



ऑयल इंडिया लिमिटेड
(भारत सरकार का उद्योग) पंजीकृत कार्यालय: दुर्गापुराण, असम
Oil India Limited
(A Government of India Enterprise) Registered Office: Duliajan, Assam

Plot No. 19, Sector 16A,
Noida – 201301, U.P.
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e- TENDER NO.: CCI3576P17 DATED 13.01.2017

For

HIRING OF SERVICE PROVIDER FOR INTERIOR WORKS INCLUDES COMPLETE CIVIL WORK, INTERIOR WORKS & PARTITION, FURNITURE WORKS, PLUMBING & FIRE FIGHTING, ELECTRICAL & LIGHTING, BUILDING AUTOMATION & ACCESS CONTROL WORKS ETC. IN 5TH & 6TH FLOOR OF NBCC CENTRE, OKHLA, PHASE-I, NEW DELHI

**Date & time of closing of Tender : 22.02.2017 AT 11:00 AM (IST)
As mentioned in the of e-portal**

**Date & time of opening of Tender: 22.02.2017 AT 3:00 PM (IST)
As mentioned in the of e-portal**

**(RUPAK KALITA)
CHIEF MANAGER(C&P) (E&D)
FOR EXECUTIVE DIRECTOR (E&D)
FOR CHAIRMAN & MANAGING DIRECTOR**

PRESS ADVERTISEMENT :

The press advertisement inviting bid is published in National Newspaper as under :

OIL INDIA LIMITED (OIL), a Govt. of India Enterprise, invites competitive bids from domestic bidders for hiring of service provider for interior works includes complete civil work, interior works & partition, furniture works, plumbing & fire fighting, electrical & lighting, building automation & access control works etc. in NBCC Centre, Okhla, Phase-I, New Delhi through its e-Procurement portal <https://etender.srm.oilindia.in/irj/portal>. Tender fee (Non-refundable) amount, Period of sale of document, Pre Bid Conference date, Bid Closing & Bid Opening date, the complete bid document and details for purchasing bid documents & participation in e-tenders etc. are available on OIL's e-procurement portal <https://etender.srm.oilindia.in/irj/portal> as well as OIL's website <http://www.oil-india.com>. All addenda, Corrigenda, time extension etc. to the tender will be hosted on above website and e-portal and no separate notification shall be issued in the press. Bidders should regularly visit above website and e-portal to keep themselves updated.

TENDER FEE :

Tender Fee is Rs. 2000.00 (Excepting PSUs and MSME / SSI unit registered with NSIC) in favour of M/s. Oil India Limited and payable at Noida/Delhi is to be sent to Executive Director (E&D) for SM(C&P), Oil India Limited, FC-24, 5th Floor, IT Infrastructure Building, Sector-16A, NOIDA-201301 [email ID: rupakkalita@oilindia.in only between 17.01.2017 and one week prior to Bid Closing date. Tender Fee can be paid online through payment gateway in OIL's e-procurement portal <https://etender.srm.oilindia.in/irj/portal>

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Forwarding Letter

HIRING OF SERVICE PROVIDER FOR INTERIOR WORKS INCLUDES COMPLETE CIVIL WORK, INTERIOR WORKS & PARTITION, FURNITURE WORKS, PLUMBING & FIRE FIGHTING, ELECTRICAL & LIGHTING, BUILDING AUTOMATION & ACCESS CONTROL WORKS ETC. IN 5TH & 6TH FLOOR OF NBCC CENTRE, OKHLA, PHASE-I, NEW DELHI

Oil India limited (OIL), a Govt. of India Enterprise under Ministry of Petroleum & Natural Gas engaged in exploration, production and transportation of crude oil & natural gas with its Field Headquarters at Duliajan, Assam and Corporate Office at Sector 16 A, Noida., Uttar Pradesh.

Oil India Limited (OIL), invite firm quotation for **HIRING OF SERVICE PROVIDER FOR INTERIOR WORKS INCLUDES COMPLETE CIVIL WORK, INTERIOR WORKS & PARTITION, FURNITURE WORKS, PLUMBING & FIRE FIGHTING, ELECTRICAL & LIGHTING, BUILDING AUTOMATION & ACCESS CONTROL WORKS ETC. IN 5TH & 6TH FLOOR OF NBCC CENTRE, OKHLA, PHASE-I, NEW DELHI**, under **Single Stage Two Bid** system from experienced and competent service providers meeting the BEC/BRC of the tender.

1.0 One complete set of bid document for hiring of above services is given herewith. You are requested to submit your most competitive bid through OIL's e-tender portal well before the scheduled bid closing date and time as mentioned in the portal against this tender. For your ready reference, few salient points (covered IN DETAIL IN THIS BID DOCUMENT) ARE HIGHLIGHTED BELOW:

(i)	Tender No	:	CCI3576P17 dated 13.01.2017
(ii)	Type of Bid	:	Open TWO Bid System
(iii)	Bid Closing date & Time	:	As Mentioned in the On-line Tender
(iv)	Bid Opening date & time	:	As Mentioned in the On-line Tender
(v)	Bid Submission Place	:	Bid to be submitted on line through OIL's e-tender portal. However, voluminous documents like catalogue, company's profile and any other volumetric technical literature as required as per tender can be submitted to the following address within the bid closing date and : OIL INDIA LIMITED E&D DIRECTORATE FC-24, 5th Floor IT TOWER, Sector 16A, Noida – 201301, U.P
(vii)	Bid Opening Place	:	OIL INDIA LIMITED

			E&D DIRECTORATE FC-24, 5th Floor IT TOWER, Sector 16A, Noida – 201301, U.P
(viii)	Bid Security	:	Rs. 19,69,000.00 valid for 150 days from date of opening of technical bid.
(ix)	Amount of Performance Bank Guarantee	:	@ 10% of Total Contract Value. The Validity of the PBG should be 03 months after completion of Contract Period / warranty obligation, whichever is later
(x)	Bid validity	:	120 days from the date of technical bid opening
(xi)	Completion period/Duration of the Contract	:	20 weeks from date of Completion of Mobilization
(xii)	Quantum of Liquidated Damage for default in Timely Mobilization and Completion of work.	:	1/2 % of total contract value for delay per week or part thereof subject to maximum of 7 ½ %
(xiii)	INTEGRITY PACT: “OIL shall be entering into an Integrity Pact with the bidders as per format enclosed vide Annexure - A of the tender document. This Integrity Pact proforma has been duly signed digitally by OIL’s competent signatory. The proforma has to be returned by the bidder (along with the technical bid) duly signed (digitally) by the same signatory who signed the bid, i.e., who is duly authorized to sign the bid. Any bid not accompanied by Integrity Pact Proforma duly signed (digitally) by the bidder shall be rejected straightway. Uploading the Integrity Pact with digital signature will be construed that all pages of the Integrity Pact have been signed by the bidder’s authorized signatory who sign the bid.” NAME OF INDEPENDENT EXTERNAL MONITOR: (a) SHRI RAJIV MATHUR, IPS(Retd.), Former Director, IB, Govt. of India E-mail Id : rajivmathur23@gmail.com (b) SHRI SATYANANDA MISHRA, IAS(Retd.)) Former Chief Information Commissioner & Ex-Secretary, DOPT, Govt. of India E-mail Id : satyanandamishra@hotmail.com		

2.0 The tender is invited under **SINGLE STAGE-TWO BID SYSTEM**. The bidders are required to submit both the “**TECHNO-COMMERCIAL UN-PRICED**” and “**PRICED**” bids through electronic format in OIL’s e-Tender portal within the Bid Closing Date and Time stipulated in the e-Tender. Detailed Guidelines to bidders for participating in OIL's e-Procurement tenders are given in website. Please ensure that **TECHNO-COMMERCIAL UN-PRICED BID / ALL TECHNICAL DOCUMENTS RELATED TO THE TENDER** are uploaded in the Technical RFX Response link only. **Please**

note that no price details should be uploaded in Technical RFX Response link. Details of prices as per Bid format / Price-bid can be uploaded as Attachment in the attachment link under “**Notes and Attachments**”. A screen shot in this regard is given below. However, we request bidders to go through OIL’s e – Portal / Website before uploading their bids for updated information regarding participation requirements and procedure for OIL’s e – tenders. Offer not complying with above submission procedure will be rejected as per Bid Rejection Criteria mentioned in Section – VI.

Display RFX Response:

Edit | Print Preview | **Technical RFX Response** | Close | Withdraw | Verify

RFX Response Number: 60006452 RFX Number: TEST2 Status: Submitted
RFX Owner: WIPRO_TEST1 Total Value: 0.00 INR RFX Response Value: 0.00 INR

RFX Information | Items | Notes and Attachments | Conditions | Summary | Tracking

Basic Data | Questions

Event Parameters

Currency: Indian Rupee

Detailed Price Information: Price with Conditions

Terms of Payment: 9010 90% against despatch+10% after receipt

Partners and Delivery Information

Details | Send E-Mail | Call | Clear

Function	Number	Name	Valid from
The table does not contain any data			

On “EDIT” Mode- The following screen will appear. Bidders are advised to Upload “Techno-Commercial Un-priced Bid” and “Priced Bid” in the places as indicated above:

Edit RFX Response:

Submit | Read Only | Print Preview | Check Technical RFX Response | Close | Save | Verify sign

RFX Response Number 60006452 RFX Number TEST2 Status Withdrawn Submission Deadline 13.04.2013 11:00:00 INDIA
 RFX Owner WIPRO_TEST1 Total Value 0.00 INR RFX Response Version Number 2 RFX Version Number 5

RFX Information | Items | **Notes and Attachments** | Conditions | Summary

Area for uploading Techno-Commercial Unpriced Bid*

▼ Notes

Add | Clear

Assigned To	Category	Text Preview

Area for uploading Priced Bid**

▼ Attachments

Sign Attachment | Add Attachment | Edit Description | Versioning | Delete | Create Qualification Profile

Assigned To	Category	Description	File Name	Version	Processor	Checked
The table does not contain any data						

Notes :

- (i) The “Techno-Commercial Un priced Bid” shall contain all techno-commercial **details except the prices.**
- (ii) The “Price bid” must contain the price schedule and the bidder’s commercial terms and conditions. For uploading Price Bid, first click on Sign Attachment, a browser window will open, select the file from the PC and click on Sign to sign. On Signing a new file with extension .SSIG will be created. Close that window. Next click on Add Attachment, a browser window will open, select the .SSIG signed file from the PC and name the file under Description, Assigned to General Data and clock on OK to save the File.
- (iii) The bid and all uploaded documents must be Digitally signed using “Class 3” digital certificate **with organization name** [e-commerce application (Certificate with personal verification and Organization name)] as per Indian IT Act obtained from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India.
- (iv) The authenticity of above digital signature shall be verified through authorized CA after bid opening. If the digital signature used for signing is not of **“Class -3” with Organizations name, the bid will be rejected.**
- (v) Bidder is responsible for ensuring the validity of digital signature and it’s proper usage by their employee.
- (vi) The bid including all uploaded documents shall be digitally signed by duly authorized representative of the bidding company.

4.0 Interested bidders may contact the following person to visit the site at their own expenses to have a realistic assessment of the requirement.

Mr. DWEET GOGOI
DGM- CIVIL, OIL INDIA LIMITED,
Plot No. 19, Sector 16A, Noida-201301
Ph No. +918130144478, e-mail : dweetgogoi@oilindia.in

5.0 For any technical help in regards to uploading of bids in the OIL's e-tender portal, may please contact the following person :

Mr. Balen Bharali
Manager- ERP, OIL INDIA LIMITED, DULIAJAN, ASSAM
Ph no. +917896651296 , e-mail : balen_bharali@oilindia.in
erp_mm@oilindia.in

6.0 Pre-Bid Meeting / Conference :

6.1 OIL will organize a pre-Bid conference on **02.02.2017** at Noida, India for providing clarifications to prospective bidders on Bid Rejection Criteria (BRC)/Bid Evaluation Criteria(BEC), Terms of Reference/Technical Specifications, Terms and conditions of the tender to enable them to understand the exact service requirement of the Company. Bidders interested to attend the pre-bid conference should contact/intimate well in advance for details of the venue, to **Rupak Kalita, Chief Manager (C&P) (CEMG),OIL INDIA LIMITED,5th Floor, FC-24,IT Infrastructure Building, Sector 16A, NOIDA, UP E-MAILS : rupakkalita@oilindia.in;cemg_c&p@oilindia.in**. Foreign bidder may also request for an invitation letter, if required, for the purpose of visa for attending the conference.

6.2 At the most 2 (two) representatives from each prospective bidder shall be allowed to participate in the pre-bid conference. All costs for attending the pre-bid conference shall be to prospective bidders' account.

6.3 The prospective bidders shall submit their queries through E-mail to e-mail id rupakkalita@oilindia.in; cemg_c&p@oilindia.in prior to the date of pre-bid conference and such queries must reach OIL's office by **30.01.2017**. OIL shall either reply /clarify their queries through e-mail or in the pre-bid conference. OIL will not be responsible for non-receipt or late receipt of any bidder's query in OIL's office

We now look forward to your valuable offer through OIL's e – portal against the tender.

Thanking you,

Yours faithfully,
OIL INDIA LIMITED



(Rupak Kalita)
Chief Manager (C&P)(E&D)
For EXECUTIVE DIRECTOR (E &D)
For Chairman & Managing Director
Ph no. 9910014067, e-mail : rupakkalita@oilindia.in

PART – 1

INSTRUCTIONS TO BIDDERS

- 1.0 Bidder shall bear all costs associated with the preparation and submission of bid. Oil India Limited, hereinafter referred to as Company, will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

A. BID DOCUMENTS

- 2.0 The services required, bidding procedures and contract terms are prescribed in the Bid Document. This Bid Document includes the following:

- a) Forwarding Letter highlighting the following points:
 - (i) Company's Tender No.
 - (ii) Bid closing date and time
 - (iii) Bid opening date and time
 - (iv) Bid submission Mode
 - (v) Bid opening place
 - (vi) Bid validity, Mobilisation time & Duration of contract
 - (vii) The amount of Bid Security with validity
 - (viii) The amount of Performance Guarantee with validity
 - (ix) Quantum of liquidated damages for default in timely mobilizations
- b) Instructions to Bidders, (Part-1).
- c) Bid Evaluation Criteria/Bid Rejection Criteria, (Part-2).
- d) General Conditions of Contract, (Section-I).
- e) Terms of Reference/Technical Specification, (Section-II).
- f) Special Conditions of Contract, (Section-III)
- g) Schedule of Rates, (Section-IV).
- h) Integrity Pact Proforma, (Annexure-A).
- i) ~~Estimated CIF value of items at the time of import, (Proforma-A)~~ **(Not in use).**
- j) Price Schedule Format, (Proforma-B).
- k) Bid Form, (Proforma-C).
- l) Certificate of Compliance with respect to BRC(Proforma-D)
- m) Statement of Non-Compliance, (Proforma-E)
- n) Bid Security Form, (Proforma-F)
- o) Performance Security Form, (Proforma-G)
- p) Agreement Form, (Proforma-H)
- q) Proforma of Letter of Authority, (Proforma-I)
- r) Authorisation for Attending Bid Opening, (Proforma-J)

- 2.1 The bidder is expected to examine all instructions, forms, terms and specifications in the Bid Documents. Failure to furnish all information required in the Bid Documents or submission of a bid not substantially responsive to the Bid Documents in every respect

will be at the Bidder's risk & responsibility and may result in the rejection of its bid.

3.0 TRANSFERABILITY OF BID DOCUMENTS:

- 3.1 Bid Documents are non-transferable. Bid can be submitted only in the name of the bidder in whose name the Bid Document has been issued.
- 3.2 Unsolicited bids will not be considered and will be rejected straightway.

4.0 AMENDMENT OF BID DOCUMENTS:

- 4.1 At any time prior to the deadline for submission of bids, the Company may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective Bidder, modify the Bid Documents through issuance of an Addendum.
- 4.2 The Addendum will be uploaded in OIL's E-Tender Portal in the "Technical RFx Response" under the tab "Amendments to Tender Documents". All prospective bidders to whom Company has issued the Bidding Documents shall also be intimated about the amendments through post/courier or by Fax or e-mail. The Company may, at its discretion, extend the deadline for bid submission, if the Bidders are expected to require additional time in which to take the Addendum into account in preparation of their bid or for any other reason. Bidders shall also check from time to time the E-Tender portal ["Technical RFx Response" under the tab "Amendments to Tender Documents"] for any amendments to the bid documents before submission of their bids.

B. PREPARATION OF BIDS

- 5.0 LANGUAGE OF BIDS:** The bid as well as all correspondence and documents relating to the bid exchanged between the Bidder and the Company shall be in English language, except that any printed literature may be in another language provided it is accompanied by an official and notarised English translated version, which shall govern for the purpose of bid interpretation.

5.1 BIDDER'S/AGENT'S NAME & ADDRESS:

Bidders should indicate in their bids their detailed postal address including the Fax/Telephone / Cell Phone Nos. and E-mail address. Similar information should also be provided in respect of their authorised Agents in India, if any.

6.0 DOCUMENTS COMPRISING THE BID:

Bids are invited under Single Stage Two Bid System. The bid to be uploaded by the Bidder in OIL's E-Tender portal shall comprise of the following components:

(A) TECHNICAL BID

- (i) Complete technical details of the services as per the Terms of reference / Technical Specification.
- (ii) Documentary evidence established in accordance with Clause 10.0.
- (iii) Bid Security (scanned) in accordance with Clause 11.0 hereunder. Original Bid Security should be sent as per Clause No. 11.10 below.
- (iv) Copy of Bid-Form **without indicating prices** in Proforma-C
- (v) Statement of Non-compliance as per Proforma-E
- (vi) Copy of Priced Bid **without indicating prices** (Proforma-B)
- (vii) Integrity Pact digitally signed by OIL's competent personnel as **Annexure-A** attached with the bid document to be digitally signed by the bidder.

(B) PRICED BID

Bidder shall quote their prices in the following Proforma available in OIL's E-procurement portal in the **"Notes & Attachments" Tab**:

- (i) Price-Bid Format as per **Proforma-B**
- (ii) Bid Form as per **Proforma-C**

The Priced Bid shall contain the prices along with the currency quoted and any other commercial information pertaining to the service offered.

7.0 BID FORM:

The bidder shall complete the Bid Form and the appropriate Price Schedule furnished in their Bid.

8.0 BID PRICE:

- 8.1 Prices must be quoted by the Bidders online as per the price bid format available in OIL's E- Tender Portal in **"Notes & Attachment"** Tab. Unit prices must be quoted by the bidders, both in words and in figures.
- 8.2 Prices quoted by the successful bidder must remain firm during its performance of the Contract and is not subject to variation on any account.
- 8.3 All duties (except customs duty which will be borne by the Company) and taxes (excluding Service Tax) including Corporate Income Tax, Personal Tax, Assam Entry Tax etc. and other Cess/levies payable by the successful bidder under the Contract for which this Bid Document is being issued, shall be included in the rates, prices and total Bid Price submitted by the bidder, and the evaluation and comparison of bids shall be made accordingly. For example, personal taxes and/or any corporate taxes arising out of the profits on the contract as per rules of the country shall be borne by the bidder.

9.0 CURRENCIES OF BID AND PAYMENT:

- 9.1 A bidder expecting to incur its expenditures in the performance of the Contract in more than one currency, and wishing to be paid accordingly, shall so indicate in the bid. In such a case, the bid shall be expressed in different currencies and the respective amounts in each currency shall together make up the total price.
- 9.2 Indian bidders too can submit their bids in any currency (including Indian Rupees) and receive payment in such currencies on par with foreign bidders. However, currency once quoted will not be allowed to be changed.

10.0 DOCUMENTS ESTABLISHING BIDDER'S ELIGIBILITY AND QUALIFICATIONS:

- 10.1 These are listed in **BID REJECTION CRITERIA (BRC) / BID EVALUATION CRITERIA (BEC), PART-2** of the Bid document.

11.0 BID SECURITY:

- 11.1 The Bid Security is required to protect the Company against the risk of Bidder's conduct, which would warrant forfeiture of the Bid Security, pursuant to sub-clause 11.8.
- 11.2 All the bids must be accompanied by Bid Security in Original for the amount as mentioned in the "Forwarding Letter" or an equivalent amount in other freely convertible currency and shall be in any one of the following forms:
- (a) A Bank Guarantee or irrevocable Letter of Credit in the prescribed format vide Proforma-F or in another form acceptable to the Company : Bank Guarantee/LC issued from any of the following Banks only will be accepted :
 - i) Any Nationalised / scheduled Bank in India or
 - ii) Any Indian branch of a Foreign Bank or
 - ii) Any reputed foreign Bank having correspondent Bank in India

The Bank Guarantee / LC shall be valid for 30 days beyond the validity of the bids asked for in the Bid Document.

Bank Guarantees issued by Banks in India should be on non-judicial stamp paper of requisite value, as per Indian Stamp Act, purchased in the name of the Banker.

- (b) A Cashier's cheque or Demand Draft drawn on 'Oil India Limited' valid for 180 days from the date of issue and payable at Delhi / Noida,. Otherwise same will be deposited in OIL's

bank account and will be returned by issuing an interest free demand draft of same amount after finalization of tender.

- 11.3 Any bid not secured in accordance with sub-clause 11.2 above shall be rejected by the Company as non-responsive.
- 11.4 The bidders shall extend the validity of the Bid Security suitably, if and when specifically advised by OIL, at the bidder's cost.
- 11.5 Unsuccessful Bidder's Bid Security will be discharged and/or returned within 30 days after finalization of IFB.
- 11.6 Successful Bidder's Bid Security will be discharged and/or returned upon Bidder's furnishing the Performance Security and signing of the contract. Successful bidder will however ensure validity of the Bid Security till such time the Performance Security is furnished.
- 11.7 Bid Security shall not accrue any interest during its period of validity or extended validity.
- 11.8 The Bid Security may be forfeited:
- i) If any bidder withdraws their Bid during the period of bid validity
 - ii) If any bidder alters their Bid during the period of bid validity or if the bidder increases the price during the period of bid validity.
 - iii) If the bidder does not accept the LOA issued by Company within the validity of the bid
 - iv) If the bid is accepted by OIL, and work is awarded but the contractor does not furnish the Performance Security.
 - v) If the bidder furnishes fraudulent document/information in their bid.
- 11.8.1 In case any bidder withdraws their bid during the period of bid validity, Bid Security will be forfeited and the party shall be debarred for a period of 2(two) years or as per OIL's banning policy.

11.9 The scanned copy of the original Bid Security in the form of either Bank Guarantee or LC or Cashier Cheque or Bank Draft must be uploaded by bidder along with the Technical bid in the C-folder of OIL's E-portal. The **original Bid Security** shall be submitted by bidder to the office of **Executive Director (E&D) Attn: Chief Manager (C&P) (E&D), Oil India Limited, FC-24, 5th Floor, IT Tower, Sector-16A, NOIDA-201301 , INDIA** in a sealed envelope which must reach **Executive Director (E&D)**'s office before the Bid Closing date and Time failing which the **bid shall be rejected**.

12.0 EXEMPTION FROM SUBMISSION OF BID SECURITY :

Central Govt. offices and Central Public Sector undertakings of India. NSIC and SME vendor of India are exempted from submitting Bid Security.

13.0 PERIOD OF VALIDITY OF BIDS:

- 13.1 Bids shall remain **valid for 120** days from the date of closing of bid prescribed by the Company. Bids of shorter validity will be rejected as being non-responsive. If nothing is mentioned by the bidder in their bid about the bid validity, it will be presumed that the bid is valid for 120 days from Bid Closing Date.
- 13.2 In exceptional circumstances, the Company may solicit the Bidder's consent to an extension of the period of validity. The request and the response thereto shall be made in writing through Fax or e-mail. The Bid Security provided under Para 11.0 above shall also be suitably extended. A Bidder may refuse the request without forfeiting its Bid Security. A Bidder granting the request will neither be required nor permitted to modify their Bid.

14.0 SIGNING OF BID:

- 14.1 Bids are to be submitted online through OIL's E-procurement portal with digital signature. The bid and all attached documents should be digitally signed by the bidder using "Class 3" digital certificates with Organizations Name [e-commerce application (Certificate with personal verification and Organisation Name)] as per Indian IT Act 2000 obtained from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India before bid is uploaded.

The bid including all uploaded documents shall be digitally signed by duly authorized representative of the bidder holding a Power of Attorney to bind the Bidder to the contract.

If any modifications are made to a document after attaching digital signature, the digital signature shall again be attached to such documents before uploading the same. The Power of Attorney in original shall be submitted by bidder as mentioned in Para 15.1 below.

The authenticity of above digital signature shall be verified through authorized CA after bid opening and in case the digital signature is not of "Class-3" with organization name, the bid will be rejected.

Bidder is responsible for ensuring the validity of digital signature and its proper usage by their employees.

- 14.2 The original and all copies of the bid shall be typed or written in indelible inks. Since bids are to be submitted ONLINE with digital signature, manual signature is NOT relevant. The letter of authorisation (as per **Proforma-I**) shall be indicated by written Power of Attorney accompanying the Bid.
- 14.3 Any person signing the Bid or any other document in respect of this Bidding Document or other relevant documents on behalf of the Bidder without disclosing his authority to do so shall be deemed to have the authority to bind the Bidder. If it is discovered at any time that the person so signing has no authority to do so, the Company (OIL) may, without prejudice to any other right or remedy, cancel his Bid or Contract and hold the Bidder liable to the Company (OIL) for all costs and damages arising from the cancellation of the Bid or Contract including any loss which the Company (OIL) may sustain on account thereof.
- 14.4 Any physical documents submitted by bidders shall contain no interlineations, white fluid erasures or overwriting except as necessary to correct errors made by the Bidder, in which case such correction shall be initialled by the person or persons who has/have digitally signed the Bid.
- 14.5 Any Bid, which is incomplete, ambiguous, or not in compliance with the Bidding process will be rejected.

15.0 SUBMISSION OF BIDS

- 15.1 The tender is processed under single stage - Two bid system. Bidder shall submit the Technical bid and Priced bid along with all the Annexures and Proforma (wherever applicable) and copies of documents in electronic form through OIL's e-procurement portal within the Bid Closing Date & Time stipulated in the e-tender. For submission of Bids online at OIL's E-Tender Portal, detailed instructions is available in "**HELP DOCUMENTATION**" available in OIL's E-Tender Portal. Guidelines for bid submission are also provided in the "Forwarding Letter". The Technical Bid is to be submitted as per Terms of Reference/Technical Specifications of the bid document and Priced Bid as per the Price Schedule. The Technical Bid should be uploaded in the "Technical RFx Response" under "Techno-Commercial Bid" Tab Page only. Prices to be quoted as per **Proforma-B** should be uploaded as Attachment just below the "Tendering Text" in the attachment link under "Techno-Commercial Bid" Tab under General Data in the e-portal. **No price should be given in the "Technical RFx Response", otherwise bid shall be rejected.** The priced bid should not be submitted in physical form which shall not be considered.

However, the following documents in two sets should necessarily be submitted in physical form in sealed envelope superscribing the "TENDER No., Brief Description of services and Bid Closing/Opening date & Time along with the bidder's name and should be submitted to SR. Manager (C&P), OIL INDIA LIMITED, CEMG / E&D Group, FC-

24, 5th Floor IT Infrastructure Building, Sector 16A, Noida – 201301, U.P on or before the bid closing date and time indicated in the TENDER/ e-tender portal :

- i) The Original Bid Security along with 2(two) copies
- ii) Power of Attorney for signing of the bid digitally
- iii) Any other document required to be submitted in original as per bid document requirement.
- iv) Printed catalogue and literature if called for in the bid document.

Documents sent through E-mail/Fax/Telex/Telegraphic/Telephonic will not be considered.

- 15.2 All the conditions of the contract to be made with the successful bidder are given in various Sections of the Bid Document. Bidders are requested to state their non-compliance to each clause as per **Proforma-E** of the bid document and the same should be uploaded along with the Technical Bid.
- 15.3 Timely delivery of the documents in physical form as stated in Para 15.1 above is the responsibility of the bidder. Bidders should send the same through Registered Post or by Courier Services or by hand delivery to the Officer in Charge of the particular tender before the Bid Closing Date and Time. Company shall not be responsible for any postal delay/transit loss.
- 15.4 Bids received through the e-procurement portal shall only be accepted. Bids received in any other form shall not be accepted.

16.0 INDIAN AGENT/REPRESENTATIVE/RETAINER/ASSOCIATE:

Foreign bidders shall clearly indicate in their bids whether they have an Agent/Representative/Retainer/Associate in India. In the event the overseas bidder is having an Agent/Representative/Retainer/Associate in India, the bidder should furnish the name and address of their Agent/Representative/Retainer/Associate in India and clearly indicate nature and extent of services to be provided by such an Agent/ Representative/Retainer/Associate in India and also stating in their bids whether the Agent/Representative/Retainer/Associate is authorized to receive any commission. The rate of the commission included in the quoted rates of bidder should be indicated which would be payable to Agent/Representative/Retainer/Associate in non-convertible Indian currency according to Import Trade Regulation of India. Unless otherwise specified, it will be assumed that agency commission is not involved in the particular bid.

Further, overseas bidders shall submit their bids directly and not through their Agent/Representative/Retainer/Associate in India. Bid submitted by Indian Agent/Representative/Retainer/Associate

on behalf of their foreign principals will not be considered and will be rejected straightway. Moreover, one Indian Agent/Representative/Retainer/ Associate cannot represent more than one foreign bidder against the TENDER.

The Indian Agent/Representative/Retainer/Associate will not be permitted to submit any Bid Security and Performance Security on behalf of their foreign principals and also the Indian Agent/Representative/Retainer/Associate will not be allowed to execute the contract and receive payment against bid submitted by their foreign principals. Such bids shall be rejected straightway.

17.0 DEADLINE FOR SUBMISSION OF BIDS:

- 17.1 Bids should be submitted on-line as per the online tender submission deadline. Bidders will not be permitted by System to make any changes in their bid/quote after the bid has been submitted by the bidder. Bidder may however request **Chief Manager (C & P), Oil India Limited, Noida** for returning their bids/quote before the original bid closing date and time for resubmission. But no such request would be entertained once the submission deadline has reached or bids are opened.
- 17.2 No bid can be submitted after the submission dead line is reached. The system time displayed on the e-procurement web page shall decide the submission dead line.
- 17.3 The documents in physical form as stated in Para 15.1 must be received by Company at the address specified in the "Forwarding Letter" on or before the Bid Closing Date and Time as mentioned in the "Forwarding Letter". Timely delivery of the same at the address mentioned in the Forwarding Letter is the responsibility of the Bidders.

18.0 LATE BIDS:

Bidders are advised in their own interest to ensure that their bids are uploaded in system before the closing date and time of the bid. The documents in physical form if received by the Company after the deadline for submission prescribed by the Company shall be rejected and shall be returned to the Bidders in unopened condition immediately.

19.0 MODIFICATION AND WITHDRAWAL OF BIDS:

- 19.1 The Bidder after submission of Bid may modify or withdraw its Bid by written notice prior to Bid Closing Date & Time.
- 19.2 The Bidder's modification or withdrawal notice may also be sent by fax/e-mail but followed by a signed confirmation copy, postmarked not later than the deadline for submission of Bids.
- 19.3 No Bid can be modified or withdrawn subsequent to the deadline for submission of Bids.

- 19.4 Once a withdrawal letter is received from any bidder, the offer will be treated as withdrawn and no further claim/correspondences will be entertained in this regard.
- 19.5 No Bid can be withdrawn in the interval between the deadline for submission of Bids and the expiry of the period of Bid Validity specified by the Bidder on the Bid Form. Withdrawal of a Bid during this interval shall result in the Bidder's forfeiture of its Bid Security and bidder shall also be debarred from participation in future tenders of OIL.

20.0 EXTENSION OF BID SUBMISSION DATE:

Normally no request for extension of Bid Closing Date & Time will be entertained. However, OIL at its discretion, may extend the Bid Closing Date and/or Time due to any reasons. In case of receipt of only one Bid on the Bid Closing Date and Time, OIL may extend the Bid Closing /Opening Date by 2(two) weeks. However, the bidder whose bid has been received within the bid closing date and time, will not be allowed to revise their Bid/prices. Withdrawal of such Bid is also not permitted.

21.0 BID OPENING AND EVALUATION:

- 21.1 Company will open the Technical Bids, including submission made pursuant to clause 19.0, in presence of Bidder's representatives who choose to attend at the date, time and place mentioned in the Forwarding Letter. However, an authorisation letter (as per **Proforma-J**) from the Bidder must be produced by the Bidder's representative at the time of Bid Opening. Unless this Letter is presented, the representative will not be allowed to attend the Bid Opening. The Bidder's representatives who are allowed to attend the Bid Opening shall sign a register evidencing their attendance. Only one representative against each Bid will be allowed to attend. In technical bid opening, only "Technical RFx Response" will be opened. Bidders therefore should ensure that technical bid is uploaded in the "Technical RFx Response" Tab Page only in the E-portal.
- 21.2 In case of any unscheduled holiday or Bandh on the Bid Opening Date, the Bids will be opened on the next full working day. Accordingly, Bid Closing Date / time will get extended up to the next working day and time.
- 21.3 Bid for which an acceptable notice of withdrawal has been received pursuant to clause 19.0 shall not be opened. Company will examine bids to determine whether they are complete, whether requisite Bid Securities have been furnished, whether documents have been digitally signed and whether the bids are generally in order.
- 21.4 At bid opening, Company will announce the Bidder's names, written notifications of bid modifications or withdrawal, if any, the presence of requisite Bid Security(if called for), and such other details as the Company may consider appropriate.

- 21.5 Company shall prepare, for its own records, minutes of bid opening including the information disclosed to those present in accordance with the sub-clause 21.3.
- 21.6 Normally no clarifications shall be sought from the Bidders. However, for assisting in the evaluation of the bids especially on the issues where the Bidder confirms compliance in the evaluation and contradiction exists on the same issues due to lack of required supporting documents in the Bid (i.e. document is deficient or missing), or due to some statement at other place of the Bid (i.e. reconfirmation of confirmation) or vice versa, clarifications may be sought by OIL. In all the above situations, the Bidder will not be allowed to change the basic structure of the Bid already submitted by them and no change in the price or substance of the Bid shall be sought, offered or permitted.
- 21.7 Prior to the detailed evaluation, Company will determine the substantial responsiveness of each bid to the requirement of the Bid Documents. For purpose of these paragraphs, a substantially responsive bid is one, which conforms to all the terms and conditions of the Bid Document without material deviations or reservation. A material deviation or reservation is one which affects in any way substantial way the scope, quality, or performance of work, or which limits in any substantial way, in-consistent way with the Bid Documents, the Company's right or the bidder's obligations under the contract, and the rectification of which deviation or reservation would affect unfairly the competitive position of other bidders presenting substantial responsive bids. The Company's determination of Bid's responsiveness is to be based on the contents of the Bid itself without recourse to extrinsic evidence.
- 21.8 A Bid determined as not substantially responsive will be rejected by the Company and may not subsequently be made responsive by the Bidder by correction of the non-conformity.
- 21.9 The Company may waive minor informality or nonconformity or irregularity in a Bid, which does not constitute a material deviation, provided such waiver, does not prejudice or affect the relative ranking of any Bidder.

22.0 OPENING OF PRICED BIDS:

- 22.1 Company will open the Priced Bids of the technically qualified Bidders on a specific date in presence of representatives of the qualified bidders. The technically qualified Bidders will be intimated about the Priced Bid Opening Date & Time in advance. In case of any unscheduled holiday or Bandh on the Priced Bid Opening Date, the Bids will be opened on the next working day.
- 22.2 deleted.
- 22.3 The Company will examine the Price quoted by Bidders to determine whether they are complete, any computational errors have been

made, the documents have been properly signed, and the bids are generally in order.

- 22.4 Arithmetical errors will be rectified on the following basis. If there is a discrepancy between the unit price and the total price (that is obtained by multiplying the unit price and quantity) the unit price shall prevail and the total price shall be corrected accordingly. If there is a discrepancy between words, and figures, the amount in words will prevail. If any Bidder does not accept the correction of the errors, their Bid will be rejected.

23.0 CONVERSION TO SINGLE CURRENCY: Not in use being domestic bids only

24.0 EVALUATION AND COMPARISON OF BIDS:

The Company will evaluate and compare the bids as per **BID REJECTION CRITERIA (BRC) / BID EVALUATION CRITERIA (BEC), PART-2** of the Bid Documents.

24.1 DISCOUNTS / REBATES:

Unconditional discounts/rebates, if any, given in the bid will be considered for evaluation.

- 24.2 Post bid or conditional discounts/rebates offered by any bidder shall not be considered for evaluation of bids. However, if the lowest bidder happens to be the final acceptable bidder for award of contract, and if they have offered any discounts/rebates, the contract shall be awarded after taking into account such discounts/rebates.

24.3 LOADING OF FOREIGN EXCHANGE: Not in use being domestic bids only

24.4 EXCHANGE RATE RISK: Not in use being domestic bids only

24.5 REPATRIATION OF RUPEE COST: Not in use being domestic bids only

25.0 CONTACTING THE COMPANY:

- 25.1 Except as otherwise provided in Clause 21.0 above, no Bidder shall contact Company on any matter relating to its bid, from the time of the bid opening to the time the Contract is awarded except as required by Company vide sub-clause 21.7.
- 25.2 An effort by a Bidder to influence the Company in the Company's bid evaluation, bid comparison or Contract award decisions may result in the rejection of their bid.

AWARD OF CONTRACT

26.0 AWARD CRITERIA:

The Company will award the Contract to the successful Bidder whose bid has been determined to be substantially responsive and has been determined as the lowest evaluated bid, provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily.

27.0 COMPANY'S RIGHT TO ACCEPT OR REJECT ANY BID:

Company reserves the right to accept or reject any or all bids and to annul the bidding process and reject all bids, at any time prior to award of contract, without thereby incurring any liability to the affected bidder, or bidders or any obligation to inform the affected bidder of the grounds for Company's action.

28.0 NOTIFICATION OF AWARD:

- 28.1 Prior to the expiry of the period of bid validity or extended validity, Company will notify the successful Bidder in writing by registered letter or by fax or E-mail (to be confirmed in writing by registered / couriered letter) that its Bid has been accepted.
- 28.2 The notification of award will constitute the formation of the Contract.
- 28.3 Upon the successful Bidder's furnishing of Performance Security pursuant to Clause 29.0 below, the Company will promptly notify each un-successful Bidder and will discharge their Bid Security, pursuant to Clause 11.0 hereinabove.

29.0 PERFORMANCE SECURITY:

- 29.1 Within 2(two) weeks of receipt of notification of award from the Company, the successful Bidder shall furnish to Company the Performance Security for an amount specified in the Forwarding Letter(and Letter of Award(LOA) issued by Company to Contractor awarding the contract) as per **Proforma-G** or in any other format acceptable to the Company and must be in the form of Bank Guarantee(BG) or an irrevocable Standby Letter of Credit(S L/C) from any of the following Banks :

- i) Any Nationalised / Scheduled Bank in India OR
- ii) Any Indian branch of a Foreign Bank OR
- ii) Any reputed foreign Bank having correspondent Bank in India

The Performance Security shall be denominated in the currency of the contract. Bank Guarantees issued by Banks in India should be on non-judicial stamp paper of requisite value, as per Indian Stamp Act, purchased in the name of the Banker.

- 29.2 The Performance Security specified above must be valid for 3(three) months (covering the warranty period) beyond the contract period.

The Performance Security may be discharged by Company not later than 30 days following its expiry. In the event of any extension of the Contract period, Bank Guarantee should be extended by Contractor by the period equivalent to the extended period.

- 29.3 The Performance Security shall be payable to Company as compensation for any loss resulting from Contractor's failure to fulfill its obligations under the Contract.
- 29.4 The Performance Security will not accrue any interest during its period of validity or extended validity.
- 29.5 Failure of the successful Bidder to comply with the requirements of clause 29.0 and/or 30.0 shall constitute sufficient grounds for annulment of the award and forfeiture of the Bid Security or Performance Security. In such an eventuality, the party may be debarred for a period of 3(three) years from the date of default or the period as per Company's banning policy.

30.0 SIGNING OF CONTRACT:

- 30.1 At the same time as the Company notifies the successful Bidder that its Bid has been accepted, the Company will either call the successful Bidder for signing of the agreement or send the Contract Form provided in the Bid Documents, along with the General & Special Conditions of Contract, Technical Specifications, Schedule of Rates incorporating all agreements agreed between the two parties.
- 30.2 Within 30 days of issue of LOA, the successful Bidder shall sign and date the contract and return it to the Company. Till the contract is signed, the LOA issued to the successful bidder shall remain binding amongst the two parties.
- 30.3 In the event of failure on the part of the successful Bidder to sign the contract within the period specified above or any other time period specified by Company, OIL reserves the right to terminate the LOA issued to the successful Bidder and invoke the Bid Security or the Performance Security if submitted by the successful Bidder. The party shall also be debarred for a period of 2(two) years from the date of default.

31.0 FURNISHING FRAUDULENT INFORMATION/DOCUMENTS:

If it is found that a bidder/Contractor has furnished fraudulent information / documents, the Bid Security/Performance Security shall be forfeited and the party shall be debarred for a period of 3(three) years from the date of detection of such fraudulent act besides the legal action.

32.0 CREDIT FACILITY:

Bidders should indicate clearly in the Bid about availability of any credit facility inclusive of Government to Government credits indicating the applicable terms and conditions of such credit.

33.0 MOBILISATION ADVANCE PAYMENT:

- 33.1 Request for advance payment shall not be normally considered. However, depending on the merit and at the discretion of the Company, advance against mobilisation charge may be given at an interest rate of 1% above the prevailing Bank rate (CC rate) of SBI from the date of payment of the advance till recovery/refund.
- 33.2 Advance payment agreed to by the Company shall be paid only against submission of an acceptable bank guarantee whose value should be equivalent to the amount of advance plus the amount of interest covering the period of advance. Bank guarantee shall be valid for 2 months beyond completion of mobilisation and the same may be invoked in the event of Contractor's failure to mobilise as per agreement.
- 33.3 In the event of any extension to the mobilisation period, Contractor shall have to enhance the value of the bank guarantee to cover the interest for the extended period and also to extend the validity of bank guarantee accordingly.

Note : CVC circular no. 02/02/11 dated 17.02.2011 for Mobilization Advance shall be applicable.

34.0 INTEGRITY PACT:

- 34.1 OIL shall be entering into an Integrity Pact with the Bidders as per format enclosed vide **Annexure-A** of the Bid Document. The Integrity Pact has been duly signed digitally by OIL's competent signatory and uploaded in the OIL's e-portal. The Integrity Pact shall be returned by the bidder (along with the technical Bid) duly signed by the same signatory who signed the Bid i.e. who is duly authorized to sign the Bid. Uploading the Integrity Pact in the OIL's E-portal with digital signature will be construed that all pages of the Integrity Pact has been signed by the bidder's authorized signatory who has signed the bid.
- 34.2 OIL has appointed following personnel as Independent Monitors(IEMs) to oversee implementation of Integrity Pact in OIL. Bidders may contact the Independent Monitors for any matter relating to the TENDER at the following addresses:
- (a) SHRI RAJIV MATHUR, IPS(Retd.),
Former Director, IB, Govt. of India
E-mail Id : rajivmathur23@gmail.com
- (b) SHRI SATYANANDA MISHRA, IAS(Retd.)
Former Chief Information Commissioner &
Ex-Secretary, DOPT, Govt. of India
E-mail Id : satyanandamishra@hotmail.com

35.0 LOCAL CONDITIONS:

It is imperative for each Bidder to be fully informed themselves of all Indian as well as local conditions, factors and legislation which may have any effect on the execution of the work covered under the Bidding Document. The bidders shall be deemed, prior to submitting their bids to have satisfied themselves of all the aspects covering the nature of the work as stipulated in the Bidding Document and obtain for themselves all necessary information as to the risks, contingencies and all other circumstances, which may influence or affect the various obligations under the Contract.

No request will be considered for clarifications from the Company (OIL) regarding such conditions, factors and legislation. It is understood and agreed that such conditions, factors and legislation have been properly investigated and considered by the Bidders while submitting the Bids. Failure to do so shall not relieve the Bidders from responsibility to estimate properly the cost of performing the work within the provided timeframe. Company (OIL) will assume no responsibility for any understandings or representations concerning conditions made by any of their officers prior to award of the Contract. Company (OIL) shall not permit any Changes to the time schedule of the Contract or any financial adjustments arising from the Bidder's lack of knowledge and its effect on the cost of execution of the Contract.

36.0 SPECIFICATIONS:

Before submission of Bids, Bidders are requested to make themselves fully conversant with all Conditions of the Bid Document and other relevant information related to the works/services to be executed under the contract.

END OF PART - 1

PART – 2

BID REJECTION / EVALUATION CRITERIA (BRC/BEC)

VITAL CRITERIA FOR BID ACCEPTANCE:

The bid shall conform generally to the specifications and terms and conditions given in the Bid Documents. Bidders are advised not to take any exception/deviation to the Bid Documents. Exceptions/Deviations, if any, should be brought out during the **Pre-Bid Conference** as scheduled against this Tender. After processing such suggestions, Company may communicate the changes, if any, through an addendum to the tender document in this regard to the prospective bidders who purchased the tender document. Still, if any exceptions/deviations are maintained in the bid, such conditional/nonconforming bids shall not be considered, but shall be rejected outright.

1.1 GENERAL CONFORMITY

Bids will be rejected in case the equipment/materials and services offered do not confirm to the required parameters stipulated in the technical specifications. Notwithstanding the general conformity of the bid to the stipulated specifications, the following requirements will have to be particularly met by the bidders without which the same will be considered as non-responsive and rejected.

1.2 Bidders are to mandatorily bid for all the items of the price schedule otherwise, offer shall be summarily rejected

I. BID REJECTION CRITERIA (BRC) :

The bid shall conform generally to the specifications and terms and conditions given in this bid document. Bids shall be rejected in case the services offered do not conform to required parameters stipulated in the technical specifications. Notwithstanding the general conformity of the bids to the stipulated specifications, the following requirements will have to be particularly met by the Bidders without which the same will be considered as non-responsive and rejected.

1.A TECHNICAL EVALUATION CRITERIA::

1.0 The following minimum criteria should be met by the Bidder failing which their bid/offer will be rejected:

1.1 The bidder should have experience of successfully executing atleast 1 (one) **similar contract** for not less than **Rs. 5.73 crore (Rupees Five Crores and Seventy Three Lakhs only)** in preceding **07 (Seven)** years. Period in this regard shall be reckoned from the original stipulated bid closing date of the tender.

Similar jobs means Interior works including Interior finishing works, minor civil works, flooring, Partitions, False ceiling, furniture, Plumbing, internal lighting and Electrical, Firefighting and fire alarm system, HVAC, IT cabling and Low Voltage works for Office building.

1.2 In support of above experience criteria, bidders are required to submit documentary evidences like relevant pages of contracts/work orders along with completion certificate/payment certificate issued by the clients or any other documents showing details of work carried out to complete the full scope of work as enumerated in the Scope of Work etc.

2.0 The bidder will have to offer and provide all the services under scope of work and required to refer to the relevant part of the Bid for detailed scope of work for the services to be carried out. Categorical confirmation is essential in this regard.

2.1 The bidder shall have to meet all the technical criteria / aspects stipulated in the Scope of work.

3.0 Bids from 100% subsidiary:

Bids of those bidders, who themselves do not meet the experience criteria as stipulated in the tender, can also be considered provided the bidder is a 100% subsidiary company of the parent company which itself meets the experience criteria. In such case, as the subsidiary company is dependent upon the experience of the parent company with a view to ensure commitment and involvement of the parent company for successful execution of the contract, the participating bidder should enclose an agreement (as per format enclosed) between the parent company and the subsidiary company and Corporate Guarantee (as per format enclosed) from the parent company to OIL for fulfilling the obligation under the contract, alongwith the technical bid.

4.0 Eligibility criteria in case Bid is submitted on the basis of the Technical Experience of Sister Subsidiary/Co-Subsidiary Company: Offers of those bidders who themselves do not meet the technical experience criteria stipulated above can also be considered based on the experience of their Sister Subsidiary/Co-Subsidiary company within the ultimate parent/holding company subject to meeting the following conditions:

(a) Provided that the sister subsidiary/co-subsubsidiary company and the bidding company are both 100% subsidiaries of an ultimate parent/holding company either directly or through intermediate 100% subsidiaries of the ultimate parent/holding company or through any other 100% subsidiary company within the ultimate parent/holding company. Documentary evidence to this effect to be submitted by the

ultimate parent/holding company along with the technical bid.

(b) Provided that the sister subsidiary/co-subsidiary company on its own meets the technical experience criteria laid down in above and not through any other arrangement like technical collaboration etc.

(c) Provided that with a view to ensure commitment and involvement of the ultimate parent/holding company for successful execution of the contract, the participating bidder must submit an agreement, as per format furnished, between them, their ultimate parent/holding company, along with the technical bid.

I.B.0 FINANCIAL EVALUATION CRITERIA:

1.0 The bidder must have annual financial turnover of at least of **Rs.5.73 Crore (Rupees Five Crores and Seventy Three Lakhs only)** in any of preceding three (3) financial years as per the Audited Annual Reports Chartered Accountant Firm indicating their Membership/ Code number along with Profit and Loss Account. These documents are to be submitted with the Technical Bid.

2.0 "**Net Worth**" of the bidder should be positive for the preceding financial/ accounting year. In case, Financial Statements of the preceding financial / accounting year are not available with the bidder, then the financial turnover of the previous three financial/accounting years excluding the preceding financial/ accounting year will be considered. In such cases, the Net worth of the previous financial/accounting year excluding the preceding financial/ accounting year will be considered. However, the bidder has to submit an affidavit/undertaking certifying that 'the balance sheet/Financial Statements for the financial year. (as the case may be) has actually not been audited so far.

3.0

a) For proof of Annual Turnover & Net worth any one of the following document must be submitted along with the bid:-

- i) A certificate issued by a practicing Chartered /Cost Accountant (with Membership Number and Firm Registration Number), certifying the Annual turnover & Net worth as per format prescribed in ANNEXURE.

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- ii) Audited Balance Sheet along with Profit & Loss account. In case of foreign bidders, self-attested/digitally signed printed published accounts are also acceptable.

b) In case the bidder is a Central Govt. Organization/PSU/State Govt. Organization/Semi-State Govt. Organization or any other Central/State Govt. Undertaking, where the auditor is appointed only

after the approval of Comptroller and Auditor General of India and the Central Government, their certificates may be accepted even though FRN is not available. However, bidder to provide documentary evidence for the same.

- 3.1 In case the Audited Balance sheet and Profit Loss Account submitted along with the bid are in currencies other than INR or US\$, the bidder shall have to convert the figures in equivalent INR or US\$ considering the prevailing conversion rate on the date on which the Audited Balance Sheet and Profit & Loss Account is signed. A CA Certificate is to be submitted by the bidder regarding converted figures in equivalent INR.
- 4.0 In case the bidder is a subsidiary company (should be a 100% subsidiary of the parent/ultimate parent/holding company) who does not meet financial criteria by itself and submits bid based on the financial strength of its parent/ultimate parent/holding company, then following documents need to be submitted along with the technical bid.
- (i) Audited Balance Sheet and Profit Loss Account of the parent/ ultimate parent/ holding company.
 - (ii) Corporate Guarantee on parent/ultimate parent/holding company's letter head signed by an authorized official undertaking that they would financially support their 100% subsidiary company for executing the project/job in case the same is awarded to them, and
 - (iii) The bidder is a 100% subsidiary company of the parent/ultimate/holding parent company.
 - (iv) Documents proving that Net worth of the parent/ultimate parent company is positive for the accounting year preceding the bid closing date.

I. C. **COMMERCIAL EVALUATION CRITERIA:** :

- 1.0 Bids are invited under **“SINGLE STAGE-TWO BID SYSTEM”** i.e. the bidders are required to submit both the **“TECHNO-COMMERCIAL UN-PRICED”** and **“PRICED”** bids online through electronic format in OIL's e-Tender portal within the Bid Closing Date and Time stipulated in the e-Tender. The **“Techno-Commercial Un priced Bid”** is to be submitted as per Scope of Work & Technical Specifications of the tender and the **“Price-Bid”** as per the online Price Bid Format given in the **“Notes and Attachments”** of the e-tender portal. Any offer not complying with the above will be rejected straightaway.
- 2.0 In **“Techno-Commercial Un priced Bid opening”**, only the Technical RFX Folder will be opened. Therefore, the bidder should ensure that **TECHNO-COMMERCIAL UN-PRICED BID / ALL TECHNICAL**

DOCUMENTS RELATED TO THE TENDER including SCANNED COPY OF BID-SECURITY and SIGNED & SCANNED COPY OF INTEGRITY PACT PROFORMA are uploaded in the Technical RFX Folder otherwise the offer will be rejected outright. **No price should be given in Technical RFX Folder, otherwise offer will be rejected.**

- 3.0 Prices/Rates should be quoted in the “**price schedule format**” given in the “Notes and Attachments” of the e-tender portal. The rates quoted in the “**price schedule format**” will only be considered. Bidder should quote for all the items as mentioned in the price schedule. If no price is entered / maintained against any item, it will be considered that no charge is involved against that item
- 4.0 Prices and rates quoted by the Bidders must be held firm during the term of the contract and not be subjected to any variation. Bids with adjustable price terms will be rejected.
- 5.0 **Bid Security** : Bid Security of **Rs. 19.69 Lakhs (Rupees Nineteen Lakhs and Sixty Nine Thousand)** in original must reach the office of the General Manager (Contracts & Purchase), **Oil India limited, 5th Floor, IT Tower, FC 24, Sector-16A, Noida – 201301, UP**, before the “Techno-Commercial Bid Opening Date and Time”. The Bid Security should be valid for **150 days** from the bid closing date. Scanned copy of this Bid-Security should also be submitted / uploaded online along with the “Techno-Commercial Un-priced Bid”. Public Sector Undertakings and Firms registered with NSIC/Directorate of Industries in India are exempted from submission of bid security against this tender. If a proper Bid Security in ORIGINAL for an amount and validity as aforesaid is not received, within the Bid Opening date and Time at the office of **Executive Director (E&D), Oil India limited, 5th Floor, IT Tower, FC 24, Sector-16A, Noida – 201301, UP**, the bid will be rejected without any further consideration.
- 6.0 **Bid Validity** : Validity of the bid shall be minimum **4 months (120 days)** from Bid closing date. Bids with lesser validity will be rejected.
- 7.0 All the Bids must be Digitally Signed using “Class 3” digital certificate (e-commerce application) **with organization name** as per Indian IT Act obtained from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India. The bid signed using other than “Class 3” digital certificate, will be rejected.
- 8.0 OIL shall be entering into an Integrity Pact with the bidders as per format enclosed in the tender document. This Integrity Pact Proforma has been duly signed digitally by OIL’s competent signatory. The proforma has to be returned by the bidder (along with the technical bid) duly signed (digitally) by the same signatory who signed the bid, i.e., who is duly authorized to sign the bid. Any bid not accompanied by Integrity Pact Proforma duly signed (digitally) by the bidder shall **be rejected straightway**. Uploading the Integrity Pact with digital signature will be construed that all pages of the Integrity Pact has

been signed by the bidder's authorized signatory who sign the bid." ***If the bidder declines to submit the Integrity Pact with the offer, the offer will be rejected.***

9.0 There must be no exception to the following Clauses including sub-clauses, otherwise the Bid will be rejected:

- Performance Guarantee Clause	- Termination Clause
- Liquidated Damages Clause	- Arbitration Clause
- Tax liabilities Clause	- Liability Clause
- Insurance Clause	- Applicable Law Clause
- Force Majeure Clause	- Integrity Pact

10. Bids received through the e-procurement portal shall only be acceptable. Bids received in any other form shall not be acceptable.

11. The bidder should submit a declaration to the effect that neither the bidder themselves, not any of its allied concerns, partners or associates or directors or proprietors involved in any capacity, are currently serving any banning orders issued by OIL debarring them from carrying on business dealings with OIL.

12. Any party who is extending technical support by way of entering into technical collaboration with another party, shall not be allowed to submit an independent Bid against the tender and such bids shall be rejected straightway. Further, all bids from parties with technical collaboration support from the same Principal will be rejected.

I.D. GENERAL

- a. The USER ID issued by Oil India Limited is not transferable and the bid must be submitted by the bidder in whose name the USER ID is issued. Bids received from any bidders who have not been issued USER ID by OIL will be rejected outright.
- b. Bidders are requested to submit their bid directly and not through their agents in India. Against this tender, either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can bid but both cannot bid. Simultaneously for the same item/product, if an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.
- c. Any Bid containing a false statement shall be rejected.
- d. The compliance statement should be digitally signed and uploaded along with the Techno-Commercial Bid (un-priced). In case bidder

takes exception to any clause of tender document not covered under BEC/BRC, then the Company has the discretion to load or reject the offer on account of such exception if the bidder does not withdraw/modify the deviation when/as advised by the Company. The loading so done by the Company will be final and binding on the bidders.

- e. If any clauses in the BRC contradict clauses elsewhere in the Bid Document, then the clauses in the BRC shall prevail.
- f. Any exception or deviation to the tender requirements must be tabulated by the Bidder in their Techno-Commercial Bid only. Any additional information, terms or conditions included in the Price-Bid will not be considered by OIL for evaluation of the Tender.

II. BID EVALUATION CRITERIA (BEC)

The bids conforming to the Scope of Work, Terms and Conditions stipulated in the bidding document and considered to be responsive after subjecting to Bid Rejection Criteria will be considered for further evaluation as per the Bid Evaluation Criteria described hereunder.

- 1.0 Price-Bids of only the technically qualified bidders will be opened on a predetermined date and the same will be evaluated taking in to account the **sum total cost of all components quoted by the bidders** as per **Price-schedule Format** and the contract will be awarded to the lowest evaluated bidder.
- 2.0 It is, however, to be clearly understood that the assumptions made in respect of the quantity of various items in the Price Bid Format are only for the purpose of evaluation of the bids. The Contractor will be paid on the basis of actual quantum of jobs carried out during job execution. However, execution of jobs in excess of the quantity mentioned herein requires Company's prior approval.

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SECTION-I
GENERAL CONDITIONS OF CONTRACT

1.0 **DEFINITIONS:**

1.1 In the contract, the following terms shall be interpreted as indicated:

- (a) **"The Contract"** means agreement entered into between Company and Contractor, as recorded in the contract Form signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein;
- (b) **"The Contract Price"** means the price payable to Contractor under the contract for the full and proper performance of its contractual obligations;
- (c) **"The Work"** means each and every activity required for the successful performance of the services described in Section II, the Terms of Reference.
- (d) **"Company"** or "OIL" means Oil India Limited;
- (e) **"Contractor"** means the Contractor performing the work under this Contract.
- (f) **"Contractor's Personnel"** means the personnel to be provided by the Contractor to provide services as per the contract.
- (g) "Services" means the work specified in Section-II, Part-3 and all other obligations to be complied with by Contractor pursuant to and in accordance with the terms of this contract.
- (h) **"Specification"** means the description of the Services and/or Equipment (if any) set out in Section-II
- (i) **"Company's Personnel"** means the personnel to be provided by OIL or OIL's Contractor (other than the Contractor executing the Contract). The Company representatives of OIL are also included in the Company's personnel.
- (j) **"Gross Negligence"** means any act or failure to act (whether sole, joint or concurrent) by a person or entity which was intended to cause, or which was in reckless disregard of or wanton indifference to, avoidable and harmful consequences such person or entity knew, or should have known, would result from such act or failure to act. Notwithstanding the foregoing, Gross negligence shall not include any action taken in good faith for the safeguard of life or property.
- (k) **"Willful Misconduct"** means intentional disregard of good and prudent standards of performance or proper conduct under the

Contract with knowledge that it is likely to result in any injury to any person or persons or loss or damage of property.

- 2.0 **EFFECTIVE DATE, MOBILISATION TIME, DATE OF COMMENCEMENT OF THE CONTRACT AND DURATION OF CONTRACT:**
- 2.1 **EFFECTIVE DATE:** The contract shall become effective as of the date Company notifies Contractor in writing (through Letter of Award) that it has been awarded the contract. Such date of notification of award of Contract will be the Effective Date of Contract.
- 2.2 **MOBILISATION TIME:** One week (07 days) from date of issue of Letter of Award.
- 2.3 **DATE OF COMMENCEMENT OF CONTRACT:** The date on which the mobilization is completed in all respects and the Contractor is in readiness to commence the work shall be treated as date of commencement of Contract.
- 2.4 **DURATION OF CONTRACT:** The duration of the Contract will be 20 (Twenty) weeks from the date of issue of Letter Of award. The above 20 weeks is inclusive of Mobilization period as mentioned in the Special Conditions of Contract (Para 4.1.0 of SCC). However, if the works are not completed within the above completion period of 20 weeks, Company reserves the right to extend the Contract till completion of the jobs at the same rates, terms & conditions.
- 3.0 **GENERAL OBLIGATIONS OF CONTRACTOR:** Contractor shall, in accordance with and subject to the terms and conditions of this Contract:
- 3.1 Perform the work described in the Terms of Reference (Section II) in most economic and cost effective manner.
- 3.2 Except as otherwise provided in the Terms of Reference and the special Conditions of the contract provide all labour as required to perform the work.
- 3.3 Perform all other obligations, work and services which are required by the terms of this contract or which reasonably can be implied from such terms as being necessary for the successful and timely completion of the work.
- 3.4 Contractor shall be deemed to have satisfied himself before submitting his bid as to the correctness and sufficiency of its bid for the services required and of the rates and prices quoted, which rates and prices shall, except insofar as otherwise provided, cover all its obligations under the contract.
- 3.5 Contractor shall give or provide all necessary supervision during the performance of the services and as long thereafter within the warranty period as Company may consider necessary for the proper fulfilling of Contractor's obligations under the contract.

- 4.0 **GENERAL OBLIGATIONS OF THE COMPANY:** Company shall, in accordance with and subject to the terms and conditions of this contract:
- 4.1 Pay Contractor in accordance with terms and conditions of the contract.
- 4.2 Allow Contractor and his personnel access, subject to normal security and safety procedures, to all areas as required for orderly performance of the work.
- 4.3 Perform all other obligations required of Company by the terms of the contract.
- 5.0 **PERSONNEL TO BE DEPLOYED BY CONTRACTOR**
- 5.1 Contractor warrants that they will provide competent, qualified and sufficiently experienced personnel to perform the work correctly and efficiently and shall ensure that such personnel observe applicable Company and statutory safety requirement. Upon Company's written request, Contractor, entirely at their own expense, shall remove immediately, from assignment to the work, any personnel of the Contractor determined by the Company to be unsuitable and shall promptly replace such personnel with personnel acceptable to the Company without affecting Company's work.
- 5.2 The Contractor shall be solely responsible throughout the period of the contract for providing all requirements of their personnel including but not limited to, their transportation to & fro, local boarding, lodging & medical attention etc. Company shall have no responsibility or liability in this regard unless specified otherwise elsewhere in bid/ contract document.
- 5.3 Contractor's key personnel shall be fluent in English language (both writing and speaking).
- 6.0 **WARRANTY AND REMEDY OF DEFECTS**
- 6.1 Contractor warrants that it shall perform the work in a professional manner and in accordance with their highest degree of quality, efficiency, and with the state of the art technology/inspection services and in conformity with all specifications, standards and drawings set forth or referred to in the Technical Specifications. They should comply with the instructions and guidance, which Company may give to the Contractor from time to time.
- 6.2 Should Company discover at any time during the tenure of the Contract or within 3(three) months after completion of the Contract that the work does not conform to the foregoing warranty, Contractor shall after receipt of notice from Company, promptly perform any and all corrective work required to make the services conform to the Warranty. Such corrective Work shall be performed entirely at Contractor's own expenses. If such corrective Work is not performed within a reasonable time, the Company, at its option may

have such remedial Work performed by others and charge the cost thereof to Contractor subject to a maximum of the contract value payable for the defective work which needs corrective action which the Contractor must pay promptly. In case Contractor fails to perform remedial work, or pay promptly in respect thereof, the performance security shall be forfeited.

7.0 CONFIDENTIALITY, USE OF CONTRACT DOCUMENTS AND INFORMATION:

- 7.1 Contractor shall not, without Company's prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing pattern, sample or information furnished by or on behalf of Company in connection therewith, to any person other than a person employed by Contractor in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far, as may be necessary for purposes of such performance with prior permission from Company. However, nothing hereinabove contained shall deprive the Contractor of the right to use or disclose any information:
- (a) which is possessed by the Contractor, as evidenced by the Contractor's written records, before receipt thereof from the Company which however the Contractor shall immediately inform to Company ; or
 - (b) which is required to be disclosed by the Contractor pursuant to an order of a court of competent jurisdiction or other governmental agency having the power to order such disclosure, provided the Contractor uses its best efforts to provide timely notice to Company of such order to permit Company an opportunity to contest such order subject to prior permission from Company.
- 7.2 Contractor shall not, without Company's prior written consent, make use of any document or information except for purposes of performing the contract.
- 7.3 Any document supplied to the Contractor in relation to the contract other than the Contract itself remain the property of Company and shall be returned (in all copies) to Company on completion of Contractor's performance under the Contract if so required by Company. However, the above obligation shall not extend to information which:
- i) is, at the time of disclosure, known to the public which Contractor shall immediately inform Company ;
 - ii) is lawfully becomes at a later date known to the public through no fault of Contractor subject to Contractor's undertaking that no information has been divulged by them to the public;

- iii) is lawfully possessed by Contractor before receipt thereof from Company which should be immediately informed to Company;
- iv) is developed by Contractor independently of the information disclosed by Company which should be shared with the Company;
- v) Contractor is required to produce before competent authorities or by court order subject to prior permission from Company;

8.0 **TAXES:**

- 8.1 Tax levied on Contractor as per the provisions of Indian Income Tax Act and any other enactment/rules on income derived/payments received under the contract will be on Contractor's account.
- 8.2 Contractor shall be responsible for payment of personal taxes, if any, for all the personnel deployed in India by Contractor.
- 8.3 The Contractor shall furnish to the Company, if and when called upon to do so, relevant statement of accounts or any other information pertaining to work done under the contract for submitting the same to the Tax authorities, on specific request from them in accordance with provisions under the law. Other than the information provided by the Contractor, the Contractor shall not be responsible for any inaccurate information provided by the Company to the Tax authorities and the Company shall indemnify the Contractor for all claims, expenses, costs or losses of any nature arising from such inaccuracy. Contractor shall be responsible for preparing and filing the return of income etc. within the prescribed time limit to the appropriate authority.
- 8.4 Prior to start of operations under the contract, the Contractor shall furnish the Company with the necessary documents, as asked for by the Company and/ or any other information pertaining to the contract, which may be required to be submitted to the Income Tax authorities at the time of obtaining "No Objection Certificate" for releasing payments to the Contractor.
- 8.5 Corporate income tax will be deducted at source from the invoice at the specified rate of income tax as per the provisions of Indian Income Tax Act as may be in force from time to time and Company will issue TDS Certificate to the Contractor as per the provisions of Income Tax Act.
- 8.6 Corporate and personnel taxes on Contractor shall be the liability of the Contractor and the Company shall not assume any responsibility on this account.
- 8.7 All local taxes, levies and duties, sales tax, octroi, etc. on purchases and sales made by Contractor (except customs duty) shall be borne by the Contractor.

- 8.8 **Service Tax:** The price excludes Services Tax and the service tax as applicable shall be to the Company account. The Service tax amount on the taxable part of the services provided by the Contractor shall be paid by the Company as per provisions of the Service Tax Act.
- 9.0 **INSURANCE:**
- 9.1 The Contractor shall arrange insurance to cover all risks in respect of their personnel, materials and equipment belonging to the Contractor or its sub Contractor (if applicable) during the currency of the contract including the third party items/consumables. For materials/equipment belong to the Contractor or its sub-Contractor, Contractor may self-insure the same.
- 9.2 Contractor shall at all time during the currency of the contract provide, pay for and maintain the following insurances amongst others :
- a) Workmen compensation insurance as required by the laws of the country of origin of the employee.
 - b) Employer's Liability Insurance as required by law in the country of origin of employee.
 - c) General Public Liability Insurance or Comprehensive General Liability insurance covering liabilities including contractual liability for bodily injury, including death of persons, and liabilities for damage of property. This insurance must cover all operations of Contractor required to fulfil the provisions under this contract.
 - d) Contractor's equipment used for execution of the work hereunder shall have an insurance cover with a suitable limit (as per international standards) except when tools / equipment are below Rotary Table or in the well bore or Contractor may self-insure its tools/ equipment.
 - e) Automobile Public Liability Insurance covering owned, non-owned and hired automobiles used in the performance of the work hereunder, with bodily injury limits and property damage limits as governed by Indian Insurance regulations.
 - f) Public Liability Insurance as required under Public Liability Insurance Act 1991, if applicable.
- 9.3 Any deductible set forth in any of the above insurance shall be borne by Contractor.
- 9.4 Contractor shall furnish to Company prior to commencement date, certificates of all its insurance policies covering the risks mentioned above.
- 9.5 If any of the above policies expire or are cancelled during the term of this contract and Contractor fails for any reason to renew such policies, then the Company will renew/replace same and charge the

cost thereof to Contractor. Should there be a lapse in any insurance required to be carried out by the Contractor for any reason whatsoever, loss/damage claims resulting there from shall be to the sole account of Contractor.

- 9.6 Contractor shall require all of his sub-Contractor to provide such of the foregoing insurance coverage as Contractor is obliged to provide under this Contract and inform the Company about the coverage prior to the commencement of agreements with its sub-Contractors.
- 9.7 All insurance taken out by Contractor or their sub-Contractor shall be endorsed to provide that the underwriters waive their rights of recourse on the Company and to the extent of the liabilities assumed by Contractor under this Contract.

10.0 **CHANGES:**

- 10.1 During the performance of the work, Company may make minor change to take care of any supplementary work within the general scope of this Contract including, but not limited to, changes in methodology, and minor additions to or deletions from the work to be performed. Contractor shall perform the work as changed. Changes of this nature will be affected by written order by the Company.
- 10.2 If any change result in an increase in compensation due to Contractor or in a credit due to Company, Contractor shall submit to Company an estimate of the amount of such compensation or credit in a form prescribed by Company. Such estimates shall be based on the rates shown in the Schedule of Rates (Section IV). Upon review of Contractor's estimate, Contractor shall establish and set forth in the Change Order the amount of the compensation or credit for the change or a basis for determining a reasonable compensation or credit for the change. If Contractor disagrees with compensation or credit set forth in the Change Order, Contractor shall nevertheless perform the work as changed, and the parties will resolve the dispute in accordance with Clause 13 hereunder. Contractor's performance of the work as changed will not prejudice Contractor's request for additional compensation for work performed under the Change Order.

11.0 **FORCE MAJEURE:**

- 11.1 In the event of either party being rendered unable by 'Force Majeure' to perform any obligation required to be performed by them under the contract, the relative obligation of the party affected by such 'Force Majeure' will stand suspended for the period during which such cause lasts. The word 'Force Majeure' as employed herein shall mean acts of God, war, revolt, agitation, strikes, riot, fire, flood, sabotage, civil commotion, road barricade (but not due to interference of employment problem of the Contractor), acts of government of the two parties, which makes performance impossible or impracticable and any other cause, whether of kind herein enumerated or otherwise which are not within the control of the

party to the contract and which renders performance of the contract by the said party impossible.

- 11.2 Upon occurrence of such cause and upon its termination, the party alleging that it has been rendered unable as aforesaid thereby, shall notify the other party in writing within Seventy Two (72) hours of the alleged beginning and ending thereof, giving full particulars and satisfactory evidence in support of its claim.
- 11.3 Should 'force majeure' condition as stated above occurs and should the same be notified within seventy two (72) hours after its occurrence the 'force majeure' rate shall apply for the first fifteen days. Parties will have the right to terminate the Contract if such 'force majeure' conditions continue beyond fifteen (15) days with prior written notice. Should either party decide not to terminate the Contract even under such condition, no payment would apply after expiry of fifteen (15) days force majeure period unless otherwise agreed to.
- 12.0 **TERMINATION:**
- 12.1 **TERMINATION ON EXPIRY OF THE TERMS (DURATION):** The contract shall be deemed to have been automatically terminated on the expiry of duration of the Contract or the extension period, if exercised by Company under the provision of the Contract.
- 12.2 **TERMINATION ON ACCOUNT OF FORCE MAJEURE:** Either party shall have the right to terminate this Contract on account of Force Majeure as set forth in Article 11.0 above.
- 12.3 **TERMINATION ON ACCOUNT OF INSOLVENCY:** In the event that the Contractor or its collaborator at any time during the term of the Contract, becomes insolvent or makes a voluntary assignment of its assets for the benefit of creditors or is adjudged bankrupt, then the Company shall, by a notice in writing have the right to terminate the Contract and all the Contractor's rights and privileges hereunder, shall stand terminated forthwith.
- 12.4 **TERMINATION FOR UNSATISFACTORY PERFORMANCE:** If the Company considers that, the performance of the Contractor is unsatisfactory, or not upto the expected standard, the Company shall notify the Contractor in writing and specify in details the cause of the dissatisfaction. The Company shall have the option to terminate the Contract by giving 15 days notice in writing to the Contractor, if Contractor fails to comply with the requisitions contained in the said written notice issued by the Company.
- 12.5 **TERMINATION DUE TO CHANGE OF OWNERSHIP & ASSIGNMENT:** In case the Contractor's rights and /or obligations under this Contract and/or the Contractor's rights, title and interest to the equipment/ material, are transferred or assigned without the Company's consent, the Company may at its absolute discretion, terminate this Contract.

- 12.6 If at any time during the term of this Contract, breakdown of Contractor's equipment results in Contractors being unable to perform their obligations hereunder for a period of 15 successive days, Company at its option, may terminate this Contract in its entirety without any further right or obligation on the part of the Company, except for the payment of money then due. No notice shall be served by the Company under the condition stated above.
- 12.7 Notwithstanding any provisions herein to the contrary, the Contract may be terminated at any time by the Company on giving 30 (thirty) days written notice to the Contractor due to any other reason not covered under the above clause from 12.1 to 12.6 and in the event of such termination the Company shall not be liable to pay any cost or damage to the Contractor except for payment for services as per the Contract upto the date of termination including the De-mob cost, if any.
- 12.8 **CONSEQUENCES OF TERMINATION:** In all cases of termination herein set forth, the relative obligations of the parties to the Contract shall be limited to the period up to the date of termination. Notwithstanding the termination of this Contract, the parties shall continue to be bound by the provisions of this Contract that reasonably require some action or forbearance after such termination.
- 12.9 Upon termination of this Contract, Contractor shall return to Company all of Company's items, which are at the time in Contractor's possession.
- 12.10 In the event of termination of contract, Company will issue Notice of termination of the contract with date or event after which the contract will be terminated. The contract shall then stand terminated and the Contractor shall demobilize their personnel & materials.

13.0 SETTLEMENT OF DISPUTES AND ARBITRATION:

13.1 Arbitration(Applicable for Suppliers/Contractors other than PSU) :

Except as otherwise provided elsewhere in the contract, if any dispute, difference, question or disagreement arises between the parties hereto or their respective representatives or assignees, in connection with construction, meaning, operation, effect, interpretation of the contract or breach thereof which parties are unable to settle mutually, the same shall be referred to Arbitration as provided hereunder :

1. A party wishing to commence arbitration proceeding shall invoke Arbitration Clause by giving 30 days notice to the other party. The notice invoking arbitration shall specify all the points of dispute with details of the amount claimed to be referred to arbitration at the time of invocation of arbitration and not thereafter. If the claim is in foreign currency, the

claimant shall indicate its value in Indian Rupee for the purpose of constitution of the arbitral tribunal.

2. The number of arbitrators and the appointing authority will be as under:

Claim amount (excluding claim for interest and counter claim, if any)	Number of Arbitrator	Appointing Authority
Upto Rs. 5 Crore	Sole Arbitrator	OIL
Above Rs. 5 Crore	3 Arbitrators	One Arbitrator by each party and the 3 rd Arbitrator, who shall be the presiding Arbitrator, by the two Arbitrators.

3. The parties agree that they shall appoint only those persons as arbitrators who accept the conditions of the arbitration clause. No person shall be appointed as Arbitrator or Presiding Arbitrator who does not accept the conditions of the arbitration clause.
4. Parties agree that there will be no objection if the Arbitrator appointed holds equity shares of OIL and/or is a retired officer of OIL/any PSU. However, neither party shall appoint its serving employees as arbitrator.
5. If any of the Arbitrators so appointed dies, resigns, becomes incapacitated or withdraws for any reason from the proceedings, it shall be lawful for the concerned party/arbitrators to appoint another person in his place in the same manner as aforesaid. Such person shall proceed with the reference from the stage where his predecessor had left if both parties consent for the same; otherwise, he shall proceed de novo.
6. Parties agree that neither shall be entitled for any pre-reference or pendent-lite interest on its claims. Parties agree that any claim for such interest made by any party shall be void.
7. The arbitral tribunal shall make and publish the award within time stipulated as under:

Amount of Claims and counter claims(excluding interest)	Period for making and publishing of the award(counted from the date of first meeting of the Arbitrators)
Upto Rs. 5 Crore	Within 8 months
Above Rs. 5 Crore	Within 12 months

The above time limit can be extended by Arbitrator, for reasons to be recorded in writing, with the consent of the other parties.

8. If after commencement of the arbitration proceedings, the parties agree to settle the dispute mutually or refer the dispute to conciliation, the arbitrators shall put the proceedings in abeyance until such period as requested by the parties.
9. Each party shall be responsible to make arrangements for the travel and stay etc. of the arbitrator pointed by it. Claimant shall also be responsible for making arrangements for travel/stay arrangements of the Presiding Arbitrator and the expenses incurred shall be shared equally by the parties.

In case of sole arbitrator, OIL shall make all necessary arrangements for his travel, stay and the expenses incurred shall be shared equally by the parties.
10. The Arbitration shall be held at the place from where the contract has been awarded. However, parties to the contract can agree for a different place for the convenience of all concerned.
11. The Arbitrator(s) shall give reasoned and speaking award and it shall be final and binding on the parties.
12. Subject to aforesaid, provisions of the Arbitration and Conciliation Act, 1996 and any statutory modifications or re-enactment thereof shall apply to the arbitration proceedings under this clause.

13.2 Arbitration(applicable in case of Contract awarded on Public Sector Enterprise) :

In the event of any dispute or difference relating to, arising from or connected with the Contract, such dispute or difference shall be referred by either party to the arbitration of one of the Arbitrators in the Department of Public Enterprises, to be nominated by the Secretary to the Government of India, In-Charge of the Bureau of Public Enterprises. The Arbitration and Conciliation Act 1996 shall not be applicable to the Arbitration under this clause. The award of the Arbitrator shall be binding upon the parties to the dispute, provided however, any party aggrieved by such award may make a further reference for setting aside or revision of the award to the Law Secretary, Deptt. of Legal Affairs, Ministry of Law and Justice, Government of India. Upon such reference, the dispute shall be decided by the Law Secretary or the Special Secretary/Additional Secretary, whose decision shall bind the parties finally and conclusively. The parties in the dispute will share equally the cost of the arbitration as intimated by the Arbitrator.

The venue of all arbitrations under both 13.1 & 13.2 will be Delhi/ NOIDA. The award made in pursuance thereof shall be binding on the parties.

14.0 NOTICES:

14.1 Any notice given by one party to other, pursuant to this Contract shall be sent in writing or by telex or Fax and confirmed in writing to the applicable address specified below:

Company

a) **For contractual matters**

b) **For technical matters**

CM(C&P) OIL INDIA LIMITED FC-24, 5TH FLOOR, SECTOR-16A, IT INFRASTRUCTURE BUILDING NOIDA – 201 301 UTTAR PRADESH Fax No. 0120-2488327 E-MAIL: corp_c&p@oilindia.in; cemg_c&p@oilindia.in	Mr. DWEET GOGOI DGM- CIVIL OIL INDIA LIMITED, OIL, HOUSE, PLOT NO. 19 Sector 16A, NOIDA 201301 Ph No. +918130144478 e-mail: dweetgogoi@oilindia.in

c) **Contractor**

Fax No. :

14.2 A notice shall be effective when delivered or on the notice's effective date, whichever is later.

15.0 SUBCONTRACTING/ASSIGNMENT:

15.1 Contractor shall not subcontract, transfer or assign the contract, in full or any part under this contract, to any third party (ies). Except for the main services under this contract, Contractor may subcontract the petty support services subject to Company's prior approval. However, Contractor shall be fully responsible for complete execution and performance of the services under the Contract.

16.0 MISCELLANEOUS PROVISIONS:

16.1 Contractor shall give notices and pay all fees at their own cost required to be given or paid by any National or State Statute, Ordinance, or other Law or any regulation, or bye-law of any local or other duly constituted authority as may be in force from time to time in India, in relation to the performance of the services and by the rules & regulations of all public bodies and companies whose property or rights are affected or may be affected in any way by the services.

16.2 Contractor shall conform in all respects with the provisions of any Statute, Ordinance of Law as aforesaid and the regulations or bye-law of any local or other duly constituted authority which may be applicable to the services and with such rules and regulation public

bodies and Companies as aforesaid and shall keep Company indemnified against all penalties and liability of every kind for breach of any such Statute, Ordinance or Law, regulation or bye-law.

16.3 During the tenure of the Contract, Contractor shall keep the site where the services are being performed reasonably free from all unnecessary obstruction and shall store or dispose of any equipment and surplus materials and clear away and remove from the site any wreckage, rubbish or temporary works no longer required. On the completion of the services, Contractor shall clear away and remove from the site any surplus materials, rubbish or temporary works of every kind and leave the whole of the site clean and in workmanlike condition to the satisfaction of the Company.

16.4 Key personnel cannot be changed during the tenure of the Contract except due to sickness/death/resignation of the personnel in which case the replaced person should have equal experience and qualification, which will be again subject to approval, by the Company.

17.0 **LIQUIDATED DAMAGES FOR DEFAULT IN TIMELY MOBILISATION:**

17.1 Time is the essence of this Contract. In the event of the Contractor's default in timely mobilization for commencement of work within the stipulated period, the Contractor shall be liable to pay liquidated damages at the rate of 0.5 % of the total Contract value for each week of delay or part thereof subject to maximum of 7.5% (Seven and half percent). Liquidated Damages will be reckoned from the date after expiry of the scheduled mobilisation period till the date of commencement of Contract as defined in Clause 2.0 of Section-I. The parties agree that this is a genuine pre-estimate of the loss/damage which will be suffered on account of delay/breach on the part of the contractor and the said amount will be payable on demand, without there being any proof of the actual loss or damages caused by such delay/breach.

17.2 If the Contractor fails to mobilise within 20 weeks after the stipulated date, then the Company reserves the right to cancel the Contract without any compensation whatsoever.

17.3 If the Contractor delays to mobilise the service and commence the operations within the stipulated mobilization period, it may request Company for extension of time with unconditionally agreeing for payment of Liquidated Damages. Upon receipt of such requests, Operator may, at its discretion, extend the period of mobilization and as its sole remedy can recover from Contractor as ascertained and agreed Liquidated Damages and not by way of penalty 0.5 % of the total Contract value for each week of delay or part thereof subject to maximum of 7.5% (Seven and half percent)contract value.

Applicable L/D will be recovered from Mobilisation Bill/ 1st bill whichever applicable. However, to avoid adverse impact on execution of Contract due to resource crunch on account of deduction of L/D in one go, OIL may consider deduction of LD in Installments on monthly basis on request from the party.

- 17.4 The Company also reserves the right to cancel the Contract without any compensation whatsoever in case of failure to Complete the work within the stipulated period. In the event of non-completion of the jobs as per the provisions of this contract, the company reserves the right to claim back the amount already paid to the Contractor. Any part/phase completion, barring the final phase, will be regarded as non-completion of the contract and loss of time & cost to the company. Number of instalments can be decided on case to case basis not exceeding 10 months.

18.0 **PERFORMANCE SECURITY:**

The Contractor has furnished to Company a Bank Guarantee No. _____ dated _____ issued by _____ for _____ (being 10% of estimated Contract Price) valid till _____ towards performance security. The performance security shall be payable to Company as compensation for any loss resulting from Contractor's failure to fulfill their obligations under the Contract. In the event of extension of the Contract period, the validity of the bank guarantee shall be suitably extended by the Contractor. The bank guarantee will be discharged by Company not later than 30 days following its expiry.

- 19.0 **ASSOCIATION OF COMPANY'S PERSONNEL:** Company's engineer will be associated with the work throughout the operations. The Contractor shall execute the work with professional competence and in an efficient and workman like manner and provide Company with a standard of work customarily provided by reputed IP Survey Contractors to major international oil companies in the petroleum industry.

- 20.0 **LABOUR:** The recruitment of the labour shall be met from the areas of operation and wages will be according to the rates prevalent at the time which can be obtained from the District Authorities of the area. The facilities to be given to the labourers should conform to the provisions of labour laws as per contract Labour (Regulation and Abolition) Act, 1970.

21.0 **LIABILITY:**

- 21.1 Except as otherwise expressly provided, neither Company nor its servants, agents, nominees, Contractors, or sub-Contractors shall have any liability or responsibility whatsoever to whomsoever for loss of or damage to the equipment and/or loss of or damage to the property of the Contractor and/or their Contractors or sub-

Contractors, irrespective of how such loss or damage is caused and even if caused by the negligence of Company and/or its servants, agent, nominees, assignees, Contractors and sub-Contractors. The Contractor shall protect, defend, indemnify and hold harmless Company from and against such loss or damage and any suit, claim or expense resulting there from.

- 21.2 Neither Company nor its servants, agents, nominees, assignees, Contractors, sub-Contractors shall have any liability or responsibility whatsoever for injury to, illness, or death of any employee of the Contractor and/or of its Contractors or sub-Contractor irrespective of how such injury, illness or death is caused and even if caused by the negligence of Company and/or its servants, agents nominees, assignees, Contractors and sub-Contractors. Contractor shall protect, defend, indemnify and hold harmless Company from and against such liabilities and any suit, claim or expense resulting there from.
- 21.3 The Contractor hereby agrees to waive its right of recourse and further agrees to cause its underwriters to waive their right of subrogation against Company and/or its underwriters, servants, agents, nominees, assignees, Contractors and sub-Contractors for loss or damage to the equipment of the Contractor and/or its sub-Contractors and/or their employees when such loss or damage or liabilities arises out of or in connection with the performance of the contract limited to the Contractor's liabilities agreed to under this Contract.
- 21.4 The Contractor hereby further agrees to waive its right of recourse and agrees to cause its underwriters to waive their right of subrogation against Company and/or its underwriters, servants, agents, nominees, assignees, Contractors and sub-Contractors for injury to, illness or death of any employee of the Contractor and of its Contractors, sub-Contractors and/or their employees when such injury, illness or death arises out of or in connection with the performance of the contract limited to the Contractor's liabilities agreed to under this Contract.
- 21.5 Except as otherwise expressly provided, neither Contractor nor its servants, agents, nominees, Contractors or sub-Contractors shall have any liability or responsibility whatsoever to whomsoever for loss of or damage to the equipment and/or loss or damage to the property of the Company and/or their Contractors or sub-Contractors, irrespective of how such loss or damage is caused and even if caused by the negligence of Contractor and/or its servants, agents, nominees, assignees, Contractors and sub-Contractors. The Company shall protect, defend, indemnify and hold harmless Contractor from and against such loss or damage and any suit, claim or expense resulting there from.
- 21.6 Neither Contractor nor its servants, agents, nominees, assignees, Contractors, sub-Contractors shall have any liability or responsibility

whatsoever to whomsoever for injury or illness, or death of any employee of the Company and/or of its Contractors or sub-Contractors irrespective of how such injury, illness or death is caused and even if caused by the negligence of Contractor and/or its servants, agents, nominees, assignees, Contractors and sub-Contractors. Company shall protect, defend indemnify and hold harmless Contractor from and against such liabilities and any suit, claim or expense resulting there from.

21.7 The Company agrees to waive its right of recourse and further agrees to cause its underwriters to waive their right of subrogation against Contractor and/or its underwriters, servants, agents, nominees, assignees, Contractors and sub-Contractors for loss or damage to the equipment of Company and/or its Contractors or sub-Contractors when such loss or damage or liabilities arises out of or in connection with the performance of the contract.

21.8 The Company hereby further agrees to waive its right of recourse and agrees to cause it underwriters to waive their right of subrogation against Contractor and/or its underwriters, servants, agents, nominees, assignees, Contractors and sub-Contractors for injury to, illness or death of any employee of the Company and of its Contractors, sub-Contractors and/or their employees when such injury, illness or death arises out of or in connection with the performance of the Contract.

22.0 **INDEMNITY AGREEMENT:**

22.1 Except as provided hereof Contractor agrees to protect, defend, indemnify and hold Company harmless from and against all claims, suits, demands and causes of action, liabilities, expenses, cost, liens and judgments of every kind and character, without limit, which may arise in favour of Contractor's employees, agents, Contractors and sub-Contractors or their employees on account of bodily injury or death, or damage to personnel/property as a result of the operations contemplated hereby, regardless of whether or not said claims, demands or causes of action arise out of the negligence or otherwise, in whole or in part or other faults.

22.2 Except as provided hereof Company agrees to protect, defend, indemnify and hold Contractor harmless from and against all claims, suits, demands and causes of action, liabilities, expenses, cost, liens and judgments of every kind and character, without limit, which may arise in favour of Company's employees, agents, Contractors and sub-Contractors or their employees on account of bodily injury or death, or damage to personnel/property as a result of the operations contemplated hereby, regardless of whether or not said claims, demands or causes of action arise out of the negligence or otherwise, in whole or in part or other faults.

23.0 **INDEMNITY APPLICATION:** The indemnities given herein above, whether given by Company or Contractor shall be without regard to fault or to the negligence of either party even though said loss, damage, liability, claim, demand, expense, cost or cause of action

may be caused, occasioned by or contributed to by the negligence, either sole or concurrent of either party.

24.0 PAYMENTS, MANNER OF PAYMENT, RATES OF PAYMENT, SET-OFF:

24.1 Company shall pay to Bidder, during the term of the contract, the amount due calculated according to the rates of payment set and in accordance with other provisions hereof. No other payments shall be due from Company unless specifically provided for in this contract. All payments will be made in accordance with the terms hereinafter described.

24.1.1 Request for payment/part payment to third party i.e. other than the party on whom the contract has been awarded will not be entertained by OIL under any circumstances. The offers stipulating payment/part payment to such third party will be considered as non-responsive and such offers will be rejected.

24.2 **MANNER OF PAYMENT:** All payments due by Company to Bidder shall be made at Contractor's designated bank. All bank charges will be to Bidder's account.

24.3 Payment of any invoices shall not prejudice the right of Company to question the validity of any charges therein, provided Company within one year after the date of payment shall make and deliver to Bidder written notice of objection to any item or items the validity of which Company questions.

24.4 **INVOICES:** Bidder shall raise invoices for release of the payment against the contract at the end of the contract as indicated in the Schedule of Rates of the contract. Payment of undisputed portion of the invoice shall be released within 30 (thirty) days of receipt of invoice.

24.5 Company shall within 30 days of receipt of the invoice notify Bidder of any item under dispute, specifying the reasons thereof, in which event, payment of the disputed amount may be withheld until settlement of the dispute, but payment shall be made of any undisputed portion. This will not prejudice the Company's right to question the validity of the payment at a later date as envisaged in sub- clause 24.3 above.

24.6 The acceptance by Contractor of part payment on any billing not paid on or before the due date shall not be deemed a waiver of Contractor's rights in respect of any other billing, the payment of which may then or thereafter be due.

24.7 Bidder shall maintain complete and correct records of all information on which Bidder's invoices are based upto 3 (Three) years from the date of last invoice. Such records shall be required for making appropriate adjustments or payments by either party in case of subsequent audit query/objection. Any audit

conducted by Company of Bidder's records, as provided herein, shall be limited to Company's verification (i) of the accuracy of all charges made by Bidder to Company and (ii) that Bidder is otherwise in compliance with the terms and conditions of this Agreement.

- 24.8 **SET-OFF**: Any sum of money due and payable to the Contractor (including Performance Security refundable to them) under this or any other Contract may be appropriated by OIL and set-off against any claim of OIL (or such other person or persons contracting through OIL) for payment of a sum of money arising out of this contract or under any other contract made by the Contractor with OIL (or such other person or persons contracting through OIL).
- 25.0 **WITHHOLDING**: Company may withhold or nullify the whole or any part of the amount due to Contractor, after informing the Contractor of the reasons in writing, on account of subsequently discovered evidence in order to protect Company from loss on account of :-
- a) For non-completion of jobs assigned as per Section-II.
 - b) Contractor's indebtedness arising out of execution of this Contract.
 - c) Defective work not remedied by Contractor.
 - d) Claims by sub-Contractor of Contractor or others filed or on the basis of reasonable evidence indicating probable filing of such claims against Contractor.
 - e) Failure of Contractor to pay or provide for the payment of salaries/ wages, contributions, unemployment compensation, taxes or enforced savings with-held from wages etc.
 - f) Failure of Contractor to pay the cost of removal of unnecessary debris, materials, tools, or machinery.
 - g) Damage to another Contractor of Company.
 - h) All claims against Contractor for damages and injuries, and/or for non-payment of bills etc.
 - i) Any failure by Contractor to fully reimburse Company under any of the indemnification provisions of this Contract. If, during the progress of the work Contractor shall allow any indebtedness to accrue for which Company, under any circumstances in the opinion of Company may be primarily or contingently liable or ultimately responsible and Contractor shall, within five days after demand is made by Company, fail to pay and discharge such indebtedness, then Company may during the period for which such indebtedness shall remain unpaid, with-hold from the amounts due to Contractor, a sum equal to the amount of such unpaid indebtedness.

Withholding will also be effected on account of the following:-

- i) Order issued by a Court of Law in India.

- ii) Income-tax deductible at source according to law prevalent from time to time in the country.
- iii) Any obligation of Contractor which by any law prevalent from time to time to be discharged by Company in the event of Contractor's failure to adhere to such laws.
- iv) Any payment due from Contractor in respect of unauthorised imports.

When all the above grounds for withholding payments shall be removed, payment shall thereafter be made for amounts so withhold.

Notwithstanding the foregoing, the right of Company to withhold shall be limited to damages, claims and failure on the part of Contractor, which is directly/indirectly related to some negligent act or omission on the part of Contractor.

26.0 **APPLICABLE LAW:**

- 26.1 The Contract shall be deemed to be a Contract made under, governed by and construed in accordance with the laws of India for the time being in force and shall be subject to the exclusive jurisdiction of Courts situated in Delhi.
- 26.2 The Contractor shall ensure full compliance of various Indian Laws and Statutory Regulations, to the extent applicable, as stated below, but not limited to, in force from time to time and obtain necessary permits/ licenses etc. from appropriate authorities for conducting operations under the Contract:
 - a) The Mines Act 1952- as applicable to safety and employment conditions
 - b) The Minimum Wages Act, 1948
 - c) The Oil Mines Regulations, 1984
 - d) The Workmen's Compensation Act, 1923
 - e) The Payment of Wages Act, 1963
 - f) The Payment of Bonus Act, 1965
 - g) The Contract Labour (Regulation & Abolition) Act, 1970 and the rules framed there under
 - h) The Employees Pension Scheme, 1995
 - i) The Interstate Migrant Workmen Act., 1979 (Regulation of employment and conditions of service)
 - j) The Employees Provident Fund and Miscellaneous Provisions Act, 1952
 - k) Service Tax Act
 - l) Customs & Excise Act & Rules

- 27.0 **RECORDS, REPORTS AND INSPECTION:** The Contractor shall, at all times, permit the Company and its authorised employees and representatives to inspect all the Work performed and to witness and

check all the measurements and tests made in connection with the said work. The Contractor shall keep an authentic, accurate history and logs including safety records of each IP survey section with major items consumed, which shall be open at all reasonable times for inspection by the Company designated representatives and its authorised employees and representatives. The Contractor shall provide the Company designated representatives with a daily written report, on form prescribed by the Company showing details of operations during the preceding 24 hours and any other information related to the said IP survey requested by the Company whenever so requested. The Contractor shall not, without Company's written consent allow any third person(s) access to the said survey, or give out to any third person information in connection therewith.

- 28.0 **SUBSEQUENTLY ENACTED LAWS**: Subsequent to the date of issue of letter of award if there is a change in or enactment of any law or change in application or enforcement or interpretation of existing law by any governmental authority or public body, which results in addition/ reduction in cost to Contractor on account of the operation contemplated under the Contract, the Company/Contractor shall reimburse the Contractor/pay Company for such additional/reduced costs actually incurred/saved by Contractor, subject to the submission of documentary evidence by Contractor/Company.
- 29.0 **ROYALTY AND PATENTS**: Each party shall hold harmless and indemnify the other from and against all claim and proceedings for or on account of any patent rights, design, trade mark or other protected rights arising from any use of materials, equipment, processes, inventions and methods which have not been imposed on the attending party by the terms of the contract or the specifications or drawings forming part thereof.
- 30.0 **LIMITATION OF LIABILITY**: Notwithstanding any other provisions herein to the contrary, except only in cases of willful misconduct and / or criminal acts,
- (a) Neither the Contractor nor the Company (OIL) shall be liable to the other, whether in Contract, tort, or otherwise, for any consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs.
 - (b) Notwithstanding any other provisions incorporated elsewhere in the contract, the aggregate liability of the Contractor in respect of this contract, whether under Contract, in tort or otherwise, shall not exceed 50 % of the Annualized Contract Price, provided however that this limitation shall not apply to the cost of repairing or replacing defective equipment by the Contractor, or to any obligation of the Contractor to indemnify the Company with respect to Intellectual Property Rights.
 - (c) Company shall indemnify and keep indemnified Contractor harmless from and against any and all claims, costs, losses

and liabilities in excess of the aggregate liability amount in terms of clause (b) above.

- 31.0 **WAIVER**: Any delay in exercising and any omission to exercise any right, power or remedy exercisable by the Company under this contract shall not impair such right, power or remedy nor shall any waiver by the Company of any breach by the Contractor of any provision of this contract prevent the subsequent enforcement of that provision by the Company or be deemed a waiver by the Company of any subsequent breach by the Contractor.

END OF SECTION – I

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SECTION II

TERMS OF REFERENCE / TECHNICAL SPECIFICATIONS/SCOPE OF WORK

**Attached as a Separate Document for INTERIOR WORKS FOR 5TH & 6TH FLOOR
AT NBCC CENTRE, OKHLA (PHASE-I) NEW DELHI**

File name : Scope of Work, page 323.

END OF SECTION - II

Section - III

SPECIAL CONDITIONS OF CONTRACT

1.0.0 SCOPE OF WORK

The scope of work shall include Civil work, Interior Works & Partition, Furniture Works, Plumbing & Fire Fighting, Electrical & Lighting, HVAC, Audio Visual Works, Fire Fighting & Detection and Communication Building Automation & Access Control system as under.

1.1.0 CIVIL & INTERIOR WORKS

1.1.1 The main scope of work to be executed under this head shall include the following composite works including materials, labour etc. complete:

- i. Flooring / cladding works including vitrified tiles, ceramic tiles, granite stone, wooden flooring etc.
- ii. Finishing works including plastic emulsion paint, synthetic enamel paint, cement paint, melamine polish etc.
- iii. False ceiling works including gypsum board, acoustical suspended tiles, wooden false ceiling etc.
- iv. Wooden framed partition & wall paneling work with laminate/ veneer finish.
- v. Wood work in frames, doors, cupboards etc.
- vi. Wooden flush door shutters with laminate/ veneer ply with fittings like door closers, stopper, lock etc.
- vii. Wooden framed fully/ partly glazed doors
- viii. Glazed sensor based sliding doors
- ix. Fixed wooden storage cabinets

- x. Water distribution Works like G.I. pipes, valves etc.
- xi. Plumbing/ Sanitary works including sanitary fittings/ fixtures viz. water closets, urinals, wash basin, sink mixers, bib cocks, stop cocks, towel rails, health faucets etc.
- xii. Misc. civil works including brick masonry, Cement Concrete, glass bricks, venetian blinds, sun films, planters etc.

1.2.0 ELECTRICAL, TELECOMMUNICATION, LAN, PUBLIC ADDRESS AND FIRE ALARM SYSTEM WORKS

1.2.1 The main scope of work to be executed under this head shall include supply, installation, testing and commissioning of the following:

- i. All conduit works including junction boxes, outlet boxes and wiring for lighting and Power
- ii. Switches, plug sockets, cover plates and other wiring accessories.
- iii. Fittings & fixtures
- iv. Distribution boards and circuit breakers including LT Panel, four/ three pole distribution boards, MCBs etc.
- v. Earthing (grounding) system
- vi. PVC conduits, 4 pair telephone wire, modular plate type twin RJ 11 telephone outlets, Krone type telephone tag blocks of 50 pair, modular plate type RJ – 45 computer socket, , 4 pair Cat- 6 UTP cable of 23 AWG solid copper conductors, modular plate type white coaxial television outlets, coaxial 3 GHz band width RG-6 television cables, 50 pair telecommunication cable etc. for Telephone, Computer and Television Network
- vii. Public Address System in office area consisting Microphone, Ceiling Speakers, Amplifiers, along with required cabling, junction Boxes, Equipment Rack etc.
- viii. Fire alarm system consisting of manual call boxes, rate of rise cum fixed temperature heat detectors, optical/ ionization type smoke detectors, electronic hooters/speaker, main control panel with suitable public address facility panels, wiring, conductors etc.

1.3.0 HVAC SYSTEM WORKS

1.3.1 The main scope of work to be executed under this head shall include supply, installation, testing and commissioning of Variable Refrigerant Volume (VRV) type multi unit Air Conditioning system including the following:

- a) Indoor Ducted Fan Coil Units and Cassette Units.
- b) Outdoor VRV condensing Units.
- c) Refrigerant piping including insulation and all accessories.
- d) Supply Air/Return air registers and diffusers.
- e) Vibration isolation for HVAC equipments
- f) Automatic Controls and instruments.
- g) Wiring and earthing for various refrigeration, air-conditioning and mechanical ventilation equipment control wiring and interlocking.
- h) Cutting holes, chases and the likes through all types of non structural walls and finishing for all type of wall crossings, including sealing, framework, fire proofing, providing sleeves, cover plates, making good structure and finishing to an approved standard.
- i) Balancing, testing and commissioning of the entire HVAC and mechanical ventilation installations.
- j) Test report, list of recommended spares, as installed drawings, operation and maintenance manuals for the entire HVAC installations.
- k) Training of owner's staff

1.3.2 The contractor shall be fully responsible for the performance of the installed equipment at the specified parameters and for the efficiency of the installations to deliver the required end results. The contractor shall guarantee that the HVAC system as installed shall maintain the inside conditions in the air-conditioning spaces as described under the Basis of Design in the specifications. The contractor shall also guarantee that the performance of various equipments individually, shall not be less than the quoted capacity, actual power consumption shall not exceed the quoted rating, during testing and commissioning, handling over and guarantee period

1.4.0 PERMITS FOR EQUIPMENT & MATERIALS

1.4.1 The Contractor shall at his own cost and initiative arrange for and obtain all necessary permissions, permits, consents and licenses, as may be necessary, to transport the equipment/ material, machinery, and labour along or across highway, roadway, railway, bridge, dike, dam, river or through posts of toll collection, octroi checks or other line border or barrier.

2.0.0 CONTRACTOR-SUPPLIED MATERIALS

2.1.0 All materials required for the civil works including cement, reinforcement, structural steel, consumables, testing appliances, tools and tackles necessary for completing the work shall be supplied by the contractor at his own cost and shall conform to the specifications and schedule of rates. No claim/ delay on this account will be entertained by the Corporation.

2.2.0 Specific approval of OIL Site Representatives must be obtained by the contractor before purchase of any material proposed to be used in works. The approved samples for all materials shall be kept at Site office and exhibited for reference and inspection at all times and till the completion of works.

2.3.0 All the materials/ equipment to be supplied by the contractor shall be of approved make specified in the respective Schedule of Rate & Specifications and as approved by the Engineer-in-Charge (EIC).

2.4.0 VENDORS FOR CONTRACTOR-SUPPLIED MATERIALS

2.4.1 A List of approved Vendors / Sub-contractors for certain materials/ services is enclosed in technical specifications/ schedule of rates.

2.4.2 Contractor may engage any of the above Vendors/ Sub-contractors for the specified category of materials/ services and obtain the Owner's approval regarding the same.

2.4.3 However, in exceptional case, the Engineer-in-Charge may consider any other potential Vendor/ Sub-contractor, provided the technical capability of such Vendor/ Sub-contractors is established based on the documentary evidences and quality performance submitted in support of their capability. The decision of Engineer-in- Charge shall be final and binding in this regard.

2.4.4 In the case of standard items, only the makes of material is specified in the tender document. In such cases, the Contractor shall effect delivery of materials directly from the manufacturer or from the Original Equipment Manufacturers upon approval from the Owner.

2.5.0 TRANSIT INSURANCE

2.5.1 Contractor should take appropriate insurance policy to cover the Contractor-supplied equipment/ materials during their transit, till delivery at site.

2.6.0 Manufacturer's guarantee

2.6.1 The manufacturer's guarantee for all bought out items shall be made available to the Owner and shall be valid for the entire defect liability period. However, this does not absolve the Contractor of his responsibilities under defect liability clause to perform in

attending to the defects noticed and rectifying these without any delay.

- 2.6.2 Manufacturer's/ Contractor's guarantee, for any replaced item shall also be made available to the Owner and shall be kept valid at least for one year from the date of last replacement.

3.0.0 WATER & POWER SUPPLY

- 3.1.0 The contractor shall arrange water/ procure water required for the work at his own cost for all leads and lifts.
- 3.2.0 The contractor shall make his own arrangement for power required for the work at his cost. DG set of suitable capacity may be installed and operated by the contractor at his cost. OIL shall not be responsible for power supply and contractor shall ensure proper supply of electricity to meet the schedule. The electrical works shall be carried out through Licensed Electrical personal only.

4.0.0 TIME FOR COMPLETION

- 4.1.0 The time of completion of the entire works shall be **20 (twenty) weeks** from the date of issue of Letter of Acceptance (LOA). Total completion period mentioned above shall be inclusive of mobilization period. However, if the works are not completed within the above completion period of 20 weeks, Company reserves the right to extend the Contract till completion of the jobs at the same rates, terms & conditions.

ALL RATES IN THIS CONTRACT SHALL BE FOR WORK INCLUSIVE OF ALL SCAFFOLDINGS, LEADS, SLOPES, DISPOSAL AND FOR ALL HEIGHTS, LEVELS AND LIFTS UNLESS OTHERWISE SPECIFIED.

1. All weights and measures (of any material) shall be recorded net to finished size only, and exclude wastage which shall be to the contract's account and provided for within the quoted rate.
2. The following shall not be measured and/or paid for and the contractor shall make allowance for the same in the quoted rate-
 - a) Setting out of the work and site clearance
 - b) Preparing and submitting shop/fabrication drawings for doors, windows and all other fabricated items of work for prior approval before commencing the work
 - c) Any other similar kind of preparatory work

3. Sand used shall be coarse sand unless where specified as jamuna/ fine sand and aggregate shall be hard crushed blue quartzite stone in accordance with the requirement of IS:383.
4. Nothing extra shall be paid for the following, which shall be provided for within the quoted rates for finishing item of work-
 - a) Making “V” / “U” grooves of any pattern at junctions of walls, ceilings, skirting and frames as directed by the CLIENT/Architect
 - b) In case of wall plaster, dado and skirting, raking out joints, cleaning the surface, application of cement slurry on RCC surface
 - c) Work in patches, narrow widths, small quantities, curved surfaces, projected bands, setbacks offsets architraves, inclined surfaces, coffer beams and slabs, fins and fascia etc
 - d) Work at all leads, lifts, levels and heights
 - e) Making all drip courses, in plastered surfaces, throating of plaster
 - f) Finishing the edges of electric fittings and boxes etc
 - g) Use of all scaffoldings and cradles, dust sheets and other covering for the protection of fixtures, fittings, furniture, floors etc
 - h) Cleaning of stains, material residue from glass, joinery, electric fittings, floors, wall surfaces etc including washing the floors and leaving the premises neat and clean
 - i) Grooves in plaster up to 12mmx12mm size or as per the drawings at the junction of two different finishes of walls, masonry and RCC etc including providing cement slurry between brickwork and concrete
 - j) All samples and mockups required for approvals
 - k) Making openings in marble/granite/ kota stone slabs of floors dados and platforms for sanitary fittings, holes, gratings, floor traps and such like services connections and electrical fittings and boxes
5. The quoted rate for External Plaster/ Stone Cladding on walls and bands shall be deemed to include:
 - a) Work at all levels and heights and as per shape/size of panels

- b) Providing External Plaster/ Stone Cladding on walls in bands, copings, raised levels, cornices, projections etc
 - c) Laying in line, level and plumb
 - d) Providing and fixing chicken wire mesh at the junction of concrete and masonry works
 - e) Provide double stage MS tabular pipe scaffolding erected independent of the walls and column surfaces to be plastered
 - f) Providing pigment / color to the desire shade, and providing external plaster in a combination of different colors and shades as per drawings
6. To execute all works as required to complete a habitable complex whether specified or not
 7. All items of work under this Contract shall be executed strictly to fulfill the requirements laid down in the specifications and drawings and also to fulfill basis of designs as per relevant IS codes. Type of equipment, material specification, methods of installation and testing and type of control shall be in accordance with the specifications, approved shop drawings and the relevant Indian Standards, however capacity of each component and their quantities shall be such as to fulfill the basic requirement.
 8. The contractor shall include for making all the opening in slabs, beams, walls etc. as required for his work. However, the contractor can coordinate with civil work to provide necessary sleeves. All openings shall be closed using water proofing compound or as specified by Engineer-in-Charge /Architect.

Removal of rejected/sub-standard materials

The following procedure shall be followed for the removal of rejected/sub-standard materials from the site of work:

- (i) Whenever any material brought by the contractor to the site of work is rejected, entry thereof will be made in the Site Order Book under the signature of the CLIENT/Architect giving the approximate quantity of such materials.
- (ii) As soon as the material is removed, a certificate to that effect shall be recorded by the CLIENT/Architect against the original entry, giving the date of removal and mode of removal, i.e., whether by truck, carts, or by manual labor. If the removal is by truck, the registration number of the truck should be recorded.

- (iii) When it is not possible for the CLIENT/Architect to be present at the site of work at the time of actual removal of the rejected/sub-standard materials from the site, the required certificate should be recorded by the Project Engineer and the CLIENT/Architect should countersign the certificate recorded by the Project Engineer.

Periodical checking of cement

Instructions as given in CPWD manual will be followed regarding checking of Cement that may be stipulated for use in a work.

4.2.0 WORK SCHEDULE

- 4.2.1 Upon award of work the Contractor shall provide detailed work schedule to the Engineer -In- Charge covering all activities related to supply, installation, testing and commissioning under their scope of work.

5.0.0 MEASUREMENT

- 5.1.0 In addition to stipulations mentioned in Technical Specifications and Schedule of Rates, method of measurement wherever not so specified shall be as per relevant parts of IS: 1200 (Latest Edition) or any other relevant standard as decided by Engineer-In-Charge.

6.0.0 CURRENCIES AND PAYMENT

- 6.1.0 Tenderers shall quote their prices in Indian Rupees only. All payments will be made in Indian Rupees only. No advance of any sort shall be payable under this Tender. All the payment shall be released through e-banking. Successful bidder shall submit details of their Bank Account for e-payment.

7.0.0 ON ACCOUNT PAYMENT

- 7.1.0 Subject to the provisions of clause 6.4.0.0 and associated sub-clauses of GCC, "On Account" payment will be made for the items on the basis provided there under. Each stage of payment as indicated hereunder shall be applicable only when the work has been accepted in accordance with the tender specification up to that particular stage.

7.1.1 Electrical, Telecommunication, Fire Alarm System, LAN and HVAC Works:

i) For Composite items:

Sl. No.	Percentage Payment	Detail of Work
1	60%	After supply of material at site and acceptance
2	20%	After installation
3	10%	After commissioning and testing
4	10%	After submission of as-built drawings

ii) For supply items

Sl. No.	Percentage Payment	Detail of Work
1	80%	After receipt of material at site and acceptance
2	20%	After erection, testing, commissioning and documentation including as built drawings of the relevant item of work in all respects

iii) For Services items:

Sl. No.	Percentage Payment	Detail of Work
1	90%	After erection, testing, commissioning and documentation including as built drawings of the relevant item of work in all respects
2	10%	On handing over the site to owner, including final clean up, demobilization and final acceptance of work

7.1.2 Each stage of payment as indicated hereinabove shall be applicable only when the work has been accepted in accordance with the tender specification up to that particular stage.

7.2.0 Payment of other items of SOR shall be made on the basis of the item rate per unit as mentioned in the SOR based on measurement of the executed work for the Running Account bills as per provisions of clause 6.4.0.0 and associated sub-clauses of General Conditions of Contract.

7.3.0 Running Account Bill(s) based on payment terms in the Contract shall be paid based on joint measurements & subject to approval of Engineer-in-Charge after deduction of necessary dues, taxes and duties as applicable and payable by the Contractor in accordance with various provisions made elsewhere in this matter.

8.0.0 CONDITIONS OF WORK/ SPECIFIC REQUIREMENT

8.1.0 MANPOWER

The contractor shall employ competent experienced supervisors for day to day supervision of all type of site works as well as fully licensed & qualified full time electrician & wireman to direct the work of electrical installation in accordance with drawings and specifications.

8.2.0 LICENSE DOCUMENTS

The Contractor or his subcontractor shall have the following valid documents from Electrical Authorities of any state in India:

- (a) Electrical contractor license and
- (b) Wiremen license for the person working

8.3.0 STANDARD OF WORK

The work shall be carried out to the satisfaction of the Engineer-In-Charge and in accordance with the relevant regulations and standards of the Electricity supply Authority, the Fire Insuring Company insuring the building, Electricity Rules & Regulations, other statutory Authority and the enclosed specifications.

8.4.0 FEES, PERMITS AND TESTS

The contractors shall obtain and pay for any and all fees and permit required for the installation of this work. On completion of the work, the contractor shall obtain and deliver to the Engineer-In-Charge/Owner, certificates of final inspection and approval by the local electricity supply authority, concerned Fire Authorities or other statutory authority. The Engineer-In-Charge shall have full powers to acquire the materials or get work tested by an independent agency at the contractor's expense in order to prove their soundness and adequacy. However, the statutory fee shall be reimbursed on production of documentary evidence of the same.

8.5.0 SPECIFICATIONS

The specifications shall be considered as part of this contract. The drawings indicate the extent and general arrangement of the fixtures, controlling switches, wiring system etc. and are essentially diagrammatic. The drawings indicate the points on termination of

conduit runs and broadly suggest the routes to be followed. The work shall be installed as indicated in the drawings. However, any minor change found essential to coordinate the installation of this work with other trades shall be made without any additional cost to the owner. The data given herein and on the drawings is as exact as could be secured, but its complete accuracy is not guaranteed. The drawings are for the guidance of the contractor: Exact locations, distances and levels shall be governed by the site conditions and Architectural drawings.

8.6.0 SHOP DRAWING

The contractor shall prepare and submit to the Engineer-In-Charge for his approval, three sets of detailed shop drawings of all equipment, conduit layout, distribution panels, switch boards, cabinets, special pull boxes, power and control wiring schematics, details of cable trays, supports, terminations, wiring diagram for the complete fire alarm system, Circuit diagram of individual panels, P.A. system & detectors, component details of the various control and indicating panels, outdoor AC unit locations, ducting layout showing exact location of supports, flanges, bends, tee connections, reducers, guide vanes, silencers, distribution grids, volume control dampers, collars, grilles, diffusers, piping layout showing exact location and type of supports, valves, fittings etc., acoustic lining, external insulation details for ducts, pipe insulation etc., and any other requirement to be fabricated by the contractor.

Approval of shop drawings shall not be considered as a guarantee of measurement or that of a building dimension. Where drawings are approved said approval doesn't mean that the drawings supersedes the contract requirements, nor does it in any way relieve the contractor of the responsibility or requirements to furnish material and perform as required by the contract.

8.7.0 INSTALLATIONS

The work shall be carried out in full knowledge of and with complete coordination of contractor. The electrical installation shall be in total conformity with the control wiring drawings prepared by the contractor and approved by the EIC/ consultant. All air conditioning equipment shall be connected and tested in the presence of an authorized representative of the contractor. The air-conditioning system shall be commissioned only after the contractor has certified in writing that the electrical installation work for air-conditioning services has been thoroughly checked, tested and found to be totally satisfactory and in full conformity with the contract drawings, specifications and manufacturer's instructions. It is to be clearly understood that the final responsibility for the sufficiency, adequacy and conformity to the contract requirements of the electrical installation work for air-conditioning services, lies solely with the contractor.

8.8.0 MANUFACTURERS INSTRUCTIONS

Where manufacturers have furnished specific instructions relating to the materials used in this job and covering points not specifically mentioned in these documents, manufacturer instructions shall be followed.

8.9.0 MATERIALS AND EQUIPMENT

All materials and equipment shall be of the approved make and design. Only the best quality materials and equipment shall be used. The material and equipment shall conform to relevant standards. The Contractor shall be responsible for the safe custody of all materials and shall insure them against theft or damage in handling or storage etc. A list of items of materials and equipment together with a sample of each shall be submitted to the Engineer-In-Charge within 15 days of the award of the contract.

8.10.0 AIR BALANCING, TESTING AND COMMISSIONING OF HVAC SYSTEM

Balancing of all air and water systems and all tests as per specifications shall be carried out by the contractor through a specialist group, in accordance with the specifications and ASHRAE guidelines and standards. Performance test shall consist of three days of 10 hrs each operation of each season. The results for summer, monsoon and winter air conditioning in quadruplicate shall be submitted for scrutiny. Four copies of the certified manufacturers' performance curves for each piece of equipment, highlighting operational parameters for the project shall be submitted along with the test certificates. Contractors shall also provide four copies of record of all safety and automatic control settings for entire installation.

The installation shall be tested again after removal of defects, if any and shall be commissioned only after approval by the owner's site representative. All tests shall be carried out in presence of the owner's site representative.

8.11.0 QUITE OPERATION AND VIBRATION ISOLATION:

All equipment shall operate under all conditions of load without any sound and vibration which is objectionable in the opinion of the owner's site representative. In case of rotating machinery sound or vibration noticeable outside the room in which it is installed or annoyingly noticeable inside its own room shall be considered objectionable. Such condition shall be corrected by the contractor at his own expenses. The contractor shall guarantee that the equipment installed shall maintain the specified NC levels.

8.12.0 ON SITE TRAINING

Upon completion of all works and all tests, the contractor shall furnish necessary helpers for operating the entire installation for a period of not less than two weeks to enable the owners staff gets acquainted with the operation of the system. During this period the contractor shall train the owner's personnel in the operation, adjustment and maintenance of all equipment installed.

8.13.0 **GUARANTEE**

On completion of the work and before issue of final certificate of completion, the contractor shall furnish written guarantee indemnifying the Engineer-In-Charge against defective materials and workmanship for a period of one year after completion. The contractor shall hold himself fully responsible for reinstallation or replacement, free of cost to Owner the following:

- a) Any defective work or material supplied by the Contractor
- b) Any material or equipment damaged or destroyed as a result of defective workmanship by the Contractor

8.14.0 **COMPLETION DRAWINGS**

Upon completion of the work and before issuance of certificate of completion, the contractor shall submit to the Engineer-In-Charge 4 (Four) sets of layout drawings in progressive manner for individual systems drawn at approved scale, indicating the complete details as installed. For Electrical, Telecommunication, LAN, Public Address, Fire Alarm and HVAC system works, these drawings must include:

- a) Run and size of conduits, inspection, junction and pull boxes
- b) Number and size of conductors in each conduit
- c) Location and rating of sockets and switches controlling the light and power outlets
- d) Location and details of distribution panels, mains, switches, switchgear and other particulars
- e) A complete wiring diagram as installed and schematic drawings showing all connections in the complete electrical system
- f) Location of outlets, junction boxes, sizes of various conduits for all low voltage systems
- g) Location of all earthing stations, route and size of all earthing conductors, manholes etc.
- h) Layout and particulars of all cables
- i) Location of wiring and sequencing of automatic controls
- j) Locations of all concealed piping, valves, controls, dampers, wiring and other services
- k) Instructions, maintenance and operation manuals for the equipments and systems. These manuals shall also include basis of design, detailed technical data for each piece of equipment as installed, spare parts manual and

recommended spares for 3 years period of maintenance of each equipment.

8.15.0 COMPLETION CERTIFICATE

On completion of work, a certificate shall be furnished by the Contractor countersigned by the licensed supervisor, under whose direct supervision the installation was carried out. For electrical installation, this certificate shall be in the prescribed form as required by the local electrical supply authority. The Contractor shall be responsible for getting the electrical installation inspected and approved by the local authorities concerned.

8.16.0 TEST, INSPECTION AND PERFORMANCE OF WORKS

8.16.1 The Contractor shall carry out the various tests as enumerated in the technical specifications of this tender document and the technical documents that will be furnished to him during the performance of the work and no separate payment shall be made unless otherwise stipulated.

8.16.2 All the tests either on the field or at outside laboratories concerning the execution of the work and supply of materials by the Contractor shall be carried out by Contractor at his own cost. All test equipment including all recording/ measuring gauges/ instruments shall be calibrated and necessary certificate of compliance issued by the Statutory agency/body to the effect that the test equipment's / instruments have been calibrated as per standard practices and found meeting the norms shall have to be furnished by the Contractor. The entire cost of carrying out such calibration and furnishing of the compliance certificate from a Statutory Authority/ body shall be at the expense of the Contractor.

8.16.3 The work is subject to inspection at all times by the Engineer-in-Charge or his authorised representative. The Contractor shall carry out all instructions given during inspection and shall ensure that the work is being carried out according to the technical specifications, the technical documents and the relevant codes of practice furnished to him during the performance for the work. Contractor shall discuss his daily work programme with Engineer-in-Charge before starting the same every day.

8.16.4 Any work not conforming to the execution drawings, specifications or codes shall be rejected forthwith and the Contractor shall carry out the rectification at his own cost.

8.16.5 All results of inspection and tests will be recorded in the inspection reports, Performa of which will be approved by the Engineer-in-Charge. These reports shall form part of the completion documents.

8.16.6 In case the Site Engineer on inspection or test be not satisfied with the quality or workmanship of any work, trench, joint or weld (the decision of the Site Engineer being final in this behalf), the Contractor shall re-perform, replace, re-install and/or re-erect as the case may be, such work, trench, joint or weld, and no such rejected work, weld or item shall be re-used with reference to the work except with prior permission of the Site Engineer.

8.16.7 The Contractor shall carry out the various tests as enumerated in the technical specifications or that will be furnished to him during the performance of the work and no separate payment shall be made unless otherwise specified

9.0.0 SETTING OUT OF THE WORKS

9.1.0 The Contractor shall be responsible for the true and proper setting out of the works and for the correctness of the position and levels, dimension and alignment of all parts of the works and for the provision of all necessary instruments, appliances and labour in connection therewith.

9.2.0 If at any time during the progress of the work, shall any error appear or arise in the position, level, dimension or alignment of any part of the works, the Contractor shall at his own expense rectify such error to the satisfaction of Engineer-in-Charge or the Site Engineer.

9.3.0 The checking of any setting-out or of any line or level by the Engineer-in-Charge or the Site Engineer shall not in any way relieve the Contractor of his responsibility for the correctness thereof and the Contractor shall carefully protect and preserve all bench marks, pegs and other things used in setting-out the works.

10.0.0 CONSTRUCTION

10.1.0 RULES AND REGULATIONS

Contractor shall observe, in addition to codes specified in respective specifications, all national and local laws, rules and regulations and requirements pertaining to the work.

11.0.0 PERSONAL ACTS AND LIABILITIES

11.1.0 Any money paid to any director, attorney, agent, officer or employee of the Contractor and any receipt, settlement, acknowledgement of liability or other arrangement, agreement or document whatsoever signed by any such director, attorney, agent, officer, or employee of the Contractor or erstwhile director, attorney, agent, officer or employee of the Contractor (without notice of his cessation of interest) or by any person held out to be a director, attorney, agent, officer or employee of the Contractor

authorised to act on behalf of and/or to bind the Contractor, be binding upon the Contractor and shall constitute a full release and discharge to the Owner and/or settlement, acknowledgement or obligation of, upon or with the Contractor, as the case may be, and the Owner shall not be concerned with the actual application of any money so paid or of the actual authority of such director, attorney, agent, officer or employee (actual, erstwhile or purported as the case may be) vis-à-vis the company to make the settlement, receipt, acknowledgement, agreement or other document concerned.

12.0.0 **INDEMNITY AND INSURANCE**

12.1.0 The Contractor shall undertake to provide comprehensive accident insurance coverage in respect of every employee employed by him for carrying out Owner's job. Contractor shall satisfy the Owner of the same within the time prescribed by the Owner but before the actual commencement of the job awarded to him.

12.2.0 **The Storage-cum-Erection policy for the total work shall be taken by the Contractor.** Contractor shall be responsible to provide all the documents required by the insurance company for full settlement of the claims. Any shortfall on claim amount on account of non-submission of documents by the Contractor shall be recovered from the Contractor.

12.3.0 Insurance of all the equipments, machinery, plant, tools & tackles, vessels and any other equipment brought to site for completion of work and which are not meant for permanent incorporation in the work shall be to the Contractors account and suitable insurance cover should be taken on his own.

13.0.0 **RESTRICTION OF VISITORS**

13.1.0 The Contractor shall not allow any visitors on the work or premises of the sites without approval of the Engineer-in-Charge and/or Site Engineer.

14.0.0 **SAFETY & POLLUTION CONTROL**

14.1.1 The Contractor shall take all reasonable precautions to avoid pollution or contamination of the air, land or water arising out of the performance of the work. Disposal of returns and cuttings produced by the work shall not be allowed to be discharged in the river. Contractor shall make arrangement at his own cost and initiatives to dispose off the return and cuttings generated from the work place. Should there be a discharge or escape of appreciable quantity of pollutants or contaminants during performance of its obligations under this contract which occurs as a result of activities of the Contractor or its sub-contractor, the Contractor shall immediately take all necessary actions to contain, control,

recover or disperse the substance and to eliminate the safety and environmental risks and correct the damage resulting there from.

- 14.1.2 In case of accidents depending on the seriousness of injury etc. in addition to the hospitalization / Treatment charges and Group insurance amount, compensation shall be paid by the Contractor to the affected person / his family members in presence of Engineer-in-charge as per Workmen Compensation Act.

14.2.0 Safety **practices while working at height**

- 14.2.1 In line with the OISD guidelines on “Safety practices during construction” (OISD-GDN- 192), the Contractor shall ensure that additional safety measures like providing Fall Arrestor type safety belt, safety net for all activities being done in line with tender requirements at a height of 2.5 metre and more depending upon the site conditions and job requirements.

15.0.0 **SCHEDULE OF RATES**

- 15.1.0 All the items of work mentioned in the schedule of rates and covered by the Contract shall be carried out as per the drawings, specifications and direction of Engineer-in-Charge and shall include all labour, materials, tools, tackles, etc. required to complete the job.

- 15.2.0 The Contractor shall be and remain at all time exclusively responsible to provide all material, consumables, labour supervision, equipment tools machines, permits, licenses, casements and facilities and other items and things whatsoever required for or in connection with the work, included but not limited to those indicated by expression or implication in the Schedule of Rates, Specification, plans, drawings and/or other Contract documents or howsoever otherwise as shall be or may from time to time at any time be necessary for or in connection with the work either for incorporation within the permanent works or in relative to the execution and performance of the work.

- 15.3.0 The rates stated in the Schedule of Rates shall not be subject to escalation or increase on any account whatsoever, other than new taxes, duties, levies etc.

16.0.0 **DRAWINGS**

- 16.1.0 The drawings appended alongwith the tender documents are preliminary and are intended to be studied by the Tenderer in order to form an idea about the nature and extent of works involved.

- 16.2.0 Approved for Construction (AFC) drawings shall be issued to the Contractor progressively during the course of work execution.

Contractor shall submit the design/ drawings under their scope to EIC for approval.

17.0.0 DOCUMENTATION

17.1.0 “AS-BUILT” drawings

17.1.1 Notwithstanding the provision contained in standard specifications, upon completion of work, the Contractor shall complete all the related drawings to the “AS-BUILT” stage (including all vendor / sub-vendor drawings for bought out items) and provide four (4) sets of hard copies and soft copies to the Owner. All As-Built drawings shall be prepared using electronic software like AutoCAD (latest version).

17.2.0 Design Details/ Drawings/ Documents

17.2.1 Contractor shall provide four (4) sets of hard copies and soft copies all design calculations/ details/ documents (under contractor’s scope) to the Owner.

18.0.0 SPECIAL NOTES:

18.1.0 In the event of conflict between Scope of work and drawings or other documents including the Specifications, the most stringent specification shall apply. The interpretation of the Architect/Client shall be final and binding on the contractor.

18.2.0 The Contractor shall procure and bring Materials/Equipment to the site only on the basis of drawings approved for construction and shop drawings and not on the basis of Scope of work which are approximate only.

18.3.0 All rates quoted are inclusive of cutting holes and chases in walls and floors with core cutting machines and electrical chasing machines and making good the same with cement mortar / concrete / water proofing of appropriate mix and strength as directed by the Architect/Engineer-in-Charge. Contractor shall provide holes, sleeves, recesses in the concrete and masonry work as the work proceeds.

18.4.0 On completion of all works, contractor shall demolish all stores, remove all surplus materials and leave the site in a broom clean condition, failing which the same shall be done by the Engineer-in-Charge at the Contractor” risk and cost. The contractor shall, from time to time, clear away all debris and excess materials accumulated at the site failing which the same shall be done by Client/ Engineer-in-Charge at contractor’s risk and cost and cost of cleanup shall be deducted from the contractors on pro-rata bill.

- 18.5.0 Tenderer's item rate prices quoted against Scope of work shall be deemed to include full and entire completion of all works as described here-in before and in accordance with good engineering practice and recognized principles.
- 18.6.0 The tender specifications, drawings, CPWD specifications and IS provisions are to complement each other and tender specific specification will have precedence over CPWD specification in case of ambiguity. In case of any details missing or incomplete, these documents shall supplement the drawback.

END OF SECTION III

SECTION IV

SCHEDULE OF RATES

PRICE SCHEDULE FORMAT IS ATTACHED IN MS-EXCEL FORMAT. BIDDER TO QUOTE THE PRICE IN THE MS-EXCEL FORMAT AND TO BE ATTACHED IN “ NOTES AND ATTACHMENT” ONLY . NO PRICE SHOULD BE QUOTED IN TECHNICAL RFX FOLDER.

End of Section IV

INTEGRITY PACT

Between

Oil India Limited (OIL) hereinafter referred to as "The Principal"

And

(Name of the bidder).....hereinafter referred to as "The Bidder/Contractor"

Preamble:

The Principal intends to award, under laid down organizational procedures, contract/s for **TENDER NO. CCI 3576P17** The Principal values full compliance with all relevant laws and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder/s and Contractor/s.

In order to achieve these goals, the Principal cooperates with the renowned international Non-Governmental Organization "Transparency International" (TI). Following TI's national and international experience, the Principal will appoint an external independent Monitor who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

Section: 1 -Commitments of the Principal

(1) The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:

1. No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for him/herself or third person, any material or immaterial benefit which he/she is not legally entitled to.
2. The Principal will, during the tender process treat all Bidders with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidders the same information and will not provide to any Bidder confidential/additional information through which the Bidder could obtain an advantage in relation to the tender process or the contract execution.

3. The Principal will exclude from the process all known prejudiced persons.

(2) If the Principal obtains information on the conduct of any of its employees which is a criminal offence under the relevant Anti-Corruption Laws of India, or if there be a Page 2 of 6 substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

Section: 2 -Commitments of the Bidder/Contractor

(1) The Bidder/Contractor commits itself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.

1. The Bidder/Contractor will not, directly or through any other person or firm, offer, promise or give to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material or immaterial benefit which he/she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2. The Bidder/Contractor will not enter with other Bidders into any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, Subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

3. The Bidder/Contractor will not commit any offence under the relevant Anticorruption Laws of India; further the Bidder/Contractor will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

4. The Bidder/Contractor will, when presenting his bid, disclose any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

(2) The Bidder/Contractor will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 -Disqualification from tender process and exclusion from future Contracts

If the Bidder, before contract award has committed a transgression through a violation of Section 2 or in any other form such as to put his reliability or risibility as Bidder into question, the Principal is entitled to disqualify the Bidder from the tender process or to terminate the contract, if already signed, for such reason.

1. If the Bidder/Contractor has committed a transgression through a violation of Section 2 such as to put his reliability or credibility into question, the Principal is entitled also to exclude the Bidder/Contractor from future contract award processes. The imposition and duration of the exclusion will be determined by the severity of the transgression. The severity will be determined by the circumstances of the case, in particular the number of transgressions, the position of the transgressions within the company hierarchy of the Bidder and the amount of the damage. The exclusion will be imposed for a minimum of 6 months and maximum of 3 years.
2. The Bidder accepts and undertakes to respect and uphold the Principal's Absolute right to resort to and impose such exclusion and further accepts and undertakes not to challenge or question such exclusion on any ground, including the lack of any hearing before the decision to resort to such exclusion is taken. This undertaking is given freely and after obtaining independent legal advice.
3. If the Bidder/Contractor can prove that he has restored/recouped the Damage caused by him and has installed a suitable corruption prevention system, the Principal may revoke the exclusion prematurely.
4. A transgression is considered to have occurred if in light of available evidence no reasonable doubt is possible.

Section 4 -Compensation for Damages

1. If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover from the Bidder liquidated damages equivalent to 3 % of the value of the offer or the amount equivalent to Earnest Money Deposit/Bid Security, whichever is higher.
2. If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/Performance Bank Guarantee, whichever is higher.

3. The bidder agrees and undertakes to pay the said amounts without protest or demur subject only to condition that if the Bidder/Contractor can prove and establish that the exclusion of the Bidder from the tender process or the termination of the contract after the contract award has caused no damage or less damage than the amount or the liquidated damages, the Bidder/Contractor shall compensate the Principal only to the extent of the damage in the amount proved.

Section 5 -Previous transgression

1. The Bidder declares that no previous transgression occurred in the last 3 years with any other Company in any country conforming to the TI approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

2. If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

Section: 6 -Equal treatment of all Bidders/Contractor/Subcontractors

1. The Bidder/Contractor undertakes to demand from all subcontractors a commitment in conformity with this Integrity Pact, and to submit it to the Principal before contract signing.

2. The Principal will enter into agreements with identical conditions as this one with all Bidders, Contractors and Subcontractors.

3. The Principal will disqualify from the tender process all bidders who do not sign this Pact or violate its provisions.

Section: 7 -Criminal charges against violating Bidders/Contractors/ Subcontractors

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor, which constitutes corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

Section: 8 -External Independent Monitor/Monitors

(three in number depending on the size of the contract)
(to be decided by the Chairperson of the Principal)

1. The Principal appoints competent and credible external independent Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.

2. The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the Chairperson of the Board of the Principal.

3. The Contractor accepts that the Monitor has the right to access without restriction to all Project documentation of the Principal including that provided by the Contractor. The Contractor will also grant the Monitor, upon his request and demonstration of a valid interest, unrestricted and unconditional access to his project documentation. The same is applicable to Subcontractors. The Monitor is under contractual obligation to treat the information and documents of the Bidder/Contractor/Subcontractor with confidentiality.

4. The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.

5. As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or heal the violation, or to take other relevant action. The monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

6. The Monitor will submit a written report to the Chairperson of the Board of the Principal within 8 to 10 weeks from the date of reference or intimation to him by the 'Principal' and, should the occasion arise, submit proposals for correcting problematic situations.

7. If the Monitor has reported to the Chairperson of the Board a Substantiated suspicion of an offence under relevant Anti-Corruption Laws of India, and the Chairperson has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8. The word 'Monitor' would include both singular and plural.

Section:9 -Pact Duration

This Pact begins when both parties have legally signed it. It expires for the Contractor 12 months after the last payment under the respective contract, and for all other Bidders 6 months after the contract has been awarded.

If any claim is made/ lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified above, unless it is discharged/determined by Chairperson of the Principal.

Section:10 -Other provisions

1. This agreement is subject to Indian Law. Place of performance and jurisdiction is the Registered Office of the Principal, i.e. New Delhi.
2. Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
3. If the Contractor is a partnership or a consortium, this agreement must be, signed by all partners or consortium members.
4. Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

(RUPAK KALITA)

.....

For the Principal

.....

For the Bidder/Contractor

Witness 1:

Witness 2:

Place. NOIDA.

Date . 17.01.2017

PROFORMA - C

BID FORM

To
The Chief Manager (Contracts & Purchase)(E&D)
OIL INDIA LIMITED,
FC-24, 5th Floor, IT TOWER,
Sector-16A, NOIDA-201301 , INDIA

Sub: Tender No. : _____

Gentlemen,

Having examined the General Conditions of Contract , the Terms of Reference including all attachments thereto, the receipt of which is hereby duly acknowledged, we the undersigned offer to perform the services in conformity with the said conditions of Contract and Terms of Reference for the sum of _____ (Total Bid Amount in words and figures) or such other sums as may be ascertained in accordance with the Schedule of Prices attached herewith and made part of this Bid.

We undertake, if our Bid is accepted, to commence the work within () days calculated from the date of award of Contract.

We agree to abide by this Bid for a period of 120 days from the date fixed for Bid opening and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

Until a formal Contract is prepared and executed, this Bid, together with your written acceptance thereof in your notification of award shall constitute a binding Contract between us.

We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this _____ day of _____ 2017.

Signature

(In the capacity of)

PROFORMA-D

CERTIFICATE OF COMPLIANCE WITH RESPECT TO BRC

We _____(Name of the bidder) hereby confirm that all the conditions given in the Bid Rejection Criteria(BRC) of the Bid document of Tender No. **CCI 3576P17** are acceptable to us and we have not made any deviations from the same or put forward any additional condition in our offer in this respect. It is also confirmed that the supporting documents with regard to Eligibility Criteria of the bidder, laid down in the Bid Document are duly submitted in the Envelope 'C' containing the Techno-commercial Bid.

Name of the authorised signatory: -----

Designation: -----

Name of the bidder/firm/service provider: -----

PROFORMA-E

TENDER NO. CCI 3576P17

STATEMENT OF NON COMPLIANCE (Excepting BRC)
(Only exceptions/deviations to be rendered)

SECTION NO. (PAGE NO.)	CLAUSE NO. SUB-CLAUSE NO.	NON COMPLIANCE	REMARKS

NOTE:

OIL INDIA LIMITED expects the bidders to fully accept the terms and conditions of the bid document. However, should the bidders still envisage some exceptions/ deviations to the terms and conditions of the bid document, the same should be indicated as per above format and submit along with their technical bids. If the proforma is left blank or not submitted, then it would be construed that the bidder has not taken any exception/deviation to the terms and conditions of the bid document

PROFORMA-F

FORM OF BID SECURITY (BANK GUARANTEE)

To:
The Chief Manager (C & P) (E&D)
OIL INDIA LIMITED,
FC-24, 5th Floor, IT TOWER,
Sector-16A, NOIDA-201301 , INDIA

WHEREAS, (Name of Bidder) _____ (hereinafter called "the Bidder") has submitted their Bid No. _____ Dated _____ against OIL INDIA LIMITED, Noida, UP, India (hereinafter called the Company)'s IFB No. **CCI3576P17** for hiring of
(herein after called "the Bid) KNOW ALL MEN BY these presents that we (Name of Bank) _____ of (Name of Country) _____ having our registered office at _____ (hereinafter called "Bank") are bound unto the Company in the sum of (*) for which payment well and truly to be made to Company, the Bank binds itself, its successors and assignees by these presents.

SEALED with the common seal of the said Bank this ____ day of ____ 2017 .

THE CONDITIONS of these obligations are:

- (1) If the Bidder withdraws their Bid during the period of Bid validity specified by the Bidder; or
- (2) If the Bidder, having been notified of acceptance of their Bid by the Company during the period of Bid validity:
 - (a) Fails or refuses to execute the form of agreement in accordance with the Instructions to Bidders; or
 - (b) Fails or refuses to furnish the Performance Security in accordance with the Instructions to Bidders;

Or

- (3) If the Bidder furnishes fraudulent document / information in their bid.

We undertake to pay to Company up to the above amount upon receipt of its first written demand (by way of letter/fax/cable), without Company having to substantiate its demand provided that in its demand Company will note that the amount claimed by it is due to it owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This guarantee will remain in force up to and including the date (**) and any demand in respect thereof should reach the Bank not later than the above date.

The details of the issuing bank and controlling bank are as under :

A. Issuing Bank

1. Full address of the Bank:
2. E-mail address of the Bankers:
3. Mobile nos. of the Contact persons :

B. Controlling Office :

1. Address of the controlling office of the BG issuing banks :
2. Name of the contact persons at the controlling office with their mobile nos. and e-mail address:

SIGNATURE AND SEAL OF THE GUARANTORS _____

Name of Bank & Address _____

Witness _____

Address _____

(Signature, Name and Address)

Date: _____

Place: _____

- * The Bidder should insert the amount of the guarantee in words and figures.
- ** Date of expiry of Bank Guarantee should be **minimum 30 days after the end of the validity period of the Bid.**

PROFORMA-G

FORM OF PERFORMANCE BANK GUARANTEE

To:
The Chief Manager (C & P) (E&D)
OIL INDIA LIMITED,
FC-24, 5th Floor, IT TOWER,
Sector-16A, NOIDA-201301 , INDIA

WHEREAS _____ (Name and address of Contractor) (hereinafter called "Contractor") had undertaken, in pursuance of Contract No. _____ to execute (Name of Contract and Brief Description of the Work) _____ (hereinafter called "the Contract").

AND WHEREAS it has been stipulated by you in the said Contract that the Contractor shall furnish you with a Bank Guarantee as security for compliance with Contractor's obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE we hereby affirm that we are Guarantors on behalf of the Contractor, up to a total of (Amount of Guarantee in figures) _____ (in words _____), such amount being payable in the types and proportions of currencies in which the Contract price is payable, and we undertake to pay you, upon your first written demand and without cavil or argument, any sum or sums within the limits of guarantee sum as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein. We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or the work to be performed thereunder or of any of the Contract documents which may be made between you and the Contractor shall in any way cease us from any liability under this guarantee, and we hereby waive notice of such change, addition or modification.

This guarantee is valid until the date _____ (calculated at **3 months** after Contract completion date).

The details of the issuing bank and controlling bank are as under :

C. Issuing Bank

4. Full address of the Bank:
5. E-mail address of the Bankers:

6. Mobile nos. of the Contact persons :

D. Controlling Office :

3. Address of the controlling office of the BG issuing banks :

4. Name of the contact persons at the controlling office with their mobile nos. and e-mail address:

SIGNATURE AND SEAL OF THE GUARANTORS _____

Designation _____

Name of Bank _____

Address _____

Witness _____

Address _____

Date Place _____

PROFORMA - H

AGREEMENT FORM

This Contract is made on _____ day of _____ between Oil India Limited, a Government of India Enterprise, incorporated under the Companies Act 1956, having its registered office at Duliajan in the State of Assam, India hereinafter called the "Company" which expression unless repugnant to the context shall include executors, administrators and assignees on the one part, and M/s. _____ (Name and address of Contractor), hereinafter called the "Contractor" which expression unless repugnant to the context shall include executors, administrators and assignees on the other part.

WHEREAS the Company desires that Services _____ (brief description of services) should be provided by the Contractor as detailed hereinafter or as Company may requires.

WHEREAS, Contractor engaged themselves in the business of offering such services represents that they have adequate resources and equipment, material etc. in good working order and fully trained personnel capable of efficiently undertaking the operations and is ready, willing and able to carry out the said services for the Company as per **Section- II** attached herewith for this purpose.

WHEREAS, Company issued a firm Letter of Award No. _____ based on Offer No. _____ submitted by the Contractor against Company's Tender No. _____.

WHEREAS Contractor has accepted Company's Letter of Award vide their letter no. _____.

All these aforesaid documents shall be deemed to form and be read and construed as part of this Contract. However, should there be any dispute arising out of interpretation of this contract in regard to the terms and conditions with those mentioned in Company's tender document and subsequent letters including the Letter of Award and Contractor's offer and their subsequent letters, the terms and conditions attached hereto shall prevail. Changes, additions or deletions to the terms of the contract shall be authorized solely by an amendment to the contract executed in the same manner as this contract

NOW WHEREAS, in consideration of the mutual covenants and agreements hereinafter contained, it is hereby agreed as follows –

1. In this Contract words and expressions shall have the same meanings as are respectively assigned to them in the General Conditions of Contract referred to.

2. In addition to documents hereinabove, the following Sections and Annexures attached herewith shall be deemed to form and be read and construed as part of this agreement viz.:

(a) Section-I indicating the General Conditions of Contract,

- (b) Section-II indicating the Terms of Reference/Technical Specifications,
- (c) Section-III indicating the Special Terms and Conditions
- (d) Section-IV indicating the Schedule of rates.

3. In consideration of the payments to be made by the Company to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Company to provide the Services and to remedy defects therein in conformity in all respect with the provisions of this Contract.

4. The Company hereby covenants to pay the Contractor in consideration of the provision of the Services and the remedying of defects therein, the Contract Price or such other sum as may become payable under the provisions of this Contract at the times and in the manner prescribed by this Contract.

IN WITNESS thereof, each party has executed this contract at Noida/Delhi, India, as of the date shown above.

Signed, Sealed and Delivered,

For and on behalf of
Company (Oil India Limited)

For and on behalf of
Contractor(M/s._____)

Name:

Name:

Status:

Status:

In presence of

In presence of

1.

1.

2.

2

PROFORMA – I

PROFORMA LETTER OF AUTHORITY

To:
The Chief Manager (C & P) (E&D)
OIL INDIA LIMITED,
FC-24, 5th Floor, IT TOWER,
Sector-16A, NOIDA-201301 , INDIA

Sir,

Sub: OIL's Tender No. _____

We _____ confirm that Mr. _____ (Name and address) as authorised to represent us to Bid, negotiate and conclude the agreement on our behalf with you against Tender Invitation No. _____ for hiring of services for _____.

We confirm that we shall be bound by all and whatsoever our said representative shall commit.

Yours Faithfully,

Signature: _____

Name & Designation: _____

For & on behalf of: _____

Note: This letter of authority shall be on printed letter head of the Bidder and shall be signed by a person competent and having the power of attorney (power of attorney shall be annexed) to bind such Bidder. If signed by a consortium, it shall be signed by members of the consortium

PROFORMA- J

AUTHORISATION FOR ATTENDING BID OPENING

To:
The Chief Manager (C & P) (E&D)
OIL INDIA LIMITED,
FC-24, 5th Floor, IT TOWER,
Sector-16A, NOIDA-201301 , INDIA

Sir,

Sub : OIL's IFB No. _____

We authorise Mr. /Mrs. _____ (Name and address) to be
present at the time of opening of the above IFB due on _____ at
NOIDA on our behalf.

Yours Faithfully,

Authorised Person's Signature: _____

Name: _____

Designation: _____

Seal of the Bidder:

Note: This letter of authority shall be on printed letter head of the
Bidder and shall be signed by a person who signs the bid.

ANNEXURE-B

Guidelines to bidders for participating in OIL's e-Procurement tenders

Bid invitations (Tenders)

The details of e-Procurement tenders can be accessed from our e-Procurement site. <https://etender.srm.oilindia.in/irj/portal/>!

To view e-Procurement tenders you need to login using your login id & password to view all tenders available for you.

If you do not have a user id, please click on Guest login button to view available open tenders.

Pre-requisites to submit tenders on line through e-Procurement Portal

Bidders should have a valid User Id to access OIL e-Procurement site.

Bidders should have a legally valid Class 3 digital certificate with Organizations Name as per Indian IT Act from the licensed Certifying Authorities operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India.

Tender fee must have been paid, if applicable for the Bid Invitation. If Bidder is exempt from paying tender fee, Bidder must hold exemption from the Tender Officer.

Bidder should fulfill any other pre-requisites mentioned in the tender documents of a specific tender.

Obtaining User Id to access OIL e-Procurement site

Initially user id and password will be assigned to you.

Please send your updated mailing address with pin code, phone number, fax number and

email ID to the us at erp_mm@oilindia.in.

Bidders interested in a particular bid invitation should apply for user id at least 7 days prior to the last date mentioned (Last Date for Tender Fee Payment, if exists or Submission Deadline) in the bid invitation.

Instructions for obtaining Digital Certificate

In order to bid for OIL e-tenders all the vendors are required to obtain a legally valid digital certificate as per Indian IT Act from the licensed Certifying Authorities (CA) operating under the Root Certifying Authority of India (RCAI), Controller of Certifying Authorities (CCA) of India. (<http://www.cca.gov.in/>)

Steps for obtaining Digital Certificate

Visit the site of the licensed CA using internet browser.

Apply online for a class 3 digital certificate for the designated individual with organization name. Ensure the Digital Certificate is legally valid in India.

For making payment and submission of documents required for issue of the Digital Certificate, follow the instructions on the CA's website.

Use the class 3 Digital Certificate thus obtained for online bidding on OIL e-

Procurement site.

Links to some licensed CA's are provided below

1. [TCS](#)
2. [Safescrypt](#)
3. [MTNL Trustline](#)
4. [\(n\)Code Solutions](#)
5. [e-mudhra](#)

Technical Settings

1. **Web Browser Supported:** Microsoft IE Ver 6.0 or higher recommended
2. **Java:** To view some of the components, you need to install Java Internet component JDK 5.0 from <http://java.sun.com/javase/downloads/index.jsp>
3. **Proxy:** If you are unable to access OIL e-Procurement site or Bid Documents, check if you are using proxy to connect to internet or if your PC is behind any firewall. Contact your system administrator to enable connectivity. Please note that standard Port for HTTPS (443) connectivity should be enabled on your proxy/firewall. Dial-up internet connectivity without Proxy settings is another option.
4. **Pop-ups:** Pop-ups should be enabled on OIL e-Procurement URL and Bid Documents URLs. This is required to view tender documents.
5. **Recommended Screen Resolution:** 1024 by 768 pixels.
6. **Internet Speeds:** If you are experiencing slow connectivity to OIL e-Procurement, then contact your system administrator/ISP provider for desirable speeds.
7. **Active-x controls:** Maintain the settings as described in Internet Explorer settings document to enable digital signature signing and verification.

Parameter	Value
Allow Scriplets	Enable
Automatic prompting for ActiveX controls	Enable
Binary and script behaviors	Enable
Download signed ActiveX controls	Enable
Download unsigned ActiveX controls	Enable
Initialize and script ActiveX controls not marked as safe	Enable
Run ActiveX controls and plug-ins	Enable
Script ActiveX controls marked safe for scripting	Enable
Use Pop-up Blocker	Disable

8. **Digital signature client SW/component :** To use Digital Signature, a client level Software is required. This is third party software from Safescrypt. This is installed automatically, once you start working on OIL's e-procurement system. A popup will come before it starts installation. You need to ensure you have administrative rights on the PC or the laptop. This installation is one time activity for a PC or Laptop.

- 9. Please go through OIL's e – Portal / Website before uploading your bids for updated information regarding participation requirements and procedure for OIL's e – tenders.**

FORMAT OF AGREEMENT BETWEEN BIDDER AND THEIR PARENT COMPANY / 100% SUBSIDIARY COMPANY (As the case may be)

(TO BE EXECUTED ON STAMP PAPER OF REQUISITE VALUE AND NOTORISED)

This agreement made this ____ day of ____ month ____ year by and between M/s. _____ (Fill in the Bidder's full name, constitution and registered office address) hereinafter referred to as bidder on the first part and M/s. _____ (Fill in full name, constitution and registered office address of Parent Company/Subsidiary Company, as the case may be) hereinafter referred to as "Parent Company/Subsidiary Company (Delete whichever not applicable)" of the other part:

WHEREAS

M/s. Oil India Limited (hereinafter referred to as OIL) has invited offers vide their tender No. _____ for _____ and

M/s. _____ (Bidder) intends to bid against the said tender and desires to have technical support of M/s. _____ [Parent Company/Subsidiary Company (Delete whichever not applicable)] and whereas Parent Company/Subsidiary Company (Delete whichever not applicable) represents that they have gone through and understood the requirements of subject tender and are capable and committed to provide the services as required by the bidder for successful execution of the contract, if awarded to the bidder.

Now, it is hereby agreed to by and between the parties as follows:

1. M/s. _____ (Bidder) will submit an offer to OIL for the full scope of work as envisaged in the tender document as a main bidder and liaise with OIL directly for any clarifications etc. in this context.
2. M/s. _____ (Parent Company/Subsidiary Company (Delete whichever not applicable)) undertakes to provide technical support and expertise, expert manpower and procurement assistance and project management to support the bidder to discharge its obligations as per the Scope of work of the tender / Contract for which offer has been made by the Parent Company/Subsidiary Company (Delete whichever not applicable) and accepted by the bidder.
3. This agreement will remain valid till validity of bidder's offer to OIL including extension if any and till satisfactory performance of the contract in the event the contract is awarded by OIL to the bidder

4. It is further agreed that for the performance of work during contract period bidder and Parent Company/Subsidiary Company (Delete whichever not applicable) shall be jointly and severely responsible to OIL for satisfactory execution of the contract.
5. However, the bidder shall have the overall responsibility of satisfactory execution of the contract awarded by OIL.

In witness whereof the parties hereto have executed this agreement on the date mentioned above.

For and on behalf of
(Bidder)

For and on behalf of
(Parent Company/Subsidiary
Company (Delete whichever not
applicable)

M/s.
Witness:
1)
2)

M/s.
Witness:
1)
2)

Appendix – II

PARENT COMPANY/ SUBSIDIARY COMPANY GUARANTEE (Delete whichever not applicable)

(TO BE EXECUTED ON STAMP PAPER OF REQUISITE VALUE AND NOTORISED)

DEED OF GUARANTEE

THIS DEED OF GUARANTEE executed at this day of by M/s (mention complete name) a company duly organized and existing under the laws of (insert jurisdiction/country), having its Registered Office at hereinafter called “the Guarantor” which expression shall, unless excluded by or repugnant to the subject or context thereof, be deemed to include its successors and permitted assigns.

WHEREAS

M/s Oil India Limited, a company duly registered under the Companies Act 1956, having its Registered Office at Duliajan in the State of Assam, India, and having an office, amongst others, at FC 24, Sector 16A, Noida India hereinafter called “OIL” which expression shall unless excluded by or repugnant to the context thereof, be deemed to include its successor and assigns, invited tender number for on

M/s (mention complete name), a company duly organized and existing under the laws of (insert jurisdiction/country), having its Registered Office at (give complete address)

hereinafter called “the Company” which expression shall, unless excluded by or repugnant to the subject or context thereof, be deemed to include its successor and permitted assigns, have, in response to the above mentioned tender invited by OIL, submitted their bid number to OIL with one of the condition that the Company shall arrange a guarantee from its parent company guaranteeing due and satisfactory performance of the work covered under the said tender including any change therein as may be deemed appropriate by OIL at any stage.

The Guarantor represents that they have gone through and understood the requirement of the above said tender and are capable of and committed to provide technical and such other supports as may be required by the Company for successful execution of the same.

The Company and the Guarantor have entered into an agreement dated as per which the Guarantor shall be providing technical and such other supports as may be necessary for performance of the work relating to the said tender.

Accordingly, at the request of the Company and in consideration of and as a requirement for OIL to enter into agreement(s) with the Company, the Guarantor hereby agrees to give this guarantee and undertakes as follows:

1. The Guarantor (Parent Company / **100% Subsidiary Company** **(Delete whichever not applicable)**) unconditionally agrees that in case of non-performance by the Company of any of its obligations in any respect, the Guarantor shall, immediately on receipt of notice of demand by OIL, take up the job without any demur or objection, in continuation and without loss of time and without any cost to OIL and duly perform the obligations of the Company to the satisfaction of OIL.
2. The Guarantor agrees that the Guarantee herein contained shall remain valid and enforceable till the satisfactory execution and completion of the work (including discharge of the warranty obligations) awarded to the Company.
3. The Guarantor shall be jointly with the Company as also severally responsible for satisfactory performance of the contract entered between the Company and OIL.
4. The liability of the Guarantor, under the Guarantee, is limited to the 50% of the annualized contract price entered between the Company and OIL. This will, however, be in addition to the forfeiture of the Performance Guarantee furnished by the Company.

5. The Guarantor represents that this Guarantee has been issued after due observance of the appropriate laws in force in India. The Guarantor hereby undertakes that the Guarantor shall obtain and maintain in full force and effect all the governmental and other approvals and consents that are necessary and do all other acts and things necessary or desirable in connection therewith or for the due performance of the Guarantor's obligations hereunder.
6. The Guarantor also agrees that this Guarantee shall be governed and construed in accordance with the laws in force in India and subject to the exclusive jurisdiction of the courts of, India.
7. The Guarantor hereby declares and represents that this Guarantee has been given without any undue influence or coercion, and that the Guarantor has fully understood the implications of the same.
8. The Guarantor represents and confirms that the Guarantor has the legal capacity, power and authority to issue this Guarantee and that giving of this Guarantee and the performance and observations of the obligations hereunder do not contravene any existing laws.

For & on behalf of (Parent
Company/Subsidiary Company (Delete whichever not applicable))

M/s _____

Witness:

1. Signature _____
Full Name _____
Address _____

Signature _____
Name _____
Designation _____

Common seal of the
Company_____

Witness:

2. Signature _____
Full Name _____
Address _____

INSTRUCTIONS FOR FURNISHING PARENT/SUBSIDIARY COMPANY GUARANTEE

1. Guarantee should be executed on stamp paper of requisite value and notarised.
2. The official(s) executing the guarantee should affix full signature (s) on each page.
3. Resolution passed by Board of Directors of the guarantor company authorizing the signatory(ies) to execute the guarantee, duly certified by the Company Secretary should be furnished alongwith the Guarantee.
4. Following certificate issued by Company Secretary of the guarantor company should also be enclosed alongwith the Guarantee.
“Obligation contained in the deed of guarantee No. _____ furnished against tender No. _____ are enforceable against the guarantor company and the same do not, in any way, contravene any law of the country of which the guarantor company is the subject”

Appendix – III

FORMAT OF AGREEMENT BETWEEN BIDDER THEIR SISTER SUBSIDIARY/CO-SUBSIDIARY COMPANY AND THE ULTIMATE PARENT/HOLDING COMPANY OF BOTH THE BIDDER AND THE SISTER SUBSIDIARY/CO-SUBSIDIARY (Strike out whichever is not applicable between Ultimate Parent and Holding Company. Similarly strike out whichever is not applicable between Sister Subsidiary and Co-subsidiary Company)

(TO BE EXECUTED ON STAMP PAPER OF REQUISITE VALUE AND NOTORISED)

This agreement made this ____ day of ____ month ____ year by and between M/s. _____ (Fill in Bidder's full name, constitution and registered office address) _____ hereinafter referred to as "Bidder" of the first part and

M/s. _____ (Fill in full name, constitution and registered office address of Sister Subsidiary/Co-subsidiary Company of the Bidder) herein

after referred to as “Sister Subsidiary/ Co-subsidiary” of the second part and

M/s_____ (Fill in the full name, constitution and registered office address of the Ultimate Parent/Holding Company’s of both the subsidiaries) hereinafter referred to as “Ultimate Parent/ Holding Company” of the third part.

WHEREAS

M/s. Oil India Limited (hereinafter referred to as OIL) has invited offers vide their tender No. _____ for _____ and

M/s. _____ (Bidder) intends to bid against the said tender and desires to have a technical support of M/s. _____ (Sister Subsidiary/Co-subsidiary Company) and

Sister Subsidiary/Co-subsidiary Company represents that they have gone through and understood the requirements of subject tender and are capable and committed to provide the services as required by the bidder for successful execution of the contract, if awarded to the bidder.

Now, it is hereby agreed to by and between all the three parties as follows:

1. M/s. _____ (Bidder) will submit an offer to OIL for the full scope of work as envisaged in the tender document.
2. M/s. _____ (Sister Subsidiary/Co-subsidiary Company) undertakes to provide technical support and expertise and expert manpower, material, if any, to support the bidder to discharge its obligations as per the Scope of work of the tender / Contract for which offer has been made by the bidder.
3. This agreement will remain valid till validity of bidder’s offer to OIL including extension if any and also till satisfactory performance of the contract in the event the bid is accepted and contract is awarded by OIL to the bidder.
4. Sister Subsidiary/ Co-subsidiary Company unconditionally agrees that in case of award of contract to the Bidder, if the Bidder is unable to execute the contract, they shall, immediately on receipt of notice by OIL, take up the job without any demur or objection, in continuation without loss of time and without any extra cost to OIL and duly perform the obligations of the Bidder/Contractor to the satisfaction of OIL.
5. The Ultimate Parent/Holding Company also confirms and undertakes that the commitment made by the Sister Subsidiary/ Co-subsidiary

company in providing the technical support and technical expertise and expert manpower to support the bidder for execution of the contract are honoured.

6. The Ultimate Parent/Holding Company also takes full responsibility in getting the contract executed through the Sister subsidiary/ Co-subsidiary company in case the Bidder/Contractor is unable to execute the contract.
7. In witness whereof the parties hereto have executed this agreement on the date mentioned above.

For and on behalf of (Bidder)	For and on behalf of (Sister Subsidiary / Co-subsidiary)	For and on behalf of (Ultimate Parent / Holding Company)
M/s.	M/s.	M/s.
Witness	Witness	Witness
1)	1)	1)
2)	2)	2)

Note: In case of contracts involving - (a) manufacture/supply (b) installation and commissioning (c) servicing and maintenance of any equipment, as the bidding company can draw on the experience of their multiple subsidiary sister/Co-subsidiary company (ies) specializing in each sphere of activity, i.e. (a) manufacture/supply (b) installation and commissioning (c) servicing and maintenance, therefore, in that case, the above format shall be signed by all the sister/Co-subsidiary company(ies) and necessary modifications may be made in the above format to include all sister subsidiaries.

GENERAL HSE POINTS TO BE INCORPORATED IN THE CONTRACT

1. It will be solely the Contractor's responsibility to fulfill all the legal formalities with respect to the Health, Safety and Environmental aspects of the entire job (namely; the person employed by him, the equipment, the environment, etc.) under the jurisdiction of the district of that state where it is operating. Ensure that all sub-contractors hired by him comply with the same requirement as the contractor himself and shall be liable for ensuring compliance all HSE laws by the sub or sub-sub contractors.
2. Every person deployed by the contractor in a mine must wear safety gadgets to be provided by the contractor. The Contractor shall provide proper Personnel Protective Equipment as per the hazard identified and risk assessed for the job and conforming to statutory requirement and company PPE schedule. Safety appliances like protective footwear, Safety Helmet and Full Body harness has to be DGMS approved. Necessary supportive document shall have to be submitted as proof. If the Contractor fails to provide the safety items as mentioned above to the working personnel, the Contractor may apply to the Company (OIL) for providing the same. OIL will provide the safety items, if available. But in turn, OIL will recover the actual cost of the items by deducting from Contractor's Bill. However, it will be the Contractor's sole responsibility to ensure that the persons engaged by him in the mines use the proper PPE while at work. All the safety gears mentioned above are to be provided to the working personnel before commencement of the work.
3. The Contractor shall prepare written Safe Operating Procedure (SOP) for the work to be carried out, including an assessment of risk, wherever possible and safe methods to deal with it/them. The SOP should clearly state the risk arising to men, machineries & material from the mining operation / operations to be done by the contractor and how it is to be managed.
4. The contractor shall provide a copy of the SOP to the person designated by the mine owner who shall be supervising the contractor's work.
5. Keep an up to date SOP and provide a copy of changes to a person designated by the Mine Owner/Agent/Manager.

6. Contractor has to ensure that all work is carried out in accordance with the Statute and SOP and for the purpose he may deploy adequate qualified and competent personnel for the purpose of carrying out the job in a safe manner. For work of a specified scope/nature, he should develop and provide to the mine owner a site specific code of practice in line.
7. All persons deployed by the contractor for working in a mine must undergo Mines Vocational Training, initial medical examination, PME. They should be issued cards stating the name of the contractor and the work and its validity period, indicating status of MVT, IME & PME.
8. The contractor shall submit to DGMS returns indicating - Name of his firm, Registration number, Name and address of person heading the firm, Nature of work, type of deployment of work persons, Number of work persons deployed, how many work persons hold VT Certificate, how many work persons undergone IME and type of medical coverage given to the work persons.
9. The return shall be submitted quarterly (by 10th of April, July, October & January) for contracts of more than one year. However, for contracts of less than one year, returns shall be submitted monthly.
10. It will be entirely the responsibility of the Contractor/his Supervisor/representative to ensure strict adherence to all HSE measures and statutory rules during operation in OIL's installations and safety of workers engaged by him. The crew members will not refuse to follow any instruction given by company's Installation Manager / Safety Officer / Engineer / Official / Supervisor/Junior Engineer for safe operation.
11. Any compensation arising out of the job carried out by the Contractor whether related to pollution, Safety or Health will be paid by the contractor only.
12. Any compensation arising due to accident of the Contractor's personnel while carrying out the job, will be payable by the contractor.
13. The contractor shall have to report all incidents including near miss to Installation Manager / departmental representative of the concerned department of OIL.

14. The contractor has to keep a register of the persons employed by him/her. The contractor's supervisor shall take and maintain attendance of his men every day for the work, punctually.
15. If the company arranges any safety class / training for the working personnel at site (company employee, contractor worker, etc) the contractor will not have any objection to any such training.
16. The health check up of contractor's personnel is to be done by the contractor in authorized Health Centres as per OIL's requirement & proof of such test(s) is to be submitted to OIL. The frequency of periodic medical examinations should be every five years for the employees below 45 years of age and every three years for employees of 45 years of age and above.
17. To arrange daily tool box meeting and regular site safety meetings and maintain records.
18. Records of daily attendance, accident report etc. are to be maintained in Form B, E, J (as per Mines Rules 1955) by the contractor.
19. A contractor employee must, while at work, take reasonable care for the health and safety of people who are at the employee's place of work and who may be affected by the employee's act or omissions at work.
20. A contractor employee must, while at work, cooperate with his or her employer or other persons so far as is necessary to enable compliance with any requirement under the act or the regulations that is imposed in the interest of health, safety and welfare of the employee or any other person.
21. Contractor's arrangements for health and safety management shall be consistent with those for the mine owner.
22. In case Contractor is found non-compliant of HSE laws as required company will have the right for directing the contractor to take action to comply with the requirements, and for further non-compliance, the contractor will be penalized prevailing relevant Acts/Rules/Regulations.
23. When there is a significant risk to health, environment or safety of a person or place arising because of a non-compliance of HSE Measures Company will have the right to direct the contractor to cease work until the non-compliance is corrected.

24. The contractor should prevent the frequent change of his contractual employees as far as practicable.
25. The contractor should frame a mutually agreed bridging document between OIL & the contractor with roles and responsibilities clearly defined.
26. For any HSE matters not specified in the contract document, the contractor will abide the relevant and prevailing Acts/rules/regulations/pertaining to Health, Safety and Environment.

**Public Procurement Policy for Micro
and Small Enterprises (MSEs)**

Govt. of India under Micro, Small and Medium Enterprises Development (MSMED) Act 2006, has proclaimed the Public Procurement Policy, 2012 with effect from 1st April, 2012 in respect of procurement of goods and services, produced and provided by micro and small enterprises, by its Ministries, Departments and Public Sector Undertakings for promotion and development of Micro and Small Enterprises.

The Public Procurement Policy shall apply to Micro and

Small Enterprises registered with:

- (i) District Industries Centers or
- (ii) Khadi and Village Industries Commission or
- (iii) Khadi and Village Industries Board or
- (iv) Coir Board or
- (v) National Small Industries Corporation or
- (vi) Directorate of Handicrafts and Handloom or
- (vii) Any other body specified by Ministry of
Micro, Small and Medium Enterprises

2.0 Classification of Micro, Small and Medium Enterprises (MSME) for supply of Goods :

In the case of the enterprises engaged in the manufacture or production of goods pertaining to any industry specified in the First Schedule to the Industries (Development and Regulation) Act, 1951, as:

- (a) A Micro enterprise, where the investment in plant and machinery does not exceed twenty five lakh rupees.
- (b) A Small enterprise, where the investment in plant and machinery is more than twenty five lakh rupees but does not exceed five crore rupees.
- (c) A Medium enterprise, where the investment in plant and machinery is more than five crore rupees but does not exceed ten crore rupees.

2.1 The MSEs owned by SC/ST entrepreneurs shall mean:

- a) In case of Proprietary MSE, proprietor(s) shall be SC/ST.
- b) In case of Partnership MSE, the SC/ST partners shall be holding at least 51% share in the unit.

c) In case of Private Limited Companies, at least 51% share is held by SC/ST. If the MSE is owned by SC/ST entrepreneurs, the bidder shall furnish appropriate documentary evidence in this regard.

3.0 Benefits to Micro and Small Enterprises :

i) **Exemption from payment of Tender Fee :**

MSEs (and not their dealers/distributors) registered with District Industry Centers or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of MSME are exempted from payment of tender fee irrespective of the monetary limit mentioned in their registration certificate provided they furnish documentary evidence that they are registered for the items they intend to quote against OIL tenders.

ii) **Exemption from submission of Earnest Money/Bid Security :**

MSEs (and not their dealers/distributors) registered with District Industry Centers or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of MSME are exempted from submission of Bid Security/Earnest Money provided they are registered for the items they intend to quote.

4.0 Documents Required to be submitted by MSEs : Micro or Small Enterprises (MSE) registered with District Industry Centers or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of MSME shall submit copy of valid Registration Certificate for the items they intend to quote along with the bid. The Registration Certificate should clearly indicate the monetary limit, if any and the items for which bidder are registered with any of the aforesaid agencies.

In case bidding MSE is owned by Schedule Caste or Schedule Tribe entrepreneur, valid documentary evidence issued by the agency who has registered the bidder as MSE owned by SC/ST entrepreneur should also be enclosed.

5.0 **Performance Security :**

Micro and Small Enterprises registered with District Industry Centres or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of MSME however, should note that Performance Security shall be required to be submitted by them for orders/contracts placed by

OIL on them.

6.0 Purchase Preference to Micro and Small Enterprises:

Purchase preference to Micro and Small Enterprises registered with District Industry Centres or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of MSME :

In case participating MSEs quote price within price band of L1+15%, such MSE shall be allowed to supply bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE and such MSE shall be allowed to supply 100% of tendered value at the L1 price.

A target of 4% out of 100% has been earmarked for procurement from MSEs owned by the SC or ST entrepreneurs. Provided that, in event of failure of such MSEs to participate in tender process or meet tender requirement and L-1 price, 4% earmarked for MSEs owned by SC or ST entrepreneurs shall be met from other MSEs.

In case of more than one such MSE qualifying for 15% purchase preference, the 100% supply shall be shared equally amongst such MSEs. However, in the opinion of OIL if tendered items are non-splitable or non-dividable, OIL reserves the right to place order for supply of 100% quantity to lowest eligible MSE amongst the MSEs qualifying for 15% Purchase preference.

7.0 In case a supplier (other than Micro/Small Enterprise) against an order placed by OIL procures materials from their sub-vendor who is a Micro or Small Enterprise registered with District Industry Centers or Khadi and Village Industries Commission or Khadi and Village Industries Board or Coir Board or National Small Industries Corporation or Directorate of Handicrafts and Handloom or any other body specified by Ministry of MSME, with prior consent in writing from OIL, the complete details (i.e. name of the subcontractor, value of sub-contacted work, copy of valid MSE registration certificate etc.) of the sub-contractor(s) shall be furnished by the supplier to OIL.

CHECK LIST

The Bidder are advised in their own interest to ensure that the following points / aspects in particular have been complied with in their offer failing which the offer is liable to be rejected.

1. Please tick whichever is applicable and cross whichever is/are not applicable.
2. Please sign each sheet.
3. The check-list duly filled in must be returned along with the offer.

COMMERCIAL**GROUP 'A'**

1. Have the rates, prices and totals, etc. been checked thoroughly before signing the tender?
 Yes No
2. Has the bidder's past experience been carefully filled and enclosed with the offer?
 Yes No
3. Whether firm prices have been quoted
 Yes No
4. Whether rates have been quoted exactly as per the price bid format?
 Yes No Not applicable
5. Whether the period of validity of the offer is as required in bidding document ? If not, mention the extent of variation.
 Yes No Extent of variation in days
6. Whether the offer has been signed indicating full name and clearly showing as to whether it has been signed as
 Secretary Manager Partner
 Sole Proprietor Active Partner Pre procuraterium
7. If the Bidder is seeking business with OIL for the first time, has he given the details of the parties to whom the offered items/services have been provided in past along with their performance report ?

	Yes	No	
8. Are the pages of the offer consecutively numbered and an indication given on the front page of the offer as to how many pages are contained in the offer?
- | | | | |
|--|-----|----|--|
| | Yes | No | |
|--|-----|----|--|
9. Has the offer been prepared in sufficient details/ clarity so as to avoid post tender opening clarifications / amendments?
- | | | | |
|--|-----|----|--|
| | Yes | No | |
|--|-----|----|--|
10. Whether all the clauses of the bidding document are accepted?
- | | | | |
|--|-----|----|--|
| | Yes | No | |
|--|-----|----|--|
11. Confirm that all documents required in unpriced techno-commercial bid without prices are placed in unpriced fold.(TECHNICAL RFX)
- | | | | |
|--|-----|----|--|
| | Yes | No | |
|--|-----|----|--|
12. Confirm that bid and all documents are signed using valid digital signatures issued by acceptable Certifying Authority (CA) as per Indian IT Act 2000 (as amended from time to time).
- | | | | |
|--|-----|----|--|
| | Yes | No | |
|--|-----|----|--|
13. Whether Bid Security in original submitted ?
- | | | | |
|--|-----|----|--|
| | Yes | No | |
|--|-----|----|--|
14. Whether Bid Security amount and validity are as per Tender ?
- | | | | |
|--|-----|----|--|
| | Yes | No | |
|--|-----|----|--|
15. Whether Financial Turnover, Net worth are as per tender and you have submitted documentary evidence.
- | | | | |
|--|-----|----|--|
| | Yes | No | |
|--|-----|----|--|

GROUP B

TECHNICAL

1.0 Whether you are meeting the Technical Experience criteria of the BRC and submitted documentary evidence ?

Yes

No

2.0 Whether you have gone through the all scope of work document and quoted for all scope of works ?

Yes

No

Signature of the Bidder

----- END OF TENDER -----



INTERIOR WORKS FOR 5TH & 6TH FLOOR AT NBCC CENTRE, OKHLA (PHASE-I) NEW DELHI

VOLUME-I

TECHNICAL SPECIFICATIONS & SCOPE OF WORK

Issued by:

**General Manager (Contracts & Purchase)
Oil India Limited
Plot No. 19, Sector-16A,
Noida (U.P.) - 201 301, India**

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VOLUME-I

TECHNICAL SPECIFICATIONS

ABBREVIATIONS & NOTATIONS

UNLESS OTHERWISE SPECIFIED FOLLOWING NOTATIONS / ABBREVIATIONS SHALL BE APPLICABLE

MM/mm	-	MILLIMETER
SQMM/sqmm/mm2	-	SQUARE MILLIMETER
CM/cm	-	CENTIMETER
SQCM/sqcm	-	SQUARE CENTIMETER
SFT/sft	-	SQUARE FEET
M/m/rm/RM	-	METRE/RUNNING METRE
SQM/sqm/M2	-	SQUARE METRE
CUM/cum/M3	-	CUBIC METRE
KG/kg	-	KILOGRAM
MT	-	METRIC TONNE
MS	-	MILD STEEL
CI	-	CAST IRON
DIA/dia	-	DIAMETER
NO (S) / Nos./nos.	-	NUMBER(S)
RCC	-	REINFORCED CEMENT CONCRETE
E-I-C	-	ENGINEER-IN-CHARGE
IS/BIS	-	INDIAN STANDARD
API	-	AMERICAN PETROLEUM INSTITUTE
JOB	-	JOB LUMPSUM
EMD	-	EARNEST MONEY DEPOSIT
ISD	-	INITIAL SECURITY DEPOSIT
BG	-	BANK GUARANTEE

Specifications For Civil Works

Specifications for Civil Works

1.0.0 GENERAL:

- 1.1.0 The scope of these specifications includes all civil works connected with the construction of buildings and other facilities described in the scope of work under special conditions of contract. CPWD specifications and relevant code may be followed for any work not covered under these specifications.
- 1.2.0 All materials which may be used in the work shall be of standard quality manufactured by renowned concerns conforming to Indian Standard Specifications (Latest Edition) or equivalent and shall bear I.S.I. mark as far as possible unless otherwise approved by the Engineer-in-Charge.
- 1.2.1 The contractor shall get all materials approved by the Engineer-in-Charge prior to procurement of the same in bulk and also before using in the works. For all major items/ materials used in the works (irrespective of the brand of material or proven source) necessary laboratory tests shall be conducted/or test certificates from the manufacturer shall be furnished by the contractor to ensure conformation of the material to specifications. The tests shall be conducted as directed by Engineer-in- Charge and in approved laboratory(s). The costs of all tests shall be borne by contractor. Additionally, for testing of materials like concrete, bricks, aggregates etc. which require continuous testing, contractor at his own cost and initiative, shall arrange for facilities for testing at site itself to ensure proper quality control at work site. Frequency of these testing shall be as per standard practice being followed in C.P.W.D. or as directed by Engineer-in-Charge. A separate register shall be maintained indicating the details of tests conducted/reports from laboratories and tests conducted/ result at work site.
- 1.2.2 The Engineer-in-Charge shall have the right to determine whether all or any of the materials are suitable for incorporation in the work. Any material procured or brought to site and not conforming to specifications and not up to the satisfaction of the Engineer-in-Charge shall be rejected and the contractor shall have to remove the same immediately from site at his own expenses and without any claim for compensation due to such rejection.
- 1.2.3 The contractor shall keep a proper register at work site indicating the details of materials brought in & the consumption details on day to day basis. The register shall be submitted to Site Engineer/Engineer -in-charge. The contractor shall also keep, readily available at site, a copy of all Delivery Challans and Invoices of materials being brought to site for incorporation in the works and shall produce the same on demand by Site Engineer.
- 1.3.0 Method of measurement for different items of works unless otherwise specified herein shall be as per IS: 1200 (latest edition).
- 1.4.0 Prior to commencement of work, the contractor shall set up, at no extra cost to OWNER, a Quality Control lab at site and shall have the following minimum test equipment(s) alongwith all relevant BIS codes, CPWD specifications and other standards:-
- Cube testing machine
Cube moulds

I.S. sieves for sieve analysis of aggregates
Rebound hammer test equipment
Weigh balance with weights
Temperature controlled oven
Measuring jar, Proctor density, core cutter, screw gauge
Any other equipment as advised by Engineer-in-Charge.

2.0.0 MATERIALS:

2.1.0 BRICKS:

2.1.1 The bricks shall be free from cracks, flaws, bends, organic matter and nodules of free lime. Bricks shall conform to IS: 1077-1992.

2.2.0 **Fine Sand:** Its grading shall be within the limits of grading zone IV. Maximum quantity of silt shall not exceed 8 %.

2.2.1 **Coarse Sand:** Its grading shall be within the limits of Grading Zone II. The maximum quantity of silt shall not exceed 8 %.

2.3.0 CEMENT:

2.3.1 Unless otherwise specified, cement shall be ordinary Portland cement conforming either to IS: 269 (OPC 33 Grade) or IS: 8112 (OPC 43 Grade) latest edition. However, Portland slag cements conforming to IS: 455 or Portland pozzolana cement conforming to IS: 1489 (part1) latest edition may be used as per instructions/ approval of Engineer-in-charge. Contractor shall make proper storage arrangement for cement at the site of works to the satisfaction of the Engineer-in-Charge. Cement should always be stored in such manner as to be easily accessible for proper inspection rejected.

2.4.0 WATER:

2.4.1 Water shall conform to requirements given in IS: 456- 2000. It shall be clean and free from injurious quantities of oils, acids, alkalis, salts, sugar, organic materials, vegetable matter or other substances that may be deleterious to brick, stone, concrete or steel. Potable water is generally considered satisfactory for mixing concrete.

2.5.0 MARBLE STONE:

Marble stone shall be Makrana second quality / Rajnagar white marble as specified. It shall be hard, sound, dense and homogenous in texture with crystalline texture as far as possible. It shall be uniform in colour and free from stains, cracks, decay and weathering. Marble tiles shall be square cut to linear dimensions in multiple of 10 cm. The tolerance limits in linear dimension and thickness shall be 3% and 1% respectively. Marble shall be tested for water absorption as per IS provision. Before starting the work, the contractor shall get samples of marbles approved by the Engineer-in-Charge.

2.6.0 PAINTS:

- 2.6.1 Paints, oils, varnish spirit etc, of brand with ISI mark as approved by the Site Engineer shall be used. Paints manufactured by M/s Berger, Asian Paints, ICI, Nerolac shall be used. Primer and thinners used shall also be of same manufacture and brand. Ready mixed paints as received from the manufacturer without any admixtures shall be used as per manufacturer's instruction. If, for any reason thinning is necessary (in case of ready mixed Paint) the brand of thinner recommended by the manufacturer or as instructed by the Site Engineer shall be used.

2.7.0 OTHER MATERIALS:

- 2.7.1 All other materials not fully specified herein and which may be used in the works shall be of best quality approved by the Engineer-in-Charge and he shall have the right to determine whether all or any of the materials offered or delivered for use in the works are suitable for the intended purpose. Contractor shall produce the sample of materials to the Engineer-in-Charge and shall get it approved before procurement and execution of work.

3.0.0 DISMANTLING & DEMOLISHING:

- 3.1.0 The term 'Dismantling' implies carefully separating the parts without damage and removing. The term 'Demolition' implies taking up or down or breaking up. This shall consist of demolishing in whole or part of work including all relevant items as directed. The dismantling & demolition operations shall always be well planned before hand. The operational procedure shall be got approved by Engineer-in-Charge before starting of work. Use of pneumatic tools or silent non-explosive demolition agent (like ACCONEX of M/s. ACC or any other equivalent approved brand) may be used as per manufacturer's recommendation & instruction of Engineer-in-charge. Under no circumstances blasting shall be allowed. Wherever necessary, propping, shoring and underpinning shall be provided for the safety of the adjoining work or property, which is to left intact, before dismantling and demolishing is taken up and work shall be carried out in such as way that no damage is caused to the adjoining work or property. Necessary precautions shall be taken to keep the dust nuisance down as and where necessary. Necessary instructions issued by Engineer-in-Charge and/or Site Engineer shall be strictly adhered to in this regard. The demolished materials shall be handled carefully and properly stacked as directed by the Site Engineer.
- 3.2.0 All materials obtained from demolition shall be the property of the owner. The serviceable materials shall be stacked in the manner as directed by Engineer-in- Charge. All unserviceable materials, rubbish etc. shall be removed from the area and disposed off in a manner as specified and directed by Engineer-in-Charge.
- 3.3.0 Demolition of reinforced concrete, plain concrete, stone masonry etc. shall be paid on cubic metre basis. No extra payment will be made for reinforcement encountered. Reinforcement is to be cut out and stacked separately.

4.0.0 BRICK WORK:

- 4.1.0 Brick work will be with bricks of class specified in schedule of rates, laid in cement mortar of designed proportion as specified in item or drawings. Bricks shall be soaked in water thoroughly at the site of work for at least 6 hours before use. When the bricks are soaked they shall be removed from the tank sufficiently early so that at the time of laying they are

skin dry. The bricks shall be placed in the tanks by hand, one by one, and not by throwing. The mortar shall be used before it shows any signs of setting or stiffening.

4.1.1 Unless otherwise specified, brick work shall be done in English bond with the frog upwards. No broken brick shall be used except at closures. Brick work shall conform to IS-2212. The courses shall be truly horizontal and the work strictly in plumb. The mortar joints should not exceed 10 mm in thickness except where extra thickness is required for the purpose of bringing the brick work to the required height or level or for making both faces even. The brick work shall not be raised by more than 14 single courses per day.

4.1.2 Masonry shall be kept constantly moist while under construction and for a period of at least 10 days after completion. Watering shall be continued twice a day for at least one month after completion.

4.1.3 **Measurement:**

Payment will be made on cubic metre basis on the volume of work done calculated on actual measurement of length, height and thickness. Any extra work over the specified dimensions shall be ignored. No extra payment will be made for cutting bricks if required either for openings or for rounding or for insertion at the time of construction of small fixtures in wall such as angles, joists, distribution boards, small size pipes, etc. No deduction will be made for volumes occupied by such fixtures. No deduction shall be made for openings up to 0.1 square metre, cement concrete blocks for holdfasts/ holding down bolts. In calculating area of opening, any separate lintel or sills shall be included with the size of opening but end portions of lintel shall be excluded.

4.1.4 **Rate:**

The contractor's rate shall include cost of all material supply, fixing and removal of scaffoldings, curing etc. and shall apply to all brick work in steps, string course, blocking course, brick work curved in plan and parapet over roof etc.

4.2.0 **HALF-BRICK MASONRY:**

4.2.1 Half - brick wall (115 mm) laid in stretcher bond including reinforced wall be measured in square metre for payment. In reinforced wall 2 no. 8 mm dia MS bars shall be provided at every fourth course. Proper laps & end embedment (of not less than 200 mm) shall be provided. They shall be securely anchored at their end where the partitions end.

4.2.2 **Measurements:**

Thickness of walls in excess of thickness computed on the basis of nominal brick sizes, if any shall be ignored while measuring. No separate payment shall be made for steel reinforcement used in the brick masonry. Deduction for openings shall be as per IS: 1200. The area shall be calculated in square metre.

4.2.3 **Rate:**

The rate includes the cost of all materials and labour involved in all the operations described including cost of reinforcement.

5.0.0 FLOORING:

5.1.0 **Scope:**

This section shall cover all floorings. No work under this section shall be started until specifically allowed by the Engineer-in-Charge and until all other major works such as plastering, embedding of conduits and pipes, channels, window fixing etc. have been completed. Samples of adequate size representing the nature of variation including quality, size and texture after polishing of the tiles to be used in the flooring work shall be prepared for all work and got approved by the Engineer-in-Charge before proceeding. The approved samples shall be retained up to the end of the project.

5.2.0 **VITREOUS CERAMIC / PORCELAIN / VITRIFIED TILES ON FLOOR:**

5.3.1 **Make:**

Vitreous Ceramic / Porcelain / Vitrified tiles shall be of best quality and of approved make/manufacturer. They shall be of specified thickness and size, type and colour and laid to pattern as shown in the drawings or as approved by the Engineer-in-Charge.

5.3.2 **Sub-base:**

The base shall first be prepared. Over the prepared base, if required cement concrete screed of 1:3:6 mix shall be laid to make up the total thickness of floor finish as specified. The surface shall be laid to falls and slopes as required and scratched for key.

5.3.3 **Laying of Floor tiles:**

After the base is cured and dried, 20 mm thick cement mortar 1:3 (1 cement: 3 coarse sand) shall be laid on the surface and spread evenly with a trowel followed by good quality approved polymer modified cement based tile-fixing adhesive conforming to IS:15477 with minimum thickness 3mm. The back of the tile previously cleaned and soaked in water shall be placed over the prepared mortar bed and brought to proper level by striking gently with a wooden mallet.

5.3.4 **Pointing:**

The tiles shall be laid in the manner as specified above in required pattern with as thin a joint as possible. The joints shall be thoroughly cleaned and pointed with white cement slurry (1 white cement: 2 sand) admixed with pigment of matching colour as the tiles. The pointing can alternatively, be carried out with an approved non-shrink grout of matching colour as recommended by the manufacturer.

5.3.5 **Cutting of Tiles:**

Care shall be taken to see that full tiles are used as far as possible. Where not possible, the edge tiles shall be neatly cut with a tile cutter and the edges rubbed smooth. The cut edge of the tiles shall not install in exposed locations.

5.3.6 **Curing:**

The tiles shall be cured for 7 days with water and then thoroughly cleaned and dried.

5.4.0 CERAMIC TILE ON WALLS:

5.4.1 Notwithstanding anything written above, the manufacturer's printed instructions regarding laying and curing shall be strictly followed.

5.4.2 Tiles:

The tiles shall be of approved make/manufacturer and shall generally conform to IS: 13753. They shall be flat, and true to shape and free from cracks, crazing, spots, chipped edges and corners. The glazing shall be of uniform shade. The tiles shall be of nominal sizes of 300 x 200 mm, 200 x 100 mm or as otherwise specified. The thickness of the tiles shall be 7 mm unless otherwise required or shown.

5.4.3 White and Colored Tiles:

The tiles shall be white, black matte or colored as specified or as instructed by Engineer-in-charge.

5.4.4 Preparation of Surface:

The joints shall be raked out to a depth of at least 12 mm in masonry wall, while the masonry is being laid. In case of concrete walls, the surfaces shall be backed and roughened with wire brushes. The surface shall be cleaned thoroughly, washed with water and kept wet before skirting/dado is commenced.

5.4.5 Mortar:

12 mm thick plaster of cement mortar 1:3 (1 cement : 3 coarse sand) shall be applied and allowed slightly to harden. The plaster shall be roughened with wire brushes or by scratching diagonal at close intervals.

5.4.6 Laying of Tiles:

The tiles shall be soaked in water, adequately washed clean, and a coat of neat cement slurry applied liberally at the back of tiles and set in the bedding mortar. The tile shall tamped and corrected to proper plane and lines. The tiles shall be set in the required pattern and butt jointed. The joints shall be as fine as possible and uniform. Top of dado shall be truly horizontal and joints truly vertical except where cut to the required size and their edges rubbed smooth. Care shall be taken to ensure that as far as possible cut tile are in non-exposed locations. Works shall be carried out in all areas only after a sample.

5.4.7 Pointing:

After laying is complete, the joints shall be cleaned off the grey cement grout with wire brush and all dust and loose mortar removed. The joints shall then be flush pointed with white cement slurry added with approved pigments to match the colour of tiles.

5.4.8 Curing and Finishing:

The surface shall be cleaned and kept wet by sprinkling water for seven days. The finished surface shall be clean, free of patches and glossy and shall not sound hollow. Finished dry surfaces shall be washed with mild organic acid, if so required. The finished surface shall meet the approval of the Engineer-in-Charge.

5.5.0 MARBLE FLOORING:

Marble flooring where so specified shall consist of marble slabs laid over cement mortar bed.

5.5.1 Dressing of slabs:

Every stone shall be cut to the required size and shape, fine chisel dressed on all sides to the full depth. The top surface shall also be fine chisel dressed to remove all waviness. The thickness of the slab shall be as specified. Base concrete or the RCC slab on which the slabs are to be laid shall be cleaned, wetted and mopped. The bedding for the slabs shall be with cement mortar 1:4 (1 cement: 4 coarse sand) of 20 mm average thickness followed by high strength modified stone adhesive conforming to IS:15477 with minimum thickness 3mm. Slabs free from all adherent materials shall be laid on bed, pressed and tapped with wooden mallet and brought to the level of the adjoining slabs. It shall then be lifted and laid aside. The hollows created in the mortar bed are made good. The mortar is allowed to harden a bit and cement slurry of honey like consistency shall be spread at the rate of 4.4 kg of cement per sqm. The edges of the slab already paved shall be filled with white cement with or without admixture of pigment to match the shade of the marble slabs. The slab to be paved shall then be placed back in position and tapped with wooden mallet till it is properly bedded in level. After each slab has been laid surplus cement on the surface of the slabs shall be cleaned off. Slabs adjoining the wall shall enter not less than 12 mm under the skirting or dado.

5.5.2 Curing, Polishing & Finishing:

Floor shall be kept wet for a minimum period of 7 days. The floor shall then be grounded & polished except that cement slurry with or without pigments shall not be applied to the surface before each polishing & instead white cement may be used. Flooring shall be laid to required slope/ level and shall be cured for a minimum of 7 days.

5.5.3 MEASUREMENT:

Length & breadth shall be measured correct to a cm before laying. Payment shall be made on square metre basis. Rate shall include cost of all labour & materials involved in all the operations but shall not include the cost of sub- grade concrete under top flooring which shall be paid under relevant Item.

5.6.0 SKIRTING AND DADO WORK:

Skirting & dado shall be fixed only after flooring. The under layer shall consist of layer of stiff cement sand mortar of 1:3 or as specified in SOR & finished rough to provide key for the topping. Topping shall be as specified. For fixing of tiles, the back of each tile to be fixed shall be covered with a thin layer of neat cement & the tile shall then be gently tapped against the wall with wooden mallet. The fixing shall be done as close as possible from bottom upwards. Skirting & dado shall be ground & polished just as floor work or

polished by hand by rubbing down with suitable polishing stones in three operations evenly & without scratching the surface. Before handing over it shall be thoroughly washed & cleaned. Dilute oxalic acid may also be used for cleaning if required.

6.0.0 FINISHING :

6.1.0 Plastering :

6.1.1 Unless otherwise specified, brick surface is to be plastered with cement mortar 15 mm thickness using medium coarse sand. Concrete surface and ceiling etc. shall be plastered with cement mortar (1:4), 6 mm thick using medium coarse sand. Before plastering work is started all joints shall be raked out and loose mortar shall be brushed out. For plaster over cement concrete surface, the surface shall be thoroughly chipped. The surface shall then be thoroughly washed with water, cleaned and kept wet before commencement of wall plasters.

6.1.2 Curing for plastered surface shall be started 24 hours after finishing the plaster and shall be kept wet for a period of 7 days.

6.1.3 Payment for plastering shall be made on square metre basis. Deduction shall not be for opening less than 0.5 sqm area and no payment shall be made for jambs, sills etc. For opening 0.5 sqm to 3.0 sqm each deduction shall be made for 50% of the opening size and no payment shall be made for jambs and sills. For opening of area more than 3 sqm deduction shall be made for jambs and sills. For opening of area more than 3 deductions shall be made for the full area but jambs, sill etc. shall be measured and paid. All measurement shall be made for each face. The rate of plastering shall be inclusive of all cost of scaffolding, labour, material etc. complete.

6.3.0 Rough Cast Plastering:

6.3.1 Rough Cast Plastering shall consist of two layers, under layer 12 mm thick cement plaster 1:4 (1 cement : 4 coarse sand) and a top layer of 10 mm thick cement plaster 1:3 (1 cement : 3 fine sand) mixed with 10% finally grounded hydrated lime by volume of cement. Preparation of surface shall be as described in clause 28.1.1 top layer shall be applied a day to two after the under layer has taken initial set. The later shall not be allowed to dry out, before the top coat is laid on. The mortar shall be sufficiently plastic so that the mix of sand and gravel gets well pitched into the plastered surface. In order to make the plaster base plastic, about 10% of finally grounded hydrated lime by volume of cement shall be added to mortar to ensure even thickness and a true surface, plaster about 15 cm x 15 cm shall be first applied horizontally and vertically, at not more than 2.0 metre intervals.

6.3.2 Rough Cast Finish:

Rough cast mixture shall consist of sand and gravel or crushed stone from 6 mm to 12.5 mm nominal size. The mix shall be wetted and shall be dashed on the plaster base in plastic state by hand scoop so that the mix gets well pitched into the plaster base. The mix shall again be dashed over the vacant spaces, if any so that the finished surface represents a homogeneous surface of sand mixed with gravel. Initially a sample of rough cast shall be got approved by the Engineer-in Charge.

6.3.3 Curing shall be done as described in clause 12.1.2 herein before.

6.3.4 Payment will be done on square metre basis, as laid down in clause 12.1.3 herein before.

7.0.0 INTEGRAL WATER PROOFING COMPOUND:

7.1.0 Water proofing compound shall, in general, conform to IS: 2645, approved brand like 'CICO', 'PUDDLO', ACCOPROOF' or equivalent shall be used. Waterproofing compound shall be procured in sealed/packed condition. Approval of the Engineer-in- Charge or his authorised representative shall be obtained prior to using the same in works. Proportion and manner of mixing the water proofing compound with cement shall be as per manufacturer's specification and instructions.

7.2.0 Water proofing compound shall normally be used in damp proof course and plastering works wherever mentioned in drawings. However, contractor may be ordered to use water proofing compound in plain or reinforced cement concrete works, flooring works etc. by the Engineer-in-Charge. Usage of water proofing compound shall be paid for as a separate item of work under relevant item of work in the 'Schedule of Rates', payment shall be made on weight basis of water proofing compound used.

8.0.0 PAINTING WORKS

8.1.0 General:

Where-ever scaffolding is necessary quote shall include the same. The surface shall be thoroughly brushed free from mortar droppings, and foreign materials. All broken edges, cracks, loose plaster and wavy surface shall be brought up either by patch plaster work or Plaster of Paris.

8.2.0 Materials:

All materials viz. oil enamel paint, plastic emulsion paint, primer etc., shall be from approved manufacturer and shall confirm to the latest Indian Standards for various paints. All paints shall be brought to site in sealed tins in ready mixed form and shall be applied directly with the addition of thinner, if recommended by the manufacturer.

8.3.0 Preparation of Surface:

The surface shall be thoroughly cleaned and dusted off. All rust, dirt, scales, smoke splashes, mortar droppings and grease shall be thoroughly removed before painting is started. The prepared surface shall have received the approval of Engineer-in-charge/ Site engineer after inspection, before painting is commenced.

8.4.0 Oil Paint / Enamel paint:

The surface shall be prepared as specified above. A primer coat of either oil based primer or an approved / recommended primer by manufacturer shall be applied. After the primer coat has dried, the surface shall be lightly sand papered and dusted to make it smooth to receive approved or specified quality paint to be applied evenly and smoothly, 3 coats of filler putty coatings to be applied to give a smooth finish. Each coat shall be allowed to dry out thoroughly and then lightly rubbed down with sand paper and cleaned off dust before

applying next coat. Number of coats shall be as specified and if the finish of surface is not uniform, additional coats as required shall be applied to get good and uniform finish at no extra cost. After completing no hair marks from brush or clogging of paint puddle in the corners of panels, angles, or mouldings, etc. shall be left on work. The glass panes, floor etc. shall be cleaned of stains.

When the final coat is applied, as directed, the surface shall be rolled with a roller or it shall be stippled with a stippling brush.

8.5.0 The wood work to be painted shall be dry and free from moisture. The unevenness shall be rubbed down with smooth sand paper and shall be well dusted. Knots, if any, shall be covered with preparation of red lead made by grinding lead in water and mixing with strong glue, sized and used hot.

8.6.0 Mode of measurement:

- a. The ceiling, including vertical surface of the coffered ceiling shall be measured in square metre of actual exposed surface area.
- b. Cornice, skirting and decorative beading if covered under separate item shall be measured by length metre.
- c. The freeze will be measured by length metre.

8.7.0 WHITE WASHING/COLOUR WASHING:

8.7.1 Before wash, the surfaces shall be thoroughly brushed free from mortar dropping and foreign matters.

The wash shall be prepared from fresh stone shale lime. The lime shall be thoroughly soaked and screened through a clean coarse cloth and admixed with gum and indigo. 3 gm. of indigo, 20 gm. Of gum per kg of lime shall be used approximately, one kg of lime will produce 5 litre of white milky solution. The solution shall be got approved by the Site Engineer before application. Number of coats shall be as specified in the Schedule of Rates and each coat shall be allowed to dry before next one is applied. For colour washing, pigment as per manufacturer's specification is required.

Dry distemper of approved brand and manufacture shall be used. The shade shall be got approved by the Engineer-in-Charge before application of the distemper. The dry distemper shall be stirred slowly in clean water using 0.6 litre of water per kg. of distemper or as specified by the manufacturer. Warm water shall preferably be used. It shall be allowed to stand at least 30 minutes and the mixture shall then be well stirred before use. The finished surface shall be even and uniform and shall show no brush marks.

8.8.0 Water Proof Cement Paint:

8.8.1 The water proof cement paint shall be "Snowcem" or equivalent of approved brand and manufacture. The same and the colour of the paint shall be got approved by the Site Engineer before application.

8.8.2 The surface to be coated with water proof cement paint shall be thoroughly cleaned of all dust and falling mortar by washing and scrubbing. The surface shall be thoroughly wetted with clean water before the water proof cement paint is applied. Water proof cement paint shall be mixed in such quantity as can be used up within a hour of its mixing. Curing shall be done as per manufacturer's specifications.

8.9.0 Oil Bound Distemper:

8.9.1 Materials:

Oil bound washable distemper of approved shad, brand and manufacture shall be used. The primer shall be of the same manufacture as oil bound distemper. The distemper and primer shall be procured by the contractor in sealed tin in sufficient quantities at a time to suffice for a fortnight's work and the same shall be kept in the joint custody of the contractor and the Site Engineer. The empty tins shall not be removed from the site of work, till this item of work has been completed and passed by the Site Engineer.

8.9.2 Preparation of Surface:

The surface shall be thoroughly cleaned of dust, old white or colour wash if any by washing and scrubbing and then be allowed to dry for at least 48 hours. It shall then be sand-prepared to remove any unevenness. Depressions if any, shall be made up with plaster of paris putty.

8.9.3 Application:

The primer coat shall be applied first horizontally and then vertically immediately afterwards. The surface shall be finished as uniformly as possible leaving no brush marks. It shall be allowed to dry for at least 48 hours before oil bound distemper is applied. The surface thus prepared shall be lightly sand papered to make it smooth for receiving distemper, taking care not to rub out the primer coat. One coat of distemper properly diluted with thinner (as stipulated by manufacturer) shall be applied with brush in horizontal strokes followed immediately by vertical ones which together constitute one coat. The subsequent coat shall be applied in the same way, so as to obtain an even shade. A time interval of at least 24 hours shall be allowed between consecutive coats to permit proper drying of the preceding coat.

8.10.0 Plastic Emulsion Paint:

8.10.1 Materials:

Plastic emulsion paint conforming to IS: 5411 of approved brand and manufacture and of the required shade shall be used.

8.10.2 Preparation of Surface:

The surface shall be thoroughly cleaned and dusted off. All rust, dirt, scales, smoke splashes, mortar droppings and grease shall be thoroughly removed before painting is started. No oil based putties shall be used in filling cracks, holes etc. for preparation of surface. The prepared surface shall have received the approval of Engineer-in-charge/ Site engineer after inspection, before painting is commenced.

8.10.3 Application:

The number of coats shall be as stipulated in the SOR item. The paint shall be applied in the usual manner with roller. The paint dries by evaporation of the water content and as soon as the water has evaporated the film get hard and the next coat can be applied. The time of drying varies from one hour on absorbent surfaces to 2to3 hors on non-absorbent surfaces.

The thinning of the emulsion is to be done with water and not with turpentine. Thinning with water will be particularly required for the under coat which is applied on the absorbent surface. The quantity of water to be added shall be as per manufacturer's instructions.

The surface on finishing shall present a flat velvety smooth finish. If necessary more coats will be applied till the surface presents a uniform appearance.

8.11.0 SPIRIT POLISHING

8.11.1 Materials:

Polishing material shall be prepared by dissolving pure shellac, varying in shade from pale orange to lemon yellow, free from direct and other materials, in methylated spirit at the rate of 0.15 kg shellac to 1 liter of spirit. Suitable pigment to achieve the required shade of polish shall be added as directed by the Engineer-in-charge.

8.11.2 Preparation of surface:

The surface, cleaned of all dirt, etc. shall be rubbed down smooth with sand paper and well dusted. Knots if visible shall be covered with a preparation of red lead and glue size laid on while hot. Holes and indentations shall be stopped with glazier's putty. The surface shall then be given a coat of wood filler made by mixing whiting (ground chalk) in methylated spirit at the rate of 1.5 kg of whiting to 1 liter of spirit. The surface shall again be rubbed down perfectly smooth with fine sand paper and wiped clean.

Three or more coats of polish shall be applied over the above surface, to achieve a finish as approved by the EIC. The polish shall be applied with a pad of woolen cloth covered by a fine cloth. The pad moisture with polish shall be rubbed hard on the wood surface in a series of overlapping movements, applying the material uniformly over the entire area to give an even finish. Subsequent coats shall be applied in a similar manner after the previous coat is allowed to dry. The finishing shall be done with a fresh piece of clean fine cloth, damped with methylated spirit and applied by light rubbing. The finished surface shall have a uniform texture and high gloss.

MATERIALS OF APPROVED BRAND AND/ OR MANUFACTURER

Sl. No.	Description	Brand Name
1	Cement	ACC, Ultra-tech, JK Lakshmi, Vikram, Ambuja.
2	White Cement	J.K., Birla or equivalent
3	POP	Sakarni, Shri Ram or equivalent
4	Ceramic Glazed tiles	Somany, Kajaria, Johnson, RAK
5	Vitrified & Porcelain Floor Tiles	Somany, Kajaria, Johnson, RAK
6	Terrazzo Floor Tiles	Nitco, Deco or equivalent
7	Ceramic Tile Adhesive/Vitrified Tile Adhesive / Stone Adhesive	Ferrous Crete (Ferro-1111/ Ferro-1122/ Ferro-1133) or equivalent
8	P.V.C. Flooring	LG floor tiles or equivalent
9	Wooden Laminated Flooring	PERGO or equivalent
10	False Ceiling	India Gypsum or equivalent
11	Water proofing compound	ACCO, CICO, PUDLO, STP
12	Water proofing Polymeric Membrane	Pidilite, STP, Fosroc, Sikka
13	Synthetic Enamel /Epoxy Paint	Berger, Asian, ICI, Nerolac
14	Acrylic Distemper	Berger, Asian, ICI, Nerolac
15	Acrylic Emulsion Paint	Berger, Asian, ICI, Nerolac
16	Waterproof Cement Paint	Super Snowcem
17	Textured Exterior Paint	Berger, Asian, ICI
18	Melamine Polish	Asian, ICI, MRF

Note: Samples of all materials shall be submitted and got approved from Engineer-in-Charge before procurement and incorporation into works. The decision of the Engineer-in-Charge in this regard shall be final.

In case of non-availability of materials of above brands, alternate equivalent brand may be approved/accepted by Engineer-in-Charge.

Specifications For Interiors Works and Partitions

Specifications for Interiors Works and Partitions

1.0 INTRODUCTION

This section shall be read in conjunction with General Conditions of Contract, Special Conditions of Contract, Specific terms and conditions and /or any other sections forming part of tender document.

Unless otherwise specified all the cost for any work/services under this contract whether expressly described or not, shall be deemed to have been included in the prices quoted/accepted.

Scope: The scope shall cover fabrication, supply, installation, and commissioning of all furniture including work-surfaces, partition low and full height, storage units etc.

All standards & codes mean the latest.

2.0 GENERAL REQUIREMENTS

2.1 The levels, measurements and other information concerning the existing site as shown in the drawings or as described are supposed to be correct, however, the same shall be verified by the Contractor beforehand. Any error/omission/discrepancy shall be brought to the notice of the Site Engineer and the Contractor shall execute the works as directed. No claim of the Contractor shall be entertained on account of the errors/omissions/discrepancies turning out to be different from what was expected by him.

2.2 The Contractor shall be responsible for all items of works to be carried out under the Contract and the Contractor shall remain liable for any error, omission or discrepancy in quality & workmanship and at all stages of the work and shall make good the errors/omission in works executed, without any extra cost to the Owner.

The Contractor shall remain responsible for fulfillment of design requirements, structural stability/ rigidity requirement, manufacturing defects, selection of material of construction, selection of methods of execution or any other requirements in terms of the Contract, notwithstanding any approval of the Owner / Site Engineer for any drawing/document/detail submitted/proposed by the Contractor including changes / modification suggested by the contractor.

The Contractor shall at all stages make necessary amendments at his own cost, should the work be found to be not consistent with the requirement of all drawings, even though, it may have been prima fascia approved by the Site Engineer. The Contractor shall be responsible for errors, difficulties in execution and/or damaged incurred owing to discrepancy in drawings which have been overlooked by him and has not been brought to the notice of the Site Engineer.

2.3 Large size details shall take precedence over small size drawings. The special dimensions in the specifications or as per instructions of the Owner/Site Engineer shall supersede the

drawings. Figured drawings dimensions shall be taken in preference to scaled dimensions in all cases.

- 2.4 The Contractor shall make adequate fire fighting arrangements during storage/execution and shall be responsible for the fire consequence if so happen.
- 2.5 The Contractor shall provide adequate lighting arrangements as approved by the Owner/Site Engineer for carrying out the work during night hours.
- 2.6 The Contractor shall ascertain from other contractors working at the site all particulars and details relating to his work with regard to order of execution of works and making provisions of works to be carried out by other agencies etc. No claim of the Contractor shall be entertained for works required to be dismantled/re-done on account of neglect by the Contractor in obtaining such details/information.
- 2.7 The Contractor shall provide and maintain any temporary covering required for the protection of finished/unfinished works or for any other work that may be damaged if left unprotected.
- 2.8 The Owner may require the works to be executed in phases as per requirement. The Contractor shall plan his activities accordingly.
- 2.9 The contractor shall take care and precautions so as not to cause hindrance / nuisance / noise / to functional areas if partial areas which are completed and the same is handed over to Owner for use. The Contractor may be required to temporarily suspend or perform works at times convenient for carrying out the work in the functional areas which have been handed over to Owner. The Contractor shall as directed by the Site Engineer, provide temporary partitions, entries, exits etc. to segregate area of works from functional areas if required.
- 2.10 The entry of materials and workers of the Contractor at the works may be restricted. The Contractor shall make alternate arrangement for movement of his material and workforce if the situation so demands.
- 2.11 The Contractor shall set up / submit samples as indicated by the Owner/ Site Engineer and obtain prior approval of Site Engineer before going in for manufacturing / procurement. Any delay in completion / submission of samples for getting approvals shall be contractor's responsibility. The samples as approved by the Owner / Site Engineer shall be used as accepted standard of finish and workmanship in the execution of works. However, the same shall not relieve the contractor of his responsibilities or waive Owner's right to subject materials / works to various tests and reject those not meeting specifications / requirements prescribed.
- 2.12 Where the Contractor is required to provide materials of certain sizes or weights which may have become out of market due to change over to metric unit or otherwise, substitute compared to the nearest equivalent as approved by the Owner / Site Engineer shall be used.

- 2.13 The Contractor shall provide all facilities to the Owner / Site Engineer or his representative to make inspection, as and when required, of his workshop / factory and ascertain the progress and quality of the works undertaken.
- 2.14 For purchase of materials, to be incorporated in the works, the Owner may ask the contractor to produce bills/cash memos of such purchases. The Owner reserves the right to verify the accuracy of such bills and prices of materials included in the bill from the same source or other suppliers chosen by the Owner.
- 2.15 The Contractor shall when called upon by the Site Engineer, submit the analysis of rates of any items of work to justify and support the rates quoted by him for that item.
- Contractor shall also produce necessary vouchers etc. in support of the analysis of rates.
- 2.16 The Contractor shall be responsible for any manufacturing defects or defects due to poor workmanship or materials. All defective or damaged work shall be removed and replaced to the entire satisfaction of the Owner/ Site Engineer.
- 2.17 The Contractor shall provide all materials and /or fittings and perform any work which is obviously necessary to complete the works or which is generally provided in accordance with good trade practice even though such materials or work may not be explicitly mentioned in the specifications or shown in the drawings.
- 2.18 Where manufactures have furnished specific instructions relating to the materials used in the works and covering points not specifically mentioned in the tender document, manufacturer's instructions shall be followed.
- 2.19 For specialized nature of works the contractor may be required by the Owner/Site Engineer to get the job done through specialized agencies.
- 2.20 The Contractor shall deploy sufficient supervisory personnel and watchman to ensure that the different items fabricated/supplied installed by him are kept in good conditions till the same are handed over satisfactorily.
- 2.21 The Contractor shall not be entitled to any compensation for any loss suffered by him on account of unforeseen delays in commencing or executing works.
- 2.22 In case the specific sizes/thickness of various materials are not available, next higher size shall be provided without any extra cost.
- 2.23 The specifications as given in BOQ and drawings are complimentary to each other. However, the sizes/thickness of different materials/ items as given in BOQ shall take precedence over sizes/thickness given in drawing.

3.0 MATERIALS

TIMBER: All timbers used are to be of top quality, free from knots, shakes wormholes and with a moisture content of not more than 12% depending on the climatic conditions prevailing at the site.

JOINTS: All joints will be standard, mortise and tenon, dovetail, dowel, cross halved, mitred, tongued and grooved and rebated. Nailed or glued butt joints will not be permitted. Except in exceptional cases, nailed butt joints will not be accepted.

FASTENINGS: Screws, nails bolts, will generally be iron or wire except in the following examples. "Outdoor Furniture" fastenings will be of brass or other non corrosive metal. In hardware, they will match the finish of the hardware item.

Nails, in a finished surface shall be nearly punched and the hole filled with filler matching the finish. Screws, in a finished surface will be round head, raised or sunk beneath the surface and the hole plugged with a wood plug with matching colour and grain of the wood surface, unless specially detailed.

PLYWOOD: Used mainly for the bodywork of this furniture, shall be Luan or similar close grained plywood suitable for veneering, painting, or bonding plastic laminate. It will be a resin bonded, weatherproof brand, for 'outdoor' furniture standard specification, 'marine' brand or equivalent. Exposed edges will be finished with a piece of solid wood, glued, or as detailed.

HARDWARE: Hinges, locks, latches, door tracks, etc. shall be as specified and as far as is possible, by the manufacture specified. In any variation of this the quality of the substitute shall be equal to or better than the original specified, and the sample should be submitted to the Owner/Site Engineer for prior approval.

FINISH: This will be as indicated on drawing and colour chart and materials (Timber, plastic, laminates, lacquer paints etc.) must be as specified. No variation will be accepted unless with the prior approval of the Owner/ Site Engineer.

NOTE: This specification is of a general type only and should be used in conjunction with the drawing of the particular item, being made. Anything showing on the drawings, but not in the specification must be completed with, and vice versa.

1. All materials shall be obtained from approved vender lists. The agreed source or quality of any material shall not be changed during the course of the contract except with the approval of the Site Engineer.
2. Samples of materials shall be got approved before placing order and approved samples shall be deposited with the Owners/Site Engineer. Once the samples are approved the supply of materials shall be sourced from same source of which the sample is approved.
3. If directed, materials shall be tested in any approved Testing Laboratory and the Test certificate in original shall be submitted to the Owner/Site Engineer and entire charges

connected with the testing including charges for repeated tests, if ordered, shall be borne by the contractor.

4. When instructed by the Owner/Site Engineer, the contractor shall produce a certificate from the manufacturer, for each and every delivery of material, showing the source, quantity delivered and confirming that the material has been tested and confirms to the required Indian Standards.
5. Unless otherwise shown on the Drawings or mentioned in the "Schedule of Quantities" or special specifications the quality of materials, workmanship, dimensions, etc. shall be as specified herein under.

3.1 Timber

1. Timber generally is to be the best of its kind, well and properly seasoned, of natural growth, free from worm holes, large loose or dead knots or other defects and sawn die square and will not suffer warping, splitting or other defects through improper handling.
2. The hardwood is to be second quality Teak wood.
3. Shelves generally shall be constructed of ply wood with edgings of teak wood lippings.
4. All timber for carpentry and joinery coming in touch with masonry or concrete, shall be treated with a coat of coal tar or creosote before fixing. All rough framework in partitions, suspended ceilings and paneling to walls etc. shall be treated with approved wood preservative and approved as per manufacturer's instructions and specifications. The rates quoted shall provide for such treatments.
5. Where glue joinery and carpentry work is likely to come into contact with moisture, the glue shall be waterproof. The use of animal glues will not be permitted.
6. Timber is to be cut to the required sizes and lengths as soon as practicable after the works are begun and stored under cover so that the air will circulate freely around it. Joinery is to be prepared immediately after the placing of the Contract, framed up (but not bonded) and stored until required for fixing in position, when it is to be bonded and wedged up. Any portions that warp or develop shakes or other defects are to be replaced before wedging up. The whole of the work is to be framed and finished in a proper and workmanlike manner in accordance with the detailed drawings, and wherever required fitted with all necessary metal ties, straps, belts, screws, etc. Running banded joint is to be cross tongued with teak tongued and where over 1.5" thick double tongued. Joiner's work generally is to be finished with fine class papered surfaces unless otherwise specified.
7. Templates, boxes and moulds shall be accurately set out and rigidly constructed so as to remain accurate during the time they are in use.
8. Grounds are to be clean sawn, free from large knots, splayed as require, plugged and fixed to walls etc. at 1'6" centers.
9. No rawl plugs are to be anywhere in the carpentry works.

3.2 Hardware and Metal Details

1. The hardware throughout shall be of approved manufacturer and supply, well made and equal in every respect to the samples to be deposited with the Owner/Site Engineer. The contractor may be required to produce and provide samples, in order to make a decision and should allow in his rates for doing so.
2. Fittings generally shall have satin chrome or anodised finish, unless otherwise specified, and shall be suitable for their intended purposes. In any case, it will have to be approved by Owner/Site Engineer before the contractor procures it at site of work.
3. Screws are to match the finish of the articles to be fixed and to round or flat headed or countersunk as required.
4. Screws up and protect the brass and bronze surfaces with a thick grease or other suitable protective material, renew as necessary and subsequently clean off and clear away on completion.
5. Aluminium or stainless steel shall be of approved manufacturer and suitable for its particular application. Generally, the surface of aluminium shall have an powder coated finish and both shall comply with the samples approved by the Site Engineer.
6. All steel, brass, bronze, aluminium and stainless steel articles shall be submitted to a reasonable test for strength, if so required by the Site Engineer, at the contractor expense.
7. Chromium plating shall be in accordance with B.S.1224 or as per approved specifications for "normal outdoor conditions" and shall be on a base material of copper or brass.

3.3 Polish

1. French polish: The basic material shall be shellac dissolved in methyl spirit.
2. Preparation: The timber must be well sanded and clean, and the grain filled with a grain filler. Any staining must be done before applying the polish.
3. Equipment: The polishing rubber the most important implement in French polish shall consist of a pad of cotton wool, which acts as a reservoir for the polish, and a cover of soft white lenin or cotton fabric, similar to a well-worn handkerchief, which acts as a fitter. The rubber must never be dipped into polish, it should be changed by pouring the polish on to the pad with the cover removed.
4. Application: Work evenly over the surface with a slow figure of eight motion until the timber is coated with a thin layer of polish. The object is to apply a series of thin coats, allowing only a few minutes for drying between the coats. When a level and even bodied surface is obtained the work is ready for second stage i.e. spiriting off. Allow the work to stand for atleast eight hours, then take a fresh rubber with a double thickness of cover material and charge it with methylated spirit. The object of spiriting off is to remove the rubber marks and to give the brilliance of finish.
5. Finally work in the direction of the grain and continue until the surface is free from smears and rubber marks then leave to harden off.

3.4 Glazing

1. All glasses & mirrors to be as per the Lists of Approved Makes and generally shall comply with the requirement if IS Specifications and as per weight and or thickness and any other specifications mentioned in the bill of quantities. All glasses shall be free from bubbles, shakes, waves, air holes, scratches or other defects, shall be used and all glasses to be approved by the Owner/Site Engineer before fixing.
2. All glasses & mirrors to be cut accurately to fit easily into the rebates and firmly secured in position as per instructions of Site Engineer or as shown on the drawing.
3. All glasses & mirrors broken or cracked during the progress of work to be reinstalled free of cost, without charging extra, all glass to be cleaned both sides and all glazing left clear and perfect, as directed by the Site Engineer at the completion of contract.
4. Unless and otherwise specified, all timber for frames shall be first class, sound, well seasoned, Teak wood and shall be free from knots, shakes, fissures, flaws, sub-cracks and other defects, the wood shall have minimum moisture content as per IS standards, however in no case should exceed 12%.. The planed surface shall be smooth and free from blemished and discoloration.
5. All timber for carpentry and joinery coming in touch with masonry or concrete, shall be treated with a coat of coal-tar or creosote before fixing. All rough frame work in partitions, suspended ceiling and paneling to walls etc. shall be treated with approved wood preservative and approved as per manufacturer's instructions and specifications. The rates quoted shall provide for such treatments.

3.5 Plywood

1. Marine grade ply wood as per the List of Approved makes to meet bureau of India Standard 710, made from selected species of core and face veneers bonded together with phenol formaldehyde synthetic resin. The core veneer also spliced in automatic cross – feed splicing machine to eliminate core gaps and over lapping of core veneers. The finishing plywood is subjected to vacuum and pressure treatment with toxic chemicals of the water soluble fixed type for permanent protection against insects borers, termite and fungi.

3.6 Veneer

1. Unless and otherwise specified the veneer shall be in matching groups with straight veins made from selected best quality wood, uniform in thickness and free from any defects. Veneers used in one shall be from the matching groups of veneer series.

3.7 Glass

1. Unless and otherwise specified glass shall be as per the Lists of Approved Makes and generally shall comply with the requirements of relevant IS and shall be free from bubbles, specks, waves flaws or any other defects.

3.8 Mirror

1. Unless and otherwise specified mirror shall be 6mm thick and shall be as per the Lists of Approved Makes or imported free from bubbles, specks, waves, flaws or any other defects or distortions.

3.9 Paints

1. Oil paint, enamel paint, plastic emulsion paint, waterproof cement paint etc., shall be from approved manufacturer and shall confirm to the latest Indian Standards for various paints. Ready mixed paints as received from the manufacturer without any admixture shall be used except for addition of thinner, if recommended by the manufacturer.

4.0 WOOD WORKS:

4.1 General:

All wood works shall be second class Indian Teak Wood unless otherwise specifically mentioned. The timber shall be of good quality, well seasoned, uniform in colour, reasonably straight grain and shall be free from dead knots, cracks, and sap wood. Permissible defects in the timber shall be as indicated in Indian Standard 883 (latest edition). For doors, windows, and other carpentry and joinery works, no individual hard and sound knot shall be more than 25 mm in diameter, and the aggregate area of all the live knots shall not exceed 1% of the area of the piece. All wood work shall be painted with two coats of synthetic enamel paint over a coat of primer. For hand rail (in case of staircase) a coat of anti-termite wood primer shall be applied followed by coat of French polish. Rate shall include cost of labour and materials for painting also.

4.2 Wooden Frames for doors, windows, ventilators & other frames:

- 4.2.1 Wooden frames shall be made of second class Indian teak wood conforming to the specification mentioned herein before. Workmanship for wooden, frames, doors, windows etc. shall in general conform to Indian Standard 4021 - 1967 unless otherwise mentioned. The work shall be as per detailed drawings or as directed by the Site Engineer. All members shall be straight without any warp or bow. Frames shall have smooth, well planed surfaces except the surfaces touching the walls, lintels etc. which may be left clean sawn. The timber shall be sawn in the direction of grains. Rebates, roundings, and moulding as shown in drawings or as directed by the Site Engineer shall be done at no extra cost. The scantling shall be finished smooth and rubbed plane with sand papers to pin with hard wood or bamboo pins of 10 to 15 mm diameter. Use of iron nails shall never be permitted. All mortice and tenon joints shall fit in fully and accurately without wedging or filling.
- 4.2.2 All portions of the timber frame abutting or embedded in brick work or concrete shall be painted with coal tar before being placed in position, without any extra cost. For door or other frames without any "Chowkat" (bottom horizontal member) the vertical members, shall be buried in the floor for at least 40 mm depth.
- 4.2.3 Each frame upto 1.5 M length shall be provided with 4 nos. hold fast, two on each vertical member and for frames above 1.5 m length 6 nos., 3 on each vertical member. Hold fasts shall be 30x6 mm M.S. Flat 20 cm long. Hold fast shall be split and splayed at ends and embedded in cement concrete block (1:2:4). No extra payment shall be made for the hold

fasts, making holes in wall or concrete and embedding the same in cement concrete blocks.

- 4.2.4 Payment for frames shall be made on gross volume of the frame. No deduction shall be made for rebate/ rounding. Rates quoted shall be inclusive of labour, materials, fabrication, fittings, fixing of ancillary materials like hold fasts, coal tar, paints etc. complete.

4.3 Panel Door, Window etc.:

- 4.3.1 Workmanship for panel door, window shutter etc. shall conform in general to IS- 1003. Timber for panel door windows shall be second class Indian Teak conforming to the specifications. The grains of timber panel shall run along the longer dimensions of the Panels. Door/Windows panels shall be 15 mm thick one piece plank finished smooth and fixed with style and rail 35 mm thick. Styles and end rails and intermediate rail shall be 150 mm wide and 35 mm thick. Styles and rails shall be properly and accurately morticed and tenon jointed and pinned with hard wood or bamboo pin 10 mm dia. Iron nails shall never be permitted. The lock rails of door shutters shall have its centre line at a height of 800 mm from the bottom of shutter unless otherwise specified. The thickness of each tenon shall be approximately one third the finished thickness of the member and the width of each tenon shall not exceed three times its thickness. The style and rails shall have 12 mm deep groove in paneled portion for the panel to fit in. All pieces shall be of accurate dimension, planed smooth, rebating, rounding, moulding etc. complete as shown in the drawing. Shutters shall not be painted, oiled or otherwise treated before these are fixed in position and passed by Site Engineer.

- 4.3.2 Fittings shall be provided as per details given in the SOR item.

- 4.3.3 Rate quoted for respective item in Schedule of Rates for door/windows shutters shall be deemed to include all labour, materials fabrication and fixing in position with necessary fittings as mentioned above, painting etc. complete. Payment will be made on square metre basis of the area of the shutters.

4.4 Flush Door Shutters:

- 4.4.1 Flush shutter (solid core type) shall in general conform to IS-2202 (Part-I - 1991) and of exterior grade with block board core. Block board core shall conform to the requirements specified in Indian Standard 1659 - 1990. The wooden strips for the core shall not exceed 25 mm in width. In any one block board the core strip shall be one piece of timber only. Wooden frame prepared from style and rails of well seasoned and treated good quality wood shall be provided for holding the core. The width of the member shall not be less than 75 mm and not more than 100 mm.

- 4.4.2 The core surface shall have two or more commercial or teak plywood veneer firmly glued on each face and pressed. The combined thickness of all the veneers on each face shall not be less than 4 mm. Only phenol formaldehyde resin glue conforming to IS:848 - 1974 shall be used for door manufacture and a certificate to this effect from the manufacturer shall be furnished on demand. The flush door shutter shall be obtained from firms of

repute and the supply shall be in accordance with the approved full size samples. All fittings for flush doors shall be provided as per details given in the SOR item.

- 4.4.3 Payment shall be made on sqm basis including the cost of all material, labour, painting etc. but excluding cost of vision panels.

4.5 Partially Glazed and Partially wooden partition work:

- 4.5.1 Framework for partition shall be of second class good quality and well seasoned Teakwood of size 2 1/2 x 2 1/2" (62.5 mm x 62.5 mm). It shall have uniform colour, reasonably straight grains and shall be free from dead knots, cracks and sap wood. The joints shall be pinned with hardwood or bamboo pins of 10 to 15 mm diameter. The timber shall be sawn in the direction of the grains. All mortice and tenon joints shall fit in fully and accurately without wedging or filling. All frame work shall be coated with anti termite paint of approved brand and quality. Vertical members of the frame shall be placed not more than 60 cm apart and horizontal members not more than 100 cm apart. Horizontal members each at top and bottom of the frame is a must. The portion of partition above door height will be fixed with 4 mm thick frosted glass panes fixed with teak wood beads of size 25x20 mm all-round fixed with screws. Frosted glass panels shall be fixed with frosted face on the inside.
- 4.5.2 After the frame is fixed commercial ply 1/4" (6 mm) thick of approved quality shall be pasted by phenol formaldehyde resin glue, on one face and 1/4" (6 mm) thick approved quality teak ply shall be pasted on the other face.
- 4.5.3 Teak ply and external face of glazed paneling frame shall have two or more coats of approved copal varnish or superior spray varnish, over an undercoat of flatting varnish of the same manufacturer as the top coat. Preparation of surface and application of varnish shall be as directed by Site Engineer.
- 4.5.4 Commercial ply facing and interior portion of glazed paneling shall be applied with two coats of approved synthetic enamel paint over a coat of primer.
- 4.5.5 Rates quoted shall be inclusive of all labour, materials, fabrication, fittings, fixing and cost of all ancillary materials like varnish, paints etc. complete.
- 4.5.6 Payment will be made on square metre basis of the area of paneling/partition. Doors wherever provided within the partition work, shall be paid separately under appropriate item.

4.6 CABINET / CREDENZA / BOOK SHELVES / TABLE /STORAGE WORK

4.6.1 General

Cabinets, etc. shall be fabricated and assembled on the site as far as practicable. The various members shall be worked in the best manner known to the trade, mortised and tenoned doweled, blocked and glued together so as to avoid the use of nails as far as possible. The details shall be closely followed, moulding clearly cut and mitred accurately. Free edge of the shutters, shelves, partitions, sides etc. shall be supported on aluminum

or other cleats or in other manner as approved by the EIC. Adjustable shelves shall have brass sockets and pine as detailed on the drawings.

Drawer bottom shall be of 6 mm commercial ply, unless otherwise specified. Drawer front, sides and back shall be of first class teak wood. The drawers shall slide on roller channels as shown in the drawings.

Timber skirting where called for shall be of first class Nagpur / CP teak wood, cut to required sizes, planned smooth on visible faces and fixed in position in approved manner. Cut-outs, openings, etc. shall be provided in the counts and cabinets to accommodate sinks, wash basins, cooking ranges, pipes, etc. as shown on the drawings and as required at site.

4.6.2 Hardware Fittings

Hinges, handles, knobs, locks, ball catchers, adjustable shelf fittings (stainless steel), and other hardware fittings for doors and cabinet work shall be of the best quality and specified make as approved by the EIC. The number, size etc. shall be as per the SOR item/ drawings.

4.6.3 Preservative Treatment

All wood work in contract with masonry shall be painted with approved bitumen paint before placing. Care shall be taken to keep exposed surfaces clear from paint, etc. felt shall used to isolate wood from masonry wherever practicable. All concealed wood etc. shall be treated fully and liberally with solignum before placing in position.

4.6.4 Painting and Polishing

All exposed teak faces of partitions, glazing, doors, cabinets work etc. shall be Duco painted / melamine matt polished to approved finish. Drawer bottoms, sides of drawers, etc. oiling etc. shall be carried out as specified under "Painting".

4.6.5 Protection of Work

The contractor shall be responsible for the temporary doors and closings in the openings necessary for the protection of the work during the progress. He shall also provide and maintain any other temporary covering required for the protection of the finished wood work that may be damaged during the progress of the work left unprotected.

5.1 ALUMINIUM GLAZING WORK:

5.1.0 General:

- 5.1.1 Aluminium Doors/Windows/ventilators shall be fabricated (by mitring) with box type frame sections & of size as shown in the drawing & conforming to IS: 1948-1961. All sections shall be fabricated from extruded sections as manufactured by reputed concerns & as approved by Engineer-in-charge. The weight & thickness of walls of sections shall be as specified in relevant item of schedule of rate. Robust construction shall be achieved by interlocking & screwing outer frame corners.

5.1.2 Finish:

Aluminium doors will be anodised or powder coated as per requirement and as mentioned in Schedule of Rates. The average thickness of anodised coating shall not be less than 15 microns as per IS-1868. In case of powder coating thickness shall be not less than 70 microns and of approved shade and finish. A thick layer of clear transparent lacquer based on mathacrylates or cellulose butyrate shall be applied on aluminium door to protect the surface from waste cement during installation. Before handing over the building the lacquer coating shall be removed as directed by Engineer-in-charge.

5.1.3 Hinges:

Hinges shall be projecting type, made of Aluminium alloy (cast/extruded conforming to relevant Indian Standards and welded to frames). Minimum two hinges shall be provided for each shutter, however, door shutter shall be provided with one additional hinge at the centre. The pins for hinge shall also be of aluminium alloy conforming to HR 30 of Indian Standard. Pins for hinges shall have an anodizing coating of 25 micron thickness or powder coated of 70 microns thickness.

5.1.4 Fixing of panels/doors/windows/ ventilators:

Fixing of frames with walls/other members shall be done in any of the following three manners:

- i) Using 30 mm x no. 10 galvanised screws in case the frame is to be fitted to a wooden member.
- ii) With slotted galvanised steel lugs fitted to the frame with galvanised nuts and screws embedded in cement concrete block (1:2:4) in case the frame is to be fitted on a brick/stone masonry wall.
- iii) With plug and galvanised screws (45 mm x 10 nos.). Position and number of fixing plugs and screws shall be as per IS: 1948: 1961 as far as practicable, complete with all accessories including cleaning the Aluminium sections free from lacquer.

5.2 Aluminium Glazed Panel Doors:

5.2.1 Aluminium door shall be manufactured from standard aluminium alloy extruded sections and shall be all as per drawings. The aluminium alloy shall be as per IS- 733, HE-O-WP. Hollow aluminium alloy sections shall conform to IS designation HV-O-WP of IS 1285. Aluminium door will be made of 6 mm thick plate glass fitted and fixed with box 101.6 x 44.45 x 3.18 mm aluminium frame with snap beadings and glazing clips as per standard practice and exhibit drawings. Aluminium beading of approved size and make, gasket and felt will be used for holding the glass in position. One floor spring 12"x8" as per IS 7197 shall be provided with each panel at bottom unless otherwise specified and one pivot at top of each panel shall be provided. Proper locking arrangement as per drawings and direction of Engineer-in- Charge shall be provided.

5.2.2 Fittings & Fixtures:

All doors shall be provided with double action floor spring, suitable locking arrangement (openable either from outside or inside), bolting devices and handles. In case of double leaf shutters doors, the first closing shutter shall have a concealed aluminium bolt at top. All fixtures shall conform to relevant I.S. codes.

5.2.3 Rate:

Rate shall include all materials and labour required for fixing the door including handles, tower bolts etc., but excluding floor springs (which shall be paid as per separate SOR item), complete with all accessories including cleaning the aluminium section free from lacquer.

5.3 Aluminium Glazed Panels:

5.3.1 Aluminium sections, finish, glazing, workmanship etc. shall, in general, conform to the specifications covered under clause 21.1.0 and its sub clauses except that floor springs and locking arrangements which will not be required in case of glazed panels. These panels shall have to be fixed in wall openings (with provision for opening as directed by Engineer-in-charge) as per drawings and as per instructions of the Site Engineer.

5.3.2 Rate:

Aluminium glazed paneling shall be paid in two following items of schedule of rates:

- i) Glazed paneling with single glass sheet.
- ii) Glazed paneling with double glass sheet.

Rates shall include all materials and labour required for providing and fixing the panel in position complete.

5.4 Aluminium Glazed Windows/ Ventilators (Openable/ Sliding Windows/ Top Hung Ventilators):

5.4.1 Glazing:

Glazing panels of not less than 5 mm thickness or as specified shall be used. Sizes of glass panels shall conform to table I of IS:1948, wherever practicable. Specifications and fixing of glazing shall conform to those of steel door, windows and ventilators.

5.4.1 Fittings & Fixtures:

All windows shall be provided with cast aluminium handles and peg stays conforming to A-5-M of IS: 617 with anodised finish of 15 micron thickness or powder coated. Ventilators shall either be top hung and provided with peg stays or of louver type. The peg shall be 300 mm long complete with peg & locking bracket. The locking bracket shall either fitted to the frame or to the ventilator.

5.4.3 Rate:

Rate quoted for glazed windows and ventilators shall be inclusive of glazing works and handles, bolts and other standard fixtures.

5.4.3 Payment:

Payment shall be made on square metre basis of the area of the opening.

6.0 FIRE RESISTANT COATINGS ON WOOD WORK

6.1 General

The paints and primers to be used should be as per IS: 12777 – 1989 and BS: 476 part 70.

6.2 Application

- i. Primer Coat - The wood surfaces is to be sand papered and coats of primer equivalent to 'Viper' FR- 880 (-2) is to be applied on it with brush with a time interval of 3-4 hours.
- ii. Finishing Coat- Primer coated wood is to be applied with 2 coats of sealant coating equivalent to 'Viper' FR –911 (fear) or 'Viper' FRS – 881 with brush with a time interval of 4-6 hours.
- iii. Thinner – Thinning agent if required could be used equivalent to 'Viper' Setter WP-914 (2:1 ratio) for Primer and Setter WP – 914 (5:1 ratio) for finishing coat paint / polish.

7.0 LUXALON TECHSTYLE CEILING

Panels shall comprise of composite structural fiberglass core with non-woven mineral coated surface wrapped on two opposite edges and matching integral hinged support clip on other two edges; with properties as follows:

1. Panel Thickness: 1.125 inches (28.5 mm).
2. Panel Size: 1200 x 1200 mm
3. Reveal: Panels configured to maintain reveal of 1/4 in (6 mm) between adjacent panels.
4. Panel Color: White
5. Noise Reduction Coefficient (NRC): 0.85, measured in accordance with ASTM C 423 with the equal to or better than absorption coefficient reading at the following specified frequencies:

Frequency: 125 250
500 1000 2000 5000 Absorp Co-ef 0.81
1.03 0.63 0.79 0.95 0.90

6. Sound Absorption Average: (SAA) 0.86, measured in accordance with ASTM C 423.
7. Surface Burning Characteristics: Flame spread less than 25 and smoke developed less than 50, Class A (1), per ASTM E 84 and ASTM E 1264.
8. Light Reflectance: LR-1 (81%), measured in accordance with ASTM E 1477.
9. Moisture Resistance: Resistant to relative humidity up to 95 percent at 105 degrees F (40.5 degrees C) for 30 days.
10. Mold and Mildew Resistant: In accordance with requirements of ASTM C 665.
11. Fungi Resistant: In accordance with requirements of ASTM C 1338.

Accessibility: Panels shall be downward accessible by disengaging hinge support rail on one side of panel from the T-Bar Flange or optional A-Mount rail flange without the use of tools. Panel shall swing hinge downward to provide complete access without removal of the panel from the ceiling.

MATERIALS OF APPROVED BRAND AND/ OR MANUFACTURER

Sl. No.	Description	Brand Name
1.	Anodised Aluminium Sections	Jindal, Indalco, Hindalco, Ajit India
2.	Aluminium Fittings (ISI)	Garnish, Adarsh, Everite
3.	Glass for Paneling, Mirror, Toughened Glass Door	Modiguard, ASAHI, Pilkington, Saint Gobain
4.	Automatic door closer	Everite, Godrej, Dorset, Geze
5.	Plywood / Board	Century, Duro, Green
6.	Veneers	Century, Duro, Green
7.	Laminate	Century, Merino, Green
8.	Insulation (Acoustic / Thermal)	Supreme Armour (The Supreme Industries Limited), Lloyd insulation, Glass Wool (U P Twiga)
9.	Pre-laminated Particle Board	Novapan, Bakelite Hylam, Kitply, Anchor, Bhutan Board, Duro
10.	Nova Teak Perforated Tiles	Anchor or equivalent
11.	Flush Door shutters	Sitapur, Bhutan Tuff
12.	Door / Window/ Cabinet Fitting Hardware	Kaff, Godrej, Dorset
13.	Sun Control Film	Garware

14.	Vertical Blind System	Vista Lavolor/ Mac Décor/ Huston Douglas/ 3M / Track /Aerolux

Note: Samples of all materials shall be submitted and got approved from Engineer-in-Charge before procurement and incorporation into works. The decision of the Engineer-in-Charge in this regard shall be final.

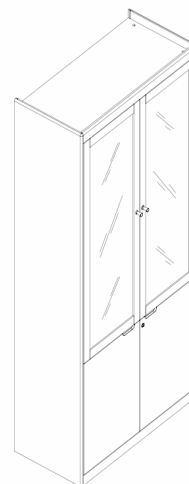
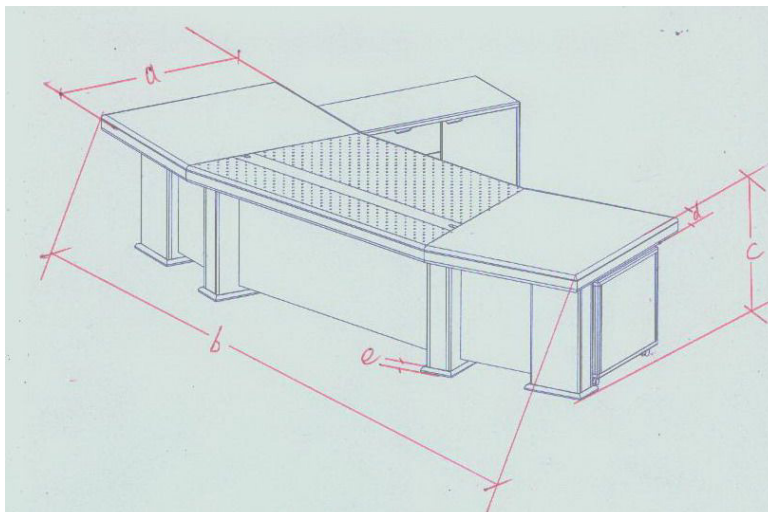
In case of non-availability of materials of above brands, alternate equivalent brand may be approved/accepted by Engineer-in-Charge.

Specifications For Furniture Works

Specifications for Furniture Works

(APPROVED MAKE: GODREJ, WIPRO, DELLFORM, HERMAN MILLER, HAYWORTH, HNI)

1. Executive Director Table(Main Table+ER+U+Back Unit)

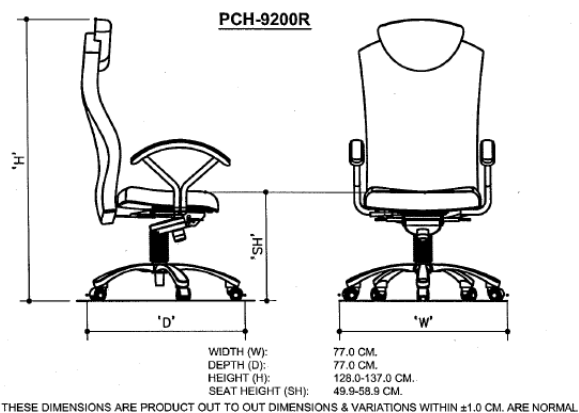


Supplying and placing in position Main desk with 4 nos. of Back Units of the following specifications. The Main table shall be of size 3600 Width mm x 1080 mm Depth x 750

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mm height. Top surface of the table shall made up of MDF (Medium density fibre) board duly finished with Veneer and final coating of PU. The Main desk should contain in Smart Case - space slides effortlessly in style. The mobile Pedestal shall be of size 480 Width mm x 640 Depth mm x 600 Height mm. Mobile pedestal shall be coated of MDF (medium density fiber) with veneer coating and PU coating. The ERU Top shall be of MDF (medium density fiber) board duly finished with veneer and final PU coating. Size of ERU top 1900 Width mm x 480 Depth mm x 550(not from ground with castors).The main desk is provided with the wire management system also there is perfect storage side unit. The Size of the Back unit shall be 1000 mm width x 480 mm Depth x 2035 mm height. The back unit shall be made up of MDF board duly finished with veneer & final finish by PU coating. The mobile unit can be bought in multiples. PU coating hardness 1.5H.

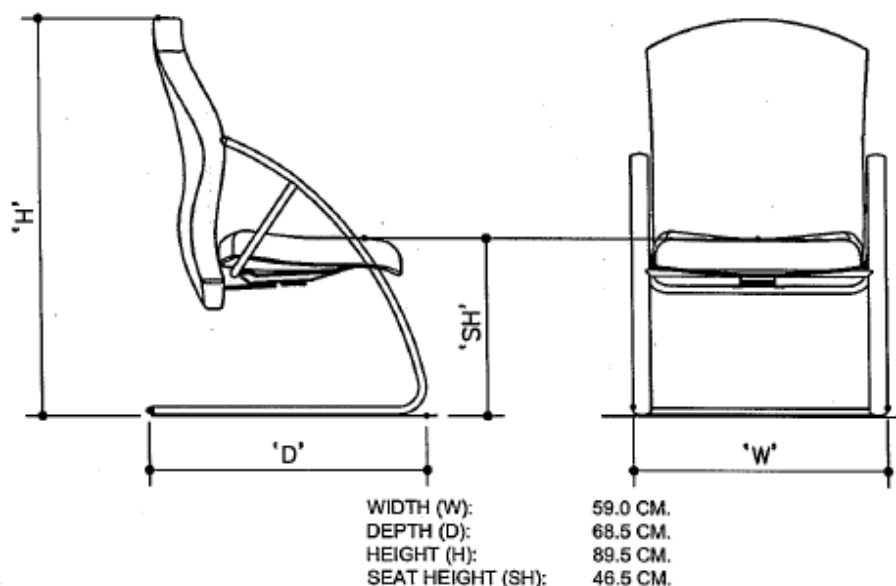
2. Executive Director Chair-



Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-95.4cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16+/- 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 +/- 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assy. shall be made of 2.54+/- 0.03cm x 0.16 +/- 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore 'A'

hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features: 360° revolving type, Knee Tilt system, Seat & back tilting ration of 1: 1.5, Front pivot for tilt with feet resting on ground ensuring more comfort, Tilt tension adjustment, 5-position locking with antilock back mechanism which should prevent the backrest from impacting the user when the lock is released, Static seat depth adjustment 5.0 +/- 0.5cm with 5 position locking. The chair shall be provided with pneumatic height adjustment which shall have stroke of 9.0 +/- 0.3 cm. The bellow should be single piece duly blow moulded in black polypropylene. The pedestal shall be made of die-cast aluminium with buffing finish. it shall be fitted with 5 nos. twin wheel castor. The size of the pedestal shall be 67.0 +/- 0.5 cm pitch-centre-dia (77.0 +/- 1.0 cm with castors). The twin wheel castors shall be made of Nylon injection moulded in black color. Overall dimensions of Chair shall be, Width of Chair - 77cm, Depth of Chair - 77 cm as measured from pedestal below. Height of back from ground - min 128.0 to max 137.0 cm. Seat height - min 49.9cm to max 58.9 cm. Dimensions tolerance / variations shall be within +/- 1 cm.

3. Visitor Chair



THESE DIMENSIONS ARE PRODUCT OUT TO OUT DIMENSIONS & VARIATIONS WITHIN ± 1.0 CM. ARE NORMAL

Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 $\pm$ 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be (W)-53cm x (H)-73cm & size of seat shall be (W)-54.6cm x (D)-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 $\pm$ 2 kg/m³ and hardness load 16 $\pm$ 2 kgf as per IS: 7888 for 25% compression. The fixed type mechanism shall be made with a 0.8 $\pm$ 0.05cm thick HR steel spine welded to it and black powder coated. Overall dimensions of Chair shall be- Width of Chair - 59cm, Depth of Chair - 68.5 cm as measured from pedestal below. Height of back from ground -89.5cm. Seat height - 46.5cm. Dimensions tolerance / variations shall be within $\pm$ 1 cm.

4. Premium Sofa Set

Supplying and placing in position set of 3+1+1 sofa of dimensions 1120 x 1030 x 600 for 1 seater & 2260 x 1030 x 600 for 3 seater. Upholstery : Material : Pure Leather, Shade : Dark Brown, Thickness : 1mm. Frame Material : Pine wood, Moisture content : 12%, Foam Material : Slab stock, Foam Density : 30 kg/m³ at seat and backrest. Webbing Make: S spring + Belt. Material of Belt: Nylon of 50 mm thickness, S spring material: Metal of 3.8 mm of thickness Legs Material: Pine wood with PVC bush at base.

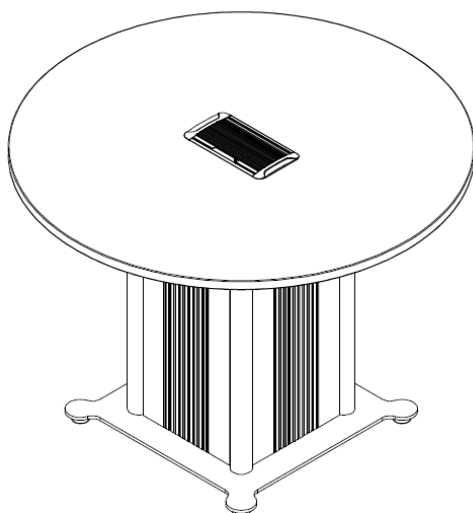
5. Premium Center Table

Supplying and placing centre table of dimensions: 1000 x 600 x 450 having 8mm tempered glass top with MDF understructure and PVC covering. Pu paint strip on glass top with silver powder. Glass top attached to the understructure via UV disc. Load bearing capacity: 30 Kg.

6. Premium Corner Table

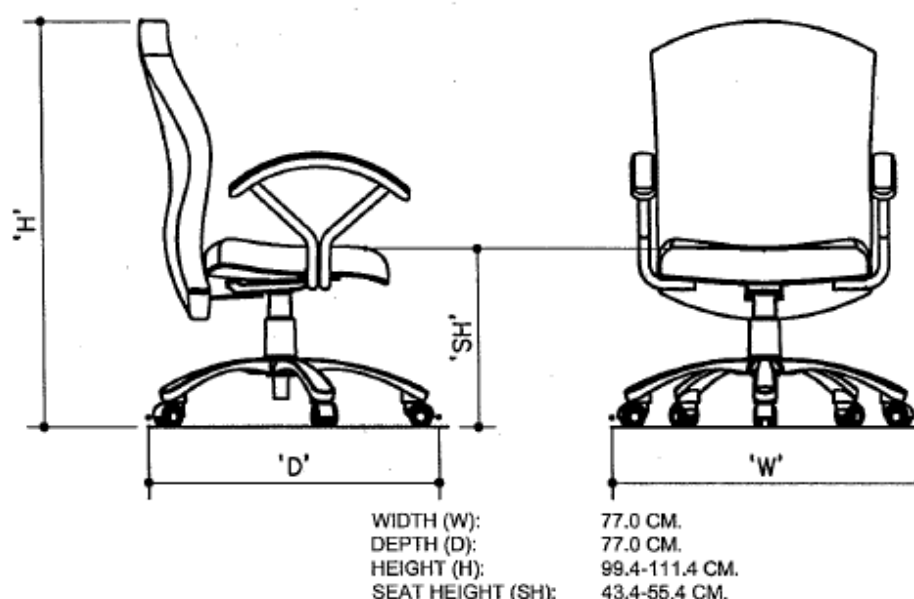
Supplying and placing corner table of dimensions: 600 x 600 x 540 having 8mm tempered glass top with MDF understructure and PVC covering. Pu paint strip on glass top with silver powder. Glass top attached to the understructure via UV disc. Load bearing capacity: 20 Kg.

7. Executive Director's Discussion Table



Supplying and placing in position POD of the following specifications. 4 Seater Round POD 1200 Dia size shall be 1200dia x 750. Top shall be 25 mm thick base material shall be 25 mm thick MDF board .0.4 mm PVC membrane foil using wrap technology. The foil shall be pre- coated with PU layer for better scratch and wear resistant. 0.6 mm balancing laminate on bottom surface. The vertical cladding shall be 18 mm thick base material shall be 18 mm MDF board. 0.4 mm PVC membrane foils using wrap technology. The foil shall be pre- coated with PU layer for better scratch and wear resistant. 0.6 mm balancing laminate on bottom surface. Legs and Top /Bottom plate shall be made from 1.6 mm Matt silver Anodized Aluminium extrusion. Legs Assembled together with 8 mm thick MS powder coated sheet at bottom and 3 mm thick MS powder sheet coated at the top. The MS base shall be having provision for wire entry and glide fixing. Access Flap and Switch Mounting Tray made from matt silver anodized aluminium extrusion and plastic moulded components to facilitate access of electrical / data / voice sockets access from top.

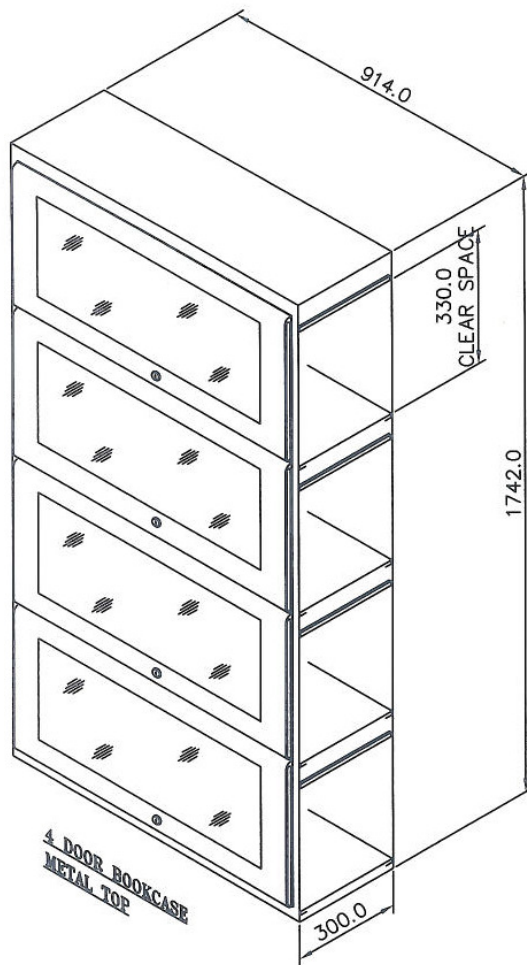
8. Executive Director's Discussion Chairs



THESE DIMENSIONS ARE PRODUCT OUT TO OUT DIMENSIONS & VARIATIONS WITHIN ± 1.0 CM. ARE NORMAL

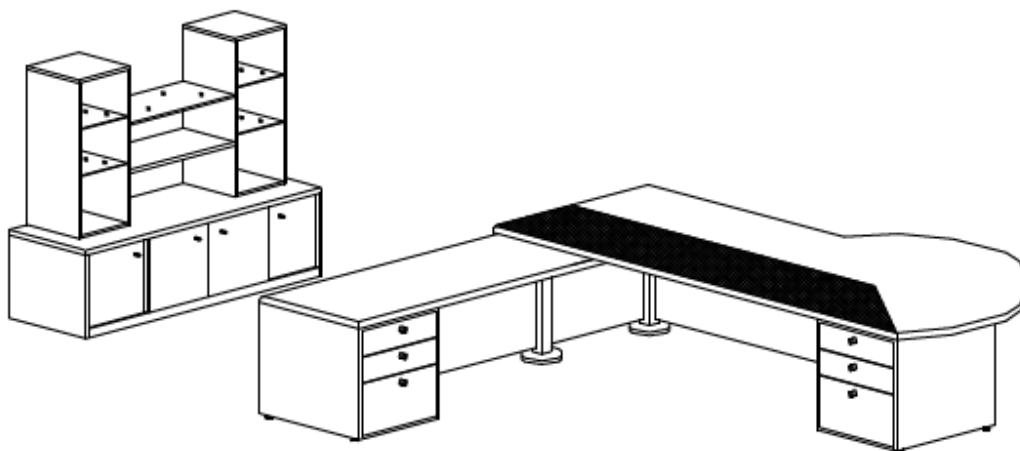
Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 $\pm$ 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-73cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 $\pm$ 2 kg/m³ and hardness load 16 $\pm$ 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 $\pm$ 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assy. shall be made of 2.54 $\pm$ 0.03cm x 0.16 $\pm$ 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore 'A' hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features: 360° revolving type without back tilt. The chair shall be provided with pneumatic height adjustment which shall have stroke of 12.0 $\pm$ 0.3 cm. The below should be made up of 3 piece telescopic type & injection moulded in black polypropylene. The pedestal shall be made of die-cast aluminium with buffing finish. it shall be fitted with 5 nos. twin wheel castor. The size of the pedestal shall be 67.0 $\pm$ 0.5 cm pitch-centre-dia (77.0 $\pm$ 1.0 cm with castors). The twin wheel castors shall be made of Nylon injection moulded in black color. Overall dimensions of Chair shall be, Width of Chair - 77cm, Depth of Chair - 77 cm as measured from pedestal below. Height of back from ground - min 99.4 to max 111.4 cm. Seat height - min 43.4cm to max 55.4 cm. Dimensions tolerance / variations shall be within $\pm$ 1 cm.

9. Book Storages



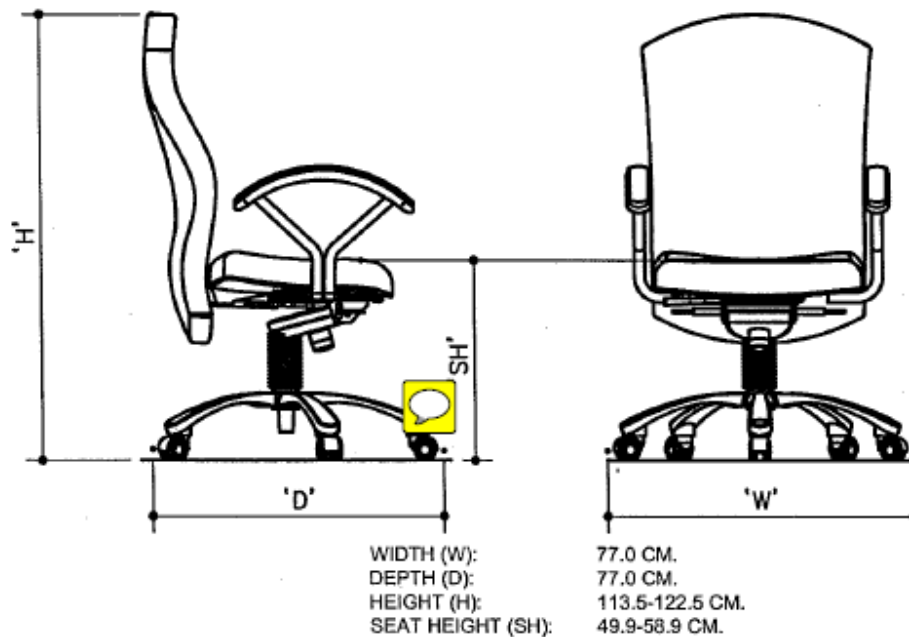
Supplying and placing in position bookcase of the following specifications. 4 Door Book Case shall have the configuration of 914mm (W) x320mm (D) x1742mm (H). The unique design provides the right rigidity to the Top hinged doors, which shall facilitate easy use. The Book Case shall be made from prime quality CRCA steel with anti rusting treatment. It shall have a Rigid Knock down Construction. The Top Panel, Back Panel and Side Panel are made from 0.7mm high yield CRCA and other components from 0.8mm CRCA. Each door shall have a 6 Lever Cam Lock with Common Key. 3mm thick glass should be used in each door for clear inside vision which shall be secured in a metal frame through a rubber gasket. Scissor Mechanism should be provided in each door for receding inside the top of every compartment and it shall ensure parallel and smooth movement. Each door should be provided with plastic side end caps as handle which is easy to grip. Each compartment shall have a storage shelf with a UDL capacity of max 80 Kg. The 2 Door Book Case shall have 18mm PLB Top straight edge with PVC lipping. The finishing shall include Epoxy powder coated to the thickness of 50 microns (+/- 10).

10. Director Table (Main Table + ERU + Back Unit + Tower units)



Supplying and placing in position Main desk of the following specifications. The Main desk RHS size shall be: 2400 Width mm x 1104 Depth mm x 735 Height mm. The top panel shall be 40 mm thick (18 mm MDF + 18 mm MDF batons + 4 mm Natural Veneer). Veneered portion of work surface is finished with high gloss polyester. The understructure shall be having legs made from 1.6 mm thick MS clad with the strips of MFC (Medium Density fiber). Hollow construction of legs facilitates wire management. The modesty & side panel should be 18 mm thick MDF plus pigmented black and coated with melamine. The storage shall be having drawer unit body shall be constructed from 18 mm thick MDF boards has combination of 2 box drawers + 1 filling drawer. Drawers should be mounted on double extension ball slides + drawer fronts should be of natural veneer coated with High gloss Polyester and made of 23 mm (18 mm MDF + 4 mm Natural Veneer + 1 mm DL) and drawer body made of 14 mm MDF (12 mm MDF + 1 mm DL + 1 mm DL). The ERU LHS size shall be: 1400 Width mm x 580 Depth mm x 690 mm Height. The top panel shall be 40 mm thick (18 mm MDF + 18 mm MDF batons + 4 mm Natural Veneer). Veneered portion of work surface is finished with high gloss polyester. The understructure shall be having the modesty panel of 18 mm thick MDF plus pigmented black and coated with melamine. The storage shall be having drawer unit body shall be constructed from 18 mm thick MDF boards has combination of 2 box drawers + 1 filling drawer. Drawers should be mounted on double extension ball slides + drawer fronts should be of natural veneer coated with High gloss Polyester and made of 23 mm (18 mm MDF + 4 mm Natural Veneer + 1 mm DL) and drawer body made of 14 mm MDF (12 mm MDF + 1 mm DL + 1 mm DL). The Back unit size shall be of: 1860 Width mm x 580 Depth mm x 690 Height mm. The door shall be 23 mm thick (18 mm thick Batons + 4 mm Veneer + 1 mm Backing Decorated (BDL). The Shelves and Partitions should be of 18 mm thick MDF (Medium density fiber) + Pigmented Black and coated with Melamine. The Tower Unit size shall be: 1700 Width mm x 400 Depth mm x 1200 Height mm. Panels shall be 18 mm thick MDF (Medium density fiber) Pigmented Black. The glass should be 12 mm thick and glass shall be Float glass plus the edges shall be Diamond cut Polished.

11. Director Chair

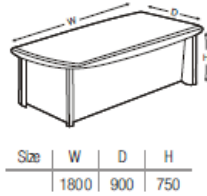


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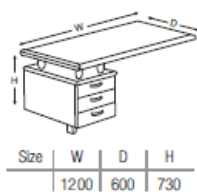
pplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 $\pm$ 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-80cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 $\pm$ 2 kg/m³ and hardness load 16 $\pm$ 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 $\pm$ 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assy. shall be made of 2.54 $\pm$ 0.03cm x 0.16 $\pm$ 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore 'A' hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features: 360° revolving type, Knee Tilt system, Seat & back tilting ration of 1: 1.5, Front pivot for tilt with feet resting on ground ensuring more comfort, Tilt tension adjustment, 5-position locking with antilock back mechanism which should prevent the backrest from impacting the user when the lock is released, Static seat depth adjustment 5.0 $\pm$ 0.5cm with 5 position locking. The chair shall be provided with pneumatic height adjustment which shall have stroke of 9.0 $\pm$ 0.3 cm. The bellow should be single piece duly blow moulded in black polypropylene. The pedestal shall be made of die-cast aluminium with buffing finish. it shall be fitted with 5 nos. twin wheel castor. The size of the pedestal shall be 67.0 $\pm$ 0.5 cm pitch-centre-dia (77.0 $\pm$ 1.0 cm with castors). The twin wheel castors shall be made of Nylon injection moulded in black color. Overall dimensions of Chair shall be, Width of Chair - 77cm, Depth of Chair - 77 cm as measured from pedestal below. Height of back from ground - min 113.5 to max 122.5 cms. Seat height - min 49.9cm to max 58.9 cm. Dimensions tolerance / variations shall be within $\pm$ 1 cm.

12. GM Table (Main Table + joining table + ERU + back unit + 2 Book Case)

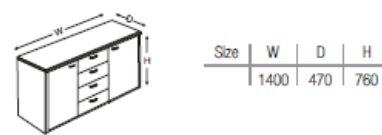
EXECUTIVE DESK



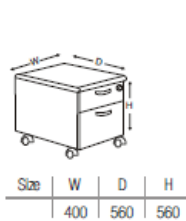
SIDE UNIT



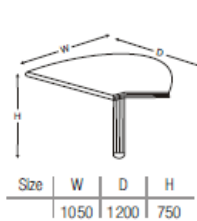
CREDENZA



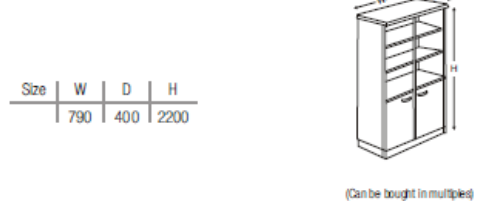
MOBILE PEDESTAL



JOINING TOP*

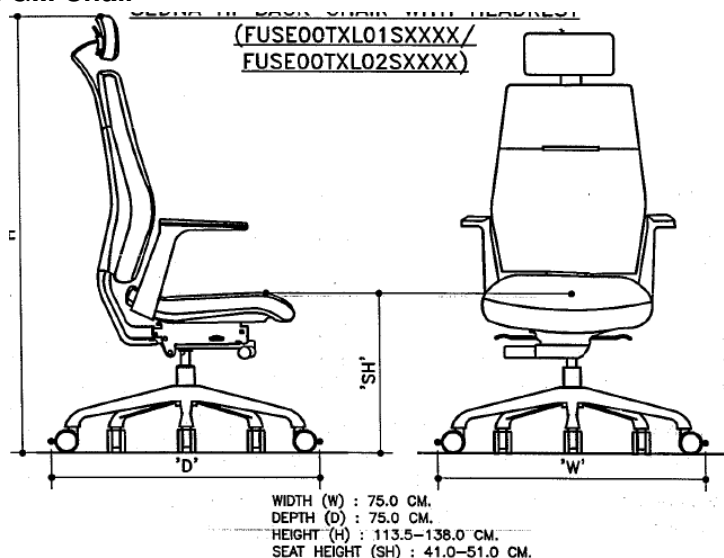


BOOKCASE



Supplying and placing in position main desk of the following specifications. The main desk shall be of size 1800 Width mm x 900 Depth mm x 750 Height mm. The table top shall be 25 mm thick MFC (Melamine Faced Chipboard) also there should be 30 mm MDF (Medium density fiberboard) black pad. The modesty panel shall be of 18 mm thick MFC (Melamine faced chipboard). The leg of the main desk shall be of 25 mm MFC plus 30 mm MDF right and left pad. The main table should be of duck noise profile edge in order to enhance the workspace aesthetics. The joining table RHS shall be of size 1050 Width mm x 1200 Depth mm x 750 Height mm. The top panel shall be 25 mm thick with MFC (Melamine Faced Chipboard). The leg of the joining table shall be of metal. Polyurethane Coated joining table. The return desk size shall be 1200 Width mm x 600 Depth mm x 730 Height mm. The top panel shall be 25 mm thick MFC (Melamine Faced Chipboard). The Modesty panel shall be 18 mm thick MFC coated. The leg of the return desk shall be 25 mm thick MFC (Melamine faced chipboard) plus the right and left pad should be 30 mm thick MDF (medium density fiber) coated. Back unit size shall be 1400 Width mm x 470 Depth mm x 760 Height mm. The top panel size shall be 25 mm thick MFC (Melamine faced chipboard). The door panels and all other panels should be 18 mm thick MFC (Melamine faced chipboard). The handle shall be of metal.

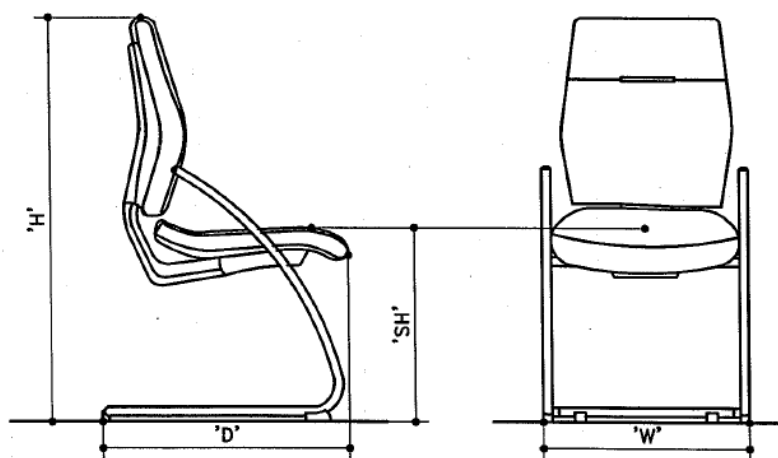
13. GM Chair



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Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 $\pm$ 0.1 cm thick hot pressed moulded reconstituted wood & upholstered with leather and moulded polyurethane foam. Size of back shall be (W)-46.0cm, (H)-57.0cm & size of seat shall be (W)-49.0cm x (D)-49.5cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 $\pm$ 2 kg/m³ and hardness load 16 $\pm$ 2 kgf as per IS: 7888 for 25% compression. The back rest should be connected to the mechanism with a drop-lift mechanism which can be adjusted in the range of 7.0 $\pm$ 0.5cm for the comfortable back support to suitable individual need. Armrests should be pressure die casted in polished aluminium with PP arm tops. The mechanism of chair shall have following features:360 degree revolving type, Seat/Back tilt ratio of 1:3, Synchronized tilt, Back tilt with 4 position locking and Side tilt tension adjustment knob should be operated while taking back support for better adjustment of comfort. The chair shall be provided with pneumatic height adjustment which shall have stroke of 10.0 $\pm$ 0.3 cm. The pedestal shall be made of die-cast polished aluminium. It shall be fitted with 5 nos. twin wheel castor. The size of head rest shall be (W) 26.0cm x 12.0cm (L). The size of the pedestal shall be 65.0 $\pm$ 0.5 cm pitch-centre-dia (75.0 $\pm$ 1.0 cm with castors). The twin wheel castors shall be injection moulded in black polypropylene. Overall dimensions of Chair shall be, Width of Chair - 75.0cm, Depth of Chair - 75.0 cm as measured from pedestal below. Height from ground - min 113.5 to max 138.0 cm. Seat height - min 41.0cm to max 51.0 cm. Dimensions tolerance / variations shall be within $\pm$ 1 cm.

14. GM Visitor Chair



WIDTH (W) : 51.0 CM.
DEPTH (D) : 66.5 CM.
HEIGHT (H) : 96.0 CM.
SEAT HEIGHT (SH) : 48.0 CM.

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Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 $\pm$ 0.1 cm thick hot pressed moulded reconstituted wood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be (W)-45.0cm, (H)-49.0cm & size of seat shall be (W)-49.0cm x (D)-49.5cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 $\pm$ 2 kg/m³ and hardness load 16 $\pm$ 2 kgf as per IS: 7888 for 25% compression. The understructure should be welded structure made up of M.S.E.R.W. elliptical tube and the understructure should powder coated with 40-60 micron DFT (Dry film thickness) Overall dimensions of Chair shall be, Width of Chair - 51.0cm, Depth of Chair - 66.5 cm as measured from base. Height from ground - 96.0 cm. Seat height -48.0 cm. Dimensions tolerance / variations shall be within $\pm$ 1 cm.

15. One Seater Sofa-1

Supplying and placing in position 1 Seater Sofa of dimensions 900 W x 800 D x 685 H with PU Upholstery and tropical wood frame. Foam: Moulded foam at seat and back of density 45 Kg/cubic m. wooden element of Rubber wood, Nylon webbing. Coffee Tray: Alluminium with powder coated.

16. Three Seater Sofa -1

Supplying and placing in position 3 Seater Sofa of dimensions 1970 W x 800 D x 685 H with PU Upholstery and tropical wood frame. Foam: Moulded foam at seat and back of density 45 Kg/cubic m. wooden element of Rubber wood, Nylon webbing. Coffee Tray: Alluminium with powder coated

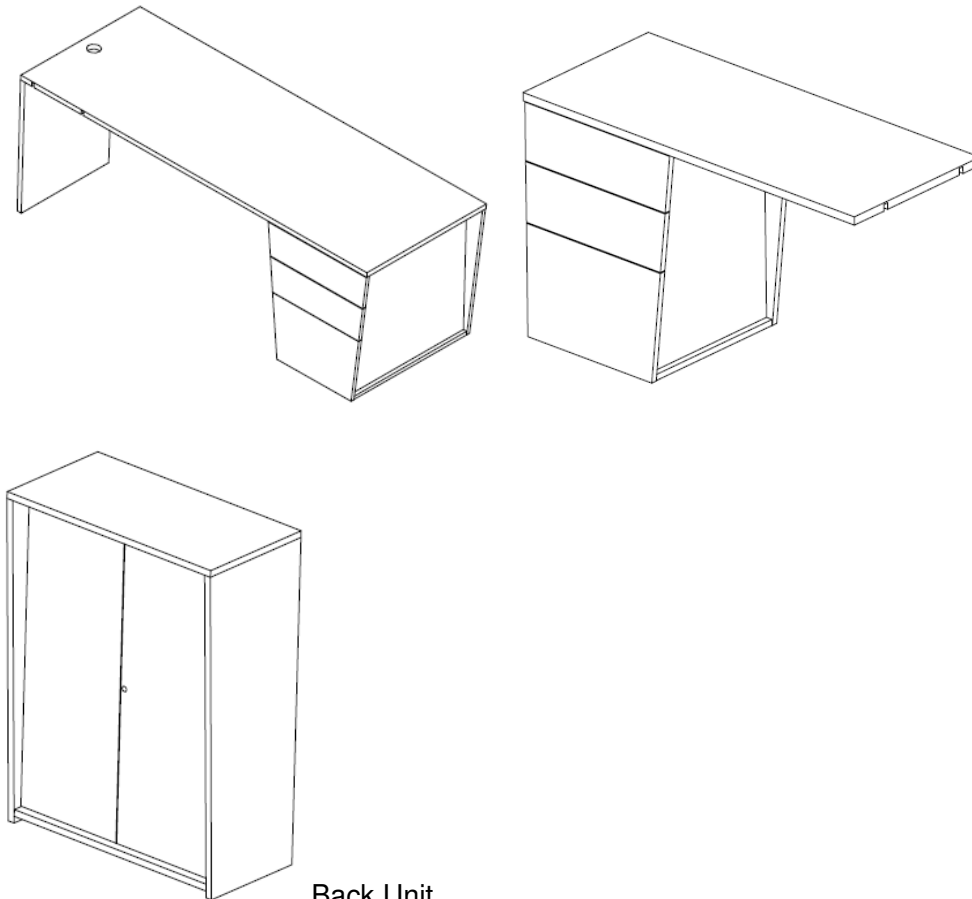
17. Center Table

Supplying and placing in position Center table of Dimensions 1100 x 600 x 500. 8 mm tempered glass top, 6 mm tempered bottom glass for storage, Silver powder coated. Glass understructure. Glass attached to the understructure via UV disc. Load bearing capacity: 30Kg

Supplying and placing in position corner table of Dimensions 600 x 600 x 450. 8 mm tempered glass top, □ 6 mm tempered bottom glass for storage, Silver powder coated. Glass understructure. Glass attached to the understructure via UV disc. Load bearing capacity: 20Kg

18. Executive Table(Main Table+ ERU+ back unit)

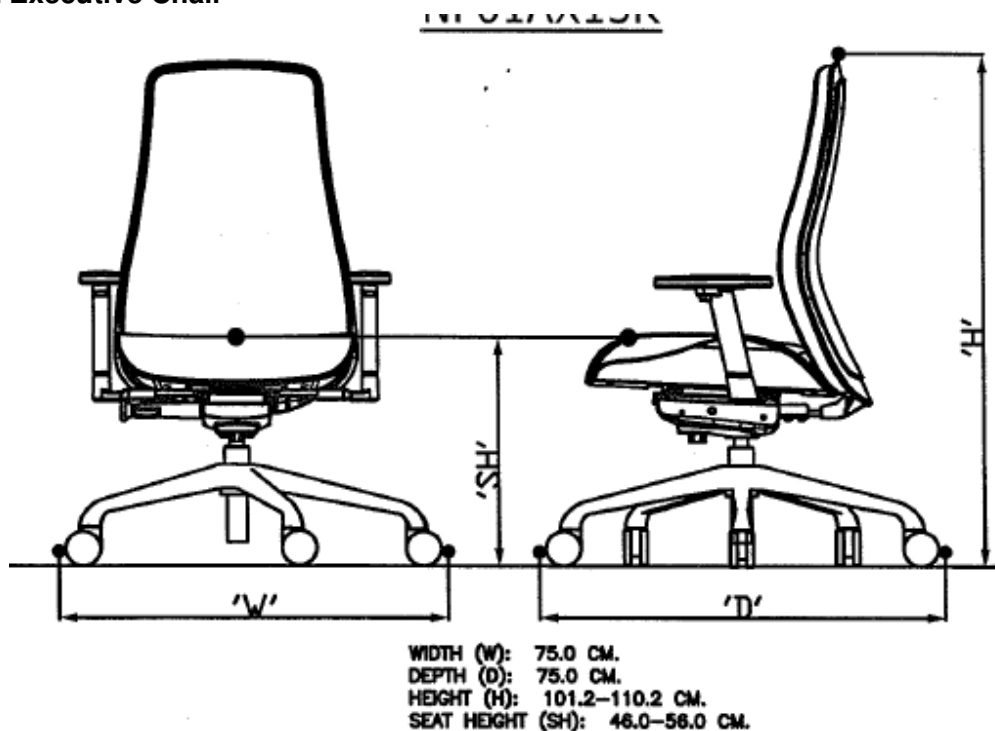
Main Desk +ERU



Back Unit

Supplying and placing in position Main Desk 1950 W x 750 D size shall be 1950 Width mm x 750 Depth mm x 733 Height mm. The top work surface shall be made from 25 mm thick PLT plus the Edge banded with matching PVC lipping. The grommet cutout shall be on primary worktop for alignment worktops connected by table connector. The Modesty panel shall be 18 mm MDF with PU painted in both sides. The Pedestal top shall be supporting wooden with soft closing drawers. There shall be a combination of 18 and 25 mm PLT also the edge shall be banded with matching PVC lipping file Hanger inside the file drawer, side central lock. Secondary (L) + Ped 1050 W x 500 D size shall be 1050 Width mm x 500 Depth mm x 733 Height mm. The top work surface shall be made of 25 mm thick PLT. Edge banded with matching PVC lipping and Grommet cutout on primary worktop. Also for alignment worktops shall be connected by table connector. Secondary Archival Storage size shall be 900 Width mm x 1200 Depth mm x 450 Height mm. The Secondary archival storage shall be a wooden wardrobe with 3 point locking and push to open doors. The design shall be handle less. There shall also be combination of 18 mm & 25 mm PLT plus Edge shall be banded with matching PVC lipping.

19. Executive Chair

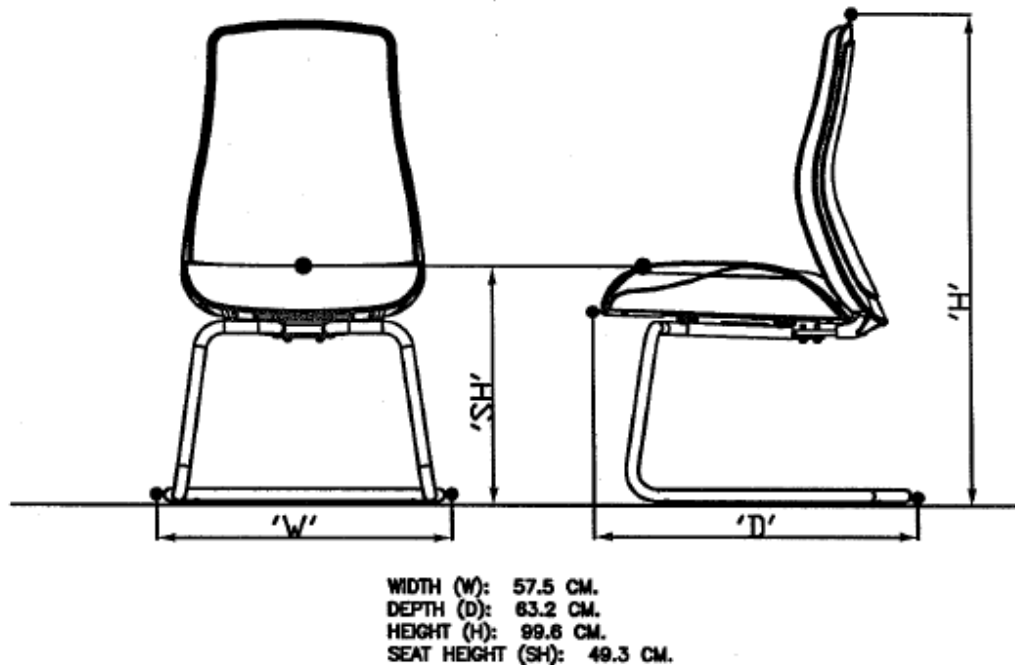


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Supplying and placing in position chair of the following specifications. The seat shall be made of injection molded plastic outer and inner in Polypropylene talc filled. Plastic inner is upholstered with synthetic leather cover and moulded polyurethane foam and lumbar foam. The back shall be made of injection molded plastic outer in nylon material and inner in Polypropylene talc filled. Seat dimensions should be 48.4cm (W) x 52 cm (D) and back as 49.0cm (W) x 73.0cm (H). High Resilience polyurethane foam shall be moulded with density 55 ± 2 kg/m³ and back hardness load 11 ± 2 kgf as per IS: 7888 for 25% compression and seat hardness load 20 ± 2 kgf as per IS: 7888 for 25% compression. The lumbar support foam insert shall made from visco-elastic slow recovery memory foam, moulded with density $= 60 \pm 5$ kg/m³ and hardness $= 6.5 \pm 1.5$ at 25% compression and recovery time 12 ± 1 sec. Armrest shall have 4 ranges of adjustments- 1. Up-down adjustment: 8 steps (8.0 ± 0.5 cm range), 2. Swivel adjustment: 3 positions, $9 \text{ degree} \pm 2$ swivel each side. 3. Width adjustment: Any position (2.0 ± 0.5 cm range each arm top) 4. To-Fro adjustment: Any position (4.0 ± 0.5 cm range) Height adjustment shall be in armrest structure and all other adjustments should be provided in pad which is fixed to armrest structure, The mechanism of chair shall have following features: 360 degree revolving type, Seat/Back tilt ratio of 1:2, Active Bio-Synchronic mechanism, 5 position tilt limiter giving option of variable tilt angle to the chair. Front-Pivot for tilt with feet resting on ground and continuous lumbar support should ensure more comfort. Pneumatic height adjustment should have an adjustment stroke of 10 ± 0.3 cm. The size of the pedestal shall be 65.0 ± 0.5 cm pitch-centre-dia (75.0 ± 1.0 cm with castors). The twin wheel castors shall be injection moulded in black polypropylene. Overall dimensions of Chair shall be, Width of Chair - 75.0cm, Depth of Chair - 75.0 cm as measured from pedestal below. Height from ground - min 101.2 to max

110.2cm. Seat height - min 46.0cm to max 56.0cm. Dimensions tolerance / variations shall be within +/- 1 cm.

20. Executive Visitor Chair



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Supplying and placing in position chair of the following specifications. The seat shall be made of injection molded plastic outer and inner in Polypropylene talc filled. Plastic inner is upholstered with synthetic leather cover and moulded polyurethane foam and lumbar foam. The back shall be made of injection molded plastic outer in nylon material and inner in Polypropylene talc filled. Seat dimensions should be 48.4cm (W) x 52.0cm (D) and back as 49.0cm (W) x 64.6cm (H). High Resilience polyurethane foam shall be moulded with density 55 ± 2 kg/m³ and back hardness load 11 ± 2 kgf as per IS: 7888 for 25% compression and seat hardness load 16 ± 2 kgf as per IS: 7888 for 25% compression. The lumbar support foam insert shall made from visco-elastic slow recovery memory foam, moulded with density $= 60 \pm 5$ kg/m³ and hardness $= 6.5 \pm 1.5$ at 25% compression and recovery time 12 $\pm$ 1 sec. The tubular visitor frame shall be powder coated (DFT 40-60 microns) cantilever structure and made of dia 2.54 ± 0.03 cm x 0.2 ± 0.016 cm thick MSERW tube with a connecting M.S spine welded to it. Overall dimensions of Chair shall be, Width of Chair - 57.5cm, Depth of Chair - 63.2 cm as measured from base below. Height from ground - 99.6cm. Seat height - 49.3cm. Dimensions tolerance/variations shall be within +/- 1 cm.

21. Sofa 2 Seater-2

Supplying and placing in position 2 Seater sofa of the following specifications. Upholstery in Synthetic Leather. Polyester fiber wadding 175 GSM (18 mm). PU foam of 32d, 28d, 23d in various positions. Expanded PF sheet for load distribution in seats. Durable rubber webbings of 50 mm & 70 mm. Cotton webbing on wooden surface to prevent sharp edges. Commercial ply – 12 to 15 mm as per design requirement. Pinewood of various thickness and length duly dried as base structure. All structures are joined with stapling. The

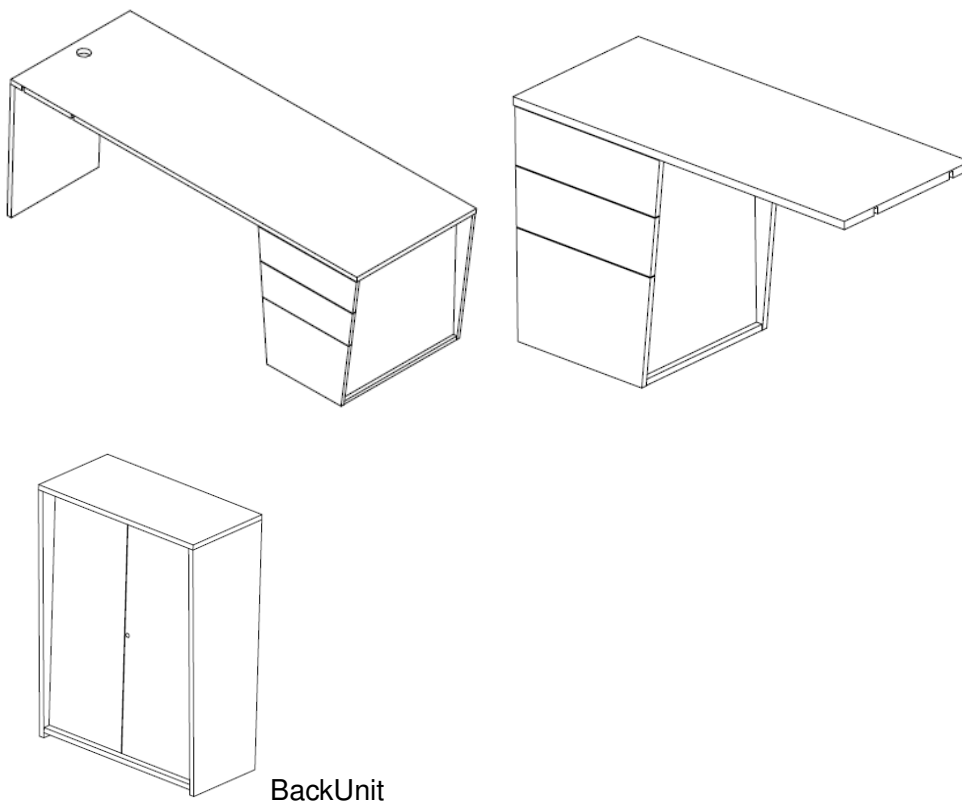
overall dimension of the sofa shall be 1360 mm (W) x 850 mm (D) X 890mm (H). The seat height shall be of 420 mm. The sofa comes in a tropical wooden frame.

22. Sofa 3 Seater-2

Supplying and placing in position sofa of the following specifications. Upholstery in Synthetic Leather. Polyester fiber wadding 175 GSM (18 mm).

PU foam of 32d, 28d, 23d in various positions. Expanded PF sheet for load distribution in seats. Durable rubber webbings of 50 mm & 70 mm. Cotton webbing on wooden surface to prevent sharp edges. Commercial ply – 12 to 15 mm as per design requirement. Pinewood of various thickness and length duly dried as base structure. All structures are joined with stapling. The overall dimension of the sofa shall be 1820 mm (W) x 850 mm (D) X 890mm (H). The seat height shall be of 420 mm. The sofa comes in a tropical wooden frame.

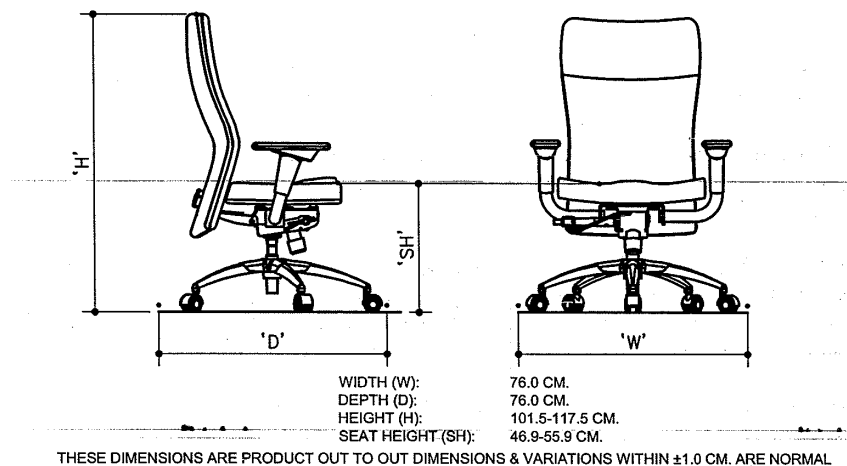
23. Executive Table(Main Table+ ERU+ back unit)-2



Supplying and placing in position Main Desk 1650 W x 600 D size shall be 1650 Width mm x 600 Depth mm x 733 Height mm. The top work surface shall be made from 25 mm thick PLT plus the Edge banded with matching PVC lipping. The grommet cutout shall be on primary worktop for alignment worktops connected by table connector. The Modesty panel shall be 18 mm MDF with PU painted in both sides. The Pedestal top shall be supporting wooden with soft closing drawers. There shall be a combination of 18 and 25 mm PLT also the edge shall be banded with matching PVC lipping file Hanger inside the file drawer, side central lock. Secndry (L) + Ped 1050 W x 500 D size shall be 1050 Width

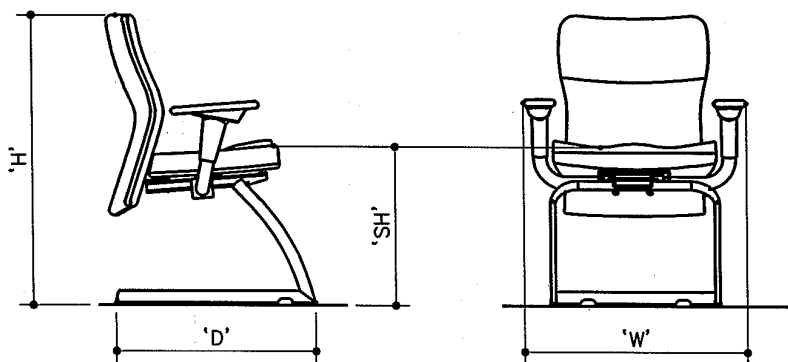
mm x 500 Depth mm x 733 Height mm. The top work surface shall be made of 25 mm thick PLT. Edge banded with matching PVC lipping and Grommet cutout on primary worktop. Also for alignment worktops shall be connected by table connector. Secondary Archival Storage size shall be 900 Width mm x 1200 Depth mm x 450 Height mm. The Secondary archival storage shall be a wooden wardrobe with 3 point locking and push to open doors. The design shall be handle less. There shall also be combination of 18 mm & 25 mm PLT plus Edge shall be banded with matching PVC lipping.

24. Executive Chair-2



Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 $\pm$ 0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with fabric or synthetic leather and moulded polyurethane foam. The back shall be made up 1.2 $\pm$ 0.1cm thick hot pressed plywood upholstered with replaceable fabric or synthetic leather upholstery covers and moulded polyurethane foam. The moulded polyurethane foam shall be of density 45 $\pm$ 2kg/m³ and hardness load 16 $\pm$ 2kgf as per IS: 7888 for 25% compression. The dimensions of seat shall be- 51.0cm (W) x 48.0cm (D) and of back shall be 48.0cm (W) x 76.0cm (H). The armrest top shall be made of moulded polyurethane and mounted on to a drop lift height adjustable type M.S tubular armrest support chrome plated. The armrest height shall be adjustable up to 6.5 $\pm$ 0.5cm in 5 steps and also has swivel adjustment of 22 degree $\pm$ 2 on both sides. The mechanism of the chair shall have following features: 360° revolving type, Knee tilt synchronic mechanism, Tilt tension adjustment, Single point control, 4 positions locking with anti shock feature, Seat depth adjustment of 6.0 $\pm$ 0.5cm should be locked in 6 positions. The backrest shall consist of a sliding up down mechanism, which can be adjusted in the range of 7.5 $\pm$ 0.5cm and should be locked in 4 positions for correct position of lumber support. The chair shall be provided with pneumatic height adjustment which shall have stroke of 9.0 $\pm$ 0.3 cm. The pedestal shall be fabricated from 0.2 $\pm$ 0.02cm thick HR sheet, chrome plated and assembled with injection moulded black polypropylene hub cap. The size of the pedestal shall be 66.0 $\pm$ 0.5 cm pitch-centre-dia (76.0 $\pm$ 1.0 cm with castors). The twin wheel castors shall be made black nylon. Overall dimensions of Chair shall be, Width of Chair - 76.0cm, Depth of Chair - 76.0cm as measured from pedestal below. Height from ground - min 101.5 to max 117.5cm. Seat height - min 46.9 to max 55.9cm. Dimensions tolerance / variations shall be within $\pm$ 1 cm.

25. Executive Visitor Chair-2

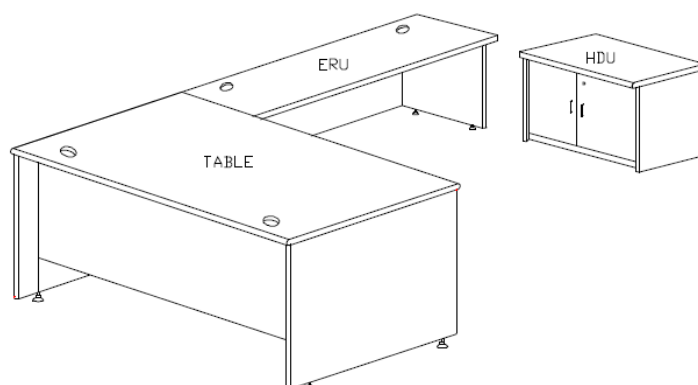


WIDTH (W): 66.5 CM.
 DEPTH (D): 58.0 CM.
 HEIGHT (H): 88.5 CM.
 SEAT HEIGHT (SH): 45.0 CM.

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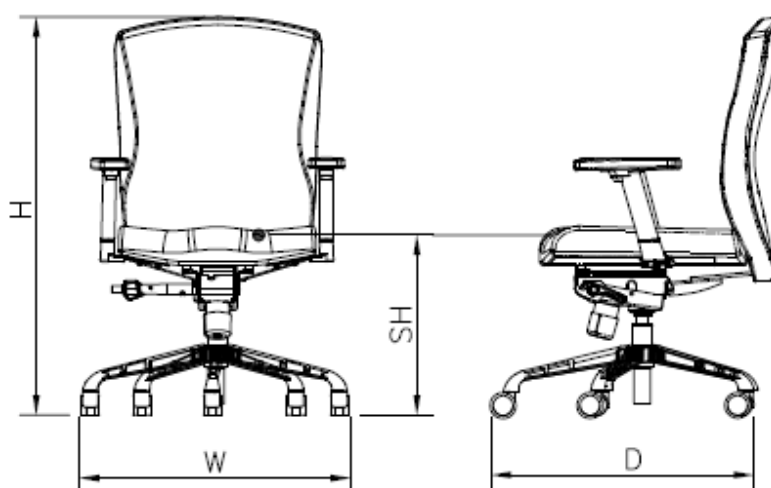
Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 $\pm$ 0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with fabric or synthetic leather and moulded polyurethane foam. The back shall be made up 1.2 $\pm$ 0.1cm thick hot pressed plywood upholstered with replaceable fabric or synthetic leather upholstery covers and moulded polyurethane foam. The moulded polyurethane foam shall be of density 45 $\pm$ 2kg/m³ and hardness load 16 $\pm$ 2kgf as per IS: 7888 for 25% compression. The dimensions of seat shall be- 51.0cm (W) x 48.0cm (D) and of back shall be 48.0cm (W) x 64.5cm (H). The armrest top shall be made of moulded polyurethane and mounted on to fixed type M.S tubular armrest support chrome plated. The Arm support has static vertical adjustment of $\pm$ 1.5 $\pm$ 0.05cm. The backrest shall consist of a fixed type mechanism i.e no back up/down adjustment. The leg frame welded assembly shall be chrome plated, made from 3.5 $\pm$ 0.03cm x 1.5 $\pm$ 0.02cm x 0.16 $\pm$ 0.0128cm thick elliptical MSERW tube and provided with a base plate for seat fixing. Overall dimensions of Chair shall be, Width of Chair - 66.5cm, Depth of Chair - 58.0cm as measured from pedestal below. Height from ground - 88.5cm. Seat height - 45.0cm. Dimensions tolerance / variations shall be within $\pm$ 1 cm.

26. Executive Table(Main Table + ERU)-3



Supplying and placing the executive table of following specifications. Main Table (1500 x 750 x 740) having top and side panel 25mm thick plain particle board(PPB) clad with 0.6 mm thick post formed laminate and 1mm thick backing laminate (BDL). Flat edge duly sealed with 2mm thick PVC beading and modesty panel of 18mm thick plain particle board (PPB) clad with 1.0mm thick decorative laminate (DL) on both sides. Edge sealed with 2mm thick PVC beading with Side Unit of size 1050 x 450 x 705 mm with 25mm thick plain particle board (PPB) clad with 0.6 mm thick post formed laminate and 1mm thick backing laminate (BDL). Flat edge duly sealed with 2mm thick PVC beading and 18mm thick plain particle board (PPB) clad with 1.0mm thick decorative laminate (DL) on both sides. Edge sealed with 2mm thick PVC beading and the mobile pedestal of same family.

27. Executive Chair-3/ Conference Chair

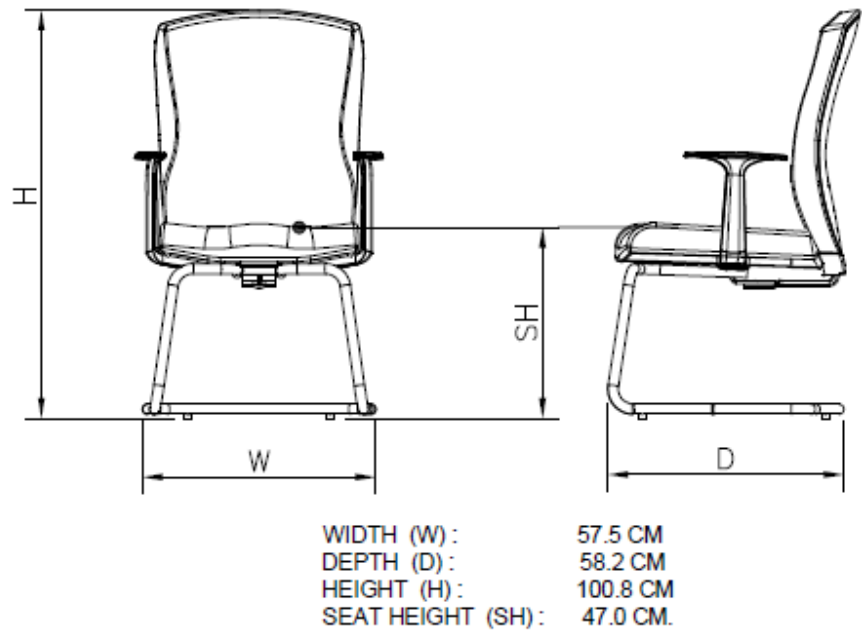


WIDTH (W) :	67.5 CM
DEPTH (D) :	67.5 CM
HEIGHT (H) :	92.0 - 110.0 CM
SEAT HEIGHT (SH) :	45.0 - 55.0 CM.

THESE DIMENSIONS ARE PRODUCT OUT TO OUT DIMENSION & VARIATION WITHIN ± 1.0 CM ARE NORMAL.

Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2+/-0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with leatherette, over molded High Resilience polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood. The HR polyurethane foam shall be of density 55+/-2kg/m³ and hardness load 16 +/- 2kgf as per IS: 7888 for 25% compression. The dimensions of seat shall be- 49.0cm (W) x 51.4cm (D) and of back shall be 51.6cm (W) x 65.7cm (H). The armrest top is PU molded over metal insert and the height adjustable armrest structure is powder coated. The armrest height shall be adjustable up to 8.0+/-0.5cm in 8 steps. The mechanism of the chair shall have following features: 360° revolving type, Front Pivot synchronic mechanism, Tilt tension adjustment, Single point control, 4 position locking with anti shock feature, Seat/back tilting ratio of 1:2. The back can be adjusted in 5 positions manually for correct position of lumbar support. Stroke of height adjustable spine is 7 cm. The chair shall be provided with pneumatic height adjustment which shall have stroke of 10.0 +/- 0.3 cm. The pedestal shall be injection molded in black 30% glass filled Nylon and fitted with 5 nos. twin wheel castors. The size of the pedestal shall be 66.0+/- 0.5 cm pitch-centre-dia (76.1 +/- 1.0 cm with castors). The twin wheel castors shall be injection molded in black nylon. The seat can be slid horizontally as per user convenience having a stroke slide of 5 cm. Overall dimensions of Chair shall be, Width of Chair - 76.1cm, Depth of Chair - 76.1cm as measured from pedestal below. Height from ground - min 102.0 to max 119.0cm. Seat height - min 45.0 to max 55.0cm. Dimensions tolerance / variations shall be within +/- 1 cm.

28. Executive Visitor Chair-3

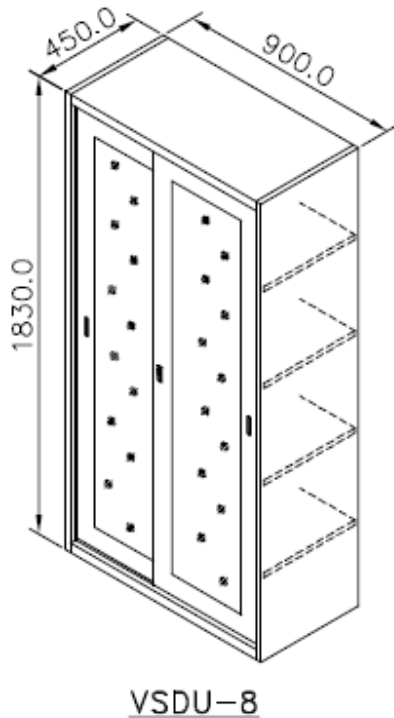


THESE DIMENSIONS ARE PRODUCT OUT TO OUT DIMENSION & VARIATION WITHIN ±1.0 CM ARE NORMAL.

Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2+/-0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with leatherette, over molded High Resilience polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood. The HR polyurethane foam shall be of density 55+/-2kg/m³ and hardness load

16 +/- 2kgf as per IS: 7888 for 25% compression. The dimensions of seat shall be- 49.0cm (W) x 51.4cm (D) and of back shall be 51.6cm (W) x 65.7cm (H). Armrests shall be fixed and the tubular frame is powder coated (DFT 40-60microns) cantilever structure & made of Dia 2.54 $\pm$ 0.03cm x 0.2 $\pm$ 0.016cm thk. M.S. E.R.W Tube with a connecting M.S. Spine welded to it. Back spine is fitted to the frame assembly.

29. Glass Door Cabinets



Overall Dimensions of VSDU - 8 shall be 900mm (W) x 450mm (D) x 1830mm (H). The top shall be Metal top (1 mm add in unit height) .The Rigid Knock down Construction, Back, Sides and Door shall be made from Glass for visibility of content. Sliding door arrangement shall have sliding door with top hanging arrangement to prevent derailment. Each door shall be provided with 2 plastic rollers having steel ball bearing for smooth movement of door & less noise .VSDU 8 shall have glass door for visibility of the content. Locking shall be 5 lever cam lock for safe locking. Handle shall be plastic flush & recessed handle. Shelving shall have Height wise adjustable shelf mounting. Uniformly Distributed Load Capacity of the shelf is 40 Kg maximum. VSDU - 8 shall have 4 no. of adjustable full shelves. Accessories optional shall be cradle with pipes. Leveler shall be screw type leveler with hex plastic base and overall finish shall be epoxy polyester coated to the thickness of 50 microns. For VSDU 8 - A4 size box file can be stored vertically on four shelves and clear space above fifth shelf is 220 mm.

30. Manager Module cubicle-



Providing and placing WISH panel & tile based modular workstation, with partition thickness as 52.4 mm thick and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles is fabric tack able & white board. Bottom tiles - Plain metal. SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tack able along with white board. INTERMEDIATE BLOCKS Intermediate blocks are given in DL finish. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. MODESTY PANELS WITH ASSEMBLY LEG - 25 MM THK PLB modesty has been given on the front of the main worktop which is attached to the partition on one end with gable end brackets and on the other end with metal powder coated frontier leg. Side panels or legs - out of 25 mm thick pre lam particle board with flat PVC lipping edge banding considered only on the open end conditions or metal powder coated legs at the end and shared condition. System shall also have 120 mm high powder coated standalone panel legs to give the system an elevated look. Work surface- Main table recta out of 25 mm thick pre lam particle board with flat PVC lipping edge banding of size 1650 mm w x 800 mm d and ERU table recta of size 1050 mm w x 450 mm d. Pedestals with or without legs - Nova pedestal flat metal front, full ht free standing central locking of size 390 mm w x 435 mm d x 646 mm ht 3dr = 2box+1file. CPU trolley - with castors KBPT with/without mousetray - plastic/metal/articulated. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring.

31. Cabinets/ passage area storage

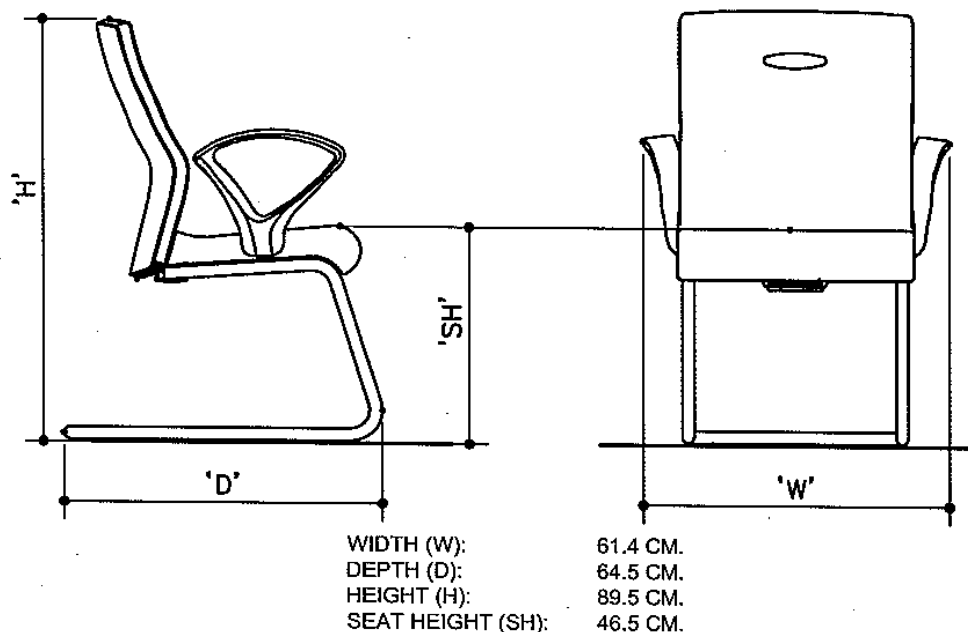
Supplying and placing the all wood storage unit of size 750 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door

Panels are made from 18 mm PLB with 2 mm Edge band on all edges and a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.

32. Assistant Table

Supplying and placing in position Main desk of the following specifications. Main Desk size shall be 900 Width x 600 Depth x 750 Height. The Top shall be in white cedar and black and shall be 18 mm PLB with PVC lipping. The side panels shall be 18 mm thick PLT with PVC. The Modesty panel shall be 18 mm thick PLT. The Modesty panel shall be in a combination of black & white cedar.

33. Assistant/Reading Chair

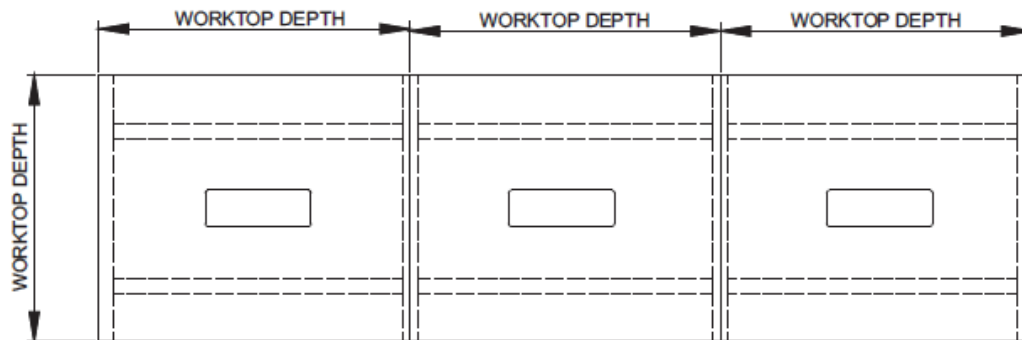


THESE DIMENSIONS ARE PRODUCT OUT TO OUT DIMENSIONS & VARIATIONS WITHIN ± 1.0 CM. ARE NORMAL

Supplying and placing in position chair of the following specifications. The seat and back shall be made up of 1.2 ± 0.1 cm. thick hot-pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with fabric upholstery covers and moulded Polyurethane foam. The back foam shall be designed with contoured lumbar support for extra comfort. The seat shall be extra thick foam on front edge to give comfort to popliteal area. The dimensions of back shall be 47.5 cm(W) x 58.0 cm(H) and of seat shall be 47.0 cm (W) x 48.0 cm (D). The HR polyurethane foam shall be moulded with density = 45 ± 2 kg/m³ and hardness load 16 ± 2 kgf as per IS:7888 for 25% compression. The one-piece armrests shall be injection moulded from black Co. polymer Polypropylene. The mechanism shall be designed with 360° revolving type, Upright-position locking, Tilt tension adjustment, Seat/back tilting ratio of 1:3. The pneumatic height adjustment shall have an adjustment stroke of 12.0 ± 0.3 cm. The bellow shall be 3 piece telescopic type and injection moulded in black Polypropylene. The pedestal shall be injection moulded in black 33% glass-filled Nylon-66 and fitted with 5 nos. twin wheel castors. The pedestal shall be 66.3 ± 0.5 cm. pitch-centerdia. (76.3 ± 1.0 cm with castors). The twin wheel castors shall be injection moulded in Black Nylon. Overall Dimensions of Chair shall be Seat Height - min

42.5 to max 54.5cm, Height - min85.5 to max 97.5cm, Width & Depth of Chair as measured from pedestal - Width-76.3 cm and Depth-76.3 cm.

34. Workstation-1



Providing and placing 2 LINEA DESK based modular workstation of size 1800 x 900 with System ht - 750 mm

UNDERSTRUCTURE: Comprising of metal powder coated cross connectors between legs, legs made up of metal powder coated finish and the entire assembly is fixed to the worktop with the help of ABS plastic spacers 20 mm high which gives the floating look to the w/s module. . The respective finishes for the screens shall be fabric.

Wire Management : Metal powder coated Cable pole of size 170mm w x 85 mm d x 705 mm ht/ is given to pull wires from the floor junction box upto the power box fixed under neath the worktop. Aluminium access flaps on worktop above power box cut out for accessing switches. Worksurface - out of 25 mm thkprelam particle board with flat pvc lipping edge banding of size 1800 mm w x 900 mm d each.

Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 10 mm of uneven flooring.

35. Workstation-2



Providing and placing WISH panel & tile based modular workstation, with partition thickness as 52.4 mm thk and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles are fabric tackable & white board. Bottom tiles - Plain metal. SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tackable along with white board.

INTERMEDIATE BLOCKS Intermediate blocks are given in DL. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. END PANEL: a 52.4 mm thk end panel is fitted with the main spine of 52.4 mm in the following size 2' wide and 4'0" ht. Following finishes are given on intermediate block DL, bottom block metal and top block fabric. Worksurface - Main table recta out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 2400 mm w x 600 mm d. Pedestals with or without legs - Nova pedestal flat metal front, free standing central locking of size 390 mm w x 585 mm d x 646 mm ht 3dr = 2box+1file. CPU trolley - with castors

KBPT with/without mousetray - plastic/metal/articulated Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring.

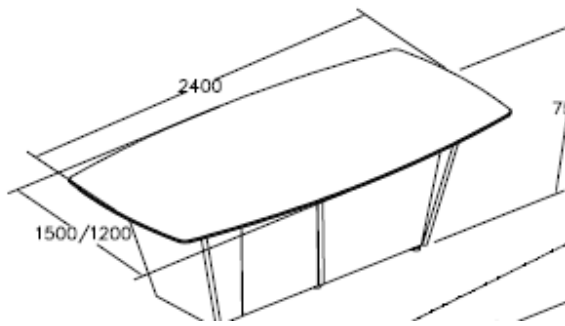
36. Centre table-3

Providing and placing Centre Table of Dimensions: 1200 x 600 x 450. Rubber wood under frame. High density plywood top with 24 mm thickness. Curved legs with ethnic design. Load bearing capacity of 50 Kg

37. Corner Table-3

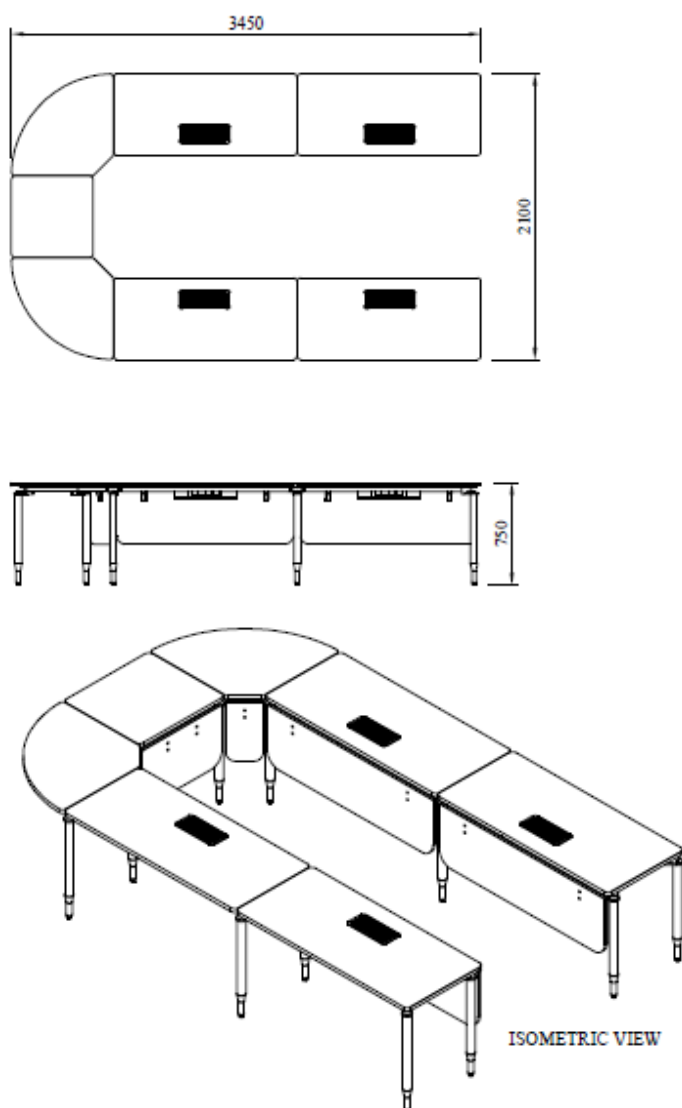
Providing and placing Corner Table of Dimensions: 600 x 600 x 480. Rubber wood under frame. High density plywood top with 24 mm thickness. Curved legs with ethnic design. Load bearing capacity of 30 Kg.

38. Meeting Table



Conclve 10 B. Conv 1500 D size shall be 3200 Width mm x 1500 Depth mm x 750 Height mm . Top work surface shall be 12 mm thick tougher glass with back painted design on to under side and crystal edge polish finish . The construction shall be Knock down Construction .The Understructure shall have all panels made from 36 mm thick Pre-laminated board with 2 mm thick PVC edge beading . Understructure also consists of storage for CPU , projector and paper storage . Provision for glass adjustment for glass aligning . The Wire Management shall have Legrand electricals used for wire management on tocentre support beam panel and CPU storage area for socket connections ,RJ11,RJ45 .

39. Conference Table

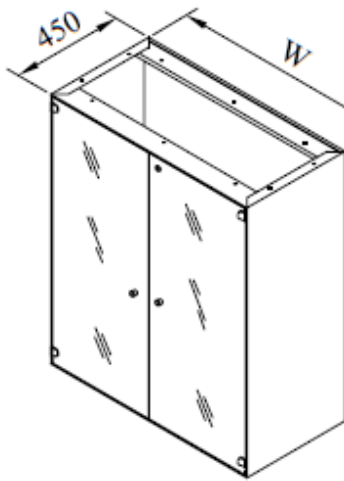


Supplying and placing in position Conference table of the following specifications. The top of Conference Table shall be 25 mm thick base material shall be 25 mm MDF board plus 0.4 mm PVC membrane foil using wrap around technology . The foil is pre - coated with PU layer for better scratch and wear resistance . 0.6 mm balancing laminate on bottom surface . The Squeeze Leg Assembly shall be nickel chrome plated made from Dia 50.8 x 1.6 mm thick MS ERW tube . Leg Assembled together with a plastic glide at bottom and a powder coated leg connector made from aluminium alloy at top . Cross Member and connectors shall be powder coated cross member made from 1.5 mm thick aluminium extrusion fixed with work surface by plastic moulded table support connector . Powder coated connectors made from Aluminium alloy fixed at both ends of cross members . Squeeze Leg Assembly and connectors are assembled together to strengthen complete understructure . Laminate Modesty shall be 18 mm thick base material shall be 16 mm Plain particle board . Post - Laminated with 0.6 mm Top laminate on either side also there

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shall be 2 mm thick PVC edge banding of matching colour on outer edges of modesty . Work surface and Modesty are assembeled together with powder coated Modesty bracket made from 2 mm thick MS sheet . Metal Perforated Modesty shall be 18 mm thick Powder coated metal perforated modesty with stiffener made from 0.8 mm thick MS sheet . Work surface and Modesty are assembeled together with powder coated Modesty bracket made from 2 mm thick MS sheet . The Access Flap and Switch Mounting Tray shall be made from Matt silver anodized aluminium extrusion and plastic moulded components to facilitate access of electrical/ data /voice sockets access from top . Powder coated switch mounting tray made from 0.8 mm and 1.5 mm MS sheet .Switches to be mounted on tray as per requirement

40. Cabinets-2

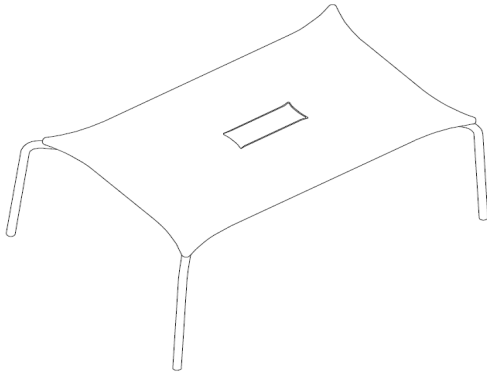


Construction & Material Knockdown construction.

Prime Quality CRCA 0.8mm thk for all the body panels and shelves. Door Opening Twin door with self closing hinges Door Wood (18 mm PLT) Handle • Aesthetically appealing recessed plastic handle for wooden Doors. • 3 point locking mechanism in • Height wise Adjustable Shelf Mounting• Uniformly Distributed Load capacity per each shelf is 80 Kg Maximum2 nos. Adj. Shelves.Top Options Wooden Top (PLB) 25 mm thk.PF or Wooden Top (PLB) 25 mmthk. Plain or 14 mm thk Metal top (Add to unit height) Skirting Options 152 mm High, 125 mm High – add to unit height

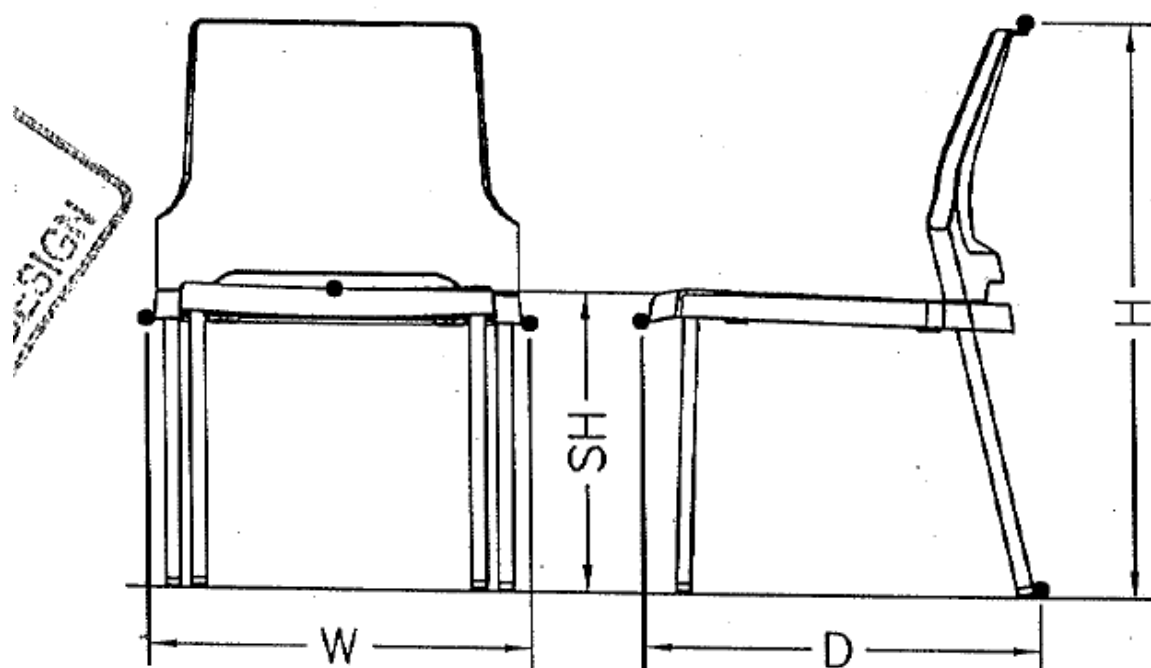
Leveler Screw type adjustable Leveler with plastic base (Add in unit height min. 18 mm & additional 10 mm adjustment) Finish: Epoxy polyester powder coating finish 50 +/-10 microns. Stack ability / Reversibility / Connectivity • Can be stacked with any of Unite range of storages. • Unit can be stacked such that its front Fascia is opposite to that of other units. • Can be connected with Grid Partition in select situations. • Work top anchoring option on demand. Back panel Unit has its own back; additionally GRID tiles can be mounted if required.

41. canteen Table



Supplying and placing in position Canteen table of the following specifications. 4 Seater PU Coated size shall be 1135 Width mm x 1175 Depth mm x 750 Height mm . Top shall be 25 mm thick base material shall be 25 mm MDF board . On top PU painting of minimum 2H hardness with 75% glass as per color chart .Combination color graphics on the centre . Brown Laminate on bottom specially profiled edges for comfort . The Understructure shall be having bend pipe structure of MS powder coated . Pipe dia 38 mm , 2 mm thick and it shall be fitted with top by SS machine screws . Legs shall be of MS powder coated and 38 mm dia. pipe legs are fixed with inderstructure and table top . Glide shall be of Plastic fixed at the understructure to prevent the damage of table top during stacking.

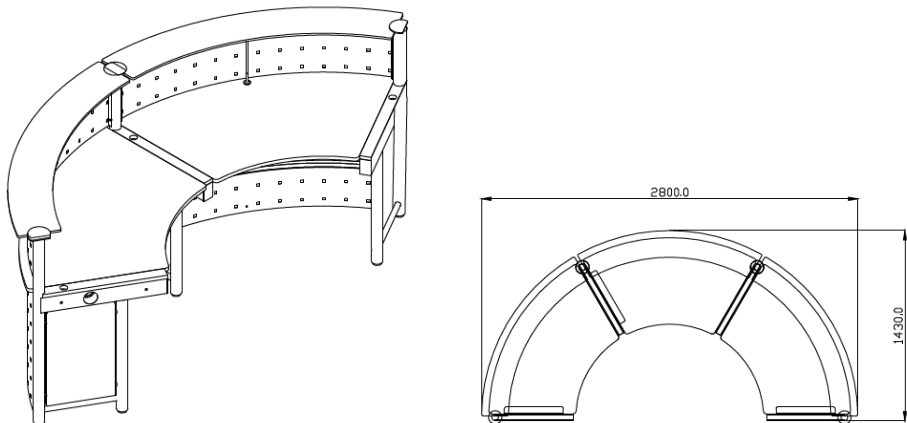
42. Canteen Chair



WIDTH (W) :	52.5 CM
DEPTH (D) :	55.8 CM
HEIGHT (H) :	84.5 CM
SEAT HEIGHT (SH) :	45.0 CM.

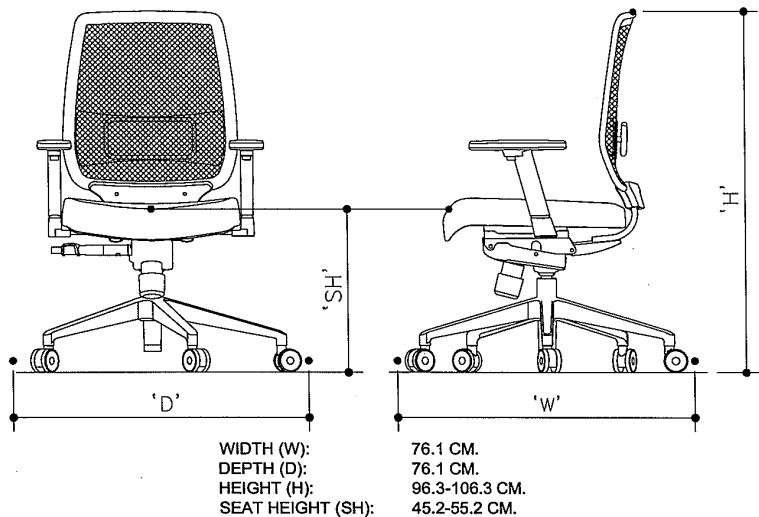
Supplying and placing in position cafe chairs of the following specifications. The seat and back shall be one piece injection moulded in high impact strength polypropylene. The dimensions of seat shall be 52.5 cm (W) X 53.2 cm (D) and of back shall be 51.6 cm (W) X 40.5 cm (H). The Tubular welded frame is made from Dia $2.22 \pm 0.03 \times 0.12 \pm 0.0128$ cm and $3.5 \pm 0.03 \times 1.5 \pm 0.03 \times 0.12 \pm 0.0128$ cm SS 202 grade tube. The tubes are buff polished to give shiny finish. Overall Dimensions of Chair shall be Seat Height - 45.0 cm, Height - 84.5cm, Width & Depth of Chair as measured from pedestal - Width-52.5cm and Depth-55.8 cm.

43. 3 Arc Reception Table



Supplying and placing in position Reception table of the following specifications. Top shall be of Rubberwood with clean Matt PU finish 18 mm thick , inside radius - 700 mm , outside radius - 1350 mm and depth - 650 mm . Cork shall be 18 mm thick of rubber . Glass shall be Frostered 10 mm thick diamond cut finishing on edges , inside radius shall be - 1202.5 mm , outside radius - 1402.5 mm and depth - 200 mm . The Modesty Panel shall be MS Perforated sheet below worksurface : 0.8 mm (thick) x 665 mm (height) x 1345 mm (flat length) . Above Worksurface : 0.8 mm (thick) x 260 mm (height) x 1345 mm (flat length) . The legs shall be of MS tube 1.6 mm thick diameter 50.8 mm and height 604 mm

44. Reception Chairs



Supplying and placing in position chair of the following specifications. The seat shall be made of Injection molded Plastic outer & inner. Plastic Inner shall be upholstered with fabric and moulded Polyurethane foam. The back shall be made of 1.2 $\pm$ 0.1em. hot-pressed plywood measured as per QA method described in OCP-QLTA-P14-18 & upholstered with fabric and moulded Polyurethane foam and back covers. The back foam shall be designed with contoured lumbar support for extra comfort. Dimensions of Back shall be: (W)46.0 cm x (H)50.5 Cm, and of Seat : (W)46.0cm x (D) 48.0 cm. The HR polyurethane foam shall be moulded with Density= 45 $\pm$ 2 kg/m³ and back hardness load

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12 ± 2 kgf and seat hardness load 16 ±2 as per IS:7888 for 25% compression. spine cap shall be made up of Polypropylene which covers the back frame and spine junction. The armrests shall have only Up-Down adjustment- 8.0±0.5cm (8 positions) which shall be provided in armrest structure. Armrest Top is made up of PU with metal insert fitted on the armrest structure. The adjustable tilting mechanism shall be designed with the following features:

- 360° revolving type.
- Front-pivot for tilt with feet resting on ground and continuous lumbar support ensuring more comfort.
- Side tilt tension adjustment can be operated in seating position.
- 4-position Tilt limiter giving options of variable tilt angle to the chair (5 steps: 0° to 20° ±2° tilting).
- Seat/back tilting ratio of 1:2., Seat depth adjustment shall be integrated in the seat through a sliding mechanism. The pneumatic height adjustment shall have an adjustment of 10.0 ±0.3cm. The pedestal shall be injection moulded in black 30% glass-filled Nylon and fitted with 5 nos. twin wheel castors. The pedestal shall be 66.1 ±0.5cm. pitch-center dia (76.1 ±1.0cm with castors). The twin wheel castors shall be injection moulded in black Polypropylene. overall dimensions shall be as Seat Height - min 45.2 to max 55.2cm, Height - min 96.3 to max 106.3cm.

Width & Depth of Chair as measured from pedestal - Width-76.1 cm and Depth-76.1 cm.

45. Sofa 1 Seater-3

Supplying and placing in position sofa of the following specifications. Upholstery : Microfibre with Polyester Laminate Frame Material : Kiln dried wood Seat Foam : Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density : 34 kg/ cubic m. Back Foam : Slab stock foam with recron fill at back and arms. Foam Density : 34 kg/cubic m. Webbing Material : S- spring along with nylon strips. The overall dimension of the sofa shall be 1060 mm(W) x 912 mm (D) X 830mm (H). The upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.

46. Sofa 2 Seater-3

Supplying and placing in position sofa of the following specifications. Upholstery : Microfibre with Polyester Laminate Frame Material : Kiln dried wood Seat Foam : Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density : 34 kg/ cubic m. Back Foam : Slab stock foam with recron fill at back and arms. Foam Density : 34 kg/cubic m. Webbing Material : S- spring along with nylon strips. The overall dimension of the sofa shall be 1572 mm(W) x 912 mm (D) X 830mm (H). The upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.

47. Sofa 3 Seater-3

Supplying and placing in position sofa of the following specifications. Upholstery : Microfibre with Polyester Laminate Frame Material : Kiln dried wood Seat Foam : Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density : 34 kg/ cubic m. Back Foam : Slab stock foam with recron fill at back and arms. Foam Density : 34 kg/cubic m. Webbing Material : S- spring along with nylon strips. The overall dimension of the sofa shall be 2072 mm(W) x 912 mm (D) X 830mm (H). The upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.

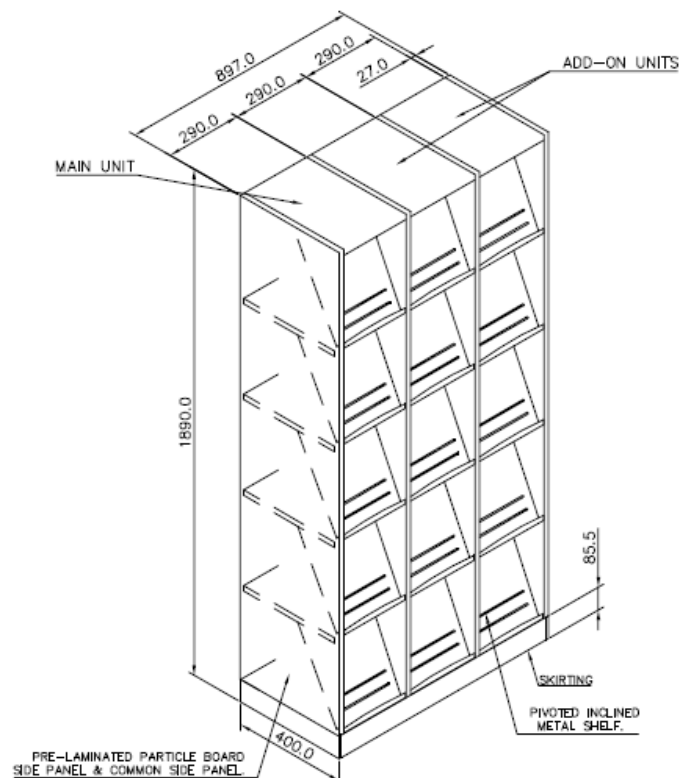
48. Centre table-4

Supplying and placing in position Center table of following specifications. The overall size shall be : Width - 1000 mm, Depth-600, Height - 428 mm. Material : Glass of 08 mm thk tempered, Solid rubber wood legs and frame, MS sheet as bottom shelf. PU Coated rubber wood parts with a clear glass. Metal frames are powder coated in shade Black to the thickness of 40-80 microns.

49. Corner Table-4

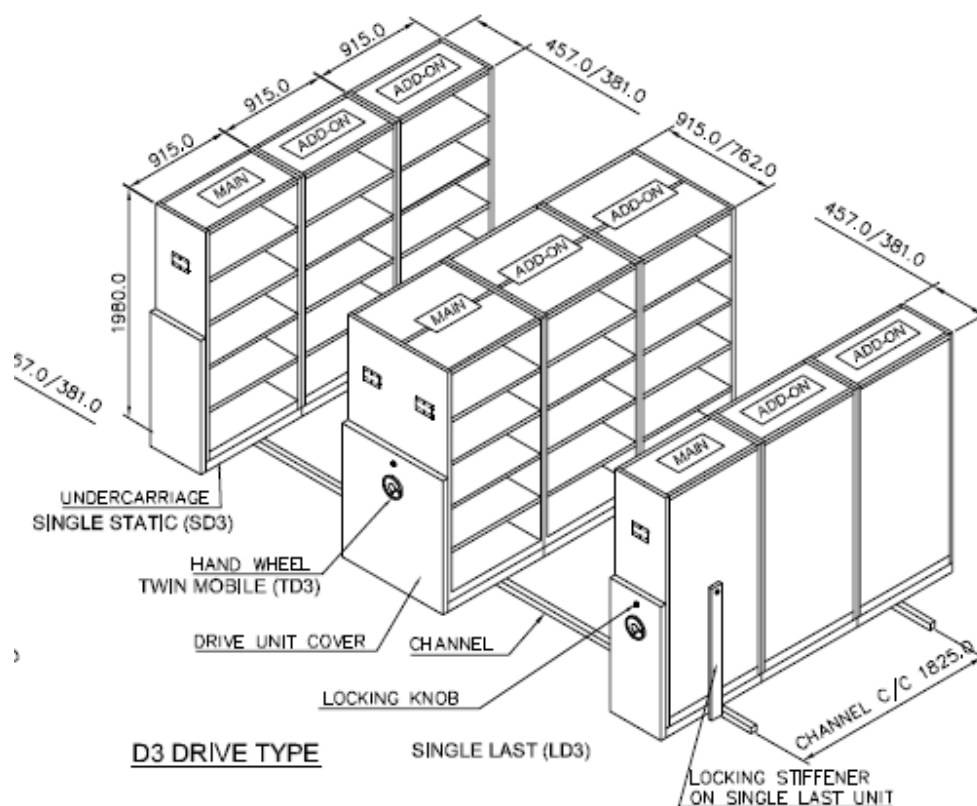
Supplying and placing in position Corner table of following specifications. Overall Size : Width - 500 mm, Depth-500, Height - 428 mm. Material : Glass of 08 mm thk tempered, Solid rubber wood legs and frame, MS sheet as bottom shelf. PU Coated rubber wood parts with clear glass. Metal frames are powder coated in shade Black to the thickness of 40-80 microns.

50. Magazine Racks



Supplying and placing in position public waiting sofa with following specifications: Overall Dimensions of Steel Body With Retractable Tray + Fittings shall be 290mm(W) x 400mm(D) x 1890mm(H). Rigid Knockdown construction. Prime quality CRCA steel shall be used panels from 0.8 mm thick . Side panels shall be 27 mm thick prelaminated particle board (PLB) with laminate on both sides .Stackability shall be having add-on units stacked width wise to form a bank of racks having common side panel .5 Level Racks per unit . Display Tray suitable for magazines, penodicals. Aesthetically appealing metal tray at an angle for easy viewing . Receding facility to access the storage behind . Sliding on plastic rollers . Behind Storage shelving shall have 5 level behind storage shelf and uniformly distributed load capacity per each shelf is 35 Kg maximum . Finish should be epoxy polyester powder coated to the thickness of 50 microns.

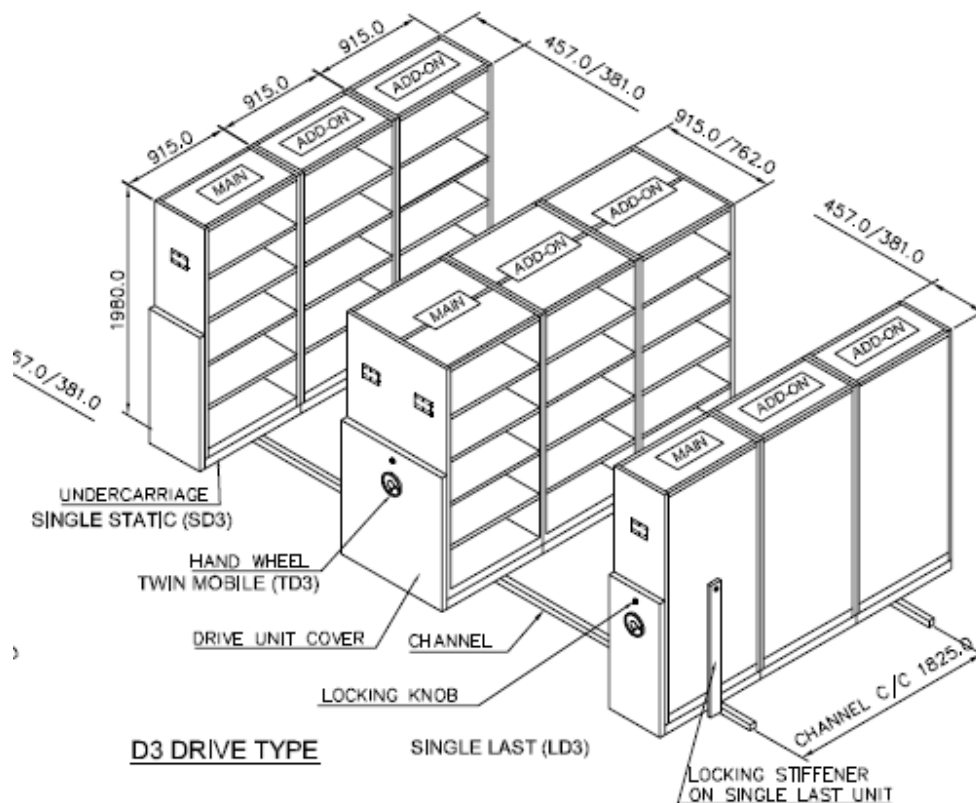
51. Optimizer 1



Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3. The Construction shall be rigid knock down made out of 0.8 thick CRCA steel conforming to IS : 513 . Each body shall have a main unit plus add on units (1,2,3,4,5) . Finish shall be Epoxy polyester powder coated thickness of 40 microns . Shelf construction shall be made from CRCA steel 0.8 mm thick IS :513 .Uniformly distributed load capacity of 80 Kg . Undercarriage shall have construction in welded frame made of HR sheet 3.15 mm thick conforming to IS : 10748 . Finish shall be epoxy polyester powder coat of approved color& shade with a dry film thickness of minimum 40 microns .The Movements shall be Drive Type configuration : In case of D2 & D3 movement of units is achieved mechanically through a PU Drive Wheel and Sprocket -Chain-Tensioner arrangement mounted rigidly onto body size .For D3 each movable undercarriage shall be provided with 2 rollers on the shaft for driving , 2 antifriction ball bearing for rolling and 4 antifriction ball bearing for guiding between rail . Fittings shall be centralized locking arrangement through locking stiffener mounted onto back of single last unit so that it gets locked on channels when all the units are brought together . The Recess handle lock is of Godrej make & placed at suitable height . This arrangement occupies a space of 90.0 mm . When the last unit is twin movable , hinged doors are provided for the end bodies, so in this case locking stiffener is mounted onto drive unit cover ; and with tile fascia option , it will be mounted in the recess of vertical trim . Each Drive Type units shall have Locking Knob near the drive wheel for manual locking of individual units when a person is using those units . Knob shall be rotated to unlock position when units are to be moved . End stoppers shall be

provided to prevent derailment . Door locking shall be having hinged doors of recessed die cast handle cum lock giving 3 way locking through a lever & shooting bolts . Guide channels shall have 'J' section 2 mm thick HR & 25 mm Square bright bar .Fasteners shall be galvanized/blackodized/Zn plated .The label holder shall be made from 2 mm thick clear transparent acrylic sheet . Also total no. of loading levels per understructure shall be 15 for SD3. Fascia(tiling) 3 tile pattern fascia option on drive side panel plus 3 tile pattern fascia on non-drive side panel plus 3 tile pattern fascia option on back panel of single last plus 3 tile pattern fascia option on back panel of single static . The tiles are held together by stiffeners & fasteners in 2 vertical metal trims.

52. Optimizer 2



Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3. The Construction shall be rigid knock down made out of 0.8 thick CRCA steel conforming to IS : 513 . Each body shall have a main unit plus add on units (1,2,3,4,5) . Finish shall be Epoxy polyester powder coated thickness of 40 microns . Shelf construction shall be made from CRCA steel 0.8 mm thick IS :513 .Uniformly distributed load capacity of 80 Kg . Undercarriage shall have construction in welded frame made of HR sheet 3.15 mm thick conforming to IS :10748 . Finish shall be epoxy polyester powder coat of approved color& shade with a dry film thickness of minimum 40 microns .The Movements shall be Drive Type configuration : In case of D2 & D3 movement of units is achieved mechanically through a PU Drive Wheel and Sprocket -Chain-Tensioner arrangement mounted rigidly onto body size .For D3 each movable undercarriage shall be provided with 2 rollers on the shaft for driving , 2 antifriction ball bearing for rolling and 4 antifriction ball bearing for

guiding between rail . Fittings shall be centralized locking arrangement through locking stiffener mounted onto back of single last unit so that it gets locked on channels when all the units are brought together . The Recess handle lock is of Godrej make & placed at suitable height . This arrangement occupies a space of 90.0 mm . When the last unit is twin movable , hinged doors are provided for the end bodies, so in this case locking stiffener is mounted onto drive unit cover ; and with tile fascia option , it will be mounted in the recess of vertical trim . Each Drive Type units shall have Locking Knob near the drive wheel for manual locking of individual units when a person is using those units . Knob shall be rotated to unlock position when units are to be moved . End stoppers shall be provided to prevent derailment . Door locking shall be having hinged doors of recessed die cast handle cum lock giving 3 way locking through a lever & shooting bolts . Guide channels shall have 'J' section 2 mm thick HR & 25 mm Square bright bar . Fasteners shall be galvanized/blackodized/Zn plated . The label holder shall be made from 2 mm thick clear transparent acrylic sheet . Also total no. of loading levels per understructure shall be 15 for SD3. Fascia(tiling) 3 tile pattern fascia option on drive side panel plus 3 tile pattern fascia on non-drive side panel plus 3 tile pattern fascia option on back panel of single last plus 3 tile pattern fascia option on back panel of single static . The tiles are held together by stiffeners & fasteners in 2 vertical metal trims.

53. Low Ht Storage -1

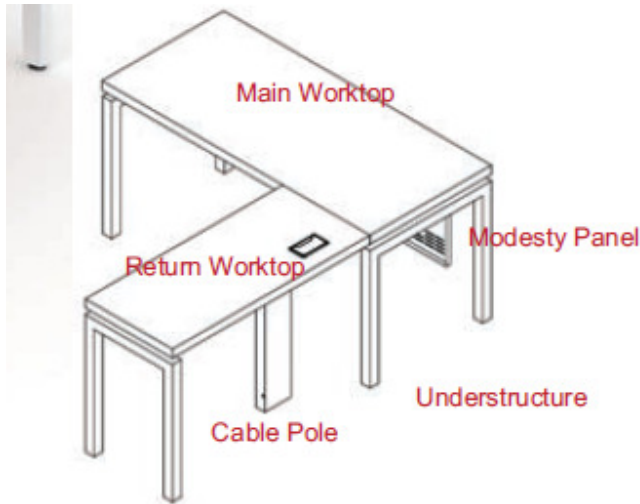
Supplying and placing the all wood storage unit of size 900 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door Panels are made from 18 mm PLB with 2 mm Edge band on all edges and a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.

54. Low Ht Storage-2

Supplying and placing the all wood storage unit of size 1050 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door Panels are made from 18 mm PLB with 2 mm Edge band on all edges and a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and

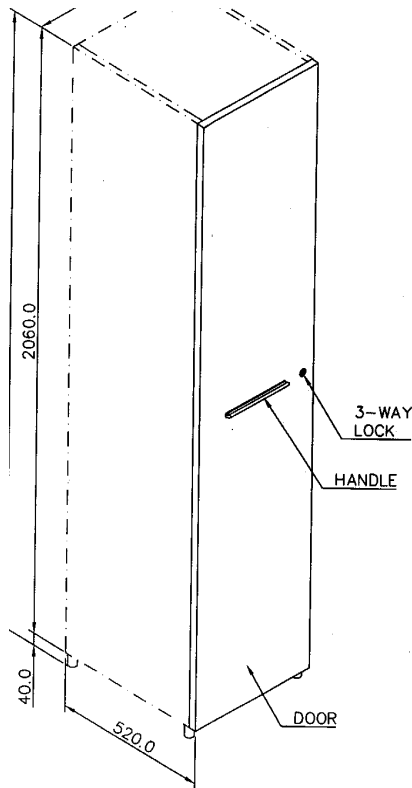
HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.

55. Managerial table



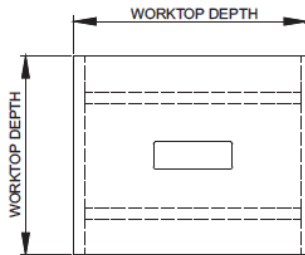
Supplying and placing Manager Table with Table top - Made of 25Mm Thick PrelaminatePartical Board. Main Table-1350mmW x 600mmD x 750mm H with ERU-900mmW x 450mmD x 750mm H. The Tables Will Be Lipped With Pvc Edge Band of 2.0Mm Thickness. Understructure - Work top Is Supported On Ms Sq Leg 40 X 40mm thick & Supporting beams. Wire Management - 150Ht,Cable Tray With Seperator For Power And Data Cable Management. Ms Vertical Cover For Wire Entry, All table tops to have wire manager. Pedestal size- 390mm W x 435mm D x 656mm

56. Modular Full Ht Storages



Providing and placing 1980 mm Ht (2100 mm including skirting) Storage consisting (500D x 2100H) units. ofin completely knocked down construction Overall width shall be as per the space requirement by adding width vise the units of width 450,500, 800, 1000. Door Opening Twin door with self closing hinges.The add on units can be stacked width wise to form a row of storages having a common side pannel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513.Heightwise adjustable sheves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.EpoxyPolyster powder coated to the thickness of 50 microns.Doorsconsdtruction made up of MDF & honeycomb with backing and decorative laminates. Self Closing Hinges and Mazak Handle.2 mm thick lipping on all edges and 3 way locking mechanism.

57. Table



Providing and placing LINEA DESK based modular workstation with System ht - 750 mm
UNDERSTRUCTURE: Comprising of metal powder coated cross connectors between legs, legs made up of metal powder coated finish and the entire assembly is fixed to the worktop with the help of ABS plastic spacers 20 mm high which gives the floating look to the w/s module. The respective finishes for the screens shall be fabric.

Wire Management : Metal powder coated Cable pole of size 170mm w x 85 mm d x 705 mm ht/ is given to pull wires from the floor junction box upto the power box fixed under neath the worktop. Aluminium access flaps on worktop above power box cut out for accessing switches. Worksurface - out of 25 mm thkprelam particle board with flat pvc lipping edge banding of size 1800 mm w x 900 mm d.

Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 10 mm of uneven flooring.

58. Full Ht Partitions

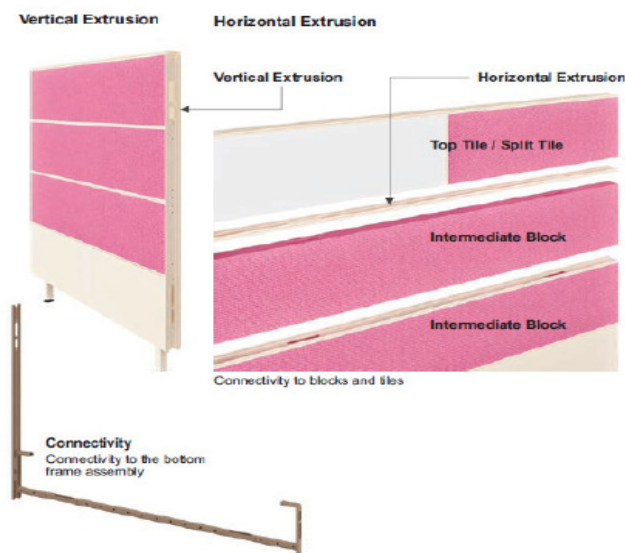


Full Height partition shall be a modular system with overall thickness of 75mm for creating rooms/spaces and enclosures of varying sizes and offer multiple elevations incorporating together functional and decorative finishes. The system also shall offers features and options of doors, shelf and worktop fixing while having provisions for mounting of accessories like motorized blinds, access control. The offering shall include both single and double glazed partition. Main Frame Structure: Main structure shall be a combination of different Aluminum Sections made from Aluminum alloy 63400-WP and shall be powder coated with Epoxy Polyester or Anodized, varying in heights and widths to make a full height cabin up to 3000 mm below the false ceiling level. The frame structure shall be made by joining Aluminium Extrusions by means of brackets made of 3 mm Thk HR (IS-2062) and screws. Overall thickness of panel assembly shall be 66 mm. In elevations, the width of tiles shall vary from 300mm to 2400mm in pitch of 150mm and heights shall vary from 600 mm to 2400 mm (actual 534 mm to 2136 mm) in pitch of 600 mm. The system shall provide to make junctions straight partition panels as per approved layout. The super structure above false ceiling level shall consist of True ceiling mounting bracket which shall hold wooden batten frame work made from Rubber wood (50x50xlength of partition). The partition panel extrusions shall be grouted to this superstructure. The system shall have provision for leveling adjustment to compensate for floor unevenness (up to 40 mm) as well as false ceiling height difference(up to 15 mm). Provision shall be provided Horizontal adjustment at wall side with adjustment up to 20 mm. Fabric Tile: Fabric Non-tack tiles shall be made of 9.0 mm thick PLB / PLT boards(IS: 12823:1990) edge banded

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with 0.5 mm thick PVC lipping, and upholstered with approved fabric on front side. The overall thickness of tile shall be 10mm. Fabric Tackable tiles shall be made of 0.7mm thick GI Sheet (IS-277), with 8mm thick P.E. foam glued to it on front side which are fabric upholstered on front side. The overall thickness of tile shall be 9 mm. Stiffeners made of GI Sheet (IS-277) shall be provided at the back of the tile. White Board tile: Back painted glass of 5 mm Shall be provided for glass finished writing board in the panel itself. Alternatively regular wooden white board shall also be provided as per approved finishes. Wooden DL tiles: Wooden DL tile of 9 mm thK PLB edge banded with 0.5 mm thk PVC lipping with approved design of laminate shade shall be provided as per approved panel elevations. Glass Door With Hinges: Single side opening Glass door shall be provided with Hinges, Lock with handle and Door Closer. The door shall be made of 10mm Thk clear Toughened glass (IS-2835). Single Side Opening door shall have provision for opening on LH side and RH side. Door Shutter Size shall be of 2200 x 956 mm. Doors shall of 1050 mm width and 2250 mm height only. Door including the frame width shall be of 1050mm. The full glass panels shall range from 300 mm to 1200 mm max. Height of single panel of glass shall be up to 8'0". Full height of panel shall be max up to 10' with skirting ht shall be of 120 mm. Worktops for cabin module shall be provided in opaque partitions and shall be of sizes – 1500, 1650 and 1800 mm width and with 600/750 mm depth. Return worktop shall be of size 900mm – 1800 mm (in pitch of 150 mm). Provision of wire management through the panels vertically shall be possible. Wiring intake into the panel from flooring as well as ceiling shall be provided. Provision in panel width up to 1200 mm width for 2 slots of 100 x 25 at a distance of 100 mm from the edge of the panel shall be provided. Beyond 1200 mm to 2400 mm, the slots shall increase from 2 to 4 nos. the intermediate slots shall be equidistance from the end slots. The end slots shall be same as the ones in the 1200 mm w panels. Provision to provide wire management in full glazed panel in separate power post should be possible.

59. Low Ht Partitions



Providing and placing panel & tile based partition with thickness as 52.4 mm thk and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles are fabric tackable & white board. Bottom tiles - Plain metal.

SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tackable along with white board. INTERMEDIATE BLOCKS Intermediate blocks are

given in DL finish. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring.

Partition thickness of 52.4 mm (minimum 50mm) thick including powder coated Aluminium trims and supported on Legs for better air circulation and helps in keeping floor clean. Panels Construction - Each panel consists of 2 nos. of vertical extrusions made of aluminum. Horizontal extrusions made of aluminium at every division of tile/block. These panels are supported on legs with levellers at various locations depending on the layout requirement.

Bottom fram : Fabricated bottom frame for 52.4mm (minimum thickness 50mm) panel comprises of L-channels made of 2mm thick CRCA steel (IS: 513), formed plates of 3mm thick HR steel (IS: 2062) & ERW steel tube of size 35x15x1.6mm thick in oval cross section (IS: 7138) welded together. Powder Coating with average 50 to 60 micron thickness of epoxy powder coating. GABLE END PANEL : Gable end panels are made of 25mm thick Prelaminated board and brackets are made from 2.0mm thick MS CRCA grade D as per IS : 513. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried up to the panels through concealed conduits inside the blocks. Wires runs through the system from Bottom tile and extended to the top at various locations by the help of 2 nos. vertical wire managers in each panels. Cable Duct: Cable duct shall be made from 0.8 mm thick M.S. CRCA Grade D as per IS: 513 - 1994. It is constructed with two parts, one is body & another is cover. It holds the cables & gives aesthetic appearance by covering all cables entry, which are moving upward to the Panels. Size of Cable duct is 107mm W X 154 mm H X 21 mm D. Side legs - Metal powder coated legs at the end. System shall also have 120 mm high powder coated standalone panel legs to give the system an elevated look. Single side legs are fabricated by CO2 welded MS Tube of section 38 mm x 25 mm (IS: 7138 ERW Tube, 38 mm x 25 mm x 16bg) with the base plate of the MS plate of 35x22x5mm (IS: 2062, 5 mm HR) over which an M8 Leveler is fitted.

Specifications For Plumbing and Fire Fighting

Specifications for Plumbing and Fire Fighting

1. BASIS OF DESIGN

The Plumbing, External Drainage and water supply System for the project is designed keeping in view the following:

- 1.1 Requirement of adequate and equal pressure availability of hot and cold water lines in Public Toilets, Kitchen and other identified areas.
- 1.2 Adequate storage of water in underground raw + overhead treated domestic water tanks.
- 1.3 Levels of roads / pavements and other services in the area.
- 1.4 Landscape layout.

The execution of works and materials used shall be as per the latest relevant I.S. specifications. Wherever reference has been made to Indian Standard or any other specifications, the same shall mean to refer to the latest specification irrespective of any particular edition of such specification being mentioned in the specifications below or Schedule of Quantities.

2. CONCEPT OF THE SYSTEM

The following services are envisaged for the complex:

- 2.1 Water Treatment System for meeting the domestic water quality requirement with chemical parameters in acceptable limits as per SP: 35 (S&T) 1987 which is considered safe for human consumption.
- 2.2 Domestic/Flushing water supply through gravity for all the floors except for Hydro pneumatic system (for top three floors) .
- 2.3 Sewage and Sullage collection system based on IS:1742 and applicable standards for domestic drainage and connected to Sewage Treatment Plant and /or as otherwise specified with outfall into municipal system.
- 2.4 Storm / Rain water drainage system from various levels of the building and disposal to Rain Water Harvesting System / storm water drain.

3. WATER STORAGE & DISTRIBUTION SYSTEM

3.1 Water Requirement

The water requirement for this project is proposed to be as per the provisions in IS : 1172 and prevalent practices.

3.2 Source of Water

It is expected that part of the daily domestic water requirement shall be through municipal mains supply. The rest will be obtained from bore wells/tankers.

3.4 **Appurtenant**

Following components shall be included in the water supply system for efficient functioning:

- i. Automatic air vent
- ii. Pressure Gauge.
- iii. Water Hammer arrestors.

4. **WORKMANSHIP**

The workmanship shall be best of its kind and shall conform to the specifications, as below or Indian Standard Specifications in every respect or latest trade practices and shall be subject to approval of the Owner's Site Representative. All materials and/or workmanship which in the opinion of the Owner's Site Representative / Architect / Consultant are defective or unsuitable shall be removed immediately from the site and shall be substituted with proper materials and/or workmanship forthwith.

5. **MATERIALS**

All materials shall be best of their kind and shall conform to the latest Indian Standards.

All materials shall be of approved quality as per samples and origins approved by the Owner's Site Representative / Architect / Consultants.

As and when required by the Owner's Site Representative / Consultant, the contractor shall arrange to test the materials and/or portions of works at his own cost to prove their soundness and efficiency. If after tests any materials, work or portions or work are found defective or unsound by the Owner's Site Representative / Consultant, the contractor shall remove the defective material from the site, pull down and re-execute the works at his own cost to the satisfaction of the Owner's Site Representative / Consultant. To prove that the materials used are as specified the contractor shall furnish the Owner's Site Representative with original vouchers on demand.

SECTION I SPECIAL CONDITION OF CONTRACT

1.0 GENERAL REQUIREMENTS

1.1 Scope of Work

- 1.1.1 The form of Contract shall be according to the "Conditions of Contract". The following clauses shall be considered as an extension and not in limitation of the obligation of the Contractor.
- 1.1.2 Work under this contract shall consist of furnishing all labour, materials, equipment and appliances necessary and required. The Contractor is required to completely furnish all the Plumbing and other specialized services as described hereinafter and as specified in the Schedule of Quantities and/or shown on the Plumbing Drawings.
- 1.1.3 Without restricting to the generally of the foregoing, the sanitary installations shall include the following:-

A. Plumbing Works

- a. Sanitary ware Installation
- b. Water Supply System (Hot & Cold).

B. Fire Fighting Works

- a. Sprinkler System
- b. Fire Extinguishers

- 1.1.4 Services rendered under this section shall be done without any extra charge.

1.2 Specifications

- 1.2.1 Work under this contract shall be carried out strictly in accordance with Specifications attached with the tender.
- 1.2.2 Items not covered under these Specifications due to any ambiguity or misprints, or additional works, the work shall be carried out as per Specifications of the latest Central Public Works Department with upto date amendments as applicable in the contract and or as per the requirement of the client or its representative.
- 1.2.3 Works not covered above in para 1.2.1 and 1.2.2 shall be carried out as per relevant Indian Standards and in case of its absence as per British Standard Code of Practice.

1.3. Execution of Work

- 1.3.1 The Contractor should visit and examine the site of work and satisfy himself as to the nature of the existing roads and other means of communication and other details pertaining to the work and local conditions and facilities for obtaining his own information on all matters affecting the execution of work. No extra charge made in consequence of any misunderstanding, incorrect information on any of these points or on ground of insufficient description will be allowed.

- 1.3.2 The work shall be carried out in conformity with the Plumbing drawings and within the requirements of Architectural, HVAC, Electrical, Structural and Other specialized services drawings.
- 1.3.3 The Contractor shall cooperate with all trades and agencies working on the site. He shall make provision for hangers, sleeves, structural openings and other requirements well in advance to prevent hold up of progress of the construction schedule.
- 1.3.4 On award of the work, Contractor shall submit a schedule of construction in the form of a PERT Chart or BAR Chart for approval of the Project Manager/Architect/Consultant. All dates and time schedule agreed upon should be strictly adhered to, within the stipulated time of completion/commissioning along with the specified phasing, if any.

1.4 **Drawings**

- 1.4.1 Plumbing drawings are diagrammatic but shall be followed as closely as actual construction permits. Any deviations made shall be in conformity with the Architectural and other services drawings.
- 1.4.2 Architectural drawings shall take precedence over Plumbing or other services drawings as to all dimensions.
- 1.4.3 Contractor shall verify all dimensions at site and bring to the notice of the Project Manager all discrepancies or deviations noticed. Decision of the Project Manager shall be final.
- 1.4.4 Large size details and manufacturers dimensions for materials to be incorporated shall take precedence over small scale drawings.
- 1.4.5 All drawings issued by the Architects/Consultant for the work are the property of the Architects/Consultant and shall not be lent, reproduced or used on any works other than intended without the written permission of the Architects/Consultant.

1.5 **Inspection and Testing of Materials**

- 1.5.1 Contractor shall be required, if requested, to produce manufacturers Test Certificate for the particular batch of materials supplied to him. The tests carried out shall be as per the relevant Indian Standards.
- 1.5.2 For examination and testing of materials and works at the site Contractor shall provide all Testing and Gauging Equipment necessary but not limited to the followings:-
 - a) Theodolite, Steel tapes
 - b) Dumpy level
 - c) Weighing machine
 - d) Plumb bobs, Spirit levels, Hammers
 - e) Micrometers, Tachometers
 - f) Thermometers, Stoves
 - g) Hydraulic test machine
 - h) Smoke test machine

1.5.3 All such equipment shall be tested for calibration at any approved laboratory, if required by the Project Manager. Nothing shall be paid extra for testing.

1.5.4 All Testing Equipment shall be preferably located in a special room meant for the purpose.

1.5.5 Samples of all materials shall be got approved before placing order and the approved samples shall be deposited with the Architects or kept at site in a sample room as prepared by the owners. Any materials declared defective by Project Manager/Architect/Consultant shall be removed from the site within 48 hours.

1.6 **Metric Conversion**

1.6.1 All dimensions and sizes of materials and equipment given in the tender document are commercial metric sizes.

1.6.2 Any weights, or sizes given in the tender having changed due to metric conversion, the nearest equivalent sizes accepted by Indian Standards shall be acceptable without any additional cost.

1.7 **Reference Points**

1.7.1 Contractor shall provide permanent Bench Marks, Flag Tops and other reference points for the proper execution of work and these shall be preserved till the end of the work.

1.7.2 All such reference points shall be in relation to the levels and locations given in the Architectural and Plumbing drawings.

1.8 **Reference Drawings**

1.8.1 The Contractor shall maintain one set of all drawings issued to him as reference drawings. These shall not be used on site. All important drawings shall be mounted on boards and placed in racks indexed. No drawings shall be rolled.

1.8.2 All corrections, deviations and changes made on the site shall be shown on these reference drawings for final incorporation in the completion drawings. All changes to be made shall be initialed by the Project Manager or Architects.

1.9 **Shop Drawings**

1.9.1 The Contractor shall submit to the Project Manager three copies of the shop drawings.

1.9.2 Shop drawings shall be submitted with following details:-

- (a) Showing any changes in layout in the plumbing drawings.
- (b) Equipment layout, piping and wiring diagram.
- (c) Manufacturer's or Contractor's fabrication drawings for any materials or equipment supplied by him.

- 1.9.3 The Contractor shall submit two copies of catalogues, manufacturer's drawings, equipment characteristics data or performance charts as required by the Project Manager.

1.10 Completion Drawings

- 1.10.1 On completion of work, Contractor shall submit one complete set of original tracings and two prints of "as built" drawings to the Project Manager. These drawings shall have the following information.

- a) Run of all piping, diameters on all floors, vertical stacks and location of external services.
- b) Ground and invert levels of all drainage pipes together with location of all manholes and connections upto outfall.
- c) Run of all water supply lines with diameters, locations of control valves, access panels.
- d) Location of all mechanical equipment with layout and piping connections.

No completion certificate shall be issued unless the above drawings are submitted.

- 1.10.2 Contractor shall provide two sets of catalogues, service manuals manufacturer's drawings, performance data and list of spare parts together with the name and address of the manufacturer for all electrical and mechanical equipment provided by him.

- 1.10.3 All "Warranty Cards" given by the manufacturers shall be handed over to the Project Manager.

1.11. Contractors Rates

- 1.11.1 Rates quoted in this tender shall be inclusive of cost of materials, labour, supervision, erection, tools, plant, scaffolding, service connections, transport to site, taxes, octroi and levies, breakage, wastage and all such expenses as may be necessary and required to completely do all the items of work and put them in a working condition.

- 1.11.2 Rates quoted are for all heights and depths and in all positions as may be required for this work.

- 1.11.3 All rates quoted must be for complete items inclusive of all such accessories, Fixtures and fixing arrangements, nuts, bolts, hangers as are a standard part of the particular item except where specially mentioned otherwise.

- 1.11.4 All rates quoted are inclusive of cutting holes and chases in walls and floors and making good the same with cement mortar/concrete/water proofing/brick work of appropriate mix and strength as directed by Project Manager. Contractor shall provide holes, sleeves and recesses in the concrete and masonry work as the work proceeds.

- 1.11.5 The Contractor shall furnish the Project managers with vouchers and test certificates, on request, to prove that the materials as specified and to indicate that the rates at which the materials are purchased in order to work out the rate analysis of non tendered items which he may be called upon to be carried out.

1.12 Testing

- 1.12.1 Piping and drainage works shall be tested as specified under the relevant clause(s) of the specifications.
- 1.12.2 Tests shall be performed in the presence of the Project Manager/ Consultant.
- 1.12.3 All materials and equipment found defective shall be replaced and whole work tested to meet the requirements of the specifications.
- 1.12.4 Contractor shall perform all such tests as may be necessary and required by the local authorities to meet Municipal or other bye-laws in force.
- 1.12.5 Contractor shall provide all labour, equipment and materials for the performance of the tests.

1.13 Site Clearance and Cleanup

- 1.13.1 The Contractor shall, from time to time clear away all debris and excess materials accumulated at the site. Contractor should depute minimum 2 persons each floor for cleaning the site on regular basis.
- 1.13.2 After the Fixtures, equipment and appliances have been installed and commissioned, Contractor shall clean-up the same and remove all plaster, paints stains, stickers and other foreign matter of discoloration leaving the same in a ready to use condition.
- 1.13.3 On completion of all works, Contractor shall demolish all stores, remove all surplus materials and leave the site in a broom clean condition, failing which the same shall be done at Contractors risk and cost.

1.14 License Permits and Authorities

- 1.14.1 Contractor must keep constant liaison with the Municipal/statutory authority and obtain all approval of all drainage, water supply and other works carried out by him.
- 1.14.2 Contractor shall obtain, from the Municipal and other authority's necessary completion certificate(s) with respect to his work as required for occupation of the building. Contractor shall obtain permanent water supply and drainage connections from authorities concerned. Employer shall pay all fees/deposits as required to be paid to the authorities towards connection charges.

1.15 Recovery of Cost for Materials issued to Contractors Free of Cost

- 1.15.1 If any materials issued to the Contractor free of cost, are damaged or pilfered, the cost of the same shall be recovered from the Contractor on the basis of actual cost to owner which shall include all freight and transportation, excise duty, sales tax, octroi, import duty etc. plus 100%. The decision on the actual cost given by the Employer shall be final and binding on the Contractor.

1.15.2 Recovery of Cost for Materials issued to Contractors if contractor fails to procure material

1.15.2 In case of contractor failure to procure any material in time the owner will procure the same and , the cost of the same shall be recovered from the Contractor on the basis of actual cost to owner which shall include all freight and transportation, excise duty, sales tax, octroi, import duty etc. plus 100%. The decision on the actual cost given by the Employer shall be final and binding on the Contractor.

1.16 Cutting of Water Proofing Membrane

No walls, terraces shall be cut for making and opening after water proofing has been done without written approval of Project Manager/Architects. Cutting of water proofing membrane shall be done very carefully to ensure that other portion(s) of water proofing is (are) not damaged. On completion of work at such place the water proofing membrane shall be made good and ensured that the opening/cutting is made fully water proof as per specifications and details of water proofing approved by Architects.

1.17 Cutting of Structural Members

No structural member shall be chased or cut without the written permission of the Project Manager.

1.18. Materials Supplied by Owner

1.18.1 The Contractor shall verify that all materials supplied by the Employer confirm to the specifications of the relevant item in the tender. Any discrepancy found shall be brought to the notice of the Project Manager.

1.19 Materials

1.19.1 Unless otherwise specified and expressly approved in writing by the Project Manager, only materials of makes and specifications mentioned in the list of approved makes attached with the specifications shall be used.

1.19.2 If required, the Contractor shall submit samples of materials proposed to be used in the works. Approved samples shall be kept in the office of the Project Manager and returned to the Contractor at the appropriate time.

SECTION-II

SANITARY FIXTURES

2.1 SCOPE OF WORK

- 2.1.1 Work under this section shall consist of furnishing all material and labour as necessary and required to completely install all sanitary fixtures, brass and chromium plated fittings and accessories as required by the drawings and specified hereinafter or given in the schedule of quantities.
- 2.1.2 Without restricting to the generally of the foregoing the sanitary fixtures shall include all sanitary fixtures, C.P. fittings and accessories etc. necessary and required for the building.
- 2.1.3 Whether specifically mentioned or not all fixtures and appliances shall be provided with all fixing devices, nuts, bolts, screws, hangers as required.

2.2 GENERAL REQUIREMENTS

- 2.2.1 All fixtures and fittings shall be provided with all such accessories as are required to complete the item in working condition whether specifically mentioned or not in the schedule of quantities, specifications, drawings or not.
- 2.2.2 All fixtures and accessories shall be fixed in accordance with a set pattern matching the tiles or interior finish as per architectural/interior designers requirements. Wherever necessary the fittings shall centered to dimensions and pattern desired.
- 2.2.3 Fixing screws shall be half round head chromium plated brass with C.P. washers wherever required as per directions of Architect.
- 2.2.4 All fittings and fixtures shall be fixed in a neat workmanlike manner true to levels and heights shows on the drawings and in accordance with the manufacturer's recommendations. Care shall be taken to fix all inlet and outlet pipes at correct positions. Faulty locations shall be made good and any damage to the finished floor, tiling or terrace shall be made good at contractors cost.
- 2.2.5 When directed, contractor shall install fixtures and accessories in a mock-up room for the approval of the Architect. Sample room fixtures may be reused on the works if undamaged, but no additional payment for fixing or dismantling shall be admissible.

2.3 EUROPEAN W.C.

European WC shall be wash down, floor / wall mounted in white glazed vitreous chinaware with integral P or S trap as required. Wash down WC shall be supported on floor. The WC shall be provided with water saving flush valve.

Flush shall be concealed in wall and flush pipe shall be of copper or GI except the exposed part as specified.

Each WC shall be provided with a solid plastic seat. The seat shall be fixed to the WC with CP brass pillar bar hinges. Rubber buffers shall be provided for the cover.

2.4 Wash Basin

Wash basins shall be white glazed vitreous chinaware of size, shape and type specified in the schedule of work.

Each basin shall be complete with:

- i) CI or galvanised steel supporting brackets & clips as required.
- ii) 32 dia CP waste and overflow
- iii) Waste with rubber plug and CP chain as specified
- iv) Single Lever Mixer (for hot & cold)
- v) Bottle Trap - CP Brass Bottle Trap
- vi) Two nos. 15 mm CP brass angle cock 15 mm size with CP brass flexible connection from angle valve to mixer.

2.5 URINALS

Urinals shall be lipid type half shall white glazed vitreous China of approx. size 630x420x380mm size or as specified in bill of quantities.

Half stall Urinals shall be provided with 15mm dia C.P. spreader, 32mm dia C.P. domical waste and C.P. cast brass bottle trap with pipe and wall flange, and shall be fixed to wall by one C.I. bracket and two C.I. wall clips as recommended by manufacturers complete as directed by Architect.

Half stall urinals shall be fixed with C.P. brass screws and shall be provided with 32mm dia domical waste leading to urinals trap.

Urinals shall be flushed by means of automatic porcelain flushing cistern or exposed or concealed type urinal flush valve, as specified in schedule of quantities.

Flushing cistern for urinals shall be automatic type cast iron or vitreous china as given in the schedule of quantities. Each flushing cistern shall have a copper siphon and inlet noose cock to control the flow. Flushing cistern shall be fixed to wall with R.S. or C.I. brackets. Cast iron cistern and brackets shall be painted with two coats of white enamel paint. Cistern may be concealed in pipe shafts or false ceilings where required as directed by Architect.

Flush pipes of flushing cistern with sizes of main and branch flush pipes shall be as follows:

No. of Size of Urinals in range	Capacity of cistern litres	Size of		Size of Connection to urinal
		main flush pipe	branch flush pipe	

One	5	--	--	15
Two	10	20	--	15
Three	10	25	--	15

Alternatively, urinals may be flush with flush valves, exposed or concealed type.

Waste pipes for urinals shall be any one of the following:

- a). G.I. pipes
- b). Rigid P.V.C.
- c). Lead pipes.

Waste pipes may be exposed on wall or concealed in chase as directed by the Engineer in charge. Specifications for waste pipes shall be same as given in sub-section 8.0 to 10.0 section-II of Volume-II.

2.6 SINKS

Sinks shall be of precast Terrazzo marble, or white glazed fireclay or vitreous china or stainless steel or any other material as specified in the schedule of quantities.

Each sink shall be provided with R.S. or C.I. brackets and clips and securely fixed. Counter top sinks shall be fixed with suitable angle iron clips or brackets as recommended by the manufacturer. Each sink shall be provided with 40mm dia C.P. waste with chain and plug or P.V.C. waste. Fixing shall be done as directed by Architect.

Supply fittings for sinks shall be mixing fittings or C.P. taps as specified in the bill of quantities.

2.7 MIRRORS

Mirrors shall be electro coated copper 5.5mm thick of guaranteed reputed make. The size shall be as specified in the bill of quantities or shown on the drawings. The image shall be clear and without waviness at all angles of vision.

Mirrors shall be provided with backing of 12mm thick marine plywood sheet fixed with C.P. brass semi-round headed screws and cup washers or C.P. brass clamps as specified or instructed by Architect.

2.8 Hand Drier

The hand drier shall be no touch operating type with solid waste time delay to allow user to keep hand in any position.

The hand drier shall be fully hygienic, rated for continuous repeat use.

The rating of hand drier shall be such that time required to dry a pair of hands upto wrists is approximately 30 seconds.

The hand drier shall be wall mounting type suitable for 230 volts, single phase, 50 Hz, A.C power supply.

2.9 Toilets for Disabled

Where specified in washroom facilities designed to accommodate physically handicapped, accessories should be provided as directed by the Project Manager.

Stainless Steel grab bars of required size suitable for concealed or exposed mounting and non-stop gripping surface shall be provided in all washrooms to be used by physically handicapped as directed by the Project Manager.

2.11 Accessories

Contractor shall install all Chromium Plated and porcelain accessories as shown on the drawings or directed by Project Manager.

All C.P. Accessories shall be fixed with C.P. brass half round head screws and cup washers in wall with rawl plugs or nylon sleeves and shall include cutting and making good as required or directed by Project Manager.

Recessed porcelain accessories shall be fixed in walls and set in cement mortar 1:2 (1 cement: 2 coarse sand) and fixed in relation to the tiling work as per Interior Designer's drawings.

2.12 Urinal Partitions

Urinal partitions shall be white glazed vitreous china, marble, granite or any other material selected by the same shall be fixed by contractor executing the finishing work. The exact location shall however be co-oriented by the Plumbing Contractor.

Urinal partitions shall be fixed at proper heights with C.P. brass bolts, anchor fasteners and M.S. clips as recommended by the manufacturer and directed by Project Manager.

2.13 MEASUREMENT

Rate for providing and fixing of sanitary fixtures accessories, urinal partitions shall include all items and operations stated in the respective specifications and bill of quantities and nothing extra is payable.

Rates for all items under specifications para above shall be inclusive of cutting holes and chases and making good the same, C.P. screws, nuts, bolts and any fixing arrangements required and recommended by manufacturers, testing and commissioning.

SECTION III

SOIL, WASTE, VENT & RAINWATER PIPES & FITTINGS

3. SOIL, WASTE, VENT & RAINWATER PIPES & FITTINGS

3.1 Scope of Work

3.1.1 Work under this section shall consist of furnishing all labour, materials, equipments and appliances necessary and required to completely install all soil, waste, vent and rainwater pipes and fittings as required by the drawings, and given in the Schedule of Quantities.

3.1.2 Without restricting to the generally of the foregoing, the soil, waste, vent pipes system shall include the followings:-

1. Vertical and horizontal soil, waste and vent Pipes, and fittings, joints, clamps, connections to fixtures.
2. Connection of pipes to sewer lines as shown on the drawings at ground floor levels.
3. Basement drainage, channels, gratings and floor drains.
4. Floor and urinal traps, cleanout plugs, inlet fittings and rainwater heads /Khurras.
5. Testing of all pipe lines.

3.2. General Requirements

- 3.2.1 All materials shall be new of the best quality conforming to specifications and subject to the approval of Project Manager.
- 3.2.2 Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.
- 3.2.3 Pipes shall be fixed in a manner as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.
- 3.2.4 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified.
- 3.2.5 Access doors for fittings and cleanouts shall be so located that they are easily accessible for repair and maintenance. Any access panel required in the Civil structure, false ceiling or marble cladding etc. shall be clearly reported to the Owner in the form of shop drawings so that other agencies are instructed to provide the same.

3.3 Piping System

3.3.1 Soil, Waste and Vent Pipes

- a) The soil and waste pipe system above ground has been planned as a "Two pipe system" having separate pipes for waste for kitchen sinks, wash basins, AHU's, condensate drains and floor drains and soil from the WCs and Urinals, and or a "Single stack system" where all waste and soil pipes are connected to the same stack. Necessary venting shall be done by using Air Admittance valves, to be installed based on manufacturers recommendations.
- b) All waste water from AHU's plant and pump rooms, floor channels in basements will be provided with a deep seal trap before connecting to the main drain or vertical stack.
- c) Vertical soil and waste stacks shall be connected to a separate horizontal drain / single horizontal drain at basement ceiling generally as shown on the drawings.
- d) Toilet layouts have been so arranged that the W.C outlets shall be with "P" trap above ground level.
- e) All soil/waste from areas in basement areas will be collected in sumps and pumped into sewer lines or as specifically designed.
- f) Head (Starting point) of drains and sewage/waste water sumps (as and where applicable) having a length of greater than 4m upto connection to the main drain or manhole shall be provided with a 80/100mm vent pipe terminating above roof / a Maxi-Filtra with an ACF cartridge shall be provided close to the MH as directed by the Project Manager.

3.5 **Noise Insulated Piping System (POLOPLAST – POLO-KAL NG)**

3.5.1 **SOCKET PIPES**

Three Layer sound insulated Polypropylene piping (PP) system as per ON EN 1451-Part 1-6 & EN 12056 Part 1-5 with 3 layer pipe made of PP-C + PP-MV + PP-C in Blue Ral 5014 (halogen and calcium free) colour, push-fit type, food safe, having high impact and stiffness, offering sound levels of not more than 21 dBA with POLO clip HS/ 22 dBA with Bismat 2000 clamp /equivalent and 16 dBA with Bismat 1000 clamp/equivalent as per DIN 4109 at a flow rate of 4 l/s and having pipe ring stiffness as per ISO/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, density = 1.25gms/cm³, elongation = 0.05mm/mOK and tensile strength > 24 N/mm², with all necessary fittings in blue colour, fitted with factory fitted lip ring, having 3 layers, pipes to be painted with ordinary cement paint for external installation:

➤ **INTERNAL LAYER:**

Of PP-C, hot water resistant to 97 degree C, tested in accordance to ON EN 1451-1 and DIN 19560, good heat and corrosion ageing stability as well as high chemical resistance and a smooth pipe inner-surface.

Color: Blue (halogen and calcium free)

➤ **INTERMEDIATE LAYER:**

Of PP-MV compound reinforced with mineral aggregate, which guarantees greater stiffness and stability.

Color: Grey.

- **EXTERNAL LAYER:**
Of PP-C. With high impact resistance and good weathering resistance.

Color: Blue (halogen and calcium free).

3.5.2 PIPE RING STIFFNESS:

Pipe ring stiffness would be in accordance with ISO/DIS 9969 and TIGHTNESS as per EN 1277/B and C and DIN 19560.

3.5.3 MARKINGS:

All pipes shall carry the following markings: Batch number; year and week of manufacture; company name; dimension application class; stiffness class, test mark and material details.

3.5.4 FITTINGS:

Single- Layered fitting reinforced with mineral aggregate, made of a Halogen free PP-C-KV synthetic material, a reinforced wall and factory fitted lip ring, hot water resistant upto 95 degree c in accordance to ON EN 1451-PART 1-6 EN 12056 PART 1-5.

Color: Blue (halogen and calcium free)

3.7.5 INSTALLATION: The piping system must be clamped properly as required, pipes passing through walls, beams, slabs, columns should pass through sleeves which are padded with insulation material internally (between pipe and sleeve) covering the pipe to avoid transfer of body and structural borne sounds (refer manufacturer's installation guide lines). The piping must not touch any wall, structure, paneling, false ceiling etc.

Minimum supporting:

Nominal outer diameter DN/OD mm	Bracket distance:	
	Horizontal pipe routing*) D max. m (max. 1.5 x da)	Vertical pipe routing*) D max. m
32	0,5	1,50
40	0,6	1,50
50	0,75	1,50
75	1,10	2,00
90	1,35	2,00
110	1,65	2,00
125	1,85	2,00
160	2,40	2,00
200	3,00	2,00
250	3,00	2,00

3.6 Traps

3.6.1 Floor Traps

Floor traps where specified shall be siphon type full bore PP (WHITE), McAlpine, UK having a minimum 50 mm deep seal. All traps are under slung from the slab and shall be adequately supported.

3.6.2 Urinal Traps

Urinal traps shall be siphon type full bore PP (WHITE), McAlpine, UK having a minimum 50 mm deep seal. All traps are under slung from the slab and shall be adequately supported.

3.6.3 Cleanout Plugs

Floor Clean Out and line clean out plugs

Clean out plug for soil, waste or rain water pipes laid under floors shall be provided near pipe junctions bends, tees, "Y" and on straight runs at such intervals as required as per site conditions. Clean out plugs shall terminate flush with the floor levels. Line clean outs shall be supported with manufacturer provided bracket. They shall be of push fit type of PKNG mane (Poloplast)

3.7 Drainage under floor/above floor (service floors, basement ceiling etc.) (POLOPLAST – POL-KAL NG (upto 250mm dia / ECO-PLUS Premium above 250mm dia)

All drainage lines passing under building, in exposed position above ground e.g. service floors, basement ceiling etc. shall be Multilayered as per details given in sub-clause 3.10 above or shall be as per details given below. Position of such pipes shall generally be shown on the drawings.

3.7.1 SOCKET PIPES

3 layer technology Polo-Eco Plus Premium 10 pipes and fittings for underground/ misc. drainage applications having external layer of PP-Blend + mineral reinforcement, supporting layer of PP + magnesium silicate and internal in PP with chemical resistance between 2-13pH and ring rigidity of $\geq 10\text{kN/m}^2$ having OFI certification for longitudinal stability & impermeability of pie connection in line with EN 14741.

3.7.2 FITTINGS

3-layered reinforced polypropylene (PP) sewage pipes, halogen and lead free, with integral push-fit socket and factory-fitted lip ring, tested and monitored according to the Product Standard EN 1852 – 1. Fittings upto dimension DN/OD 200 are manufactured by injection molding (1-layer), above DN/OD 200 (250 and above) the fittings are butt or extrusion welded by the manufacturer. Fabrication of fittings at site shall not be permitted.

3.7.3 Pipe Joints

Field-proven push-fit connection with improved and modified lip ring of high ageing-resistant shall be provided with the pipes and fittings for easy push-fit installation, installation procedure as given in clause 3.10 above shall be followed.

SECTION IV

WATER SUPPLY SYSTEM

4. WATER SUPPLY SYSTEM

4.1 Scope of Work

- 4.1.1 Work under this section consists of furnishing all labour, materials equipment and appliances necessary and required to completely install the water supply system as required by the drawings, specified hereinafter and given in the Schedule of Quantities.
- 4.1.2 Without restricting to the generality of the foregoing, the water supply system shall include the following:-
- a) Distribution system from main supply headers to all fixtures and appliances for cold/hot water.
 - b) Connections to all plumbing fixtures and appliances.
 - c) Inserts for RCC tank.

4.2 General Requirements

- 4.2.1 All materials shall be new of the best quality conforming to specifications. All works executed shall be to the satisfaction of the Project Manager.
- 4.2.2 Pipes and Fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanlike manner.
- 4.2.3 Short or Long bends shall be used on all main pipe lines as far as possible. Use of Elbows shall be restricted for short connections.
- 4.2.4 Pipes shall be fixed in a manner so as to provide easy accessibility for repair and maintenance and shall not cause obstruction in shafts, passages etc.
- 4.2.5 Pipes shall be securely fixed to walls and ceilings by suitable clamps at intervals specified.
- 4.2.6 Clamps, hangers and supports on RCC walls, columns and slabs shall be fixed only by means of approved made of expandable metal fasteners inserted by use of power drills.
- 4.2.7 All pipe clamps, supports, nuts, bolts, washers shall be galvanized MS steel throughout the building. Painted MS clamps & MS nuts, bolts and washers shall not be accepted.
- 4.2.8 Valves and other appurtenances shall be so located as to provide easy accessibility for operations, maintenance and repairs.

4.3 Water Supply System

CPVC PIPES, FITTINGS

All hot & cold water pipes inside the building up to 50mm diameter and where it specified shall be CPVC pipes.

4.3.1 MATERIAL

All pipes and fitting comply with ASTM D2446 standard.

CPVC fusion compound (solvent cement) as per ASTM F493.

All fitting are fusion bonding type (assembly using CPVC fusion compound) unless otherwise specified.

All metal transition are brass type with threads as per IS 554 CPVC threaded fitting are not recommended.

4.3.2 INSTALLATIONS

Install product according to Manufactures installation instruction and manual and follow recommended safe work practices.

Keep pipe and fitting in original packaging until needed and store pipes in covered areas. Use tools designed for use with plastic pipe and fitting.

Cut of minimum 25mm beyond the edge of the crack in case any crack is discovered in the pipe.

Cut the pipe as square (perpendicular) as possible before making joint. Always use sharp edge cutting tools. Sharpen holder tools periodically.

Always apply a heavy & even coat of CPVC solvent cement on pipe and a light coat inside fittings.

Use CPVC fusion compound confirming with ASTM F 493.

Always hold the fresh fusion compounded joint in place for 20-30 second.

Use brass threaded MTA's and FTA's for hot water & for transition to or from Metal.

Always conduct hydraulic pressure testing after installation to detect any leaks and faults. Wait for appropriate cure time before pressure testing. Fill lines slowly and bleed air from the system prior to pressure testing.

Deburr, bevel and clean mating surface of pipe and fittings before joining.

Rotate the pipe 80 degree to 190 degree to spread the CPVC solvent cement evenly in the while pushing the pipe into fitting.

Use Teflon tapes with threaded fitting, good quality champion make only.

Ensure that there no sharp edge in contact with the pipe while embedding the pipes on the

wall or in the floors.

Provide vertical and horizontal supports as recommended using the plastic straps only.

Apply only water- based paint on exposed pipes and fitting.

Provide sleeves (pipe cover) at entry & exit it under slab installations & while crossing walls.

Visually inspect all joints for proper cemented at the end of shift or day. A visual inspection of the complete system is also recommended during pressure testing.

4.4 **PEX PIPING (Pliable/Giacoquest – Giacomini):**

Pex piping system shall be confirming to EN ISO 15875-2003 and in confirmation to ASTM F876, 877 and 1807 and CAN/CSA B 137.5 in compliance with ANSI/NSF standard 61 having basic characteristics as given below.

Fittings shall be in brass / Gm and shall be lead free; fittings shall be supplied by the pipe manufacturer.

Jointing shall be by use of copper crimping rings using tools and technique as per manufacturer's specification only.

• 3/8", 1/2", 3/4", 1" pex pipe according to ASTM F876/F877

(Table 1 - pipe dimensions)

Nominal size	Outside diameter(mm)	Tolerance for outside diameter	Minimum wall-thickness(mm)	Tolerance on wall-thickness(mm)
3/8"	12.70	± 0.08	1.78	+ 0.25
1/2"	15.88	± 0.1	1.78	+ 0.25
3/4"	22.22	± 0.1	2.47	+ 0.25
1"	28.58	± 0.12	3.18	+ 0.33

(Table 3 - maximum pressure)

Nominal size	Temperature 23°C	Temperature 82.2°C	Temperature 93.3°C	Temperature 99°C*
3/8"	42.7 bar	19.0 bar	16.2 bar	10.34 bar
1/2"	33.1 bar	14.8 bar	14.8 bar	10.34 bar
3/4"	32.7 bar	14.5 bar	12.4 bar	10.34 bar
1"	32.7 bar	14.5 bar	12.4 bar	10.34 bar

PEX shall be used for inter piping of size (1/2" and 3/4" only). System shall be in Pliable or non-Pliable form as per details given in the BOQ.

4.4 **Clamps**

PEX & CPVC pipes in shafts and other locations shall be supported by G.I clamps of design approved by the Resident Engineer. Pipes at ceiling level shall be supported / suspended on structural clamps fabricated from MS structure. Pipes in shafts shall be supported on slotted angles/ channels as specified/ as directed.

4.5 Unions

The Agency shall provide adequate number of unions on all pipes to enable easy dismantling later when required. Unions shall be provided near each gunmetal valve, stop cock or check valve and on straight runs as necessary at appropriate locations as required for easy dismantling and/ or as directed by Resident Engineer.

4.6 Flanges

Flanged connections shall be provided on pipes as required for maintenance/ ease in dismantling or where shown on the drawings, all equipment connections as necessary and required or as directed by the Resident Engineer. Connections shall be made by the correct number and size of the GI nuts/ bolts, as per relevant IS Standards and made with 3mm thick insertion rubber washer/ gasket.

Valves

4.7 Ball Valves

Valves upto 50 mm dia. shall be screwed type Ball Valves with stainless steel balls spindle teflon seating and gland packing tested to a hydraulic pressure of 20 kg/sq.cm., and accompanying couplings and steel handles.(to BIS 5351)

4.8 Testing

All pipes, fittings and valves, after fixing at site, shall be tested by hydrostatic pressure of 1.5 times the working pressure or 7 kg / sq.cm whichever is higher. Pressure shall be maintained for a period of at least thirty minutes without any drop. A test register shall be maintained and all entries shall be signed and dated by Contractor (s) and Project Manager.

In addition to the sectional testing carried out during the construction, Contractor shall test the entire installation after connections to the overhead tanks or pumping system or mains. He shall rectify all leakages and shall replace all defective materials in the system. Any damage done due to carelessness, open or burst pipes' or failure of fittings, to the building, furniture and fixtures shall be made good by the Contractor during the defects liability period without any cost.

After commissioning of the water supply system, Contractor shall test each valve by closing and opening it a number of times to observe if it is working efficiently. Valves, which do not effectively operate, shall be replaced by new ones at no extra cost and the same shall be tested as above.

Hot water pipes chased into the walls shall be provided with a 6mm thick insulation with elastic flexible material having hermetic closed cell structure of expanded synthetic material rated for 60°C hot water supply.

4.9 Measurement

- a) Pipes above ground shall be measured per linear meter (to the nearest cm) and shall be inclusive of all fittings e.g. coupling, tees, bends, elbows, unions, flanges and U clamps with nuts, bolts & washers fixed to wall or other standard supports.
- b) Jointing with teflon tape, white lead, solvent, crimping and insertion gasket of appropriate temperature grade.
- c) Cutting holes, and chases in walls, floors, any pipe support required for pipes below ground & making good the same.
- d) Excavation, backfilling, disposal of surplus earth and restoring the ground & floor in original condition.

4.10 Pipe Supports

Fabricated and / or galvanised supports shall be measured by weight. Weight for each type of clamp shall be calculated on basis of the quantity of structurals and MS used from the theoretical weight calculated on basis of the components theoretical weight of the sections.

4.11 Rate quoted for supports & hangers shall be inclusive of :

- a) Expandable anchor fastens.
- b) Galvanising of all supports & hangers.
- c) Cutting holes in walls, ceilings on floors and making good where permitted.
- d) Nuts, bolts and washers for fixing and assembling.
- e) Wooden / PVC pipe saddles for vertical or horizontal runs.

4.12 Painting/pipe protection/insulation

Painting/pipe protection /insulation for pipes shall be measured per linear meter over finished surface and shall include all valves and fittings for which no deduction shall be made. No extra payment shall be made for fittings, valves or flanges.

SECTION – V

SPRINKLER SYSTEM

1.0 **Pendant type Sprinkler Head**

- 1.1 Sprinkler heads shall be of quartzoid bulb type with bulb, valve assembly, yoke and the deflector. The sprinkler shall be of approved make and type with 15 mm nominal dia outlets.
- 1.2 The bulb shall be made of corrosion free material strong enough to withstand any water pressure likely to occur in the system. The bulb shall shatter when the temperature of the surrounding air reaches at 68° C / 79° C.
- 1.3 The nominal bore shall be 15 mm dia and colour of liquid shall be Red / Yellow.
- 1.4 The Sprinkler head shall be approved by UL / FM.

2.0 **Upright type Sprinkler Head**

- 2.1 Upright sprinkler heads shall be similar to Pendant type in material construction and performance but designed to throw water Droplets upwards in umbrella fashion, to cool the underside of ceiling and extinguish any fire involving combustibles on the floor below.
- 2.2 The Sprinkler head shall be approved by UL / FM. The nominal bore shall be 15 mm dia and the colour of liquid shall be red.
- 2.3 Upright Sprinkler heads shall be use in lower and upper basement parking areas and above the false ceiling.

3.0 **Side Wall type Sprinkler Head**

- 3.1 Side wall sprinkler heads shall be similar to Pendant type in material construction and performance but designed to throw water Droplets horizontally.
- 3.2 The Sprinkler head shall be approved by UL / FM. The nominal bore shall be 15 mm diameter and the colour of liquid shall be red.
- 3.3 Side wall sprinkler heads shall be use in staircase landing and along the ramp.

4.0 **Powder coated Sprinkler with Powder coated Twin plate Rosette.**

- 4.1 Most areas below false ceiling shall be provided with powder coated pendant sprinkler with twin plate sliding rosette. The sprinkler head shall be same as Pendant type above but powder coated white. The sprinkler head shall be provided with a double plate powder coated rosette that shall seal the gap between the false ceiling and he sprinkler head.
- 4.2 The adjustment allowable shall be 12 mm. The lower part shall have flared ends that shall fit tightly into the upper piece.
- 4.3 The Sprinkler head shall be approved by UL / FM. The nominal bore shall be 15 mm diameter and the colour of liquid shall be red.

5.0 **Makes of materials**

For makes of materials refer to list of approved makes of material.

6.0 **Mode of measurement**

- 6.1 Sprinkler head including supports and clamps for fixing shall be measured as unit.

- 6.2 All alarm control valves including drain valves, butterfly valve and all other accessories together with flanges or tail pieces shall be measured per unit.
- 6.3 All floor control valves including drain valves, butterfly valve, sight glass and all other accessories together with flanges or tail pieces shall be measured per unit.

7.0 Piping

Internal

All internal pipes shall be, unless otherwise specified, heavy quality mild steel tubes to IS 1239 using wrought steel heavy duty screwed fittings. Flanges shall be provided to mate with valves and other equipment and shall conform to IS 6392. Flanges shall be screwed type. Flanges shall be rated for 2.0 N/sqmm.

Valves shall be suitable for external piping.

All pipes shall be of approved make and best quality without rust marks. Pipes and fittings shall be fixed in a manner as to provide easy accessibility for repair, maintenance and shall not cause obstruction in shafts, passages etc. Pipes and fittings shall be fixed truly vertical, horizontal or in slopes as required in a neat workmanship manner. Pipes shall be securely fixed to walls and ceilings by suitable supports at intervals specified. Only approved type of anchor fasteners shall be used for RCC ceiling and walls.

All pipes shall be adequately supported from ceiling or walls through structural supports fabricated from mild steel structural e.g. rods, channels, angels and flats generally as shown on drawings. Fasteners shall be shear type anchor fasteners in concrete walls and ceilings and wrought steel spikes of at least 75mm long in brick walls. All pipes supports shall be painted with 1 coats of red oxide primer and two coats of black enamel paint.

All low point loops in the piping shall be provided with 25mm Ball Valves with rising spindle for draining the system. All valves shall have screwed brass caps. Likewise 25mm gun metal air vents shall be provided at all high point loops to prevent air-locking.

All piping shall have flanged joints at about 25m intervals to facilitate easy maintenance.

8.0 Pipe Jointing

All pipes shall be provided with threaded joints up to 50mm diameter and welded joints for pipe above 50mm diameters. Hold tite shall be used for sealing.

All welded joints shall be tested by radiography test.

Joints between CI and GI pipes shall be made by providing a suitable flanged tail or socket piece and MS flange on the GI pipe. Flanges shall have appropriate number of holes and shall be fastened with nuts, bolts and 1.5mm thick compressed asbestos gasket.

9.0 Ball Valve

The Ball Valve shall be made from die cast brass and tested to 14 Kg/cm² pressure. The valve shall be internally threaded to receive pipe connections.

The Ball shall be made from brass and machined to perfect round shape and subsequently chrome plated. The seat of the valve body- bonnet gasket and gland packing shall be of Teflon.

The handle shall be of chrome plated steel with PVC jacket. The handle shall also indicate

the direction of 'open' and 'closed' situations. The gap between the ball and the teflon packing shall be sealed to prevent water seeping upto 14 Kg / cm² pressure.

The handle shall also be provided with a lug to keep the movement of the ball valve within 90 degree. The lever shall be operated smoothly and without application of any unnecessary force.

10.0 Pipe supports

All pipes whether horizontal or vertical shall be suitably supported using galvanised mild steel clamps/clevis hanger manufactured by M/s Hitech Support (India) Pvt Ltd or equivalent product of good quality as approved by engineer in-charge.

Vertical Pipes

The pipes running vertical shaft shall be supported by galvanised mild steel rigid clamps fixed to wall with anchor bolts and studs.

When the horizontal distance between the centre line of two adjacent pipes is less than 300 mm a powder coated HITECH/or equivalent rail shall be fixed to wall the pipes independently clamped to the rail with 'U' bolt clamps.

Horizontal Pipes

Pipes running horizontal shall be supported from structural beam/slab by using appropriate galvanised m.s. pipe clevis hangers.

The spacing of supports shall be as follows:

GI Pipes/MS Pipes			CI Spun Pipes		
<u>Internal (mm)</u>	<u>Dia</u>	<u>Spacing (mm)</u>	<u>Internal (mm)</u>	<u>dia</u>	<u>Spacing (mm)</u>
<u>15</u>		<u>1800</u>	<u>75-150</u>		<u>2700</u>
<u>20,25</u>		<u>2400</u>	<u>200-250</u>		<u>3000</u>
<u>32</u>		<u>2700</u>	<u>300</u>		<u>3600</u>
<u>40-50</u>		<u>3000</u>			
<u>65-80</u>		<u>3600</u>			
<u>100</u>		<u>4000</u>			
<u>150</u>		<u>4500</u>			

Supports for horizontal piping longer than 15m in a stretch shall be provided with swivel clamps. Otherwise, the clamps shall be universal clamps or rigid clamps as required by the project engineer.

11.0 Fixing of clamps/rails etc.

All clamps, rails and accessories shall be fixed to the structure (beam, slab, walls etc.) by using approved good quality anchor fasteners of appropriate size.

12.0 Painting

All exposed piping for fire fighting shall be distinctly painted 'Fire red' shade 536 to IS:5-1978. Pipes shall first receive two coats of red oxide primer uniformly applied and two coats of oil paint applied thereafter. All pipes supports shall be painted black as specified for support & clamps.

Painting Schedule

All equipment and piping shall be painted in accordance with the following colour code:

Equipment	Colour	Distinguishing Mark
a) Pump motors	Fire Red Shade No.536 to IS: 5 -1978	
b) Internal piping	"	
c) Landing valves & Hose reel cabinets	"	
d) External Hydrants	"	
e) Fire brigade connection	"	
f) Priming tank	"	
g) Air vessel	"	
h) Electric panels	Black & Red	
i) Fire Alarm Panel	Black & Red	
j) Repeater panel	Black & Red	
k) Break Glass Unit	Fire Red	
l) Hooters/Speakers	Fire Red	
m) Sprinkler pipes	Fire Red	

All surfaces to be painted shall be thoroughly after the prime coat, after ensuring that the paint is dry. The second coat shall be done before the installation is handed over and after approval to do so from the Engineer-in-charge.

Testing & commissioning

All piping after installation shall be tested for a hydrostatic test pressure of 10.5 kg/sqcm or 1.5 times the working pressure (whichever is less) maintained for 24 hours. All joints and valves shall be checked for leaks and rectified and retested. During testing all valves except drain & air valves shall be kept fully open.

Makes of materials

For makes of materials refer to list of approved makes of material.

cleaned with wire brush to remove completely rust and other extraneous substances. Over the cleaned surfaces one coat of red oxide primer shall be applied completely covering the exposed surfaces. Finishing coat of enamel paint shall be applied one day

13.0 Mode of measurement

All external piping shall be measured along the centre line of the pipe and paid per unit length and shall include:

- i) All pipes & fittings
- ii) Bituminous coating

All internal piping shall be measured similarly but shall include for the pipe supports and clamps.

All valves, air valves, drain valves together with flanges or tail pieces shall be measured per unit.

All excavation and concrete supports and thrust blocks shall be measured as per drawing and paid for per cum.

The cost of pipe supports described above form part of the rate quoted for piping and no extra shall be payable on the account.

All painting shall form part of the cost of equipment piping etc. No separate payment shall be admissible.

SECTION – VI

PORTABLE FIRE EXTINGUISHERS & EXIT SIGNAGES

1.0 Scope

1.1 The scope of work covers the supply and installation of portable fire extinguishers. The following types are envisaged in these specifications and provided as shown in the schedule of portable fire extinguishers.

- 1.0.1 Dry powder extinguisher
- 1.0.2 Carbon-dioxide extinguisher
- 1.0.3 Mono ammonia phosphate extinguisher
- 1.0.4 Water expelling type.

2.0 Standards

2.1 The following standards and rules and regulations shall be applicable:

- 2.1.1 Fire protection manual of the tariff advisory committee, Fire Insurance Association of India
- 2.1.2 IS:2176 :Portable fire extinguisher Dry power type
- 2.1.3 IS:2878 :Portable fire extinguisher carbon-dioxide type
- 2.1.4 Local Fire Brigade/Authority
- 2.2 All standards mean the latest.

3.0 Extinguishers

3.1 Dry powder type

3.1.1 The extinguishers shall be 2, 5, 10 kg capacity and cartridge type unless specified otherwise.

3.1.2 The body shall be of cold rolled carbon steel grade D and 1.5mm thick upto 5 kg and 2mm for 10 kg. The construction shall be similar to 'Soda Acid type' but of the following dimensions.

Capacity (kg)	Outside dia (mm)	Filler opening (mm)
2.00	100	45
5.00	150	45
10.00	175	45

3.1.3 The discharge fitting shall be with 500mm 10mm dia hose upto 5 kg and 750 mm 12.5 mm dia for 10 kg with a trigger controlled nozzle capable of discharging 85% of the contents as follows:

Capacity (kg)	Time (sec)	Throw (m)
2.00	8 - 10	2
5.00	15 - 20	4
10.00	23 - 30	6

3.1.4 A carbon dioxide cartridge conforming to IS:4947 shall be fitted in a cartridge holder with an inner shell. A spring loaded piercing device shall be provided in the cap for piercing the seal of the gas cartridge. A syphon tube of copper or PVC shall be provided for upright operation. The cap and neck ring shall be similar to Soda Acid type extinguisher.

3.1.5 All internal and external components and surfaces shall receive anti-corrosive coating of not less than 12 microns shall be applied uniformly as indicated below:

a)	Body	Mild steel	Tin alloy
b)	Cage for acid	Brass sheets	Lead or tin alloy
c)	Discharge fittings	Leaded - Tin	Tin alloy
		Bronze	
d)	Strainer	Brass sheets	Lead or Tin alloy

3.2 Carbon dioxide type

3.2.1 The extinguishers shall be rated for 2.0 and 4.5 kg by weight or carbon dioxide, unless stated otherwise. The contents shall be with a filling ratio not exceeding 0.667.

3.2.2 The body shall be steel cylinder made according to IS:2872 and approved by the chief controller of explosives.

3.2.3 The discharge head shall be simple and safe to operate conforming to IS:3224 with a safety release to IS:5903 set to 18.0 to 20.0 N/sqmm. A syphon tube of copper or PVC shall be fitted. A non-conducting discharge horn and a high pressure hose (27.5 N/sqmm pressure) shall be fitted with each extinguisher.

3.2.4 The discharge system shall be designed to expel 95% of the contents in continuous discharge as follows:

Capacity (kg)	Time (Sec.)
2.0	8 - 18
3.0	10 - 20
4.5	10 - 24

3.3 Mono ammonium phosphate type

3.3.1 The capacities envisaged are 2 kg & 6 kg. The filling pressure shall be 0.95 +/- 0.055 N/sqmm.

3.3.2 The body shall be cylindrical in shape and made of cold rolled carbon steel grade D/DD or hot rolled steel plate with radiographically tested welded construction. Plate thickness shall conform to IS:11108.

3.3.3 Discharge valve mechanism shall be a simple and safe squeeze grip valve. 4.5 kg and above capacity shall have a high pressure (0.5 N/sqmm) hose and non-conducting horn and shall also be provided with a pressure gauge. 95% of the contents shall be discharged as follows:

Capacity (kg)	Time (sec)	Throw (m)
2.00	8 - 16	2
6.00	15 - 24	4

3.3.4 The internal and external components and surface shall be treated for anti-corrosion as for dry powder type extinguishers.

3.4 Water CO2 Fire Extinguisher

3.4.1 The extinguishing medium shall be primarily water stored under normal pressure, the discharge being effected by release of carbon dioxide gas from a 60 gms cylinder.

3.4.2 The capacity of the cylinder when filled shall be 9 litres +/- 5 %.

3.4.3 The cylinder shall be fabricated from MS sheet, welded at seams, with dish and dome, being of same thickness and of size not exceeding the diameter of the body. The neck shall be externally threaded with leaded tin bronze.

3.4.4 The cap shall be of leaded tin bronze. The siphon tube shall be of brass or GI. The cartridge holder, knob, discharge fittings and plunger shall be of leaded tin bronze and plunger of stainless steel with spring also of stainless steel. The discharge tube shall be of braided nylon, of 10 mm dia and 600 mm length with a brass nozzle.

3.4.5 The extinguisher shall be treated for anti corrosion internally and externally and painted fire red externally. The cartridge shall be IS marked. The Extinguisher body shall be tested to 25 bar pressure for 2 minutes. The Extinguisher shall be IS:940 marked.

3.5 General requirements

3.5.1 All extinguishers shall be standard products approved by the Tariff Advisory Committee and Local Fire Authority and manufactured and tested strictly in accordance with the relevant Indian Standard. All markings and test results shall be stamped in the appropriate colour markings accordingly to the Indian Standards.

3.5.2 All extinguishers shall have a structurally designed galvanised steel handle and also a suitable wall mounting bracket.

4.0 Illumination signs/EXIT signage

The illuminated signs shall have the letters 'FIRE EXIT' or 'NO FIRE EXIT' painted in red on a 6mm thick white perspex sheet as the front face of a sheet steel enclosure constructed with minimum 1.5mm thick sheet. The MS box shall be powder coated finished in white colour. The perspex sheet shall be back lit with a rechargeable maintenance free sealed battery integral with a battery charging circuit. The battery backup facility shall operate independent of the mains supply in the event of a mains failure. The batteries shall be of adequate rating so as to support the illumination of the signage for a minimum period of 1 hour without mains power. The preferred dimensions of the illuminated signs shall be 450 mm length and 225mm height with 100 mm high lettering. They shall be suitable for surface or recessed mounting or ceiling hung type as required including all arrangements for suspension, cutting/chasing and making good the defects etc. complete as approved.

5.0 Mode of measurement

5.1 Each extinguisher with its mounting bracket shall be measured per unit and paid for.

5.2 Exit signages with mounting plate shall be measured per sq.inch and paid for.

6.0 Makes of Equipment and materials

Refer to list of approved makes.

COMMISSIONING & GUARANTEE

1. SCOPE OF WORK

Work under this section shall be executed without any additional cost. The rates quoted in this tender shall be inclusive of the works given in this section.

Contractor shall provide all tools, equipment, metering and testing devices required for the purpose.

On award of work, Contractor shall submit a detailed proposal giving methods of testing and gauging the performance of the equipment to be supplied and installed under this contract.

All tests shall be made in the presence of the Architect or his representative or any inspecting authority. At least five working days notice in writing shall be given to the inspecting parties before performing any test.

Water flow rates of all equipment and in pipe lines through valves shall be adjusted to design conditions. Complete results of adjustments shall be recorded and submitted.

Contractor shall ensure proper balancing of the hydraulic system and for the pipes / valves installed in his scope of work by regulating the flow rates in the pipe line by valve operation. The contractor shall also provide permanent Tee connection (with plug) in water supply lines for ease of installing pressure gauge, temperature gauge & rotameters. Contractor shall also supply all required pressure gauge, temperature gauge & rotameter for system commissioning and balancing. The balancing shall be to the satisfaction of Consultant / Project Manager.

Three copies of all test results shall be submitted to the Engineer in A4 size sheet paper within two weeks after completion of the tests.

2 PRECOMMISSIONING

On completion of the installation of all pumps, piping, valves, pipe connections, insulation etc. the Contractor shall proceed as follows:

- 2.1 Prior to start-up and hydraulic testing, the Contractor shall clean the entire installation including all fittings and pipe work and the like after installation and keep them in a new condition. All pumping systems shall be flushed and drained at least once through to get rid of contaminating materials. All pipes shall be rodded to ensure clearance of debris, cleaning and flushing shall be carried out in sections as the installation becomes completed.
 - a) All strainers shall be inspected and cleaned out or replaced.
 - b) Check all clamps, supports and hangers provided for the pipes.
 - c) Check all the equipment, piping and valves coming under hot water system and operate each and every valve on the system to see if the valves are functioning properly. Thereafter conduct & hydro test of the system as for (b) above.

- d) Fill up pipes with water and apply hydrostatic pressure to the system as given in the relevant section of the specification. If any leakage is found, rectify the same and retest the pipes.

3 FINAL ACCEPTANCE TESTS

Following commissioning and inspection of the entire installation, and prior to issue of the Completion Certificate, the Contractor shall carry out final acceptance tests in accordance with a programme to be agreed with the Architect.

Should the results of the acceptance tests show that plant, systems and/or equipment fail to perform to the efficiencies or other performance figures as given in this Specification, the Contractor shall adjust, modify and if necessary replace the equipment without further payment in order that the required performance is obtained.

Where acceptance tests are required by the relevant Authorities having jurisdiction, these tests shall be carried out by the Contractor prior to the issue of Completion Certificate to the acceptance of the Authorities.

4 REJECTION OF INSTALLATION / PLANT

Any item of plant or system or component which fails to comply with the requirements of this Specification in any respect whatsoever at any stage of manufacture, test, erection or on completion at site may be rejected by the Architect either in whole or in part as he considers necessary/appropriate. Adjustment and/or modification work as required by the Architect so as to comply with the Authority's requirements and the intent of the Specification shall be carried out by the Contractor at his own expense and to the satisfaction of the Authority/Architect.

After works have been accepted, the Contractor may be required to carry out assist in carrying out additional performance tests as reasonably required by the Architect/Employer.

5. WARRANTY AND HANDOVER

The Contractor shall warrant that all plant, materials and equipment supplied and all workmanship performed by him to be free from defects of whatsoever nature before handover to the Owner.

6. HANDING OVER OF DOCUMENTS

All testing and commissioning shall be done by the Contractor to the entire satisfaction of the Owner's site representative and all testing and commissioning documents shall be handed over to the Owner's site representative.

Two persons(1plumber & 1 helper) from contractor side will remain at site for 3 months after completion of work for smooth handing over of the entire installation to client's representative.

The Contractor shall also hand over all maintenance and operation manuals, all certificates and all other documentation as per the terms of the contract to the Owner's site representative.

8. PIPE COLOUR CODE:

S.No.	Pipe Lines	Ground / Base Color	First Color Band	Second Color Band
1	Drinking Water (All cold water lines after filter)	Sea Green	French Blue	Single Red
2	Treated Water (Soft Water)	Sea Green	Light Orange	
3	Domestic Hot Water	Sea Green	Light Grey	
4	Drainage	Black		

Color code to confirm to IS: 2379:1990

LIST OF STANDARD CODES

S.No.	IS Code No.	Description
1.	IS:1729:1979	Specification for sand cast iron spigot and socket soil, waste and ventilating pipes, fittings and accessories (1st rev.) (Amendment 4)
2.	IS:651:1992	Specification for salt glazed stoneware pipes and fittings (5th rev.) (Amendment 1)
3.	IS:456:1978	Code of practice for plain and reinforced concrete (3rd rev.) (Amendment 2)
4.	IS:3114:1994	Code of practice for laying of CI pipes (2nd rev.) (Amendment 2)
5.	IS:782:1978	Specification for caulking lead (3rd rev.)
6.	IS:783:1985	Code of practice for laying of concrete pipes (1st rev.) (amendment 1)
7.	IS:4127:1983	Code of practice for laying of glazed stoneware pipes (1st rev.)
8.	IS:780:1984	Specification for sluice valve for water works purposes (6th rev.) (50 to 300 mm size) (amendment 3)
9.	IS:1172:1993	Code of basic requirements for water supply, drainage & sanitation (4th rev.)
10.	IS:1200 (Part-16):1979	Code of practice for methods of measurements of building and civil engineering works: Part 16 laying of water and sewer lines including appurtenant items (3rd rev.)
11.	IS:1200(PART-19):1981	Code of practice for methods of measurements of building and civil engineering works: part 19 water supply, plumbing and drains (3 rd rev.)
12.	IS:1742:1983	Code of practice for building drainage (2nd rev.)
13.	IS:13095:1991	Butterfly valves for general purposes
14.	IS:5312 (part 1):1984	Swing heck type reflux valves (non-return valve): part 1 single door pattern (1 st rev.) (amendment 1)
15.	IS:1726:1991	CI manhole covers & frames (3rd rev.)
16.	IS:884:1985	Fire aid hose reel for fire fighting
17.	IS:901:1988	Coupling double male and female instantaneous pattern for fire fighting
18.	IS:903:1984	Fire hose delivery coupling, branch pipe, nozzles and nozzles spanner
19.	NBC-SP-7-1983 Part IV	National building code of India 1983, amendment No. 3
20.		Central public works division (CPWD) Part-V, wet riser system for fire fighting 1985, Govt. of India
21.	IS:3844-1989	Code of practice for installation and maintenance of internal fire hydrants and hose reels on premises
22.	IS:2190:1992	Code of practice for selection and maintenance of first-aid fire extinguisher
23.	IS:6382:1984	Code of practice for design and installation of fixed system carbon dioxide fire extinguishing system
24.	SP:35 (s&t)-1987	Hand book on water supply & drainage by bureau of Indian standards

S.No.	IS Code No.	Description
25.		National Building code (sec-ix)
26.	IS:2065:1983	Code of practice for water supply in buildings
27.	IS:933-1989	Specifications for portable chemical from fire extinguisher
28.	IS:2171-1985	Specifications for portable fire extinguishers, dry power

LIST OF APPROVED MAKES FOR EQUIPMENT & MATERIALS PLUMBING

<u>S.No</u>	<u>Item</u>	<u>Make at PAR</u>
1.	European Water Closet	KOHLER/AMERICAN STANDARD / ROCA
2.	Wash Basin	KOHLER / AMERICAN STANDARD /ROCA
3.	Urinal With Sensor	EURONICS / KOHLER / SCHELL
4.	Cistern	KOHLER/AMERICAN STANDARD /
	SCHELL	
5.	Plastic W.C. seats Covers	KOHLER / AMERICAN STANDARD /
	ROCA	
6.	Stainless Steel Sinks	JAYNA/ NIRALI / JAQUAR
7.	C.P. Fittings & Accessories	KOHLER/SCHELL / GROHE
8.	Rubber Insulation	ARMAFLEX/ VIDEOFLEX / THERMAFLEX
9.	Urinal Sensors	EURONICS / KOHLER / SCHELL
10.	Sensors Basin Tap	SCHELL / KOHLER / GROHE
11.	Grab Bar	EURONICS /JAQUAR / JAQUAR
12.	Toilet Paper Holder	KOHLER / JAQUAR / GROHE
13.	Automatic Soap Dispenser	EURONICS / TOSHI/ JAQUAR
14.	Air Purifier	JAQUAR / TOSHI / EURONICS
15.	Paper Towel Dispenser	JAQUAR / TOSHI/ EURONICS
16.	Hand Drier	EURONICS / TOSHI/ KOHLER
17.	Heater	AO SMITH / VENUS/ RACOLD
18.	CPVC pipes/fittings and valves	ASTRAL /ASHIRWAD /DUTRON
19.	G.I. Pipes /M.S.Pipes IS 1239/3589	TATA /JINDAL HISSAR
20.	G.I. Fittings (Malleable cast iron)	DRP-M/UNIK / VICTOLIC
	Soil, Waste & Rain water pipes & Fittings –	
21.	Polypropylene Pipes	POLOPLAST/REHAU
22.	S.S. Hinged Grating	CHILLY/CAMRY
23.	Ball valves (15 to 40mm)	DRP/SANT/AIP
24.	Anti corrosive tape for pipe protection	PYPKOTE/MAKPOLYKOTE
25.	Anticorrosive Bitumastic Paint	ISI
26.	Epoxy Paint	ISI
27.	Air Admittance valves	STUDOR / Mc ALPINE
28.	Firefighting equipment (Hydrant, Hose Drum, F.B Inlet, Branch)	NEWAGE / SAFE GUARD /
		GETECH/FIRE SHIELD
29.	Fire Extinguishers	KANEX/ GETECH / SAFE
		GUARD/FIRE SHIELD

30.	Fire fighting first-aid hose reel tubing	NEWAGE/JYOTI/DUNLOP /FIRE SHIELD
31.	M.S. Pipes	TATA/JINDAL HISSAR
32.	Sprinkler heads	VIKING/TYCO/H.D./NEWAGE
33.	M.S. FORGED FITTINGS	DRP-M / V.S./UNIK /SS
34.	Welding Rod	ADWANI/ VICTOR
35.	Flexible Pipe	NEWAGE / Viking /TYCO
36.	Dash Fasteners	HILTI/ canon
37.	Automatic Air Vent	DANFOSS/ IBP/TBM
38.	Pipe Clamps / Hangers / Support	CAMRY/ CHILLY
39.	Clamps & Support	CAMRY/ CHILLY
40.	Paint	Shalimar/ Asian

Note

- a. It shall be at the discretion of the client or the client's representative to choose the final make for materials for execution from the specified list of approved makes. The contractor to consider this while quoting and procuring each item with prior approval of the client or the client's representative.
- b. In case the contractor is unable to be procure or defaults in procuring one or more of the specified materials, the client or the client's representative reserves the right to procure the same at the expense of the contractor. The same shall be adjusted in the subsequent running bill of the contractor.

Specifications For Electrical and Lighting

Specifications for Electrical and Lighting

CHAPTER 1 : WIRING

1 GENERAL

Technical Specifications in this section cover the Internal Wiring Installations comprising of :

- Wiring for lights and convenience socket outlets etc. in concealed/surface conduit/raceways.
- Wiring for telephone outlets.
- Wiring for fire detection system
- Sub main wiring.

2 STANDARDS AND CODES

The following Indian Standard Specifications and Codes of Practice will apply to the equipment and the work covered by the scope of this contract. In addition the relevant clauses of the Indian Electricity Act 1910 and Indian Electricity Rules 1956 as amended up to date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and/or IEC Standards shall be applicable.

BIS certified equipment shall be used as a part of the Contract in line with Government regulations. Necessary test certificates in support of the certification shall be submitted prior to supply of the equipment.

It is to be noted that updated and current Standards shall be applicable irrespective of those listed below.

660/1100 V grade PVC insulated wires.	IS	694 : 1990
Rigid steel conduits for electrical wiring.	IS	9537 : Part I 1980
	IS	9537 : Part II 1981
Accessories for rigid steel conduits	IS	3837 : 1990
Flexible steel conduits for electrical wiring	IS	3480 : 1990
Switch socket outlets	IS	4615 : 1990
Switches for domestic and similar purposes	IS	3854 : 1997
Boxes for the enclosure of electrical accessories	IS	5133 : Parts I & II 1969
Code of practice for personal hazard fire safety of buildings	IS	1644: 1998
Code of practice for electrical installation fire safety of buildings	IS	1646 : 1997
Code of practice for electrical wiring installations	IS	732 : 1989

3 CONDUITS/ RACEWAYS

3.1 PVC Conduits

PVC conduits shall be high impact, rigid, FRLS PVC, heavy-duty type and shall comply with relevant Indian Standards.

Conduits up to 32mm dia shall be 2mm thick and above that shall be 2.5mm thick.

Plain conduits shall be joined by slip type of couplers with approved sealing cement. All conduit entries to outlet boxes are to be made with adaptors female thread and screwed male bushes. Conduit fittings and accessories such as inspection boxes, draw boxes and junction boxes shall be of heavy duty rigid PVC installed in such a manner that they can remain accessible for existing wires or for the installation of the additional wires. Fan hook box shall be of M.S. Inspection boxes shall be covered with suitable covers.

Conduit runs shall be so arranged that the cables connected to separate main circuits shall be enclosed in separate conduits and that all lead and return wires of each circuit shall be run with the same circuit.

PVC conduits shall be smooth in bore, true in size and all ends where conduits are cut shall be made carefully smooth. Sharp edges shall be trimmed. All joints between lengths of conduits or between conduits and fittings and boxes shall be held firmly together and glued properly. All joints shall be fully water tight. All jointing of PVC conduits shall be by means of adhesive jointing.

3.2 Laying & Fixing of Conduits

Conduits shall be installed so as to avoid steam and hot water pipes. Conduits for LV systems shall be at least 150mm away from the electrical conduits.

Conduits concealed in the ceiling slab shall run parallel to walls and beams and conduit concealed in the walls shall be vertical or horizontal.

The chase in the walls required for the recessed conduit system shall be neatly made and shall be of ample dimensions to permit the conduits to be fixed in the manner desired. Conduits in chase shall be held by steel clamps of approved design. The chase shall be filled up neatly after erection of conduits and brought to the original finish of the wall with cement plaster/cement concrete. The spacing between each clamp shall be 60 cm center to center.

Surface conduits shall be fixed by means of spacer bar saddles at intervals of not more than 500 mm from both sides of fittings/accessories. The saddles shall be of 3mm x 19mm galvanized M.S. flat properly treated, primed and painted securely fixed to support by means of nuts & bolts / raw plugs and brass machine screws.

Where conduits cross expansion joints in the buildings, adequate expansion fittings shall be used to take care of any relative movement.

Separate conduits shall be laid for the following systems:

- a) Normal light, Fan and 6 A socket outlets.
- b) Power points.
- c) TV outlets.
- d) PA system.
- e) Telephone points
- f) Fire alarm system
- g) CCTV System
- h) Emergency Lighting

Contractor shall submit the conduiting layout to PMC / Owners for approval before start of work. While laying conduiting, care should be taken that water, mortar and dirt etc. do not enter the conduits and boxes.

Conduiting system should be such that it shall facilitate easy drawing of new wires/additional wires at any stage. All junction boxes/pull boxes/ draw boxes shall be completely accessible for inspection, maintenance or for future expansion. While drawing of wires, care shall be taken to avoid damage to the wire insulation.

All joints in the wiring shall be made only at switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joint shall be made in conduits and junction boxes.

3.4 Bends

Large right angle bends (more than 75 mm radius) or non right angle bends in conduit runs shall be made by means of conduits bending machines carefully so as not to cause any crack in the conduit. Small right angle bends in conduits runs can be made by standard conduit accessories (solid/inspection bends/elbows) no run of conduits shall have more than four right angle bends from outlet to outlet. Bends in multi runs of conduits shall be parallel to each other and neat in appearance, maintaining the same distance as between straight runs of conduits.

3.5 Conduit Accessories.

3.5.1 Standard accessories

Heavy duty black enamel painted standard conduit fittings and accessories like standard/extra-deep circular boxes, looping in boxes, junction boxes, normal/ inspection bends, solid/inspection elbows, solid/inspection tees, couplers, nipples, saddles, check nuts, earth clips, ball socket joints etc. shall be of superior quality and of approved makes. Heavy duty covers screwed with approved quality screws shall be used. Superior quality screwed PVC bushes shall be used. Samples of all conduits fittings and accessories shall be got approved by Owners/Architects before use.

3.5.2 Fabricated accessories

Where ever required, outlet/junction boxes of required sizes shall be fabricated from 1.6 mm thick MS sheets excepting ceiling fan outlet boxes which shall be fabricated from minimum 2 mm thick sheets. The outlet boxes shall be of approved quality, finish and manufacture. Suitable means of fixing connectors etc., if required, shall be provided in the boxes. The boxes shall be protected from rust by zinc phosphate primer process. Boxes shall be finished with minimum 2 coats of enamel paint of approved colour. A screwed brass stud shall be provided in all boxes as earthing terminal.

3.5.2.1 Outlet Boxes For Light Fittings.

These shall be minimum 75mm x 75mm x 50mm deep and provided with required number of threaded collars for conduit entry. For ceiling mounted florescent fittings, the boxes shall be provided 300 mm off centre for a 1200 mm fitting and 150 mm off centre for a 600 mm fitting so that the wiring is taken directly to the down rod. 3 mm thick Perspex/hylam sheet cover of matching colour shall be provided.

3.5.2.2 Outlet Boxes For Ceiling

Outlet boxes for ceiling fans shall be fabricated from minimum 2 mm thick MS sheet steel. The boxes shall be hexagonal in shape of minimum 100 mm depth and 60 mm sides. Each box shall be provided with a recessed fan hook in the form of one 'U' shaped 15 mm dia rod welded to the box and securely tied to the top reinforcement of the concrete slab for a length of minimum 150 mm on either side. 3 mm thick Perspex/xylen sheet cover of matching colour shall be provided.

3.5.3 Boxes For Modular Wiring Accessories

3.5.3.1 Switch Boxes - Modular Type

Switch boxes suitable to house modular type switches of required ratings, and fan regulators as required shall be provided. In case the number of switches in one box is not tallying with that available in standard manufacture, the box accommodating the next higher number of switches shall be provided without any extra cost. In case fan regulator/regulators is /are to be provided at a later dated, suitable provision for accommodating such regulators shall be made in the switch boxes and blank off covers shall be provided without any extra cost.

Switch boxes shall be so designed that accessories are mounted on a grid plate with tapped holes for brass machine screws leaving ample space at the back and on the sides for accommodating conductors, check-nuts and screwed bushes at conduit entries etc... The grid plates and M.S. boxes shall be fitted with a brass earth terminal. Boxes shall be attached to conduits by means of check-nuts on either sides of their walls. Moulded front covers made from high impact resistant, flame retardant and ultra violet stabilized engineering plastics shall be fixed by means of counter sunk chromium plated brass machine screws. No timber shall be used for any supports. Switch boxes shall be located with bottom at 1200 mm above floor level unless otherwise indicated.

3.5.3.2 Modular Type Boxes For Socket/ Telephone/Call Bell Outlets

Outlet boxes shall be suitable for housing modular type switched socket outlets/ telephone outlets/ buzzers and any other outlet as required. These shall be so designed that accessories are mounted on a grid plate with tapped holes for brass machine screws leaving ample space at the back and on the sides for accommodating conductors, check nuts and screwed bushes at conduit entries etc. The grid plates and M.S. boxes shall be fitted with a brass earth terminal. These shall be attached to conduits by means of check nuts on either sides of their walls. Moulded front covers made from high impact resistant, flame retardant and ultra violet stabilized engineering plastics shall be used to mount the outlets and shall be fixed to the outlet M.S. boxes by means of counter sunk chromium plated brass machine screws. No timber supports shall be used. Boxes shall be located at skirting level or bottom at 1200 mm from floor or inside raceways on laboratory work tables., as indicated in drawings and/or as directed.

3.6 Cross Section

The conduits shall be of ample sectional area to facilitate simultaneous drawing of wires and permit future provision also. Total cross section of wires measured overall shall not normally be more than half the area of the conduit. Maximum number of PVC insulated 660/1100 Voltage grade copper conductor cable conforming to IS - 694 - 1990 as per table give below.

Maximum no of PVC insulated 660/1100 V grade aluminium/copper
Conductor cable conforming to IS : 694 - 1990

Normal Cross Sectional area of conductor in sq. mm	20 mm		25 mm		32 mm		38 mm		51 mm		64 mm	
	S	B	S	B	S	B	S	B	S	B	S	B
1	2	3	4	5	6	7	8	9	10	11	12	13
1.50	5	4	10	8	18	12	-	-	-	-	-	-
2.50	5	3	8	6	12	10	-	-	-	-	-	-
4	3	2	6	5	10	8	-	-	-	-	-	-
6	2	-	5	3	4	8	7	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-	-
16	-	-	2	2	3	3	6	5	10	7	12	8
25					3	2	5	3	8	6	9	7
35							3	2	6	5	8	6

Note :

4. The above table shows the maximum capacity of conduits for a simultaneous drawing in of cables.
5. The columns headed 'S' apply to runs of conduits which have distance not exceeding 4.25 m between draw boxes and which do not deflect from the straight by an angle of more than 15 degrees. The columns headed 'B' apply to runs of conduit which deflect from the straight by an angle of more than 15 degrees.
6. Conduits sizes are the nominal external diameters.

4. WIRES

Wiring shall be carried out with PVC insulated 660/1100 volt grade unsheathed single core wires with electrolytic annealed stranded copper (unless otherwise stated) conductors and conforming to IS 694/1990. All wire rolls shall be ISI marked. All wires shall bear manufacturer's label and shall be brought to site in new and original packages. Manufacturer's certificate, certifying that wires brought to site are of their manufacture shall be furnished as required.

5 COAXIAL CABLES

The coaxial cables shall be of wide band type with operation up to 300 MHz capability. Aging resistance shall comply with DIM 472.52 part 2 i.e. maximum 5% increase in attenuation at 200 MHz measured by artificial aging (14 days at 80°C) cables shall meet all exceed following specifications

Center core Dia	0.8 mm
Dielectric Dia	4.8 mm
Dielectric	PE
Outer Conductor Dia	5.4 mm
Outer Dia	7.0 mm
Bending radius	more than 30 mm
Impedance	75 ohms
D.C Resistance	50 ohms/KM
Screening factor	more than 50

Attenuation	
50 MHz	6.5
100 MHz	9
200 MHz	13
300 MHz	16

6 LAYING OF CONDUITS

- Conduits shall be laid either recessed in walls and ceilings or on surface on walls and ceilings or partly recessed and partly on surface, as required.
- Same rate shall apply for recessed and surface conduiting in this contract.
- Stranded copper conductor insulated wire of size as per schedule of quantities shall be provided in entire conduiting for loop earthing.
- GI wire of suitable size to serve as a fish wire shall be left in all conduit runs to facilitate drawing of wires after completion of conduiting.

6.1 Recessed Conduiting

Conduits recessed in concrete members shall be laid before casting, in the upper portion of slabs or otherwise as may be instructed, so as to embed the entire run of conduits and ceiling outlet boxes with a cover of minimum 12 mm concrete. Conduits shall be adequately tied to the reinforcement to prevent displacement during casting at intervals of maximum 1 meter. No reinforcement bars shall be cut to fix the conduits. Suitable flexible joints shall be provided at all locations where conduits cross expansion joints in the building.

Conduits recessed in brick work shall be laid in chases to be cut by electrical Contractor in brick work before plastering. The chases shall be cut by a chase cutting electric machine. The chases shall be of sufficient width to accommodate the required number of conduits and of sufficient depth to permit full thickness of plaster over conduits. The conduits shall be secured in the chase by means of heavy duty pressed steel clamps screwed to MS flat strip saddles at intervals of maximum 1 meter. The chases shall then be filled with cement and coarse sand mortar (1:3) and properly cured by watering.

Entire recessed conduit work in concrete members and in brick work shall be carried out in close coordination with progress of civil works. Conduits in concrete members shall be laid before casting and conduits in brick work shall be laid before plastering. Should it become necessary to embed conduits in already cast concrete members, suitable chase shall be cut in concrete for the purpose. For minimizing this cutting, conduits of lesser diameter than 25 mm and outlet boxes of lesser depth than 50 mm could be used by the Contractor for such extensions only after obtaining specific approval from Architects/Owners. For embedding conduits in finished and plastered brick work, the chase would have to be made in the finished brick work. After fixing conduit in chases, chases shall be made good in most workmanlike manner to match with the original finish.

Cutting chases in finished concrete or finished plastered brick work for recessing conduits and outlet boxes etc shall be done by the Contractors without any extra cost.

6.2 Surface Conduiting

Wherever so desired, conduit shall be laid in surface over finished concrete and/or plastered brickwork. Suitable spacer saddles of approved make and finish shall be fixed to the finished structural surface along the conduit route at intervals not exceeding 600 mm.

Holes in concrete or brick work for fixing the saddles shall be made neatly by electric drills using masonry drill bits. Conduits shall be fixed on the saddles by means of good quality heavy duty MS clamps screwed to the saddles by counter sunk screws. Neat appearance and good workmanship of surface conducting work is of particular importance. The entire conduit work shall be in absolute line and plumb.

6.3 Fixing of conduit fittings and accessories

For concealed conducting work, the fittings and accessories shall be completely embedded in walls/ceilings leaving top surface flush with finished wall/ceiling surface in a workman like manner.

Loop earthing wire shall be connected to a screwed earth stud inside outlet boxes to make an effective contact with the metal body.

6.4 Painting and Colour coding of conduits

Before laying, conduits shall be painted specially at such places where paint has been damaged due to vice or wrench grip or any other reason.

If so specified, surface conduits shall be provided with 20 mm wide and 100 mm long colour coding strips as below

Use	Code colour
Low voltage	Grey
Fire alarm	Red
Telephone	Black
PA system	Brown
Earthing system	Green
Control system lighting	Purple

6.5 Protection of Conduits

To safeguard against filling up with mortar/plaster etc. all the outlet and switch boxes shall be provided with temporary covers and plugs which shall be replaced by sheet/plate covers as required. All screwed and socketed joints shall be made fully water tight with white lead paste.

6.6 Cleaning of Conduit Runs

The entire conduit system including outlets and boxes shall be thoroughly cleaned after completion of erection and before drawing in of cables.

6.7 Protection Against Dampness

All outlets in conduit system shall be properly drain and ventilated to minimize chances of condensation/sweating.

6.8 Expansion Joints

When crossing through expansion joints in buildings, the conduit sections across the joint shall be through approved quality heavy duty metal flexible conduits of the same size as the rigid conduit.

6.9 Loop Earthing

Loop earthing shall be provided by means of insulated stranded copper conductor wires of sizes as per Schedule of Quantity laid along with wiring inside conduits for all wiring

outlets and sub-mains. Earthing terminals shall be provided inside all switch boxes, outlet boxes and draw boxes etc.

7 LAYING AND DRAWING OF WIRES

7.1 Bunching of Wires

Wires carrying current shall be so bunched in conduits that the outgoing and return wires are drawn into the same conduit. Wires originating from two different phases shall not be run in the same conduit.

7.2 Drawing of Wires

The drawing of wires shall be done with due regard to the following precautions:-

- No wire shall be drawn into any conduit, until all work of any nature, that may cause injury to wire is completed. Burrs in cut conduits shall be smoothen before erection of conduits. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Approved type bushes shall be provided at conduit terminations.
- Before the wires are drawn into the conduits, conduits shall be thoroughly cleaned of moisture, dust, dirt or any other obstruction by forcing compressed air through the conduits if necessary..
- While drawing insulated wires into the conduits, care shall be taken to avoid scratches and kinks which cause breakage of conductors.
- There shall be no sharp bends.
- The Contractor shall, after wiring is completed, provide a blank metal/sun mica plate on all switch / outlet / junction boxes for security and to ensure that wires are not stolen till switches / outlets etc.. are fixed at no extra cost the contractor shall be responsible to ensure that wires and loop earthing conductors are not broken and stolen. In the event of the wire been partly / fully stolen , the contractor shall replace the entire wiring along with loop earthing at no extra cost to the Owners. No joint of any nature whatsoever shall be permitted in wiring and loop earthing .

7.3 Termination /Jointing of Wires

- Sub-circuit wiring shall be carried out in looping system. Joints shall be made only at distribution board terminals, switches/buzzers and at ceiling roses/connectors/lamp holders terminals for lights/fans/socket outlets. No joints shall be made inside conduits or junction/draw/inspection boxes.
- Switches controlling lights, fans or socket outlets shall be connected in the phase wire of the final sub circuit only. Switches shall never be connected in the neutral wire.
- Wiring conductors shall be continuous from outlet to outlet. Joints where unavoidable, due to any special reason shall be made by approved connectors. Specific prior permission from Architect/Owners in writing shall be obtained before making such joint.
- Insulation shall be shaved off for a length of 15 mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or wringing.

- Strands of wires shall not be cut for connecting terminals. All strands of wires shall be twisted round at the end before connection..
- Conductors having nominal cross sectional area exceeding 4 sq. mm shall always be provided with crimping sockets.
- At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used.
- Brass nuts and bolts shall be used for all connections.
- The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less.
- Switches controlling lights, fans, socket outlets etc. shall be connected to the phase wire of circuits only.
- Only certified valid license holder wiremen shall be employed to do wiring / jointing work.

7.4 Load Balancing

Balancing of circuits in three phase installation shall be planned before the commencement of wiring and shall be strictly adhered to.

7.5 Colour Code of Conductors

Colour code shall be maintained for the entire wiring installation - red, yellow, blue for three phases, black for neutral and green for earth.

8. MEASUREMENT AND PAYMENT OF WIRING

Wiring for lights, fans, convenience socket outlets and telephone outlets etc. shall be measured and paid for on POINT BASIS as itemized schedule of quantities and as elaborated as below unless otherwise stated.

8.1 Primary and Secondary light point wiring

In respect of group control of lights (more than one light controlled by one switch or MCB), wiring up to the first light in the group shall be measured and paid for as a primary light point. Wiring for other lights looped in one group for switch controlled as also MCB controlled lights shall be measured and paid for as secondary light points. Primary light points for switch controlled lights shall include the cost of control switch whereas primary light points controlled by MCBs shall not include the switch cost. The cost of MCB controlling such lights shall not be included in the primary light point rate since the MCB shall be paid for in the item of DB.

The point wiring basis shall assume average wiring length and average conducting length per point based on parameters stipulated in para 8.2 below. The average wiring length and average conducting length forming the basis of point wiring payment, shall take the electrical layouts of the entire project into consideration. Tenderers are advised to seek clarifications, if they so desire, on this aspect before submitting their tenders. No claim for extra payment on account of electrical layouts in part or whole of the project requiring

larger average wiring and conducting length per point, whether specifically shown in tender drawings or not, shall be entertained after the award of contract.

8.2 Parameters: Wiring shall be carried out as per following parameters in recessed/ surface conduit system.

- Only looping system of wiring shall be adopted throughout. No joints excepting at wiring terminals shall be permitted.
- All accessories shall be flush type unless otherwise stated.
- For estimation of load, following loads per point shall be assumed.

Light points	100 Watts.
6 amps socket outlet points	100 Watts.
Fan points	60 Watts.
Exhaust fan points	300 Watts or as specified.
16 amp socket outlet points	1000 Watts.

- Lights, fans and 6 amp socket outlets may be wired on a common final such circuit. Such circuit shall not normally have more than a total of ten lights, fans or socket outlets or a load of 800 watts whichever is lesser.
- Power circuits shall normally have maximum one 16 amps socket outlet unless otherwise stated. Separate circuit shall be run for each geyser, kitchen equipment, window air conditioners and similar appliances.
- Wiring rates shall include painting of conduits and other accessories as required.
- Wiring rates shall include cleaning of dust, splashes of colour wash or paint from all fixtures, fans, fittings etc. at the time of taking over of the installation.
- Wiring rates shall include blanking of outlet boxes to prevent damage/pilferage of wires

8.3 Definitions

8.3.1 Wiring for Lights

Primary Light Points : Wiring for primary light points, as defined in para 8.1 above, shall commence at the Distribution Board terminals and shall terminate at the ceiling rose/connector in ceiling box/lamp holder via the control switch (for switch controlled lights). Rates for primary light point wiring shall be deemed to be inclusive of the cost of entire material and labour require for completion of primary light point thus defined including : .

- Recessed / surface conducting system with all accessories, junction/draw/inspection boxes, bushes, check nuts etc. complete as required,
- Wiring with stranded copper conductor PVC insulated 660/1000 volt grade wires including terminations etc. complete as required.
- Control switch with switch box and cover plate of specified type including fixing screws, earth terminal etc. complete as required. Cost of this switch is applicable only for switch controlled points. This cost shall not be applicable for DB controlled points.
- Loop earthing with insulated copper wires.

Secondary Light points :

Secondary light points, as defined in para 8.1 above, shall cover the cost of interconnection wiring between group controlled light fittings and shall be deemed to be inclusive of the cost of entire materials and labour required for completion of the secondary light point thus defined including

- Recessed / surface conducting system with all accessories, junction/draw/inspection boxes, bushes, check nuts etc. complete as required,
- Wiring with stranded copper conductor PVC insulated 660/1000 volt grade wires including terminations etc. complete as required.
- Loop earthing with insulated copper wires.

8.3.2 Wiring for Ceiling Fans

Wiring for ceiling fan points shall be same as for primary light points and shall, in addition, include ceiling outlet box with recessed fan hooks and provision in the switch box for mounting the fan regulator.

8.3.3 Wiring for Exhaust Fans

Wiring for exhaust fan points shall be same as for primary light points and shall in addition include the cost of providing a 3/5 pin 6 amp socket outlet near the fan and a 6 amp control switch at convenient location near the room entry.

8.3.4 Wiring for Call Bell Points

Wiring for call bell points shall be the same as for primary light points and shall in addition include the cost of a call bell/buzzer of approved type and make in the required location and a call bell in lieu of the control switch at a convenient location as required.

8.3.5 Wiring for Telephone Outlets

Wiring for telephone outlets points shall include the entire wiring and conducting from the telephone tag block to the telephone outlet including the telephone outlet complete as required and as itemized in the Schedule of Quantities

8.3.6 Wiring for Convenience Socket Outlets

3/5 pin 6 amps and 3/6 pin 16 amps single phase switched convenience socket outlets shall be provided in the building as indicated in the layout drawings. In addition, combined 3 pin 6 / 16 amps socket outlets at modular intervals in special PVC raceway over the work tables in laboratories shall be provided. Wherever required, 20/32/50 amps single phase and 32/50 amps 3 phase outlets shall also be provided.

Wiring for 3/5 pin 6 amps convenience socket outlets

Point wiring for 3/5 pin 6 amps socket outlets (in locations other than over the laboratory work tables) on point wiring basis shall be the same as primary light point defined in para 8.3.1 and shall in addition include 3/5 pin 6 amp socket outlet with 6 amp control switch in MS box with cover. Including loop earthing of the third pin complete as required as itemized in scheduled of quantities.

Wiring for 3/6 pin 16 amps convenience socket outlets

Point wiring for 3/6 pin 16 amps socket outlets (in locations other than over the laboratory work tables) on point wiring basis shall be the same as primary light point defined in para

8.3.1 and shall in addition include 3/6 pin 16 amp socket outlet with 16 amp control switch in MS box with cover. Including loop earthing of the third pin complete as required as itemized in scheduled of quantities.

Wiring for combined 3 pin 6/16 amps socket outlets in laboratories

Wiring for 3 pin 6/16 amp combined socket outlets in existing PVC raceways (provided over laboratory work tables) on point wiring basis shall include the cost of wiring from DB terminals to the outlets along with loop earthing of the earth pin and the switched combination 6/16 amp outlet with 16 amp control switch housed in the existing raceway, as indicated in layout drawings and as itemized in schedule of quantities. PVC raceway/conduit required for this wiring shall be paid extra as itemized in the schedule of quantities.

Wiring for special socket outlets

In addition to the above, special convenience outlets of 20/32/50 amps single phase and 32/50 amps three phase, required in few locations as indicated in the layout drawings, shall be paid for on linear basis as itemized in schedule of quantities. Outlets only shall be paid separately in numbers as per actuals. Wiring along with loop earthing shall be paid separately on running meter basis and conduiting /PVC raceway shall be paid separately on running meter basis.

9. ROUTINE AND COMPLETION TESTS

9.1 Installation Completion Tests

At the completion of the work, the entire installation shall be subject to the following tests:

1. Wiring continuity test
2. Insulation resistance test
3. Earth continuity test
4. Earth resistivity test

Besides the above, any other test specified by the local authority shall also be carried out. All tested and calibrated instruments for testing, labour, materials and incidentals necessary to conduct the above tests shall be provided by the contractor at his own cost.

9.2 Wiring Continuity Test

All wiring systems shall be tested for continuity of circuits, short circuits, and earthing after wiring is completed and before installation is energized.

9.3 Insulation Resistance Test

The insulation resistance shall be measured between earth and the whole system conductors, or any section thereof with all fuses in place and all switches closed and except in concentric wiring all lamps in position of both poles of the installation otherwise electrically connected together, a direct current pressure of not less than twice the working pressure provided that it does not exceed 1100 volts for medium voltage circuits. Where the supply is derived from AC three phase system, the neutral pole of which is connected to earth, either direct or through added resistance, pressure shall be deemed to be that which is maintained between the phase conductor and the neutral. The insulation resistance measured as above shall not be less than 50 meg.ohms divided by the number

of points provided on the circuit the whole installation shall not have an insulation resistance lower than one meg.ohms.

The insulation resistance shall also be measured between all conductors connected to one phase conductor of the supply and shall be carried out after removing all metallic connections between the two poles of the installation and in those circumstances the insulation shall not be less than that specified above.

The insulation resistance between the frame work of housing of power appliances and all live parts of each appliance shall not be less than that specified in the relevant Standard specification or where there is no such specification, shall not be less than half a meg.ohms or when PVC insulated cables are used for wiring 12.5 meg.ohms divided by the number of outlets. Where a whole installation is being tested a lower value than that given by the above formula subject to a minimum of 1 Meg.ohms is acceptable.

9.4 Testing Of Earth Continuity Path

The earth continuity conductor including metal conduits and metallic envelopes of cable in all cases shall be tested for electric continuity and the electrical resistance of the same along with the earthing lead but excluding any added resistance of earth leakage circuit breaker measured from the connection with the earth electrode to any point in the earth continuity conductor in the completed installation shall not exceed one ohm.

9.5 Testing Of Polarity Of Non-Linked Single Pole Switches

In a two wire installation a test shall be made to verify that all non-linked single pole switches have been connected to the same conductor throughout, and such conductor shall be labeled or marked for connection to an outer or phase conductor or to the non-earthed conductor of the supply. In the three or four wire installation, a test shall be made to verify that every non-linked single pole switch is fitted to one of the outer or phase conductor of the supply. The entire electrical installation shall be subject to the final acceptance of the Architect as well as the local authorities.

9.6 Earth Resistivity Test

Earth resistivity test shall be carried out in accordance with IS Code of Practice for earthing IS 3043.

9.7 Performance

Should the above tests not comply with the limits and requirements as above the contractor shall rectify the faults until the required results are obtained. The contractor shall be responsible for providing the necessary instruments and subsidiary earths for carrying out the tests. The above tests are to be carried out by the contractor without any extra charge.

9.8 Tests And Test Reports

The Contractor shall furnish test reports and preliminary drawings for the equipment to the Architect/owners for approval before commencing supply of the equipment. The Contractor should intimate with the tender the equipment intended to be supplied with its technical particulars. Any test certificates etc., required by the local Inspectors or any other Authorities would be supplied by the Contractor without any extra charge.

CHAPTER 2 : 415 VOLTS MV SWITCHBOARDS

1.0 GENERAL

This section covers specification of Switchboards

2.0 STANDARDS AND CODES

The Standards and Codes applicable to the works are listed in Annexure I of the tender document and may be referred to.

3.0 SWITCHGEAR

3.1 Moulded Case Circuit Breakers (MCCB)

3.2.1	Type	Air Break
3.2.2	Operating voltage	415 volt 3 phase 50 Hz
3.2.3	Insulation Voltage	660 volts
3.2.4	Current rating	As per Schedule of Quantities
3.2.5	Fault Level withstand Ices	As per Schedule of Quantities
3.2.6	Ice	100% Ices
3.2.7	Icy	100% Ices
3.2.8	Isolation function	As per IEC 60947-2 Section 7.12
3.2.9	Insulation	class II insulation between the front panel and internal power circuits
3.2.10	Cubicle mounting	Fixed unless otherwise specified
3.2.11	Operating mechanism	Trip free Independent Manual spring closing (IMS) or motor wound spring closing mechanism (MWS) as per Schedule of Quantities
3.2.12	No of Poles	3 or 4 as required
3.2.13	All current carrying parts	Silver plated
3.2.14	Arcing contacts	Shall be provided to protect the main contacts and shall be separate from the main contacts and easily replaceable.
3.2.15	Arc chutes	Shall be provided for each pole, and shall be suitable for being lifted out for the inspection of the main and the arcing contacts.

3.2.16	Common Operating handle	Required for Three phase MCCBs for simultaneous operation and tripping of all the three phases.
3.2.17	Indications and Operations integral with ACB on front	• mechanical ON/OFF/ Tripped indication • Operating handle • mechanical trip push button
3.2.18	Accessories	Following accessories shall be provided as required • Under voltage trip • Shunt trip • Alarm switch • Auxiliary switch
3.2.19	Circuit Breaker Interlocking	Interlocks shall be provided to ensure the following: • Handle interlock to prevent unnecessary manipulations of the breaker. • Door interlock to prevent door being opened when the breaker is in ON position • Deinterlocking device to open the door even if the breaker is in ON position. • Sheet steel hinged lockable doors for each separate compartment shall be provided and duly interlocked with the breaker in "ON" and "OFF" position.
3.2.20	Protection	Microprocessor based releases and/or thermal magnetic releases shall be provided for the Circuit Breakers as stipulated in the Schedule of Quantities
3.2.21	Electrical endurance	Upton 250 amps..... minimum 10,000 operations For 400 amps & above.....minimum 4,000 operations
3.2.22	Type test certificates	Submit Certificates from a recognized test house for the Circuit Breakers offered.

4.0 SWITCHBOARDS

4.1	Supply System	Three phase 4 wire, 415 volt, 50 Hz, Indian TN-S system
4.2	Short circuit level withstand	As per Schedule of Quantities
4.3	Ingress protection	IP 42 unless otherwise stated Metal based neoprene gaskets between all adjacent units and beneath all doors and covers shall be provided to render the joints dust and vermin proof
4.4	Pressure relief devices	Shall be provided to minimize danger to operator during internal fault conditions.
4.5	Panel Compartmentation	
4.5.1	Compartment	Tier 3A as per IEC 6043 (Part-I) unless otherwise stated in Schedule of Quantities
4.5.2	Circuit Breaker	Separate segregated compartment shall be provided

	Metering	for accommodating instruments, indicating lamps, control contactors and control MCB etc. These shall be accessible for testing and maintenance without any danger of accidental contact with live parts of the circuit breaker, bus bars and connections.
4.5.3	Control wiring compartment	A horizontal wire way with screwed cover shall be provided at the top to take interconnecting control wiring between vertical sections.
4.6	Panel Configuration	
4.6.1	Panel configuration	MCCB's arranged..... multi-tier formation Air Circuit Breakers..... Single or Double tier formation
4.6.2	Spare Space provision	The Switchboards shall have a provision of 25% spare space to accommodate possible future additional switch gear.
4.6.3	Extensible	Shall be extensible on both sides
4.7	Panel Construction	
4.7.1	Panel construction	• Metal clad totally enclosed, • Dead front • floor mounted • free standing type • modular extensible design • suitable for indoor mounting.
4.7.2	Switchboard cubicles, doors and covers	Fabrication with.... CRCA Sheet Steel Cubicles..... thickness not less than 2.0 mm folded and braced to ensure rigid support for all components. Doors/ covers..... thickness not less than 1.6 mm. Joints seam welded Welding slag ground off Welding pits wiped smooth with plumber metal.
4.7.3	Switchboard frames	Fabrication with electro galvanized MS sheets 'U' Channel switchboard frames..... 2.5 mm thick All joints..... neatly formed and finished flush with adjacent surfaces No joints shall be located in corners. Bare edges shall be lipped. Structural members and bracings where ever required shall be welded or bolted to the frame. The frame shall be of modular design and extensible.
4.7.4	Cable compartment	Rear Access switchboards.....all cabling from rear Front access switchboards.....Separate vertical cable Accessible from front only Adequate space shall be provided for ease of installation and maintenance with safety for working without coming into contact with any live parts.

		The cable chambers shall be complete with • Adequate support for cables. • tinned brass cable sockets, • tinned brass compression glands, • 3 mm thick gland plates, • supporting clamps and brackets etc for termination of 1100 volt grade aluminium conductor XLPE/ PVC/ PVCA cables.
4.7.5	Door handles	Good quality door handles fitted with toggles to operate rods to latch with suitable slots in both top and bottom of switchboards shall be provided. Latching rods and associated brackets shall be cadmium plated.
4.7.6	Operating handles	All operating device shall be located in front of switchgear only.
4.7.7	Fixing Screws	Fixing screws shall enter holes tapped into an adequate thickness of metal or provided with hank nuts. Self threading screws shall not be used in switchboards.
4.7.8	Dimensional Limitations	• Base channel 75 mm x 5 mm thick shall be provided at the bottom. • Minimum 200 mm blank space between the floor of switchboard and bottom most unit shall be provided. • Overall height shall be limited to 2300 mm unless otherwise stipulated. • Height of the operating handle, push buttons etc shall be restricted between 300 mm and 1700 mm from finished floor level.
4.8	Switchboard Bus Bars, Interconnections etc rating	
4.8.1	Rating of Bus Bars, interconnections and to feeders	These shall be designed as per requirements in Schedule of Quantities to • Carry full load current for phase and neutral bus bars • withstand the stresses of fault level • for aluminium shall have a minimum cross section of 1 amp per sq.mm. • Copper 0.6 amps per sq mm
4.9	Switchboard Bus Bars	
4.9.1	Bus Bar material	High conductivity, high strength aluminium alloy, complying with requirements of grade E 91E of IS 5082 – 1981 Alternatively Electrical grade 99.99% pure copper As per Schedule of Quantities
4.9.2	Bus Bar Insulation	Heat shrunk PVC sleeving of 1.1 kV grade and bus bar joints provided with clip-on shrouds.
4.9.3	Bus Bar supports	Non-breakable, non-hygroscopic epoxy resin or glass fiber reinforced polymer insulated supports able to

		withstand operating temperature of 110° C at regular intervals, to withstand the forces arising from a fault level as stipulated in schedule of quantities.	
4.9.4	Colour Coding	All bus bars shall be colour coded.	
4.9.5	Auxiliary Bus	Electrolytic copper Auxiliary buses for control power supply, space heater power supply or any other specified service shall be provided. These shall be insulated, adequately supported and sized to suit specific requirement.	
4.10	Switchboard Interconnections		
4.10.1	Interconnection material	Unit ratings up to 100 amps,	FRLS PVC insulated copper conductor wires with crimped terminations.
		Rating of 100 amps and above	Solid copper/ aluminium connections PVC sleeved
4.10.2	Interconnection jointing	All connections, tapings etc • Shall be made to ensure minimum contact resistance. • shall be firmly bolted and clamped with even tension. Before assembly • joint surfaces shall be filed or finished to remove burrs, dents and oxides and silvered to maintain good continuity at all joints. All screws, bolts, washers shall be cadmium plated. Approved spring washers shall be used with cadmium plated high tensile steel bolts with BSF threads.	
4.10.2	Instrument and control wiring	All wiring for relays and meters shall be with ZHFR PVC insulated copper conductor wires. The wiring shall be coded and labelled with approved ferrules for identification. The minimum size of copper conductor control wires shall be 2.5 sq. mm.	
4.11	Earthing	Continuous earth bus sized for prospective fault current shall be provided with arrangement for connecting to station earth at two points. Hinged doors / frames shall be connected to earth through adequately sized flexible braids.	
4.12	Ventilation Fans	Panel mounting type ventilation fans shall be provided in each panel with switchgear rated for 2500 amp and above. The fan shall be interlocked with switchgear operation.	
4.13	Space Heaters	Anti- condensation heaters shall be fitted in each cubicle together with an ON/OFF isolating switch suitable for electrical operation at 230 volts A.C 50 Hz single phase of sufficient capacity to raise the internal ambient temperature by 5° C operation interlocked with switchgear.	
4.14	Sheet Steel	Sheet steel used in the fabrication of switchboards	

	Treatment And Painting	shall undergo a rigorous cleaning and surface treatment seven tank process comprising of alkaline degreasing, descaling in dilute sulphuric acid and a recognized phosphating process after which a coat of primer paint comp actively with the final paint shall be applied over the treated surface. Final paint coat of oven baked powder coating, of minimum 50 micron thickness, of sheet approved by Engineer-in-Charge shall then be provided.
4.15	Labels	Suitable engraved white on black metal identification labels shall be provided for each switchgear cubicle in front and back identifying the circuit, switchgear type, rating and duty.
4.16	Testing at manufacturers works	• All wiring checks and connections • Relay adjustment • Interlock function check • Continuity checks of wiring, fuses • Insulation test • Trip test • Hight voltage test
4.17	Testing and commissioning	• Assembly of various sections of panels • Grounding the units • Connecting up bus bars and jointing insulated • Insulation test with 500 volts megger. The insulation resistance not more than 100 mega ohms
4.18	Local Authority Requirements	All requirements by the local Authority including those listed below shall be complied with • Provisoon for Gas nozzles within each cubicle • Danger Notice Plate • Rubber floor mat of 6 m thickness and 1 m width provided for the full length of the switchboard. • A dry chemical type fire extinguisher of required capacity with approved label

CHAPTER 3 : RELAYS, CTs, PTs, METERS, INDICATING LAMPS ETC.

1.0 GENERAL

This section covers specifications for Protection and Control Relays for breakers, Instrument Transformers, Measuring Instruments, Push Buttons, Indicating Lamps etc. required in LT and HT switchboards.

2.0 STANDARDS AND CODES

Updated and current Indian Standard Specifications and Codes of Practice will apply to the equipment and the work covered by the scope of this contract. In addition the relevant clauses of the Indian Electricity Act 1910, Indian Electricity Rules 1956, National Building Code 1994, National Electric Code 1985, Code of Practice for Fire Safety of Building (general) :General Principal and Fire Grading – IS 1641 as amended up to date shall also apply. Wherever appropriate Indian Standards are not available, relevant British and/or IEC Standards shall be applicable.

Application guide for Current Transformers	IS 4201 :
Application guide for Voltage Transformers	IS 4140 :
Application guide for Relays	IS 3842 :
Electromagnetic Relays	IS 5051 :

3.0 PROTECTION AND CONTROL RELAYS

The Circuit Breaker shall have protection and control relays as specified in the bill of quantities. Relays shall be approved types complying to relevant ISS and having approved characteristic. Relays shall be flush mounted in dust proof cases. Relays shall be arranged so that adjustments, testing and replacement can be affected with minimum of time and labour.

Incase of C.T. operated thermal overload and magnetic instantaneous short circuit release. The overload releases shall be such that each phase can be individually set depending on the phase unbalanced currents. The releases shall have inverse time current characteristics and the magnetic release shall be time delayed with a minimum setting of 25 ms varying up to 300 ms for discrimination without effecting the breaking current capacity of the ACB.

4.0 CURRENT TRANSFORMERS

Separate sets of CTs shall be provided for metering and protection. C/Ts shall conform to IS 2705 (part -I, II and III) in all respects. All C/Ts used for medium voltage application shall be rated for 1 kV. C/Ts shall have rated primary current, rated burden and class of accuracy as specified in Bill of Quantities/drawings. Rated secondary current shall be 5A unless otherwise stated. Minimum acceptable class for measurement shall be class 0.5 to 1 and for protection class SP 10. C/Ts shall be capable of withstanding magnetic and thermal stresses due to short circuit faults of 31 MVA on medium voltage. Terminals of C/Ts shall be paired permanently for easy identification of poles. C/Ts shall be provided

with earthing terminals for earthing chassis, frame work and fixed part of metal casing (if any). Each C/T shall be provided with rating plate indicating :

- Name and make
- Serial number
- Transformation ratio
- Rated burden
- Rated voltage
- Accuracy class

CTs shall be mounded such that they are easily accessible for inspection, maintenance and replacement. Wiring for CT shall be with copper conductor FRLS PVC insulated wires with proper termination works and wiring shall be bunched with cable straps and fixed to the panel structure in a neat manner.

5.0 POTENTIAL TRANSFORMER

PTs shall conform to IS 3156 (Part-I, II and III) in all respects.

6.0 MEASURING INSTRUMENTS

Direct reading electrical instruments shall conform to IS 1248 or in all respects. Accuracy of direct reading shall be 1.0 of voltmeter and 1.5 for ammeters. Other instruments shall have accuracy of 1.5. Meters shall be suitable for continuous operation between -10° C and +50°C. Meters shall be flush mounting and shall be enclosed in dust tight housing. The housing shall be of steel or phenolic mould. Design and manufacture of meters shall ensure prevention of fogging of instrument glass. Pointer shall be black in colour and shall have Zero position adjustment device operable from out side. Direction of deflection shall be from left to right. Suitable selector switches shall be provided for ammeters and volt meters used in three phase system. The rating type and quantity of meters, instruments and protective device shall be as per Bill of Quantities /drawings

6.1 Ammeters

Ammeters shall be of moving iron type. Moving part assembly shall be with jewel bearings. Jewel bearings shall be mounted on a spring to prevent damage to pivot due to vibrations and shocks. Ammeters shall be manufacture and calibrated as per IS 1248

Ammeters shall normally be suitable for 5 A secondary of current transformers. Ammeters shall be capable of carrying substantial over loads during fault conditions.

6.2 Voltmeters

Voltmeters shall be moving iron type range of 3 phase 415 volt voltmeters shall be 0-500. Volt meters shall be provided with protection fuse.

6.3 Watt meter

Wattmeter shall be of 3 phase electro dynamic type and shall be provided with a maximum demand indicator if required.

6.4 Power factor meters

3 phase power factor meters shall be of electro dynamic type with current and potential coils suitable for operation with current and potential transformers provided in the panel. Scale shall be calibrated for 50% lag - 100% - 50% readings. Phase angle accuracy shall be $\pm 4^\circ$.

6.5 Energy and reactive power meters

Trajectory meters shall be two element, integrating type, KWH, KVA, KVARH meters. Meters shall conform to IEC 170 in all respects. Energy meters, KVA, and KVARH meters shall be provided with integrating registers. The registers shall be able to record energy consumption of 500 hours corresponding to maximum current at rated voltage and unity power factor. Meters shall be suitable for operation with current and potential transformers available in the panel.

7.0 INDICATING LAMPS

Neon type indicating lamps shall be provided for indication of phases and Breaker position as required in the bill of quantities. Lamps shall be easily removed and replaced from the front of the panel by manual means not requiring the use of extractors.

8.0 PUSH BUTTONS

Push buttons shall be of non hygroscopic material, non-swelling and fitted to avoid any possibility of sticking. Contacts shall be of adequate strength and have a positive whipping action when in operation

Annexure-I

STANDARDS AND CODES

LT & HT CABLING

LT SWITCHBOARDS

	<u>Specification for low voltage switchgear switchgear and controlgear</u>	
	• General Rules	IS 13947 Part-1 : 1993
	• Circuit breaker	IS 13947 Part-2 : 1993
	• Switches, disconnectors, switch disconnectors and fuse combination units	IS 13947 Part-3 : 1993
	• Low voltage switchgear and controlgear Specification - Control circuit devices and switching elements	
	➤ Electro mechanical control circuit devices	IS 13947 Part-5 : Sec-1 : 2004
	➤ Proximity switches	IS 13947 Part-5 : Sec-2 : 2004
	Guide for uniform system of marking and identification of conductors and apparatus terminals	IS 113553 : 1985
	<u>Electrical relays for power system protection</u>	
	General introduction and list of parts	IS 3231 Part-0 : 1986
	• General requirement	
	➤ Contact performance	IS 3231 Part-1 : Sec-1 : 1986
	➤ Insulation tests	IS 3231 Part-1 : Sec-2 : 1986
	➤ High frequency disturbance test for static relay	IS 3231 Part-1 : Sec-3 : 1986
	• Requirements for principal families	
	➤ All or nothing relays	IS 3231 Part-2 : Sec-1 : 1987
	➤ General requirement for measuring relay	IS 3231 Part-2 : Sec-2 : 1987
	➤ General requirements for thermal relay	IS 3231 Part-2 : Sec-3 : 1987
	• Requirements for particular group or relays : Biased (percentage) differential relay	IS 3231 Part-3 : Sec-3 : 1987
	• Requirements for particular group or relays : Directional relays and power relays	IS 3231 Part-4 : Sec-3 : 1987
	<u>Specification for low voltage switchgear and controlgear assemblies :</u>	
	• Requirements for type tested and	IS 8623 : Part 1 : 1993

	partially type tested assemblies	
	Particular requirements for bus bar trucking system (bus way)	IS 8623 : Part 2 : 1993
	Particular requirements for equipment where unskilled person have access for their use	IS 8623 : Part 3 : 1993
	<u>Code of practice for selection, installation, and maintenance of switchgear and control gear</u>	
	General	IS 10118 Part-1 : 1982
	Selection	IS 10118 Part-2 : 1982
	Installation	IS 10118 Part-3 : 1982
	General requirement for switchgear and control gear for voltage not exceeding 1000 volt AC or 1200 volt DC	IS 4237 : 1982

RELAYS, CTs, PTs, METERS, INDICATING LAMPS ETC.

	Application guide for Current Transformers	IS 4201 : 1993
	Application guide for Voltage Transformers	IS 4146 : 1983
	Application guide for Relays	IS 3842 :
	<u>Application guide for electrical relays for AC systems :</u>	
	Overcurrent relay for feeders and transformers	IS 3842 : Part-1 : 1967
	Overcurrent relays for generators and motors	IS 3842 : Part-2 : 1966
	Phase unbalance relays including negative phase sequence relay	IS 3842 : Part-3 : 1966
	Thermal relays	IS 3842 : Part-4 : 1966
	Distance protection relays	IS 3842 : Part-5 : 1968
	Power relays	IS 3842 : Part-6 : 1972
	Frequency relay	IS 3842 : Part-7 : 1972
	Voltage relay	IS 3842 : Part-8 : 1976
	Relays for bus bar protection relay	IS 3842 : Part-9 : 1977
	Relays for traverse differential protection	IS 3842 : Part-10 : 1976
	Differential relay for transformer	IS 3842 : Part-12 : 1976
	Specification for relays for electronic and telecommunication equipment : General requirement and tests	IS 5051 Part-1 : 1982
	<u>Direct acting indicating analogue electrical measuring instruments and their accessories – specification</u>	
	Definitions and general requirement	IS 1248 Part-1 : 2003
	Requirements for ammeters and voltmeters	IS 1248 Part-2 : 2003
	Special requirement for frequency meter	IS 1248 Part-4 : 2003

	• Special requirements for phase meter, power factor meters and synchrosopes	IS 1248 Part-5 : 2003
	• Special requirements for multi function instruments	IS 1248 Part-8 : 2003
	<u>Current transformer :</u>	
	• General requirements	IS 2705 Part-1 : 1992
	• Measuring current transformer	IS 2705 Part-2 : 1992
	• Protective current transformer	IS 2705 Part-3 : 1992
	<u>Voltage transformer</u>	
	• General requirements	IS 3156 Part-1 : 1992
	• Measuring voltage transformer	IS 3156 Part-2 : 1992
	• Protective current transformer	IS 3156 Part-3 : 1992
	Insulating mats	IS 15625 : 2006

SPECIAL INSTRUCTIONS TO TENDERER

1. GENERAL

- Rates quoted shall be for work to be carried out at all heights and levels as required at site. No extra payment on this account shall be admissible.

2 WIRING

- Rates quoted for Point Wiring items shall be based on average wiring and average conduting length in all areas of the project. irrespective of their being shown in tender drawings or not. No extra claim on this account shall be admissible.
- Cost of circuit wiring (wiring from DB terminal to the first switch in any sub circuit) is included in the scope of Point Wiring item. Circuit wiring shall not be paid extra.
- Rate quoted for Point Wiring for ceiling fan points shall also include the cost of providing fan hook cum outlet box in the ceiling. The switchbox shall have space provision for electronic fan regulator.
- Same rate shall be payable for wiring in surface conduting system or recessed conduting system
- Recessed conduting work shall be carried out in close co-ordination with progress of civil works Conduting system in slabs shall be laid on shuttering before concrete is poured. Chases in brick work shall be made prior to plastering. Cutting of concrete or plaster for conduit laying shall not be permitted.
- Wiring colour code – Red, Yellow, Blue for three Phases, Black for Neutral and Green for Earth – shall be maintained for entire wiring except on UPS
- UPS wiring colour code – Red/white, Yellow/white, Blue/white for three Phases, white for Neutral and Green/yellow for Earth shall be maintained for wiring on UPS system.

- All wiring accessories (switches, socket outlets, bell pushes etc.), shall be as per approved make, type and colour. Sample of each type shall be got approved by Architect/Owners before use on work.
- Socket outlets on UPS and on normal supply shall be designated and labeled as “UPS” and “Raw Power” in a manner specifically got approved from Architects/ Owners
- Rates for wiring of IP 56/metalclad 20/32 amps single/three phase socket outlets shall include the cost of matching plugs also.

3 SUB-MAINS AND MAINS.

- Payment of **sub main wiring in conduit** shall be as per the length of conduit measured between conduit terminations. Wires without conduits inside equipments for making terminal connections at either end shall not be payable extra.
- Payment of **cables** shall be based on length of cable laid between cable termination glands on either end. Length of cable leads inside the cable termination arrangement shall not be payable extra..
- Single core cables shall be armored with non magnetic material. The core insulations shall be colour coded (Red/Yellow/Blue for phases and Black for neutral)
- Annular space around cables, conduits, bus ducts and rising mains shall be filled by fire resistant compound of approved make and type in accordance with the compound manufacturers instructions.
- Annular space around cables/earth strips entering below ground level into the building shall be filled up with suitable mastic compound to prevent ingress of rodents and water into the building.

4 SWITCHBOARDS AND DISTRIBUTION BOARDS

Quoted rates shall be inclusive of the cost of the following.

- Details of sub-circuits being fed by DBs shall be affixed on the back of the DB door of each DB
- Earth bonding of all hinged doors (of DBs and SWBD cubicles/panels) shall be effectively done by braided flexible copper wire .
- All doors and operable covers shall be casketed with neoprene or equivalent approved gaskets.
- 3 mm thick gland plate shall be provided at top/bottom of SWBDs for cable entry.
- 1 no. sample DB shall be got approved from Owners/Architects before undertaking bulk procurement /fabrication.

- All DBs and SWBDs shall be designated by engraved name plates of approved material, finish and lettering fixed by countersunk nickel/cadmium plated screws. Danger plates shall be affixed on all three phase boards.
- An as-built schematic wiring diagram in stenciled permanent ink and housed in wooden frame with clear non- reflective acrylic cover shall be provided near main LT panel in substation/electrical room.
- Framed safety instructions complete with emergency telephone numbers shall also be provided inside each switch room and generator room..

5 **FIXING OF LIGHTING FIXTURES**

Quoted rates shall include the following:

- All components that may be required to make the installation complete in all respects such as,
 - Suitable length of down rod, hanger and connecting wires where called for..
 - Internal wiring between accessories.
 - Wiring for connecting the fixtures to the point through connection blocks.
 - Metal blocks to serve as base of fixtures.
 - Bonding with earth.
 - Drilling holes in supports where required.
 - Fixing clamps, GI bolts and nuts, brass screws, saddles, rawl plugs and other fixing accessories as required.
- Installation of light fittings shall be with the use of two junction boxes placed 600 mm apart for 36/40 watt fixtures and 300 mm apart for 20 watt fixtures. The junction boxes shall form a part of the conduiting and shall be placed in the slab at the time of concreting.
- For any fixtures and fittings required to be fixed to the RCC slab, the Contractor shall drill the required holes with the use of an appropriate drilling machine with drill bits and no extra charges shall be payable on this account.

6 **WIRES AND CABLES**

ALL WIRES AND CABLES USED SHALL BE OF THE STIPULATED MAKE. THE CONTRACTOR SHALL PROVIDE A CERTIFICATE FROM THE MANUFACTURER CONFIRMING THAT ALL WIRES AND CABLES SUPPLIED TO SITE ARE OF THEIR MAKE, IRRESPECTIVE OF WHETHER THE WIRES/CABLES ARE PURCHASED FROM THE MANUFACTURER DIRECTLY OR THROUGH A DEALER SUITABLE TEST CERTIFICATES FROM MANUFACTURERS, AS REQUIRED, SHALL BE SUBMITTED TO ARCHITECT/OWNER.

PAYMENT FOR WIRES/CABLES SHALL NOT BE MADE WITHOUT THE MANUFACTURER'S CERTIFICATE BEING FURNISHED TO THE OWNERS.

We confirm that the Special Instructions to Tenderers have been understood and our tender complies to the above in its entirety.

Specifications For HVAC

Specifications for HVAC

Section 1

SYSTEM DESIGN DATA

General:

The system design, basis of design, requirements and other relevant data are outlined in this section. The detailed specifications and specific requirements are outlined in the subsequent sections.

A. Location:

The NBCC Centre at Okhla Phase-II New Delhi

B. Scope of works :

The work proposed under this tender includes providing and fixing air-conditioning & ventilation systems for the above work.

Providing and fixing at site all equipment associated with air-conditioning and ventilation for the above.

To execute all incidental work at site including material supply at site associated with the system asked in the specifications.

Nature of such works will be sheet metal ductwork, air distribution devices viz. grilles and diffusers, copper refrigerant piping and its insulation, drain piping etc., incidental civil works, incidental electrical works, cable, control panel etc. at site for all manufactured items at works and also items fabricated at site.

Routine Testing, pressure testing of fabricated components, commissioning of complete plant at site.

Performance testing at site of complete air-conditioning and ventilation system / installations at site.

C. Basis of Design:

Station Name - NBCC Bhawan

Latitude - 28.35° North

Altitude - 216 Meter from MSL

OIL e-TENDER NO. CCI3576P17- INTERIOR WORK S NBCC

Daily Range	- 25 °F
Out side Conditions	Summer : Dry bulb temperature 43.3°C/110°F Wet Bulb Temperature 23.9°C/75°F Monsoon: Dry bulb Temperature 35.0°C/95°F Wet Bulb Temperature 28.3°C/83°F Winter : Dry bulb Temperature 7.2°C/45°F Wet Bulb Temperature 5.0°C/41°F
Inside Design Conditions	24±1 C and 55±5% RH (Relative Humidity)
Roof Insulation:	The entire exposed roof to be insulated with 50 thick Expanded polystyrene insulation / or equivalent Insulation
Toilets	- 12 air changes per hour

Based on the area wise detailed heat loads of the above design data and the details the estimated loads are summarized as below:

Sr. No.	Area Description	Area (ft2)	Load TR
1.	Fifth Floor	16750	116
2.	Sixth Floor	11750	69
Total		28400	185

HVAC System Design:

The total air-conditioning load for the above areas works out to be 100 TR. Since the chilled water system is already installed and functional we only have to tap the chilled water into AHUs and does the low side work as per BOQ.

The system shall be complete with electrical panel boards, power cabling, control cabling, earthing and controls.

Ventilation System:

The toilet areas shall be ventilated with propeller fans as per the CFM requirements.

The system shall be complete with electrical panel boards, power cabling, control cabling, earthing and controls.

Section 2

AIR HANDLING UNITS

1 SCOPE

The Scope of this section comprises the supply, erection, testing and commissioning of double skin Air Handling Units conforming to these Specifications and in accordance with requirements of drawings and schedule of quantities.

2 TYPE

The Air Handling Units shall be of floor mounted draw through type having sections such as filter section with pre-filters, cooling coil section with suitable chilled water cooling coil, fan section with DIDW fan, mixing section, spray section with centrifugal fan as per schedule of quantities and arrangement shown on the drawings.

3 CAPACITY

The air moving and coil capacities (Air Conditioning Load) shall be as shown in Schedule of equipment and quantities and on drawings.

4 CASING

The housing/ casing of the air handling unit shall be of double skin construction. The housing shall be so made that it can be delivered at site in total/ semi knock down conditions depending up on the conditions. The frame work shall be of extruded aluminium hollow sections fitted with pre-formed insulated sections. All the members shall be assembled thru mechanical joints to make a sturdy and strong frame work for various sections.

Double skin panels (each not exceeding 750mm wide) shall be made of 22G pre-coated Galvanised sheet steel and 22G galvanised sheet inside with pressure injected PU foam insulation of 25mm thick X 38 Kg/ Cum in between. The panels shall be bolted from inside on to the frame work with soft rubber gasket in between to make the joints air tight.

Frame work for each section shall be bolted together with soft rubber gasket in between to make the joints air tight. Suitable doors with powder coated hinges and latches shall be provided for access to various panels for maintenance.

The fan and the motor arrangement shall be mounted on to the extruded aluminium frame work. The entire housing i.e. The Air Handling Unit shall be mounted on extruded aluminium base channel framework.

Drain pan shall be constructed of 16 SS sheet having 12 mm thick 32 Kq/Cu XPE insulation. The pan shall have necessary slope to facilitate for fast removal of condensate.

5 **MOTOR AND DRIVE**

Fan motors shall be 230 $\pm$ 10% volts 50 cycles 3 phase totally enclosed fan cooled with IP-55 rotation. Motor shall be especially designed for quiet operation and motor speed shall not exceed 1440 RPM. Drive to fan shall be provided through belt drive arrangement. Belts shall be of oil-resistant type. Adjustable sheaves shall be provided.

6 **FAN**

The fan shall be forward curved (only for OTs AHUs the Fan shall be Backward curved type) double inlet double width type complete with motor and drive package. The wheel and housing shall be fabricated from heavy gauge galvanized steel. The fan impeller shall be mounted on a solid shaft supported to housing with angle iron frame and pillow block heavy duty ball bearings. The fan shall be selected for a speed not exceeding 1000 RPM. The fan outlet velocity shall not be more than 1800 rpm. Fan housing with motor shall be mounted on a common steel base mounted inside the AHU on anti vibration springs or cushy foot mount. The fan shall be direct driven type. Another fire retardant canvas connection shall be provided at unit outlet to connect the ducts.

7. **Cooling Coils:**

The cooling coil shall be seamless copper tubes not less than 0.437 mm thick and 12.5 mm O.D. The coil shall have continuous aluminium fins. The tube shall be staggered in the direction of air flow. The fins shall be uniformly bonded to the tubes by mechanical expansion of the tube. The coil shall be tested against leaks

At a hydraulic pressure of 21kg/m³ for a period of two hours. The water headers shall be of copper pipes to connect all the tubes. The header shall be complete with water In/Out connections, vent plug and drain at the bottom and designed to provide a water velocity between 0.6 to 1.8 m/s (2 to 6 FPS)

8. **Filters:**

Filtration level of various AHUs shall be as mentioned in BOQ.

9. **Electrical Panel:**

Each unit shall have its own electric panel consisting of MCCB / fuse switch unit, starter, indicating lamps, incoming/outgoing internal and external wiring and earthing as per the details in BOQ.

10 **Fresh Air Control:**

An adjustable damper of GI sheet along with bird screen, air inlet louvers and air filters shall be provided for fresh air entry. The damper shall be sized for 50% of designed air quantity.

11 Limitations:

The air velocity across the cooling coils shall not exceed 500 fpm. The fan outlet velocity shall not exceed 1800 fps (9m/s) in any case. The velocity across the filters shall not exceed 500 fpm in any case.

Section 3:

Pipes & Valves:

1. General

The scope shall comprise the supply, installation of pipe, fittings, valves, etc. and testing/balancing of complete system. Pipe sizes shown on drawing are for the guidance of Contractor and shall not relieve Contractor of responsibility of providing smooth, noiseless circulation of fluid.

2. Pipes

All piping work shall conform to quality standards and shall be carried out as per specifications and details given hereunder:

All pipes shall be of schedule 40 thick as per ANSI-B-36.1.

All pipes in sizes upto 150mm dia shall be M.S. ERW pipe heavy class as per IS: 1239-Part-I (as per latest amendment).

All pipes in sizes 200mm and above shall be M.S. ERW pipe heavy class as per IS: 3589 (as per latest amendment).

3. Fittings

The dimensions of the fittings shall conform to I.S. 1239-Part-II (as per latest amendment) unless otherwise indicated in the specifications.

All bends in sizes upto and including 150mm dia. shall be ready made of heavy duty, wrought steel of appropriate class.

All bends in sizes 200mm and larger dia. shall be fabricated from pipes of the same dia. and thickness with a minimum of 4 sections, and having a minimum centre line radius of 1.5 diameters of pipes.

All fittings such as branches, reducers, etc. in all sizes shall be fabricated from pipes of the same dia. and thickness and its length should be at least twice the dia. of the pipe.

The branches may be welded straight to the main line, without making a separate fitting, where specified on drawings or required by Engineer-in-Charge.

Blank ends are to be formed with flanged joints and 6mm thick blank between flange pair for 150mm and over in case where, a future extension is to be made, otherwise blank end discs of 6mm thickness are to be welded on, with additional cross stiffeners from 50mm x 50mm x 5mm heavy angles.

4. Flanges

All flanges shall be of mild steel as per IS:6392/71 and shall be steel slip-on-type, welded to the pipes flanges thickness shall be to suit class-II pressures. Flanges may be tack welded into position, but all final welding shall be done with joints dismantled. 3mm thick gaskets shall be used with all flanged joints. The gaskets shall be fibre reinforced rubber as approved by the Engineer-in-Charge. Special adhesive compound shall be used between flanges of steam, air and gas lines.

Flanges shall be used as used as follows:

Counter flanges for equipment having flanged connections.

Flanged pairs shall be used on all such equipment, which is required to be isolated or removed for service e.g. pumps, refrigeration machines, air handling units, etc.

All threaded valves shall be provided with nipples and flanged pairs on both sides to permit flange connection, for removal of valves from main lines for repair/replacement.

5. Valves

a) Butterfly Valves, Gate Valves, Globe Valves and Check Valves:

All gate valves, globe and check valves upto and including 40mm dia. Shall be of gun metal screwed type, conforming to class 1 of IS:778.

All butterfly valves of 50mm dia. and above shall be flanged type, have cast iron body with black nitrite rubber seat and conforming to class PN-10 of IS:780 (for sizes upto 300mm) and of IS:2906 (for sizes 350mm and above).

All globe and check valve of 50mm dia. and above shall be flanged type in cast iron construction and conforming to class PN-10.

Air valves shall be provided at all higher points in the piping system for venting as per the sizes shown in the BOQ.

All air needle valves shall be of gun metal and tested upto a pressure of class 1 pressure rating. All globe valves of size 50mm and above shall be of rising spindle type.

b) Balancing Valves

All balancing valves of upto and including 50 mm dia. shall be in gun metal screwed type construction. The valves of 65 mm dia. and above shall be in cast iron flanged end construction.

The valve shall have PTFE/SS disc with special erosion/ corrosion proof sealing.

The valves shall be capable of delivering metered quantity of water and subsequently should function as isolating valve. All the valves shall have built in pressure drop measuring facility to ascertain water flow rate. The valves shall have temper proof adjustable and lockable arrangement for required water quantity after commissioning. The valve shall be to the minimum requirement of IS:778 Class-1.

The valves shall be complete with drain cock, pressure test cocks, etc.

c) Miscellaneous Valves

All gauge cocks shall be of gunmetal plug type, complete with siphon (brass chrome plated).

All drain valves shall be of gunmetal with a hose union connection on one end or extended upto the drain pit as the case may be.

All valves on the supply line of fan coil units shall be of gunmetal ball type with integral water strainers, having (BSP) FPT inlet and flare type MPT outlet connection.

All valves on the return line of fan coil units shall be as above but without integral water strainer.

d) Strainers

The strainers shall either be 'pot' type or 'Y' type with cast iron or fabricated steel body, tested to a pressure of 10 kg/sqcm applicable for the butterfly valves as shown on the drawings.

The strainers shall have a perforated bronze sheet screen with 3mm perforation, 0.63mm thick.

Pot strainers and Y strainers shall be provided with flanged connections.

The strainers shall be designed to facilitate in easy removal of filter screen for cleaning, without disconnection of pipe line

Pot strainer shall be fabricated out of M.S. sheet and the sizes shall be as under:

Pipe size	Pot Dia	Pot HT	Basket dia	
Basket HT				
(mm) (mm)	(mm)	(mm)	(mm)	(mm)
50	300	400	200	240
80	350	450	250	250
100	450	500	300	280
125	500	600	330	340
150	540	700	360	390
200	610	815	400	470
250	800	955	550	510

300	1000	1105	750	580
350	1190	1300	895	678
400	1350	1500	1020	785
450	1518	1700	1060	890
500	1690	1800	1100	900

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6. Jointing

All pipelines shall be welded type except G.I. piping which shall have screwed connections. Square cut plain ends will be welded to pipe upto and including 100mm dia. All pipes 125mm dia. or larger will be bevelled by 35° for welding.

7. Miscellaneous

- a) Provide all piping, required to make the apparatus connected, complete and ready for regular and safe operation. Unless otherwise noted, connect all apparatus and equipment in accordance with manufacturer's standard details, as approved by Engineer-in-Charge.

Consult drawings and specifications to determine number and requirements of all items of equipment requiring piping, such as bend, drain, relief, etc. wherever equipment is provided with connections for such piping.

- b) Unless otherwise specified, pitch the lines of piping as follows:

All condensation drainage, including air handling unit and fan coil unit shall be pitched in the direction of flow to ensure adequate drainage, with an adequate trap seal to prevent leakage of air due to static pressure developed by air conditioning units. Pitch, 20mm per metre wherever possible, but not less than 10mm. Drains from other equipment shall be pitched similarly without trap seal.

- c) Provide valves and capped connections for all low points in piping system, necessary or required for draining systems. Provide for all risers isolating valves and drain valves to permit repairs without interfering with the rest of the system
- d) During construction, temporarily close, open ends of pipes with sheet metal caps, where necessary, or required to prevent debris from entering piping system.
- e) Support piping independently of all equipment so that the equipment is not stressed by the piping weight or expansion.
- f) Provide suitable platforms, etc. to facilitate the maintenance-repair and replacement of valves and fittings.

- g) Unions, if used, shall be flanged, as required, wherever indicated and in connections to all equipment, apparatus, and specialties requiring disconnection for repairs or replacement. Locate unions between shut-off valves and equipment, as directed by Engineer-in-Charge.
- h) Provide shut-off valves where indicated and for individual equipment, units at inlet and outlet, to permit unit removal for repairs, without interfering with remaining of the system. Additional shut-off valves shall be provided as required to enable all systems to be fully sectionalized. By-pass and stop valves shall be provided for all automatic control valves as specified
- i) Arrange piping for maximum accessibility for maintenance and repair; locate valves for easy access and operation. No valves shall be installed with handles pointing down, unless unavoidable.
- j) Cut the pipes accurately according to measurements, established at building and work into place without springing or forcing.
- k) Pipe supports shall be adjustable for height and prime coated with rust preventive paint and finish coated with grey paint, both as approved by Engineer-in-Charge. Spacing of pipe supports shall not be more than that as specified below:

Nominal pipe size (MM)	Spacing (Metres)
15	1.25
16	20 & 25
2.00 32, 40, 50 & 65	2.50 80, 100 & 125
2.50	150&above

- l) Extra supports shall be provided at the bends, and at heavy fittings like valves to avoid undue stresses on the pipes. Pipe hangers shall be fixed on walls and ceilings by means of 'Hilti' metallic dash fasteners.
- m) Insulated piping shall be supported in such a manner so as not to put undue pressure on the insulation.

Hangers and supports shall be provided and installed for all piping and tubing wherever indicated, required or otherwise specified. Wherever necessary, additional hangers and supports shall be provided to prevent vibration or excessive deflection of piping and tubing.

All hangers and supports shall be made of steel or other durable and non-combustible materials, galvanised or plated. Wood, wire or perforated strap iron shall not be used as permanent hangers or supports.

Hangers shall be supported from structural steel, concrete inserts and pipe racks, specifically approved.

No hanger/equipment shall be suspended midway, between steel joists and panel points.

Drilling or punching of holes in steel joist members will not be permitted.
All pipes in AC plant room shall be supported from pipes and channels from floor.

8 Sleeves

Where pipes pass through walls, provide galvanised steel pipe sleeves 50mm larger than outside diameter of pipe without any extra cost. Where pipes are insulated, sleeves shall be large enough to have ample clearance for insulation.

Where pipes pass through outside walls or floor slab the space between pipe and sleeve shall be packed with lead wool and oakum.

The centre of pipes shall be in the centre of sleeves and sleeves shall be flush with the finished surface. Floor sleeves shall project 50mm above finished floor level.

9 Expansion or Contraction

The Contractor shall provide for expansion and contraction of all piping installed by the use of swing connections and expansion loops.

10 Arrangement and Alignment of Piping

All piping shall be arranged and aligned in accordance with the drawings as specified. Where special conditions are encountered in the field, the arrangement and alignment of piping shall be as directed by the Engineer-in-Charge.

Unless otherwise specified, the piping shall be installed in a uniform manner, parallel to or perpendicular to walls or ceilings, and all changes in directions shall be made with fittings. The horizontal piping shall be run at right angles and shall not run diagonally across rooms or other piping. Wherever possible all piping shall be arranged to provide a maximum head room.

All piping shall be installed as directly as possible between connecting points in so far as the work of other trades permits. Where interference occurs with another trade whose work is more difficult to route, this contractor shall reroute his pipes as required to avoid interference at the discretion of the Engineer-in-Charge.

All piping shall be carefully installed to provide for proper alignment, slope and expansion.

The stresses in pipelines shall be guided and pipes shall be supported in such a manner that pipe lines shall not creep, sag or buckle.

Anchors and supports shall be provided wherever necessary to prevent any misalignment of piping.

Small tubing, gauges, controls or other equipment installed on any apparatus, shall not be coiled or excessive in length, but shall be installed neatly, carefully bent at all changes in direction, secured in place and properly fastened to equipment at intervals to prevent

sagging. The piping shall be grouped wherever practical and shall be installed uniformly in straight parallel lines in either vertical or horizontal positions. All tubing/ capillaries shall be provided with PVC sleeves to save it against frictional cuts or damage due to vibration.

11 Testing

In general, tests shall be applied to piping before connection of equipment and appliances. In no case shall piping equipment or appliances be subjected to pressures exceeding their test rating.

The tests shall be completed and approved before any insulation is applied. Testing of segments of pipe work will be permitted, provided all open ends are first closed, by blank-offs or flanges.

After tests have been completed, the system shall be drained and flushed 3 to 4 times and cleaned of all dust and foreign matter. All strainers, valves and fittings shall be cleaned of all dirt, fillings and debris.

All piping shall be tested to hydraulic test pressure of at least two times the maximum operating pressure but less than 10 kg/sq. cm. for a period of not less than 24 hours. All leaks and defects in the joints revealed during the testing shall be rectified to the satisfaction of the Engineer-in-Charge, without any extra cost.

All the piping systems shall be tested in the presence of the Engineer-in-Charge or their authorised representative. Advance notice of test dates shall be given and all equipments, labour, material required for inspection, and repairs during the test shall be provided by the contractor. A test shall be repeated till the entire system is found satisfactory to the above authority. The tests shall be carried out for a part of work if required by the Engineer-in-Charge in order to avoid hindrance in the work of the insulation contractor.

All water and condensate pipes shall be tested and proven tight under hydrostatic pressure of 10 kg/sq.cm., unless otherwise stated, for a minimum period of 24 hours without drop in pressure.

The Contractor shall make sure that proper noiseless circulation is achieved through all piping systems. If due to poor air bond, proper circulation is not achieved, the contractor shall bear all expenses for carrying out the rectification work including finishing of floors, walls and ceiling damaged in the process of rectification.

The Contractor shall provide all labors and materials to make provision for removing water and throwing it at the proper place during the testing or/and after the testing to avoid damages to employer or other contractors properties. Any damage caused by the contractor to the employer or other contractors properties, shall be borne by the Contractor.

12. Copper Piping

Heavy gauge soft copper tubing, type M, shall be used to make connections to equipment, wherever required or specified by Engineer-in-Charge.

Flare fittings e.g. flare nuts, tees, elbows, reducers, etc. shall all be of brass.

13. Refrigerant Piping

The refrigerant circuit piping shall be of carbon steel seamless, as per ASTM A-106, grade B or BS-3602 grade 23 and dimensioned as per ANSI B-36.1, schedule 40. The fittings shall be heavy class. The pipes and fittings shall be connected by means of welded joints. The connections to gauges, controls, etc. shall be with flare fittings. The refrigerant valves, required in the circuit shall be as follows:

Valve Size	Valve Material fittings	Type of Connections
=====		
Upto 12mm	Brass pack less type	Flare
16mm and above	Brass/Steel packed	Brazed/Welded type

Note :- All valves shall be tested against leaks upto 28 kg/sq.cm.

The strainers for the refrigerant liquid line shall be 'Y' type with gun metal body and bronze filter screen of fine mesh. The filter screen shall be easily removable type without dismantling the strainer from the circuit. The moisture indication sight glass in the liquid line shall have leak proof glass on opposite sides to permit easy inspection of the liquid refrigerant. Silencers and moisture drier etc. shall be provided as part of the refrigerant piping.

Bolts wherever used shall be electro-galvanised steel. Brazed joints, in the refrigerant piping, which has leak, shall be opened and re-done. These shall in, no case be repaired by addition of brazing alloy to the joint.

14. Drain Piping

The drain piping shall be medium class galvanized steel as per IS:1239 (as per latest amendment).

The fittings shall be of as per IS: 1239 Part-II with screwed connections.

The gate valves shall be of gun metal as described earlier.

Pipe crosses shall be provided at bends, to permit easy cleaning of drain line. The drain line shall be provided upto the nearest drain trap and pitched towards the trap.

Drain lines shall be provided at all the lowest points in the system, as well as at equipments where leakage of water is likely to occur, or to remove condensate and water from pump glands. The drain pipe work shall be carried out with threaded joints only. No welded joint shall be permissible.

15. Painting

All pipes supports, hangers, etc., shall be given two coats of red oxide primer.

All pipes (insulated and non-insulated) shall then be given two coats finish paint, of a type and colour as approved by the Engineer-in-Charge.

Section 4

Sheet Metal Work & Air Distribution

1. Scope :

The scope of work shall include supply, fabrication and installation of site fabricated G.I. sheet metal duct as shown in the relevant duct drawing, testing at site, loading & unloading of G.I. sheets at site, and shifting the G.I. sheets and other hardware from site stores to exact location inside the office complex. The packing shall be suitable for marine transportation purpose and all other natural disasters and the same shall be transported to respective office warehouses to achieve a guaranteed commercial operation of the same to the entire satisfaction of client.

2. Materials

Ducts shall be made of either galvanized steel sheets or aluminum sheets. The galvanized steel sheet shall conform to IS: 277 – 1977 Aluminum shall be of grade SIC of B-3 as specified in IS: 177 – 1974.

Thickness of sheet shall be as per the table given below:

Maximum Side (mm)	Thickness (mm)	
	Galvanized Steel Sheet	Aluminum Sheet
Up to 750 mm	0.63	0.80
751-1500	0.80	1.00
1501-2250	1.00	1.50
2250-2500	1.20	
Plenums and Ducts above 2500	1.60	

- The bracing shall be as per ISS 655-1964. Supports for ducts at 2.4m distance apart up to 2250/1.2m distance apart for larger ducts.
- Ducts shall be rectangular in cross section and fabricated in accordance with the following table :

Maximum Side of Duct (mm)	Minimum Thickness of Sheet (mm/SWG)	Transverse Joints	Reinforcement	Hanger Rod Dia (mm)
Up to 400	0.63 (24 SWG)	25mm pocket/s slip	Cross Break	8
401 to 750	0.63 (24 SWG)	25mm pocket/s slip	25 X 25 X 4.2 Girth angle @ 1000 mm c/c	8
751 to 900	0.80(22SWG)	38x38x4.2 Companion Flanges	25 X 25 X 4.2 Girth angle @ 1000 mm c/c	8
901 to 1500	0.80(22SWG)	38x38x4.2 Companion Flanges	38x38x4.2 Girth angle @ 760 mm c/c	10
1501 to 2250	1.00(20SWG)	38x38x4.2 Companion Flanges	38x38x4.2 Girth angle @ 760 mm c/c	10
2250 and above	1.25(18 SWG)	50x50x4.2 Companion Flanges	50x50x4.2 Girth angle @ 610 mm c/c	12
Plenums	1.25(18 SWG)	50x50x6.4 Companion Flanges	50x50x6.4 Girth angle @ 610 mm c/c	12

Rounds Ducts:

	<u>GSS</u>	<u>Aluminium</u>
Round Ducts 150 mm dia to 500 mm dia.	24 Gauge	22 gauge
Round Ducts 501mm dia to 750 mm dia	22 Gauge	22 gauge
Round Ducts 751 mm dia to 1000 mm dia.	22 Gauge	20 gauge

Girth angles and companion flanges shall be mitered and welded at corners and riveted to duct sheets at 75mm centers. Flanged joints shall be made with 9.5-mm GI bolts spaced at 1.5cm centers and provided with 4.2mm rubber or 6.0mm. All joints and seams shall be rendered airtight. All duct seams and joints to be sealed with silicon sealant to stop supply air leakage. Duct panels are not to be cross-broken if insulated. Longitudinal seams shall be inside groove of Pittsburgh type. All ducting supports, bracing and framework shall be painted with 2 coats of epoxy primer and 2 coats of epoxy paint min. (50 microns).

3. Accessories:

- All dampers, except where shown, shall be louver dampers having multiple opposed blades type or with parallel blades of airfoil construction. The construction of the dampers shall be robust and tight fitting. They should be made from 18 gauge galvanized sheets. The depth should be minimum of 150mm and flanges of 40mm. Blades shall be connected with a

suitable linkage for operation by an extending lever, which shall have a locking quadrant with positions of the damper indicated on it. Dampers and their operating device shall be made robust, easily operable and accessible through suitable access doors in the ducts.

- Dampers shall be provided in ducts at every branch supply or return air duct connections whether or not indicated on the drawings for the proper volume control and balancing the system.
- Where shown, splitter dampers shall be installed. This damper consists of double thickness airfoil blade hinged on the downstream edge. The operating lever shall extend outside the duct and insulation with an airtight hub and locking arrangements. The thickness of the damper blades shall be the same as the duct in which they are installed but not less than 1.5mm thickness.
- Fire dampers shall be motorized / solenoid type wherever specified shall be provide in the ducts to minimize spreading of fire through ducts, i.e. points where duct passes fire (rated 1 ½ hrs. or more) wall or slab. Fire dampers shall be 230mm – deep and face area as required. The outlet casing of the damper shall be fabricated out of 12 gauges M.S. sheet duly epoxy painted with two coats. The louvers shall be provided with smooth pivoted linkage, tripping mechanism of steel bar with heavy-duty spring assembly and provision of motor. The louvers to be arranged to pivot and hold in an open position and can be closed by an electrically operated motor. The damper is used in conjunction with a smoke alarm system. The entire assembly shall be duly epoxy primer of 2 coats (epoxy paint) or aluminum spray painted. The dampers shall be designed for automatic as well as manual tripping.
- Motors shall be rated for fire damper (spring to close power to open) operation and shall be suitable for outdoor installation (IP55). Fire dampers are closed on a signal from the fire control module. Module supply and wiring by fire control contractor.
- Motorised dampers should be single flap dampers with 18 gauge construction with Belimo or Equivalent make spring return type. Opening time should be more than 75secs. And closing time should be 30secs. The power shall be given from the electrical panel and will be routed through the unit.
- 300mm X 300mm access panels with gasket neoprene and stud bolt type shall be provided near lower dampers/ splitters dampers and fire damper. All main ducting work shall be accessible throughout using tight fitted hinged access doors. Doors shall be cemented sponge rubber gaskets of 6mm thickness. Felt is not acceptable. In the case of insulated ducts with access doors, the same shall be properly insulated, such that it can be operated without damaging the duct insulation and there should be no condensation either on the access doors or on the ducts when he plant is running.

4. Installation Guidelines

- The duct fabrication and installation shall generally confirm to IS 655-1963.
- All ducts shall be supported from the concrete slab or beams. Duct supports shall be fixed through the use of two anchor fasteners for each leg. The anchor fasteners shall be of approved make. If ducting is supported from steel structure, Beam Clamps shall be provided. In no case shall the duct be supported from the false ceiling hangers or be permitted to rest on a hung ceiling.
- Transverse joints shall be provided with rubber gaskets (6mm thk.) of nonflammable type. Use of felt shall not be permitted.

- Wherever the ducts are acoustically lined, the duct size shall be increased by the thickness of the duct lining.
- The contractor shall provide and neatly erect all sheet metal work as per the specifications and drawings. This work ,in all its parts and details, shall meet with the approval of the Engineer
- The contractor shall make all necessary allowances and provisions for beams, pipes or other obstructions in the ducting, whether or not the same has been shown in the drawings. Wherever necessary to avoid beams or other structural works, plumbing or other pipes / conduits, the ducts shall be transformed, divided or curved to one side as approved or directed by the Engineer. However the required cross-sectional area shall be maintained.
- All metal work shall be done in dead or furred down spaces so as not to cause any delay to other contractors on the building.
- If a duct cannot be installed as shown in the drawings, the contractor shall install the duct between the required points by any path available subject to the approval of the Engineer and Architect.
- All ducts shall be rigid and shall be adequately supported with standing seams, tees or angles of ample size wherever required to keep the ducts true to shape, prevent buckling, vibration and breathing.
- All duct joints shall be tightly fitted using rubber gasket of nonflammable type and all interior surfaces shall be smooth. Bends shall be made with radius not less than one-half of the width of the duct or with properly designed interior curved vanes. Two vanes shall be spaced such that the aspect ratio of each of the individual elbows formed by the vane will be about five to one.
- All sheet metal connections, partitions and plenums required to confine the flow of air to and through the filters and fans, shall be constructed from 16G galvanised iron thoroughly stiffened with 25mm X 25mm angle iron braces and fitted with all necessary doors as required to give access to all parts of the apparatus. Doors shall not be less than 46 cm X 71cm. Sheet Metal connections to indoor units shall be flexible, double thickness fiberglass cloth or equivalent nonflammable material of 100mm long.
- Where metal ducts or sleeves terminate in woodwork, brick or masonry openings tight joints shall be made by the means of closely fittings heavy flanged collars.
- Resistoflex or similar vibration isolation material of 6mm thickness shall be provided between ducts and duct support.
- Where ductwork is connected to rotating equipment duct such as fans, air handling units (indoor unit of split/package system), the connections shall be made with double thickness nonflammable flexible material, 100mm long.

5. Grilles and Diffusers:

- **Supply Air Side Wall Outlets**
- Wherever specified in the B.O.Q. shall be in Aluminum construction.
- **Double Deflection Grilles:**
- Wherever specified in the B.O.Q. shall be in Aluminum construction. Aluminum double deflection grilles for supply air shall be provided with vertical and horizontal adjustable bars and an approved blade damper adjustable from the front face of the grille. The grilles will be powder -coated in a shade as given in the schedule of finishes of this handbook.

- **Fixed Bar Linear Grilles**

Fixed bar grilles will be in extruded aluminum construction. Bars shall be fixed in position using vertical tie bars. Bar spacing shall not exceed 12mm and the grilles shall have 60% free area. Deflection angle of the bars shall be 0. The grilles will be powder coated in a shade as per the owner/architect. Irrespective of grille finish, vertical tie bars shall be powder coated in Matt black. Supply air outlets shall be provided with volume control dampers to be installed in the duct collar. Dampers shall be in black Matt powder coated finish. Where required by the Architects/Consultants, the grilles shall be provided with a margin on all sides. Supply air outlets shall be provided with end closure pieces for the supply portion of the grille. The end closure pieces shall not come to the grille face.

- Continuous grilles shall butt with hairline joints and be provided with interlocking splines.
- All return air grilles shall be similar and equal to the above as determined by consultants.
- All exhaust air grilles shall be similar and equal to the supply air grilles specified above.

6. Ceiling Outlets:

Square / Rectangular Diffusers:

Shall be of aluminum construction wherever specified in the BOQ. Corners of inner and outer cores shall be assembled to provide precise mitered corners. Supply air diffusers shall be provided with multi blade butterfly dampers. Damper flaps shall be provided with a nylon worm gear assembly for ease of operation. Diffusers will be powder -coated in a shade as approved by client/Architect. Diffuser shall be half step down type.

7. Guidelines for Installation of Grilles/Diffusers

Installation of the grilles/diffusers shall be done by the air conditioning contractor irrespective of the type/model of false ceiling systems .The diffusers will have to be individually suspended from the duct and aligned to match the ceiling line level. In case gypsum or any other false ceiling system, all wooden frames, rectangular or circular for supply/return/exhaust air diffusers will be provided by the Air conditioning contractor.

All air outlets/return air inlets in the same room shall be of the same size unless otherwise specified.

Grilles and diffuser samples must be submitted to the consultants for prior approval before procurement and installation.

Section 5:

Duct and Pipe Insulation

Ductwork shall be insulated as per the below specified guidelines.

Painting

Angle iron Flanges, Stiffeners, hangers and supports shall be painted with 2 coats of anti-rust primer and remaining uncovered duct shall be further painted with 2 coats of synthetic enamel paints of black color.

Testing and Balancing

After completion of ducting work, system shall be tested for air leakage. Leakage if any shall be plugged and all the adjustments and balancing are completed. The air quantity readings shall be recorded. All dampers shall be set and locked in position after the final adjustments. All readings made shall be submitted to the consultants for approval.

Insulation

All tests like pressure testing should be completed and recorded. All systems shall be approved by the Consultants before insulation is applied to the equipment, duct and piping. Insulation material shall be supplied by approved manufacturers and shall be of the type specifically intended for the services required.

Ductwork & Piping Insulation Application Guidelines :

Piping and accessory insulation application shall be as follows:

- Pipes shall be thoroughly cleaned with wire brush and rendered free from all rust and grease.
- For insulation of straight pipe slip on method shall be used. For elbows and bends snap off method will be used.
- First 2 coats of specified Insulation adhesive shall be applied then the Insulation shall be fixed tightly on the surface taking care to seal all joints .
- Adequately sized PVC self-adhesive tape shall be provided to seal all joints.

The insulation of chilled water pipes, ductwork and chilling Machines etc. shall be done as per specifications given below:

The thermal insulation on ac ducts shall be carried out by resin bonded fiberglass insulation of thermal conductivity 0.23 BTU/(hr.sqft-DegF) at 32 Deg C mean temperature and thickness shall be 25mm and density shall be min 24kg/m³.

The thermal insulation on chilled water pipes PUF insulation having a density of 36 kg/m³ (minimum) and a thickness of 36mm at least as per the drawings, BOQ and specifications. The thermal insulation on drain pipes, expansion tanks and valves shall be carried out thru elastomeric nitrite foam insulation of minimum 19 mm thickness as per drawings and boq.

Acoustic Insulation

- Interior of duct shall be coated with primer. 25mm thick resin bonded fiberglass Twiga finished with RP tissue shall be fixed to duct using spot hot bitumen. All joints shall be sealed with bitumen. The acoustic lining to be covered with RP tissue and perforated aluminum sheets of 30G thickness. The lining of aluminum sheet facing to be mechanically fastened to the duct with GI bolts/nuts and washers Contractor to ensure a smooth internal finish.
- All plenums, connecting pieces connected to air handling units and return air pieces shall also be acoustically insulated.
- There shall be minimum of 75mm overlap between the acoustical and thermal insulation on ducts.

Section 6

Controls

1. General :

1.1 The various controls listed below shall be electrically operated and generally comply with the specifications listed below:

1.2 In case of low voltage controls necessary step down transformers shall be provided with each control as required.

2. Chilling Unit Control:

The Chilling machines controls shall be generally standard as per the selected manufacturer standards.

3. Air Handling Unit and Fan Coil Unit controls:

3.1 AHUs thermostats shall be cooling/heating suitable for mounting in the room or the return path as required. The thermostat shall be modulating potentiometer type with an adjustable throttling range and required accuracy.

3.2 2/3- way motorized Valve for AHUs :

The motorized water valve shall be globe type and consist of CI/gunmetal valve body with SS trim and equal percentage of flow characteristics, modulating motor and linkage. The valve shall be of 3 way mixing type.

3.2 The thermostat for Fan coil unit shall be space type for cooling. It shall be snap acting type, line voltage, mercury bulb type with differential of 1.1 C. It shall have minimum three speed controls complete with wiring etc.

3.3 The water pressure gauges shall be of robust construction 150 mm dial of suitable range and occupancy range.

3.4 The thermometers shall be mercury filled industrial stem type with metal casing and threaded fixing arrangement.

Section 7

Control Panel, Motors and switchgears

1. General

This specification covers the designs, material, construction features, manufacture, inspection and testing at the VENDOR'S/his sub-contractors work, delivery and performance testing of metal-enclosed Medium Voltage Switchgear of voltage not exceeding 1000 V AC.

The switchgears would comprise of Motor Control Centres (MCCs) required for the supply of power to the motors of the plant for medium voltage equipment.

2. Codes & Standards

The design, construction, manufacture and performance of equipment shall conform to latest applicable standards and comply with all currently applicable statutes, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve the VENDOR of this responsibility.

Equipment shall conform to the latest applicable standards as mentioned. In case of conflict between the standards and this specification, this specification shall govern.

All components shall be of reputed make and subject to Purchaser's approval and as per recommended manufacture.

3 Power Supply System

The incomer power supply shall be 415V, 3 phase, 3 wire, 50 Hz, no effectively earthed AC system. The fault level for the switchgear shall be 40 KA for 1 sec.

Dynamic - 84 Ka (Peak) - Short time

Variation of voltage and frequency from their rated values are as below:

Variation of voltage	$\pm 10\%$
Variation of frequency	$\pm 5\%$
Combined voltage and frequency variation	$\pm 10\%$

4 Site Conditions

The following site conditions shall be considered for the design of the MCCs

Reference Temperature	}	Ref: Basis of Design
Relative Humidity	}	
Climatic Conditions	}	

5 **Sheet Metal Work**

The switchgear frame shall be fabricated using suitable mild steel structural sections or pressed and shaped cold rolled sheet steel of thickness not less than 2 mm.

Frames shall be enclosed by sheet metal of thickness not less than 2 mm cold rolled or 2.5mm hot rolled, smoothly finished, leveled and free from flaws. Doors and covers shall be made of sheet steel of thickness not less than 1.6mm. Cold rolled or 2mm hot rolled. Stiffeners shall be provided wherever necessary.

All panel edges and door edges shall be reinforced against distortion by rolling, bending or by the addition of welded reinforcement members.

Cut-outs shall be true in shape and devoid of sharp edges.

The complete structure shall be rigid, self-supporting, free from vibration, twists and bends.

6 **Painting**

All sheet steel work shall be phosphated in accordance with the following procedure and in accordance with applicable standards.

Oil, grease, dirt and swarf shall be thoroughly removed by emulsion cleaning.

Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

After phosphating, thorough rinsing shall be carried out with clean water, followed by final rinsing with dilute dichromate solution and oven drying.

Panels shall be dry electrostatic painted (powder coated).

Finished painted appearance of equipment shall present an aesthetically pleasing appearance, free from dents and uneven surfaces.

7 **Constructional Features**

Switchgear panel shall be:

- a) Of the metal enclosed, indoor, floor mounted modular type
- b) Made up of the requisite vertical sections

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- c) Of dust and vermin proof construction
- d) Provided with a degree of protection of IP-54
- e) Easily extendable on both sides by the addition of vertical sections after removing the ends cover
- f) Provided with a metal frame made of structural steel channel section properly drilled for mounting the Switchgear along with necessary mounting hardware. Hardware shall be zinc plated and passivated
- g) Provided with labels on the front indicating the switchgear designation
- h) Provided with cable entry facilities at top or bottom with 3mm thick removable plates and necessary cable glands. For 1 core cables these plates shall be non-magnetic
- i) Of uniform height of not more than 2450 mm
- j) Of double front execution
- k) Provided with gaskets all round the perimeter of adjacent panels, panel and base frame, removable covers and doors
- l) Provided with copper bus bars running at the top or bottom, as required, all along the length of the switchgear in a separate sheet steel enclosure.

Operating devices shall be incorporated only in the front of the Switchgear.

The Switchgear shall be provided into distinct vertical sections each comprising:

- a) A completely metal enclosed bus bar compartment running horizontally.
- b) Individual feeder modules arranged in multi-tier formation. It is essential that the modules are integral multiples of the basic unit size to provide for flexibility in changes, if any, at site.
- c) Enclosed vertical bus bars serving all modules in the vertical sections. For safety isolation of the vertical bus bars, insulating barrier with cut-outs shall be provided to allow the power stab contacts to engage with vertical bus bars.
- d) A vertical cable alley covering the entire height. The cable alley shall be minimum 200mm wide for motor control modules and 500mm wide for circuit breaker controlled modules.
- e) A horizontal separate enclosure for all auxiliary power and control buses, as required, shall be located so as to enable easy identification, maintenance and segregation from the main power buses. Tap-off connections from these buses shall be arranged separately for each vertical section.

Each vertical section shall be equipped with space heaters which may be located in the cable alley as specified in schedule of quantities.

One metal sheet to be provided between two adjacent vertical sections running to the full height of the switchgear except for the horizontal bus bar compartment. However, each shipping section shall have metal sheets at both ends.

All equipment associated with a single circuit shall be housed in a separate module compartment of the vertical section. The compartment shall be sheet steel enclosed on all sides and the rear, with the withdrawable units in position or removed, except on the cable alley side. A plate cover with a slot to permit wiring connections shall be provided on the side corresponding to the cable alley. The front of the compartment shall be provided with a hinged door.

For dial out type, modules, only the handles of control and selector switches, push buttons, knobs and cut-outs for lamps and meters shall be arranged on the front doors of the respective compartments to permit operation without opening the door. On circuit breaker controlled circuits, protective relays shall be mounted on the front door of the compartment. All other equipment pertaining to a circuit shall be mounted on the withdrawable chassis. All cut-outs shall be provided with gaskets for the purpose of dust proofing.

Current transformers shall not be directly mounted on the buses. Current transformers on circuit breaker controlled circuits shall be mounted on the fixed portion of the compartment.

In breaker compartments, suitable barriers shall be placed between circuit breakers and all control, protective and indication circuit equipment including instrument transformers. External cable connections shall be carried out in separate cable compartments for power and control cables.

After isolation of power and control connections of a circuit, it shall be possible to safely carry out maintenance in a compartment with the bus bars and adjacent circuits live.

The withdrawal chassis shall move on suitable guides and on suitably plated steel or stainless steel rollers or balls to facilitate easy withdrawal.

Cable alleys shall be provided with suitable hinged doors. It shall be possible to safely carry out maintenance of cable connections to any one circuit with the busbars and adjacent live circuits. Adequate number of slotted cable support arms shall be provided for dressing the cables.

All doors shall be provided with concealed type hinges and captive screws.

The withdrawable chassis housing circuit breakers shall be of the fully draw out type.

The chassis/base plate housing feeder control and motor control equipment not incorporating circuit breakers shall be of the fully-drawout, or fixed type.

a) Fully Draw out Type

In this type of construction it shall be possible to draw out the withdrawable chassis without having to unscrew or unbolt any connections to the equipment mounted on the withdrawable chassis. The power and control draw out type connections shall be of the stab-in or sliding type. All draw out contracts, including the auxiliary and control wiring shall be of self aligning type.

b) Fixed Type

In this type of construction all power connections to the equipment mounted on the base plate shall be of the bolted type. All control circuit connections to equipment mounted on the base plate shall be carried out through conventional terminal blocks mounted in the respective base plate. It shall be possible to remove the base plate after unbolting/unscrewing all the power and control circuit connections to the equipment mounted on the base plate.

c) Interchangeability

All identical equipment and corresponding parts including chassis of draw out modules of the same size shall be fully interchangeable, without having to carry out modifications. For trouble free interchangeability, the draw out arrangements shall be designed such that normal dimensional variations are taken care of by self aligning feature of the modules. Components and equipment that are not fully interchangeable will be rejected. VENDOR shall replace all such equipment by fully interchangeable equipment at his cost.

Switchgear shall be designed in such a way that all component equipment and bus bars operate satisfactorily without exceeding their respective maximum permissible rise in temperature under ambient temperature conditions prevailing with the switchgear cubicle, with reference ambient temperature outside the switchgear cubicles.

All dummy cubicles necessary to meet the requirements of this specification shall be included in the VENDOR's scope.

No equipment/devices associated with a particular circuit shall be mounted in any other circuit module.

8 Main and Auxiliary Buses

a) Main buses & Tape

Switchgear shall be provided with three phase bus bars and neutral.

Bus bars shall be of uniform cross section throughout the length of the switchgear.

The bus bars shall be made of high conductivity copper alloy of E91E grade.

Bus bars shall be provided with at least the minimum clearances in air as per applicable standards for a 500V, 3 phase system.

All bus bars, bus taps shall be insulated with close fitting sleeve of hard, smooth, dust and dirt free plastic insulation of high dielectric strength (450 V/mil) to provide a permanent high dielectric no ageing and no tracking protection; impervious to water, tropical conditions and fungi. The insulation shall be non-inflammable and self-extinguishing and in fast colors to indicate phase. The joints shall be insulated in such a way as to provide for accessibility of

contact bolts for maintenance. The dielectric strength and properties shall hold good for the temperature range of 0 deg.C to 90 deg.C.

Bus bars shall be adequately supported and braced to withstand the stresses due to the specified short circuit currents for the associated switchgear. Bus bars supports shall be made of Hylam sheets, glass reinforced moulded plastic material, permali wood or cast resin.

Separate supports shall be provided for each phase of the bus bars. If a common support is provided for all three phases, ant tracking barriers shall be incorporated.

Bus bar joints shall be complete with high tensile steel bolts and lock washers and nuts. Bus bars shall be thoroughly cleaned at the joint locations and a suitable contact grease shall be applied just before making a joint.

b) Auxiliary Buses

Auxiliary buses for control power supply, space heater power supply or any other specified service shall be provided. These buses shall be insulated, adequately supported and sized to suit specific requirements. The material of control power supply buses shall be electrolytic copper. The material for space heater power supply buses shall be same as that for the main power buses. Supply transformer(s), auxiliary busbars and necessary connections to the supply transformers and associated circuits shall be in the VENDOR's scope.

9 Circuit Breakers

a) Circuit breakers shall be of the air break draw out type, mounted along with its operating mechanism on a wheeled carriage moving on guides, designed to align correctly and allow easy movements.

- Of the shunt trip type.
- Provided with an operating mechanism of the type specified.
- Provided with mechanically operated targets to show 'Open', 'Closed', 'Service' and 'Test' positions of the circuit breaker.
- Provided with mechanical operated, red 'trip' push button, shrouded to prevent accidental operation.
- provided with locking facilities in the 'Service', 'Test' and 'Isolated', positions. In test position the breaker will be tested without energizing the power circuits. The breaker shall remain fully housed inside the compartment in the test position.
- provided with 6 No. and 6NC potential free auxiliary contacts, rated 10A at 240V A.C. and 1A (inductive breaking) at 220 V D.C.

- provided with 'red', 'green' and 'amber' indicating lamps to show 'closed', 'open' and 'auto trip' conditions of the circuit breaker when breaker operation is controlled by a control switch.

b) Circuit breakers shall be provided with the following interlocks.

It shall not be possible to plug-in a closed circuit breaker, or to draw out a circuit breaker in the closed position.

It shall not be possible to operate a circuit breaker unless it is in the fully plugged in, test, or fully isolated position.

c) Circuit breaker closing and trip coils shall be rated for satisfactory operation on a control supply system indicated in Data Sheet-A.

d) Closing and trip coil shall operate satisfactorily under the following conditions of supply voltage variation:

Closing coils-85% to 110% of rated voltage.

Trip coils-50% to 110% of rated voltage.

The breakers controlling motors shall operate satisfactory under following conditions :-

- i) Direct online starting of the specified motor.
- ii) Breaking no load current of the specified motor.

e) Operating Mechanism

Circuit breaker shall be provided with operating mechanism as specified .

Power operated mechanism shall be of the motor wound spring charging stored energy type.

The closing action of the circuit breaker shall charge the tripping spring ready for tripping.

Speed of closing of contacts shall be independent of the speed with which the handle is operated.

All stored energy mechanisms shall be provided with mechanical indicators to show the 'charged' and 'discharged' conditions of the spring.

Circuit breakers provided with stored energy operating mechanisms shall be provided with the following interlocks.

- i) The circuit breaker shall not close unless the spring is fully charged.
- ii) Shocks, vibrations, or failure of springs shall not operate the breaker or prevent intended tripping.
Power operated mechanism shall be
- i) Provided with a universal motor suitable for operation on A.C. and D.C. control supplies specified in Annexure A with voltage variation from 85% to 110% rated voltage.
- ii) Designed to enable a continuous sequence of closing and opening operation as long as power is available and at least one opening operation on power supply failure.
- iii) Provided with emergency manual charging facilities.

10. Moulded Case Circuit Breaker:

Moulded case circuit breakers shall be made of insulating case and cover made of high strength, heat resistant and frame-retardant thermosetting insulating material.

The switching mechanism shall be made/quick-break type utilizing a trip free toggle mechanism. The handle position shall give positive indication of whether the breaker is ON (top), OFF (down) or tripped (midway). For overload protection, three bimetal magneto-thermal release and electromagnets releases for short circuit protection to be provided. The magneto-thermal release shall be variation and direct acting. All releases shall operate on a common trip bar so that all phases are disconnected in the event when fault occurs even on only one of them.

The contacts shall be made of silver allow and arc chutes shall be made of de-lon plates. These plates shall be housed in a vulcanized fibre casing. The arc chutes shall be capable of quenching the arc rapidly and drawing away the arc from contact tips.

The terminates shall have sufficiently large dimensions to accept links or cable lugs of suitable sizes.

11 Miniature Circuit Breakers (MCB)

- a) MCBs shall be hand operated, air break, quick make, quick break type conforming to applicable standards.
- b) MCB shall be provided with overload/short-circuit protective device for protection under overload and short-circuit conditions. The minimum breaking capacity of MCBs shall be 3 KA rms at 415V/220V D.C.
- c) MCBs shall be provided with locking facility.

12 Air Break Switches

- a) Air break switches shall be of heavy duty, group operated load break, fault make type, complying with the requirements of applicable standards.
- b) The switches shall be capable of withstanding the thermal stresses caused by overloads, locked rotor and short circuit currents of values associated with protective relay settings and the let through current of the associated fuse.
- c) The switches shall be capable of withstanding the mechanical stress caused by the peak short circuit current of value equal of the cut-off current of the associated fuse.
- d) Whenever solid links are used for the connections between switches and fuses, such links shall be fitted with insulated sleeves.
- e) All live parts of the switch shall be shrouded.
- f) Switch operating handles shall be suitable for padlocking in 'OFF' position.
- g) Each switch shall be interlocked with the associated compartment door to achieve the following interlocks.

It shall be possible to open the door only when the switch is in the 'OFF' position.

It shall not be possible to close the switch with the door open.

Suitable means however shall be provided to intentionally release the interlocks specified above for making trip setting adjustments and operation tests.

13. Fuses

Fuses generally shall be of the HRC cartridge fuse link type having a certified rupturing capacity of not less than 80 KV at 440 V. Fuses upto 63A for distribution systems of medium short circuit levels may be of HRC cartridge screw cap type, having a certified rupturing capacity of not less than 46ka at 440 V and 16 KA at 250V DC.

Fuses shall be provided with visible indication to show that they have operated.

Fuses shall preferably be mounted on moulded plastic carriers and shall be complete with fuse bases.

Wherever it is not possible to mount fuses on carriers, fuses shall be directly mounted on plug in type of bases. In such cases an insulated fuse pulling handle shall be provided for each size of fuse for each switch board.

14 Motor Starters

a) Contactor

Motor starter contactors shall be of the electromagnetic type rated for uninterrupted duty as defined in applicable standards.

Main contacts of motor starter contactors shall be of silver plated copper.

Each motor starter contactor shall be provided with two NO and two NC auxiliary contacts.

Insulation class of operating coils shall be class B or better.

Operating coils of contactors shall be suitable for operation from the specified control supply system.

Contactors shall be of the double break, non-gravity type.

One number spare auxiliary contactor with 4 No./4NC contact along with its coil completely wired up to the terminal should be provided.

b) Direct Online Starters

Direct online starters shall be suitable for Class AC 3 utilization category.

c) Reversing Starters

Reversing starters shall comprise forward and reverse contactors, electrically interlocked with each other.

Reversing starters shall be suitable for Class AC 4 duty.

d) Thermal Overload Relays

Starters shall be complete with a three elements, positive acting, ambient temperature compensated, time lagged thermal overload relay with adjustable settings. The settings range shall be properly selected in accordance with the rating of the motor.

Thermal overload relays shall be hand reset type.

'Stop' push button of the starter and hand reset device shall be separate from each other.

Overload relay hand reset push button shall be brought out on the front of the compartment door.

Overload relay shall be provided with at least one 'NO' and one 'NC' or one change-over contact.

15 Current Transformers

Current transformers shall be of the dry type.

Current transformer shall have a short time withstand rating equal to the short time withstand rating of the associated switchgear for one second.

Unless otherwise specified, the minimum performance requirement of current transformers are as follows:-

- a)** Measuring CTs-7.5VA, accuracy class 1.0 and an instrument safety factor of 5.
- b)** Protective CTs - 7.5 VA, accuracy class 5P and an accuracy limit factor of 10.

Notwithstanding the above it shall be the VENDOR'S responsibility to coordinate the current transformer burden with the requirements of relays, instruments and leads associated with that particular current transformer.

Test links shall be provided in both secondary leads of the CTs to easily carry out current and phase angle measurement tests.

All current transformers shall be earthed through a separate earth link on the terminal block to permit easy measurement of the current transformer insulation resistance. (CTs built-in with the thermal relays of the contactors are excluded).

16 Voltage Transformer

Voltage transformers shall be of dry type.

Unless otherwise specified, the minimum performance requirements of voltage transformers are as follows :

- a)** Measuring VTs - 15 VA per phase and accuracy class 1.0.
- b)** Protective VTs - 15 VA per phase and accuracy class 1.0.
- c)** Dual purpose VTs - 100 VA and dual accuracy class 1.0/3.0 for metering and protection respectively. VA is per phase.

All secondary windings of voltage transformers including open delta windings shall be rated for 110/ 3 V per phase.

Voltage transformers shall have a continuous overvoltage factor of 1.2 and short time overvoltage factor as follows:

1.5 for 30 seconds in case of effectively earthed. 1.9 for 8 hours in case of non-effectively earthed system.

Voltage transformers shall be complete with suitable rated primary, secondary and tertiary fuses. Primary fuses shall have a rupturing capacity equal to the rupturing capacity rating of the associated switchgear. Fuses shall be provided on each sub circuit.

It shall be possible to replace voltage transformers without having to de-energise the main bus bars.

The terminals of V.T. secondary and tertiary windings which are required to be connected to earth shall be earthed by an isolating link without a fuse.

Single phasing preventers relay shall be provided when required to protect motor against single phasing. The relay shall not operate for supply voltage unbalance of $\pm 5\%$ but shall positively operate for supply voltage unbalance of more than $\pm 5\%$. The relay shall operate in the event of a single phase fuse blowing even though the motor cmf in the concerned phase is of the order of 85%.

After sensing single phasing the relay shall operate with a time delay of 2 to 3 sec. The relay shall not operate for a 3 phase power supply failure. The relay shall be of the hand reset type with a hand reset push button. Resetting shall be instantaneous and independent of the adjusted time delay in the tripping of the unit. Visual indication for the operation of the relay shall be provided.

The relay shall be suitable for application to protect reversible and non-reversible motors. The relay operation shall be independent of the motor KW rating, the loading conditions prior to the occurrence of the single phasing and rpm of the motor. The relay shall be of the fail safe type and shall operate to trip the motor when the relay internal wiring is accidentally open circuited.

17 Relays

The following clauses shall apply to the protective relays.

Relay shall be -

- a)** Enclosed in dust proof flush mounting draw out type cases.
- b)** Accessible for setting and resetting from the front.
- c)** Provided with positive acting hand reset flag indicators visible from the front.

Access to setting devices shall be possible only after the front covers are removed. Access to resetting devices shall be external to the case.

Auxiliary relays shall be rated to operate satisfactorily between 70% and 110% rated voltage.

Each relay shall be provided with at least two separate voltage from contacts.

Make and type of relays shall be subject to the EIC approval.

18 Indicating Instruments and Meters

Electrical indicating instruments shall be of minimum 96mm x96mm square size, suitable for flush mounting.

Indicating instruments shall have provision for zero adjustment outside the cover.

Instrument dials shall be parallel free with black numerals on a white dial.

Ammeters provided on motor circuits shall be provided with a suppressed extended scale to indicate motor starting current.

Watt-hour meters shall be of the direct reading electro-dynamometer type complete with cyclometer type dials and reverse running stops.

19. Indicating Lamps

Indicating lamps shall be:

- a) Of the filament type and of low watt consumption
- b) Provided with services resistors
- c) provided with translucent lamp covers of colors 'Red', 'Green' and 'Amber' as required in the control wiring diagrams.

Bulbs and lenses shall be easily replaceable from the front.

20. Control and Selector Switches

Control and selector switches shall be:

- a) Of the rotary type

- b) Adequately rated for the purpose intended (Minimum acceptable rating is 10A continuous at 240V AC and 1A inductive break) 220V DC.
- c) Provided with escutcheon plates clearly marked to show the positions.

Control switches for circuit breakers shall be provided with pistol grip type handles.

Control switches for circuit breaker control shall be provided with

- a) Contact development and sequencing device.

Selector switches shall be:

- a) of the maintained contact stay put type. Switches in ammeter circuits shall have make-before-break type contact.
- b) Provided with oval handles.

21. Push Buttons

Push button shall be:

- a) Of the momentary contact, push to actuate type rated to carry 10A at 240V AC and 1A (inductive breaking) at 220V DC.
- b) Fitted with self reset, 2 NO and 2 NC contacts.
- c) Provided with integral escutcheon plates marked with its function.

'Start', 'Open', 'Close' push buttons shall be green in colour.

'Stop' push buttons shall be red in colour.

All other push buttons shall be black in colour.

'Emergency Stop' push buttons shall be of the lockable in the pushed position type and shall be shrouded to prevent accidental operation. Key shall not be required for the operation of the push button.

22. Space Heaters (As applicable)

Space heaters for switchgear panels shall be:

- a) Suitable for operation on a supply system as specified

- b) Provided with single pole MCD with overload and short circuit release
- c) Provided with thermostats to cut off the heaters at 45 deg.C.

For details for spacing between terminals; clearance between gland plate and first row terminals; and size of gland plate refer Annexure - B, Table I, II & III.

23 Cable Terminations

Suitable compression type heavy duty brass cable glands with nuts, rubber sealing ring and brass washers mounted on a removable and control cables entering the switchgear shall incorporate built in facilities for earthing the wire armor of cables. Cable glands shall be plated to avoid corrosion.

Power cable glands and crimping type lugs shall be supplied to suit the cable sizes given in clause 3. If during course of detailed engineering of the switchgear it is found necessary to provide more glands or glands of higher size than those envisaged the vendor shall provide and accommodate the same.

Wire Sizes :

The vendor shall select the power cable glands and lugs based on the following cable sizes.

Type of cable : 1100 V grade stranded aluminium conductor PVC insulated PVC sheathed armoured and outer sheathed FRSL created cable conforming to IS:1554 Part I.

KW Rating Service	No. of cores x conductor size (mm ²)	Approximate overall diameter/mm
Upto 3	3 x 4	18
3.1 - 7.5	3 x 6	19.5
7.6 - 15	3 x 16	24
16 - 25	3 x 35	30
26 - 40	3 x 70	34
41 - 55	3 x 120	40
56 - 70	3 x 185	49
71 - 85	3 x 240	55.5
86 - 110	3 x 400	60
111- 175	3 x 1C x 500	-
Space Heating	2 x 6	19

For supporting & clamping cable cores at regular intervals inside the cable alleys, suitable shuttled angles, upto the respective terminal blocks shall be provided.

Necessary crimping type of tinned copper cable lugs for connecting the individual cores to the respective terminals shall be provided.

24. Internal Wiring

Control wiring shall be of the rating of 650V and power wiring shall be of the rating of 1100V.

Wiring inside the switchgear shall be carried out with 1100/650 V grade, PVC insulated, stranded conductor wires. Minimum size of conductor for power circuits is 4 sq.mm copper or equivalent size aluminium conductor. Control circuits shall be wired with copper conductor of at least 2.5 sq.mm for CT circuits and 1.5 sq.mm for other circuits, the number and size of strands shall be 7 of 0.67 mm and 0.5mm diameter respectively.

Engraved identification ferrules, marked to correspond with the wiring diagrams shall be fitted to each wire. Ferrules shall be of yellow colour with black lettering.

Wires forming part of a tripping circuit of circuit breaker shall be provided with an additional red ferrule marked 'T'.

Spare auxiliary contacts of all equipment forming part of the switchgear shall be wired up to the terminal blocks.

Spare and unassigned modules shall be complete with internal wiring.

Wiring shall be terminated on preferably stud type terminal blocks such that the wires are connected by cable lugs with nuts and washers/lock-nuts.

Not more than two connections shall be made on any one terminal.

25. Terminal Blocks

Terminal blocks (both for power and control circuit) shall be of reputed make especially for CT and VT circuit. It shall comprise of finely threaded pairs of brass studs of at least 6mm diameter, links between each pair of studs, washers, nuts and locknuts. The studs, shall be securely locked within the mounting base to prevent their turning. Insulated barriers shall be provided between adjacent terminals.

Terminals for circuits with voltage exceeding 125 V shall be shrouded. Terminal blocks shall be grouped depending on circuit voltage. Different voltage groups of terminal blocks shall be segregated.

Terminal blocks shall be adequately rated to carry the current of the associated circuit. Minimum rating of the terminal block is 10A.

Terminals shall be numbered for identification. Engraved white-on-black labels shall be provided on the terminal blocks, describing the function of the circuit. Where duplication of a terminal block is necessary it shall be achieved by solid bonding links.

Terminal blocks for CT secondary lead wires shall be provided with shorting and disconnecting/earthing facilities.

Terminal blocks shall be arranged with at least 100mm clearance between two sets of terminal blocks.

Control terminals for external connections shall be suitable for terminating at least two conductors each of 2.5 sq.mm size.

26. Labels

All labels shall comprise white letters on a black background.

Labels shall be made of non-rusting metal or 3-ply laminate, or engraved PVC.

Labels shall be properly fixed, with provision to prevent distortion due to expansion.

Size of lettering shall be 6mm.

27. Earthing

Each MCC and LCC shall be provided with an earth bus bar running along the entire length of the board. Material and size of the earth bus bar shall be as specified in data sheets. At either end of the earth bus, one (1) clamp type terminal with nuts, bolts and washers shall be provided for bolting the main earthing conductor of size and material indicated in data sheets. In case the earth bus is provided near top of the switchgear, one down comer at either end shall be provided for connection to the main earthing conductor.

Earth busbars shall be supported at suitable intervals.

Positive connection between all the frames of equipment mounted in the switchboard and earth bus bar shall be provided by using insulated copper wires/bare bus bars of cross section equal to that of the bus bar, or equal to half the size of circuit load current carrying conductor, whichever is smaller.

All instrument and relay cases shall be connected to the earth bus bar using 1100/650 V grade, 2.5 sq.mm stranded, copper, earthing conductor.

28. Local Push Button Stations

Constructional Features

The constructional features of the local push button stations shall be as follows :

- a) Metal enclosed weather-proof suitable for mounting on wall or steel structures. The enclosure shall be die cast aluminium or sheet metal of 2mm thickness.
- b) Dust and vermin proof.

- c) Provide a degree of protection of not less than IP:54.
- d) Metal parts shall be given tropical sing treatment as per standards and painted with one coat of epoxy primer and two coats of light grey epoxy paint.
- e) Provided with inscription plates of rear engraved Perspex with white letters on black background. The letter size shall be 6mm.
- f) Provided with two earthing terminals suitable for 8 SWG G.I. wire.
- g) Provided with removable undrilled gland plate and adequate members of cable glands for PVC insulated, armoured cable. The cable entry shall be from the bottom.
- h) All local push button stations shall have locking facility. The lock switch shall have two positions "locked" and "unlocked". When in unlocked position the switch shall allow individual starting of the equipment. Start/stop push buttons provided for local operation of the equipment shall be provided on the same enclosure and stop rush buttons shall be lockable in stop position. The lock switch shall be key operated.

Push Buttons

- a) The Open/Close/Start push buttons shall be of the momentary contact push to actuate type.
- b) The stop push buttons shall be stay put type with mushroom knob.
- c) All push buttons shall be :
- i) Fitted with two (2) normally open and two (2) normally closed contacts rated to carry and break 6 Amps at 415 Volts. (10A at 240 AC).
- ii) Provided with integral escutcheon plates marked with its function.
- d) 'Open/Close/Start' push buttons shall be green colour.
- e) 'Stop' push button shall be red in colour.

29. Wiring

- 29.1** The push button stations shall be as follows : Push button station Type- A - Each P.B., station shall comprise three push buttons viz. 'OPEN' 'CLOSE' and 'STOP' for control of reversible motors.

Push button station type B - Each P.B. station shall comprise two push buttons viz. 'START' and 'STOP' for control of non-reversible motors.

Push button station type- C - Each P.B. station shall comprise only one push button i.e. 'STOP' for emergency stop function.

Power - Electricity at specified voltage (415/220V).

29.2 The controls shall be complete with actuators, probes, relays, transformers, wiring, etc.

Safety controls of chilled water unit shall be as under:

- a) Compressor - High/Low pressure stat/manual reset type high bearing temperature safety.
- b) Chiller thermostat - Manual reset type antifreeze.
- c) Oil pressure - Differential safety switch with manual Reset button. It should have a time delay relay for start up of the compressor.
- d) Main motor - Thermal relay to avoid overloading of Motor & overheating of winding

Interlocks for refrigeration unit shall be:

- a) Flow switches in condenser and chiller lines to prevent compressor starting without water flow.
- b) Oil temperature to be maintained at set point.
- c) Condenser and chilled water pumps and cooling tower fans shall be interlocked with chilling units to prevent operation without pump and cooling tower fan running.

30. Tests

Switchgear shall be subjected to following tests :

- a) Temperature rise test on power circuits.
- b) Short time current tests on power circuits.
- c) Mechanical operation test.
- d) High voltage test.
- e) Electrical control interlock and sequential operation tests.

- f)** Verification of wiring as per approved schematic.

Type tests and routine tests shall be carried out on all associated equipment as per relevant standards.

Certified copies of all type and routine test certificates shall be submitted for the Engineers approval before dispatch of the switchgear.

31. Drawings and Data

As part of proposal BIDDER shall furnish the following drawings and data:

- a)** For each switchgear, overall dimension drawing showing front view, plan, elevation and cross-section.

All drawings and data sheets shall be annotated in English.

Section 8

Electrical Cabling Works

1 WIRING OF EQUIPMENT

CABLES:

PVC insulated aluminium conductor Armoured cables shall be used for connecting motors.

CABLE GLANDS:

Heavy duty compression type cable gland alongwith the cable lugs shall be used for termination of cables. The cable glands shall be of cadmium plates brass. For all power cables, crimped type copper cable lugs shall be provided.

The cable trays shall be channel type made out of M.S. sheets (slotted) having a minimum thickness of 2mm duly painted. (Cable trays exposed to atmosphere shall be hot dip galvanised). The Clamps used shall be Aluminium with G.I./Cadmium plated nut-bolts. The size of these trays shall be selected considering the number of cables and leaving minimum 20% spare area. The arrangement of cables in these trays shall be in Single Tier Formation.

Sharp bending of the cables shall be avoided. The radius for bending PVC insulated cable and sheath armoured cable shall not be less than 10D where "D" overall diameter of the cable. Wherever cable rises from concrete trenches, these shall be taken in G.I. pipes of suitable size. The Contractor shall make sure that the 40% area of pipe shall be free after the cable is laid.

2. WIRE SIZES

Final connection to the equipment shall be through flexible wiring enclosed in galvanised flexible conduit rigidly clamped at both ends. An isolator shall be provided near each motor/equipment wherever the motor/equipment is separated from the supply panel through a partition barrier or through ceiling construction. P.V.C. insulated single strand hard drawn copper conductor wires shall be used inside the control panel for connecting different components and all the wires inside the control panel shall be neatly dressed and plastic beads shall be provided at both the ends for easy identification. All the wires shall be suitably sized for motor duty.

3. EARTHING

Main power upto the Electrical panels in Plant rooms along with earthing shall be provided by other agency. Each panel shall be earthed to building main earthing. All the motor etc. shall be double earthed to the panel. All three phase motors/equipment shall be earthed

with two independent earth conductors as per the requirement of Indian Electricity Rules and Regulation - 1956.

4. DRAWINGS

Shop drawing for control panel and wiring of equipment showing the route of conduit/cables shall be got approved by the Consultant/Architect before starting the fabrication of panel and starting the work. On completion four sets of completion/"As installed" drawings incorporating all details like conduit routes, number of wires in conduit, location of panels, switches, junction/pull boxes and cable route etc. shall be furnished by the Contractor.

5. TESTING

Before commissioning of the equipment the entire Electrical Installation shall be tested in accordance with code of Practice IS:732-1963 (Revised) and test report furnished by a qualified and authorised person. The entire electrical installation shall be got approved by Electrical Inspector and certificate from Electrical Inspector shall be submitted. All tests shall be carried out in presence of Consultant/Architect.

6. Painting

All sheet steelwork shall undergo a process of degreasing, pickling in acid, cold rinsing, phosphatising passivating and then sprayed with a high corrosion resistant primer. It shall then be baked in an oven. The finishing treatment shall be by application of synthetic enamel paint of approved shade.

Section 9

Mode of Measurement

1. General

This specification covers measurement of various items/materials at site.

2. Unit Prices in the Schedule of Quantities

The item description in the Schedule of Quantities is in the form of a condensed resume. The unit price shall be held to include every thing necessary to complete the work covered by this item in accordance with the specifications and drawings. The sum of all the individual item prices shall represent the total price of the installation ready to be handed over.

The unit price of the various items shall include the

All equipment, machinery, apparatus and materials required as well as the cost of any tests which the consultant may request in addition to the tests generally required to prove quality and performance of equipment.

All the labour required to supply and installs the complete installation in accordance with the specifications.

Use of any tools, equipment, machinery, lifting tackle, scaffolding ladders etc. required by the contractor to carry out his work.

All the necessary measures to prevent the transmission of vibration.

The necessary material to isolate equipment foundations, from the building structure, wherever necessary and suggested by the Engineer.

Storage and insurance of all equipment apparatus and materials.

The Contractor's unit price shall include all equipment, apparatus material and labour indicated in the drawings and/or specifications in conjunction with the item in question, as well as all additional equipment, apparatus, material and labour usual and necessary to complete the system even though not specifically shown, described or otherwise referred to.

3. Measurements of Sheet metal ducts, grilles/diffusers, etc.

a) Sheet Metal Ducts

All duct measurements shall be taken as per actual outer duct surface area including bends, tees, reducers, collars and other fittings. Gaskets, nuts, bolts vibration isolation pads, vanes are included in the basic duct items of the B.O.Q.

The unit of measurements shall be the finished sheet metal surface area in metre squares. No extra shall be allowed for overlaps.

All the guide vanes, deflectors access panels, splitter dampers within the duct work shall be considered as part of the duct and nothing will be paid extra on this account.

The unit duct price shall include all the duct hangers, supports and 'Hilti' metallic fasteners as well as any materials and labour required to complete the duct frame.

b) Box Dampers

Box dampers wherever shown or required in ducts shall be measured as per finished inside cross-sections and paid as per the calculated area in sqm.

c) Grilles/Diffusers

All measurements of grilles/diffusers shall be the nominal outlet size excluding the outer flanges.

The square or rectangular grilles/diffusers shall be measured in plain sqm.

All round diffusers shall be measured by their diameters in centimeter.

All linear diffusers shall be measured as per actual length in meters.

4. Measurements of Piping, Fittings, Valves, Fabricated Items

a) Pipe

(Including Water Piping, Oil Piping, L.P. Gas Piping, Air Piping, Vacuum Piping, etc.)

All pipes shall be measured in linear meter (to the nearest Cm.) along the axis of the pipes and rates shall be inclusive of all fittings e.g. tees, bends, reducer, elbows, hanger support bracket, etc. Deduction shall be made for valves in the line.

The rate quoted shall be inclusive of cutting holes, 'Hilti' metallic fasteners and inclusive of all items as specified in specifications and Schedule of Quantities.

Rates quoted shall be inclusive of providing and fixing vibration pads and wooden pieces, wherever specified or required by the Engineer-in-Charge.

Flexible connections, wherever required or specified shall be measured as part of straight length of same diameter, with no additional allowances being made for providing the same.

The length of the pipe for the purpose of payment will be taken through the centre line of the pipe and all fittings (e.g. tees, bends, reducers, elbows, etc.) as through the fittings are also presumed to be pipe lengths. Nothing extra whatsoever will be paid for over and above the fittings. For valves and flanges, section 1.16.3.2 below applies:

b) Valves and Flanges

All the C.I. and G.M. valves shall be measured according to the nominal size in mm and shall be measured by number. Such valves shall not be counted as part of pipe length hence deduction in pipe length, will be made wherever valves occur.

All gate and globe valves shall include two nos. of flanges and two numbers 150 mm long M.S. nipples, with one side threaded matching one of the valves, and other welded to the M.S. slip-on- flanges.

Rate for all valves shall also include the necessary number of bolts, nuts and washers, 3mm thick insertion gasket of required temperature grade companion flanges and all items specified in the specification.

The rates quoted shall be inclusive of making connections to the equipment, tanks, pumps, etc. and the connection made with an installed pipe line shall be included in the rates as per the B.O.Q.

c) Structural Supports

Structural supports including supports fabricated from pipe lengths for pipes shall be measured as part of pipe line and hence no separate payment will be made. Rates shall be inclusive of hoisting, cutting, jointing, welding, cutting of holes and chases in walls, slabs or floors, painting supports and other items as described in specifications, drawings and schedule of quantities or as required at site by Engineer-in-Charge.

d) Copper Connections for Fan Coil Units

Copper connection assembly for making connections to the fan coil units shall be measured, as part of the fan coil unit price and shall include brass flare nuts, brass tees, brass reducers, fittings, fixing of automatic 3 way valve, making connections and leak testing, complete assembly as per specifications and drawings. Nothing extra shall be payable on account of any variation in the length of copper pipe.

5. Painting

Painting of all pipes, supports, valves and fittings shall be included with the cost of these items. Nothing extra shall be paid for this work.

Painting of grilles/diffusers, tanks and equipment wherever required shall be in the cost of these items.

6. Insulation

Measurement of insulation for vessels, piping, equipment and ducts shall be made over the bare uninsulated surface area of the metal.

a) Pipes

The measurements for insulation of piping shall be made in linear meters through all valves, flanges, and fittings. Pipes/bends shall be measured along the centre line radius between tangent points. If the outer radius is R1 and the inner radius is R2, the centre line radius shall be measured as $(R1+R2)/2$. Measurement of all valves, flanges and fittings shall be taken in running metre of pipe line as if they are also pipe lengths. Nothing extra over the above shall be payable for insulation over valves, flanges and fittings in pipe line/routings. Fittings that connect two or more different sizes of pipe shall be measured as part of the larger size.

b) Ducts

The measurements for insulation of ducts shall be made in actual square meters of bare uninsulated duct surface.

In case of bends the area shall be worked out by taking an average of inner and outer lengths of the bends. Measurements for damper, flanges, fittings shall be for the surface dimension for the connecting duct. Nothing extra over the above shall be payable for insulation over dampers, flanges and fittings in duct routing.

c) Vessels

The area of standard dished and flat ends of vessels shall be measured as the uninsulated body of the shell. Areas for other shapes shall be the actual calculated area. There shall be no deduction or additions for nozzles, handle ribs, dampers, expansion joints etc. all projections on vessels or tanks shall be measured separately as pipe/duct.

d) Accessories Insulation

The unit of measurement for accessories such as expansion tank, pumps, chiller heads etc. shall be of uninsulated area in square meters. In case of curved or irregular surfaces, measurements shall be taken along the curves. The unit insulation price shall include all necessary adhesives, vapor proofing and finishing materials as well as additional labour and material required for fixing the insulation.

e) Acoustic Duct Lining

In case of acoustic lining of air ducts, measurements of the bare inside duct surface in square metre shall be final for billing purpose.

The insulation/acoustic treatment shall include cost of battens/sections, supports, adhesives, vapor proofing, finished tiles/boards/sheets as well as additional labour and materials required for completing the work.

f) Roof and Wall Insulation and Acoustic Treatment

The unit of measurement for all under deck roof insulation wall insulation, wall/roof acoustic panel shall be the acoustic uninsulated area of walls, roofs, to be treated, in square metre.

The insulation/acoustic treatment shall include cost of battens supports, adhesives, vapour proofing, finished boards/sheets as well as additional labour and materials required for completing the work.

g) Acoustic Baffle Boxes (wherever required)

The unit of measurement shall be the exposed inside face of the acoustic baffle boxes in square meters.

The unit price shall include all hold fasts, nuts, & ventilation systems for the above work. bolts connecting the size of wall opening and making it good as well. Any additional materials and labour to fabricate and fix the boxes.

Section 10

Technical data

Contractor shall submit catalogues of the equipment offered by him :

<u>Sr.No.</u>	<u>Equipment description</u>	<u>unit</u>	<u>Condition of service</u>

1. Air Handling Units:

a.	Manufacturer
b.	Casing
c.	Coil
d.	Blower
e.	Type
f.	Overall Dimension
g.	Unit Weight
h	Air Quantity
i.	Fan outlet velocity
j.	Design static pressure
k	Fan balancing static/and or Dynamic
h.	Fan motor output
i.	Motor location i.e. inside or outside the fan section
j.	Type of casing finish
k.	Type of drive/vibration Isolators

AHU Coil Data :

a.	Cooling Coil Area
b.	No.of Rows

- c. No.of fins/cm
- d. Tube Material
- e. Tube dia
- f. Coil Header material
- g. Thickness of tube

2. Exhaust Fan /Fan section :

- a. Make
- b. Air Quantity at Operational speed
- c. Static Pressure
- d. Diameter/size
- e. Type
- f. Current characteristics
- g. Motor Rating
- h. Type of Motor
- i. Fan outlet Speed
- j. Fan Speed
- k. Motor Speed at the duty conditions
- l. Operating Weight
- m. Type of vibration isolators
- o. Type of bearings
- p. Performance curves
- q. Motor Efficiency

- r. Class of Insulation

3. Controls

Make and Model of the following :

- a. Flow Switch
- b. 2/3 – way Valves
- c. Operating Voltage
- d. Air Stat
- e. Pressure Gauge
- f. Thermometer
- g. AHU Thermostat
- h. FCUs Thermostat

4. Electrical Accessories :

Make of the following:

- a. Motor Control Centre (MCC)
- b. Air Circuit Breaker
- c. MCCB
- d. MCB
- e. Rotary Switch
- f. Soft Starter
- g. Auto-transformer starter
- h. Direct on line starter
- i. Contactor

- j. Current transformer
- k. Single phase preventer
- l. Push bottom/changeover switch
- m. Ammeter/Voltmeter
- n Relays
- o Indicating Lamps
- p. Cables/wires

5. Water Piping ;

a. Make of pipes/class of pipes

b. Pipe wall thickness

c. Valves & Strainers	Make	Material

- i) Butterfly Valve
- ii) Balancing Valve
- iii) Ball Valve
- iv) Ball valve with strainer
- v) Pot Strainer
- vi) Flexible connections
- vii) Check Valves
- viii) Gate Valves
- ix) Globe Valves
- x) Y-Strainers

c) pressure Gauge

- i) Make
- ii) Model
- iii) Dial

d) Thermometer	Make/Type & Range

6. Galvanised Steel Sheets :

- a. Make
- b. Gauge/Thickness
- c. Class of galvanizing

7. Grilles/Diffusers & Dampers/Louvers Make/Material/Guage

8. Insulation

- a. Manufacturer
- b. Duct Insulation Material/Density
- c. Duct Acc. Lining Material/Density
- d. Pipe Insulation Material/density

Section 11:

LIST OF CODES OF BUREAU OF INDIAN STANDARD

IS:277-1992	-	Galvanised steel Sheet (plain & corrugated)
IS:544-1985 (Reaffirmed 1996)	-	Dimension for pipe Threads
IS:778	-	Valves (gate/globe/check type)
IS:655-1963	-	Metal Air Ducts
IS:13095-1991	-	Butterfly Valves
IS:659-1964	-	Air-conditioning (safety codes)
IS:1239-1990/92	-	Mild Steel Pipes
IS:325	-	3 phase induction motor
IS:822	-	Code of procedure for inspection of welds
IS:900	-	Code of practice for installation and maintenance of motors
IS:6392	-	Steel Pipe Flanges
IS:1822	-	Motor starters for voltage not exceeding 650 Volts
IEC	-	Relevant Sections
IS:996	-	Single phase small A.C. Motors
IS:4894-1987	-	Centrifugal Fans
IS:1554(I)	-	PVC Insulated (heavy duty)electric cables for working Voltage upto and including 1100 Volts
IS:8623-1993	-	Bus Bar Trunking System
IS:8828-1996 & IEC898-1995	-	Miniature Circuit Breakers
IS:9537-1981 Part II	-	Rigid steel conduit for electrical wiring
IS:10810-1989	-	Method of Test of Cables
IS:13947-1989	-	Circuit Breakers
IS:13947-1993	-	Switches, disconnections, fuse combination units
IS:139-1993(Part IV)	-	Contactors & Motor Starters
Duct Fabrication standards	-	SMACNA
ASHRAE Handbooks	-	Application 1995
	-	fundamentals 1997
	-	System & equipment 1996
	-	Indoor Air Quality 62-1982

Section 12

LIST OF APPROVED MAKES FOR HVAC EQUIPMENT AND MATERIALS

Sr. No.	Details of the Items	Manufacturer's name
1.	Air Handling Units	Caryaire/Carrier/VTs
2.	Centrifugal fans for AHUs	Nicotra/comefrei / Krugar
3.	Electric Motors	ABB/Crompton/Kirloskar/ GEC/Siemens
4.	MS/GI Pipes	Jindal- Hissar /TATA
5.	GI Sheet	Sail/TATA/ Bhushan
6.	Butterfly Valves	Castle/SKS / Audco /C&R
7	Balancing Valves	Castle/Econosto/Sant/C&R
8.	Check Valve	Castle/Kirloskar/Econosto Audco / C & R
9.	Ball Valves	CIM /Festo/Rapid Cool
10.	Ball Valves with Strainers	CIM /Festo/Rapid Cool
11.	Flexible Pipe Connections	Resistoflex/Kanwal
12.	Gate Valve	Leader/Kirloskar
13	2 way mixing Valves for AHUs /FCUs	Siemens/Honeywell /Schneider
14.	Thermostats for AHUs	Siemens/Honeywell/schneider
15.	Pressure Guage	H.Guru/Feibig
16.	Thermometer	H.Guru/Taylor/Emerald
17.	Flow Switch	Rapidcool/Danfoss/Siemens
18.	Air Vents	Rapidcool/Anergy

19.	Grilles/Diffuser	Caryaire/Mapro/Airmaster/Ravistar
20.	MS Dampers/Louvers	Tristar/Mapro/Servex
21.	MCCB	L&T/Siemens/GE/Shneider
22.	MCB	L&T/MDS/Ishneider
23.	Control Cables	Grandlay/Batra Henlay/Kalinga
24.	Power Cable	ICC/Skytone/Plycab/Kalinga
25.	DOL/Star Delta starters	L&T/Siemens
26.	Aux.Relay/contactors	L&T/Siemens
27.	Line Type Fuse	L&T/EnglishElectrc/Siemens
28.	Timer	L&T/EnglishElectrc/Siemens
29.	Terminal Block	Elmex
30.	Indicating Lamps	L&T/Siemens
31.	Selector Switches	L&T/Siemens
32.	Electrical Pane	Tricolite/Advance/EAPL/PCS
33.	Nitrile rubber Insulation for ducts and pipes	Eurabatax/Aeroflex/Superlon/Armaflex
34.	Flexible Duct Connection	Airflow/Kanwal
35.	Gaskets	Neoprene rubber
36.	Adhesives	Fevicol / Superlon
37.	VIBRATION ISOLATOR	Resistoflex/Dunlopl
38.	FILTERS	Thermadyne/Anfilco
39.	Fire Damper	Conaire/RTI/Caryaire

Specifications For Audio Visual Works

Specifications for Audio Visual Works

1. General description

The contractor shall supply, install, test, connect and commission a high quality fast-acting Conferencing System complying strictly with BS 5839 part8 and EN60849 and or Equivalent Agency approved for future use as Conferencing System. The Public Address System shall comprise of Audio Matrix Units, Amplifiers, High quality speakers etc with rack equipments able to be mounted on a 19" Rack. The system shall connect and integrate with the fire alarm system for emergency evacuation. The system shall be used for Professional Sound Reproduction for all the areas where special events take place.

Prior to placing order for any equipment, the contractor shall submit comprehensive document comprising of working drawings, catalogues and descriptive literature of components, acoustic calculation to meet with BS5839 part8 RASTI (Room Acoustic Speech Transmission Index) requirements of 0.5 on the STI scale and 0.7 on the CIS scale. The contractor shall be required to train and instruct client's personnel in the correct use, operation and supervision of the system, preferably prior to the handing over of the project.

In order to ensure integration capability and to meet the local standards, the voice alarm system will be awarded separately. The public address system supplier shall be responsible for the design, global operation, management and interfacing of the public address system with the voice alarm system proposed. The contractor shall make sure that all power tapping facilities of the speakers must be exactly as specified, even if the acoustic calculations shows otherwise. The contractor must endure minimum of 10dB above the ambient noise levels are achieved.

The system shall be fully programmable to accommodate fire alarm and voice communication zones as indicated on the drawings and schematics. The system shall be configured to allow on site modifications with the minimum of disruption using the PC based software to facilitate future changes or alterations to the buildings.

APPLICABLE STANDARD:

- EVAC Compliant with IEC/EN60849
- Loudspeakers -Rated power EN54 Approved
- Tested in accordance with BSEN60268-5
- Acoustic models ready for CATT, ULYSSES & EASE
- Compliant with BS5839 Part 8
- Battery backup/charger compliant with EN54 part 4

2. Scope of Work

The scope of work shall include designing supplying and installing of Public Address System. The work under this system shall consist of furnishing all materials, equipment's and appliances and labor necessary to install the said system, complete with Speakers, Amplifiers, Microphone, Zone Selection Panel for interfacing with other systems.

The PA system shall be designed to serve the purpose of making general announcement and a hardwired interface with Voice Evacuation system at the time of Fire alarm activation.

3. System Design

The PA system shall be interfaced with the Fire Alarm system. The interface shall be hardwired. The system shall be de-centralized in nature, each distributed rack DAU (Distributed Amplifier Unit) shall have all the DSP (Digital Signal Processing), amplifiers, and speaker loops connected and shall communicate to the Man Machine Interface (MMI) for easy operations and maintenance from a single PC. The design shall be in such a way that the DAU's can work in a standalone mode in case the communication loop or MMI failure.

The MMI shall be available in iOS / Android play store as an application to be installed in the wireless touch devices which are capable of zone selection and music routing via the wireless touch device. Wireless touch device shall have iOS or Android OS.

The Man Machine Interface (MMI) shall be connected back to the control room, to monitor and control the entire PA system. The MMI shall be fully BS5839 part 8 and EN60849 compliant and EN54 approved. The DAU shall play background / Foreground music, paging announcement and shall be able to switch to EVAC mode in case of Fire trigger. The system shall go to full power as programmed to provide the enough SPL (Sound Pressure Level) levels to comply with BS5839 part8, with minimum of 10dB above the noise levels.

All system components shall have basic digital monitoring including and not limited to, Amplifiers, Speaker Circuits, Audio Matrix units, Paging Microphone, Battery Charger (If any) and the 230VAC line. Each amplifier / line circuit shall be monitored individually and shall report any faults back to the Master Audio Matrix Unit as well as the Paging Microphone for easy trouble shooting and maintenance purpose.

The system shall be capable of sending any kind of audio signal to any zones at any time interval, without affecting other areas. Each Zone and circuit speaker shall have separate amplifier, system sharing two amplifiers to multiple circuit speakers are not acceptable. The system shall have capability to connect one back up amplifier for every eight amplifiers where if used the system shall automatically change over to the backup in case of any amplifier failure, and the backup amplifiers shall be monitored as well. In case of any system component failure, the paging microphone shall override any defective unit and provide paging to the required zone. The System can provide any Cause & Effect programs after integrating with the Fire Alarm System.

The PA system shall be properly integrated with the fire alarm system. The integrated PA system shall cover all normally accessible areas including the car parks. All stair cases shall have dedicated zone riser. The system shall be capable of being used for everyday background music and public announcement duties with the fire alarm initiated emergency announcements overriding all other facilities. Initiation of voice alarm shall take immediate priority and shall cancel all other PA operations.

A fire alarm broadcast signal shall cancel any public address operation and shall override it. The same shall be the condition when a fireman's microphone is operated. All the Alert and Evacuate pre-recorded messages and live voice fire announcements shall be maintained in the VA or Fire system and shall have the highest priority.

Rack shall be located in the Control/Security Room enabling the operator to select music from the CD player, AM / FM tuner to transmit music via analogue cable or, the iPad / iPod / Mp3 player or android devices to transmit music wirelessly to selected zones or all the zones in the building from the touch screen paging microphone or management software installed in the wireless

device. A public address announcement shall override the music transmission to selected zones or all zones. Paging any zone shall not interrupt music in other zones. The Speakers shall be distributed in the entire floor and shall be configured in different zones. The announcement shall be made zone wise or to all the speakers simultaneously in ALL CALL mode. Fire Alarm shall be announced immediately on receipt of Fire signal from the panel to all zones or group of Zones.

4. Amplifiers

All amplifiers shall be power amplifier with High quality speech and Music broadcast. The power amplifiers shall have adequate continuous (RMS) power output to meet the requirement of the configuration. The unit shall be capable of delivering the rated output power with less than 0.1% harmonic distortion in the design bandwidth. The amplifier shall have a broad band frequency response of 20 Hz to 20 KHz. The output voltage and impedance shall meet with the system requirements. Amplifiers shall be protected against over loads and output shorts and a special thermal overload on the heat sink.

The Amplifier shall be Class –D Amplifier have one channel, Two Channel, Three Channel and four channels’ each channel have rated power 120/240or 500W. The Amplifier shall have switch power technology for power electricity saving, sleep mode is automatically enabled when no signal input is detected.

Amplifier shall have AC 115V or 230V power supply and DC 24V input, having separate fuse for each channel. The Amplifier shall be connected through balanced audio input and shall work on 100V Speaker Line.

Technical Specifications	
Rated Output Voltage (RMS)	120/240/500W or 2x120/2x240/2x500 4x120/4x240/4x500W
Amplification	Class-D
Battery Voltage	24VDC (max 10% deviation)
Frequency Response	20Hz to 20 KHz
S/N Ratio	>80 dB
Total Harmonic Distortion	<0.1% @ 1 kHz
Power Efficiency	>75%
Approval	EN

MIXER

24 channels Mixing console with 4-Sub-group, 8-Mono, Stereo returns distortion degree <.02% @1 KHz , output channel 3 main output; 4 output group; 2 CH aux output; 2 CH CD/TAPE auxiliary output; 2 CH 1 CH stereo headphone output SMT technology circuit design, powerful and complete function, sweet sound, clear treble, shock bass: 8 (CM16) or 16(CM24) or 24(CM32) microphone and line input with returning select: 8 stereo input; 4 stereo external Select signal input;* independent four group output, 2 auxiliary output, 2 select output; Built in two groups of 21 kind DSP select, 9 stage equalization adjustable output channel; Microphone input interface with 48V phantom power supply, can directly supply to the phantom microphone; Low noise external power adapter;

5. Speakers

1. Speakers shall be especially designed for broadcasting high quality, integrated emergency fire alarm signals and voice communications and approved by an appropriate authority for use in such situations.
2. Speakers shall be ceiling, wall mounted or Horn Speaker as shown in the schedule of work and shall be completed with mounting brackets accessories etc. Speakers shall be in metal enclosures only.
3. Speakers shall be of high efficiency providing maximum output at minimum power across 120 – 14000 Hz frequency range for Indoor Speakers. Speakers shall have a line matching transformer for direct connection to amplifiers with multiple taps.
4. Speaker external appearance shall be approved by the Architects.
5. Speakers shall be interconnected in the zone configuration.

5.1 6W Ceiling Mounted Loud Speaker

The ceiling mounted 6 W speakers shall be installed as depicted in the drawing. The speakers support EASE, CATT or ULYSSES models for acoustic studies. This mean the acoustic model can be designed to simulate the sound quality and distortion prior to installation. The Speaker should be in compliance BS/EN 60065, 2003 and EMC (BS EN 61000-6-Part 1/2/3/4). The Ceiling speaker shall work on 100V line so that it can reduce line losses over long distance and allow easy parallel connection of multiple loudspeakers. The Speaker shall have multiple tapping for different application according to room size and ambient noise environment. The Speaker shall have aluminum grille and metal baffle and shall have spring clip clamp for easy installation.

Technical Specifications

➤ Rated power	6 W
➤ Tapings 100V line	6/3/1.5W
➤ Operation Voltage	100V or 70V
➤ Effective frequency range	110 ~ 18kHz (10% Variation allowed)
➤ SPL @ 1W/m	>91 dB
➤ S.P.L. ,@Full power/ 1m, dB	>98dB
➤ Color	White
➤ Ceiling Cut-out	170mm
➤ Dimensions	200 mm x 55 mm (10% Variation allowed)

5" 30 Watt ceiling Loud Speaker:

Built-in 100v/70v transformer • In-ceiling type loudspeaker • 5" +1.5" coaxial speaker unit • Power output RMS 40W @100V • Built-in crossover for hi-fi level use • Metal grille, ABS baffle & ABS back cover • Paint in white color • Secure flush mount installation

The built-in 5"+1.5" coaxial speaker driver is designed of wide frequency response 90-20kHz, and rated power output is 30 watts. The metal grille, ABS baffle and ABS back cover are painted in attractive white color. Its flush mount type makes the easy and secure installation. It is ideal choice for industrial and commercial applications in hotel, school, shopping mall office and factory where background music and paging is needed.

Power Taps @ 100V Power	30W
Taps@70V	15W

Impedance	Black: com, Red: 330Ω
SPL(1W/1M)	90dB±3dB
Max. SPL (Rated W/1M)	105dB
Frequency Response (-10dB)	90-20KHz
Finish	Baffle : ABS, White Grille : Steel, White
Speaker Drive	5" x 1 1.5" x 1
Cutout Size	210mm
Dimensions	240x 155mm
Weight	2Kg
Mounting	Flush mount dog ears

5.2 6W Wall Mount Loud Speaker

The Wall mounted 6 W speakers shall be installed as depicted in the drawing. The speakers support EASE, CATT or ULYSSES models for acoustic studies. This mean the acoustic model can be designed to simulate the sound quality and distortion prior to installation. The Speaker should be in compliance BS/EN 60065, 2003 and EMC (BS EN 61000-6-Part 1/2/3/4). The speaker shall work on 100V line so that it can reduce line losses over long distance and allow easy parallel connection of multiple loudspeakers. The Speaker shall have multiple tapping for different application according to room size and ambient noise environment. The Speaker shall have Metal grille and ABS Enclosure and shall be closed cabinet.

Technical Specifications

➤ Rated power	6 W
➤ Tapings 100V line	6/3/1.5W
➤ Operation Voltage	100V or 70V
➤ Effective frequency range	90 ~ 18kHz (10% Variation allowed)
➤ SPL @ 1W/m	>90 dB
➤ S.P.L. ,@Full power/ 1m, dB	>98 dB
➤ Color	White
➤ Dimensions	285mm x 200mm x 85mm (10% Variation allowed)

5.3 15W Horn Speaker

The Horn speakers with 15W Output shall be installed as depicted in the drawing. The speakers support EASE, CATT or ULYSSES models for acoustic studies. This mean the acoustic model can be designed to simulate the sound quality and distortion prior to installation. The Speaker should be in compliance BS/EN 60065, 2003 and EMC (BS EN 61000-6-Part 1/2/3/4). The Horn speaker shall work on 100V line so that it can reduce line losses over long distance and allow easy parallel connection of multiple loudspeakers. The Speaker shall have multiple tapping for different application according to room size and ambient noise environment. The Speaker shall have aluminum grille and metal baffle and shall have spring clip clamp for easy installation.

Technical Specifications:

➤ Rated power	15 W
➤ Tapings 100V line	15W/7.5/3.75W

➤ Operation Voltage	100V or 70V
➤ Effective frequency range	250 ~ 8kHz (10% Variation allowed)
➤ SPL @ 1W/m	>103 dB
➤ S.P.L. ,@Full power/ 1m, dB	>115 dB
➤ Color	White
➤ IP Rate	IP 66
➤ Dimensions	221 x 165 x 235mm (10% Variation allowed)

6. Delegate & Chairman Unit

1. Main unit power consumption - 450W
2. Each unit has a microphone for the chairperson and can support 60 delegate units delegate – which is extendable to 200 units simply by adding an extension power supply unit
3. The system has four group 8-DIN sockets to enable multi-line connection • It has one group wired microphone input port with independent volume adjustment • High fidelity sound • Audio input signal and REC output • Independent system volume adjustment •
4. Built-in monitor loudspeaker of 1W with independent volume adjustment • Special 'T' type single cable with DIN socket • RCA input Salient Features of the Chairperson Console • Frequency response: 40-16000Hz • Sensitivity: -42dB±2dB • Speaking reference distance: 20-120cm • Built-in 1W 8Ω loudspeaker • A built-in lamp will switch on when the microphone is in use. The microphone power supply comes through the main unit • The 'Talk' button has an indicative light – which enables control to the person speaking • The automatic switch off function shuts the microphone in 45 seconds if not in use

7. Conferencing Controller Unit

Using a new numerical control design. Microphone has to speak a single bond and lamp, can speak state control/instructions Single directional microphones, high sensitivity, with the function of preventing gas explosion sound. Chairman of the unit has the priority to speak control key, can start the system prompt remind to attend the researchers note that permanent can be set to terminate or suspend terminate all speak on behalf of the unit of a state. Chairman in the system unit quantity not restricted, and may be placed on a loop in any position The host power supply unit by the system, the input voltage 18 v, belongs to the scope of security Unit 8 core type "T" line connection Attachment: "T" type cables,

Frequency response	100 hz - 16 KHZ sensitivity: - 40 + 2 db
Input voltage	390 mm
Net Weight	0.45 Kg
Appearance size	130 * 55 * 105 mm
Embedded hole	104 x and x 99 mm

Weekly Music Controller

OIL e-TENDER NO. CCI3576P17- INTERIOR WORK S NBCC

Background music + 16 zone paging + voice message alarm • Built-in 8 inputs 16 outputs audio matrix • Built-in weekly scheduled timer • Built-in 16 zone speaker selector for remote paging console • Built-in 6 channel power sequencer • Built-in MP3 player of 2GB memory card through SD card slot • Built-in monitor • With telephone paging, fire alarm and remote paging console interface • With regular program and stored program • With Mic emergency announcement and CD/MP3 manual priority broadcast With memory function alter power off • Each day program operation up to 200 steps

4 Extra program sources plus built-in MP3 matrix distributed into 16 zones 8 inputs and 16 outputs • Manual CD/MP3 priority broadcast at particular circumstance • The music will not be interrupted when paging console is make zone paging CD, AM/FM tuner, MP3 player as program audio sources • Playing modes: random, single circle, repeat and all circle • Music system will be monitored by operator in control room

Remote Zone Paging System

Microphone built-in 16 zone speaker selector • With WT8PM to achieve individual, group, each zone, all zone paging • WT8PM paging with priority over music except EMC (line alarm input) and Mic 1 (front panel) • WT8PM remote paging distance within 1 km through Cat 5 cable and RJ45 communication port • WT8M can work with several Microphone at the same time • There is no interference other zones music when zone paging is mode Manual zone select paging system

8. Software

PA Software shall have the following Features: Shall work over TCP/IP, Shall provide Zone control, status monitor, Offline Program, Event Recording, System Configuration, User Management and shall be available in iOS and Android OS as an app. Software shall allow automatically playing and timing function to achieve timing programmed playing in the designated zones for unattended operation, Built-in Automatic Timing Corrector. Support Export and Import easily to save Data.

PROJECTOR

Daylight View Basic technology resolves hidden details in dark images that are normally difficult to see in bright conditions. Using an ambient light sensor, Daylight View Basic adjusts halftone color and brightness to suit the room. Resulting images are clear, bright, and easy to see.

A color adjustment function allows you to easily correct for slight variations in the color reproduction range of individual units set up for multiple projection, particularly in side-by-side configuration. Correction can be performed on 3 colors or 7 colors highly resistant to dust, with maintenance extended to an impressive 17,000 hours*6 for the Eco Filter (which may be washed and reused*7). Extensive optical shielding and sealing, a straight airflow path and improved filter sealing add up to an essentially dust-free design that keeps images brighter for a longer duration.

Power consumption	495 W (0.3 W with Standby Mode set to Eco*1, 10 W with Standby Mode set to Normal, 37 W with the Audio Setting's In Standby Mode set to ON.)

Resolution	1,280 × 800 pixels (Input signals that exceed this resolution will be converted to 1,280 × 800 pixels)
Contrast	2,000:1 (full on/full off, lamp power: Auto)
Built-in speaker	3.7 cm round shape × 1, output power: 10.0 W (monaural)
Terminals	DVI-D IN: DVI-D 24-pin × 1 (DVI 1.0 compliant, compatible with HDCP, compatible with single link only) HDMI IN: HDMI 19-pin × 1 (Deep Color, compatible with HDCP), audio signal: Linear PCM (Sampling frequency: 48 kHz/44.1 kHz/32 kHz) Display Port IN: Display Port 20-pin × 1 (Display Port 1.1, compatible with HDCP), audio signal: Linear PCM (Sampling frequency: 48 kHz/44.1 kHz/32 kHz)
Operating environment	Operating temperature: 0 °C–45 °C (32 °F–113 °F)*10, operating humidity: 10 %–80 % (no condensation)

SWITCHER

VGA switchers with two, four, six, or eight inputs. They are designed for applications where multiple high resolution computer video or HDTV component video signals must be switched to one or two displays. The eight input SW VGA switcher offers dual buffered video and audio outputs, which eliminates the additional cost of a VGA and audio distribution amplifier for dual-display applications. The SW VGA Series switchers are ideal for small to mid-sized applications where high resolution switching is needed.

SW VGA Series switchers feature auto-input switching, input signal sensing, and active PC audio buffering. Auto-input switching automatically switches to the highest-numbered input with an active video signal eliminating the need for manual switching. Input signal sensing detects which inputs have an active input signal and sends this input confirmation through the RS-232 port to the control system. SW VGA switchers offer active PC audio buffering, which converts unbalanced PC audio to balanced, line level signals, eliminating noise over long cable runs. They accept PC audio on 3.5 mm mini stereo jacks for fast, easy connection with pre-terminated VGA and audio cables. Balanced or unbalanced audio is outputted on captive screw connectors.

Control options for all SW VGA switchers include front panel, RS-232, and an optional IR 102 handheld remote control. Two, four, and six input switchers in this series also feature contact closure remote control. All of the SW VGA models are housed in 1U, rack-mountable metal enclosures for easy integration into new or existing AV environments.

Features

Inputs: Two, four, six, and eight input models with 15-pin HD connectors; 3.5 mm stereo mini jacks for audio

Output: 15-pin HD connector for video; captive screw connector for audio

350 MHz (-3 dB) RGB video bandwidth

Compatible with VGA-QXGA and HDTV component video signals

ID bits from input 1 are routed to the primary output

Dual buffered outputs, eight-input switcher only — eliminates the additional cost of a VGA and audio distribution amplifier for dual-display applications.

Switches balanced and unbalanced stereo audio

Active PC audio buffering — Converts unbalanced PC audio to balanced, line level signals, eliminating noise over long cable runs.

Compatible with VSW I AAP — the optional VSW I AAP provides remote input connection and selection, which is useful in multiple-participant presentation environments.

Auto-input switching — automatically switches to the highest-numbered input with an active video signal.

RS-232 control

Contact closure remote control — two, four, and six input switchers only

IR control — The SW VGA Series switchers can be conveniently controlled via IR remote control with the optional Exton IR 102 kit.

Rack-mountable 1U or 2U metal enclosure

9. Digital AM/FM Tuner

The digital AM/FM tabletop and rack mount design with aluminum alloy panel. It shall have clearly visible LDC display, microcomputer control and touch-button operation. FM/AM two band receive option, FM receiving frequency 76MHz – 108MHz, AM receiving frequency 520Hz – 1708 KHz. Radio frequency automatic search and memory function, memory up to 99 bands and a power off memory functions. Using vehicle dedicated digital radio module, integrated radio tuner module, with a small size good performance and strong anti – interference etc.

Built in High fidelity wideband monitor Speaker, Sound full and clear, and a monitor with adjustable volume knob

Technical Specifications:

- Power Supply 220V/50Hz
- Power Consumption 8W
- 1 Channel audio signal left and right channel output

Cable Cubby:

Smart solution for conference table • Convenient access of different types of cables • Hydraulic Mechanism is used • Self fitting clamp easy to install • Available in Rectangular shape

• Available in Black / White anodized Top Surface

Below features should be available min.

VGA, HDMI, AUDIO, VIDEO, USB, SWITCH, LANx2, POWERx1

10. CD/DVD Player

The CD/DVD player shall be capable playing MP3 audio tracks from USD or DVD or CD.

Technical Specifications:

- D/A converter 24 bit, 192 kHz
- Frequency response 30-20000 Hz

- Signal to noise ratio > 90
- Distortion and Noise (1kHz)> 65 dB
- Crosstalk (1kHz)> 70 dB
- Dynamic Range (1kHz)> 80 dB
- Sound System Dolby Digital
- Playback Media
 - CD
 - MP3-CD
 - MP3-DVD
 - WMA-CD
 - CD-R/RW
 - Audio CD
- Compression format
 - MP3
 - Dolby Digital
 - PCM
 - WMA
- MP3 bit rates
 - 32 - 320 kbps

11. 19" Rack

The equipment shall be housed in a standard rack of suitable height, with Plexiglas door or metal mesh and lock. Ventilation panels of 1U height shall be provided between each item of equipment.

Details of the proposed equipment shall be forwarded to the Consultant with performance specifications, dimensions, construction and finish for approval.

Rack should comply with ANSI/EIA RS-310-D; DIN41491; DIN41494; IEC297-2; and GB/T3047.2-92.

The Rack should have DIN Rail Mounted Terminal Blocks for termination of Speaker Zone cables on the rear.

All cables coming from Speaker zones, Call Stations, Power supply should enter from Bottom. Rack should be installed at location which has minimum 600mm space from front & back for accessing it easily.

Rack should be installed in well ventilated room preferable Air conditioned. The unit should have Fans from top.

The unit should have Lockable Glass door at front

Dimensions

- Height as per the Quantity of PA Processor & Amplifiers
- Depth 600mm Deep
- Width 19"

12. Speaker Cables

All cables associated with PA system shall be of following specifications:

The 2 core speaker cable will be connected to the speakers by screw terminals before which it shall be crimped using 1.5 sq. mm. bootlace lugs. Care has to be taken for avoiding any single strand of wire shall not come out of Lug & screw terminals to avoid noise & leakage.

Speaker cables used should be Multi-conductor Stranded type

Flexible Copper Conductor of cross section 1.5 Sq. mm / 2.5 Sq. mm insulated, PVCFRLS sheathed control Cable as per IS 694.

These Cables shall be laid in G.I. Conduits concealed/surface.

13. Call Station Cables

Call station cables should be 4pair CAT6 STP (Shielded Twisted Pair) type, It should be crimped by RJ45 Shielded Male Connectors.

14. Approved Makes

- Televic
- HEINRICH UK
- Xavtel USA

15. Testing PA system

Sr. No.	Description	Visual	Test Readings	Documentation
1	All cables are tested for continuity, insulation, resistance etc.			√
2	System installation proper as per drawing	√		
3	Carry out visual checks on all speakers & Processors are free from any mechanical damage, cables, inter phase modules etc.to ensure they are properly installed.	√		
4	Check for proper termination of bootlace lugs & feruling	√		
5	Check Input A/C Supply Voltage		√	
6	Check location / spacing of loudspeakers as in drawing.	√		√
7	Check Distribution of Zones as per Drawing.	√		√
8	Check full load speaker sound quality & measure Sound pressure level (SPL) in dB.	√	√	
9	Check if local loudspeakers overrides by voice messages in case of emergency evacuation.	√		√
10	If power fails, whether Voice evacuation system is working on battery supply if yes for what time		√	
11	Check if recorder messages are CLEAR, free from any noise distortion & easy to understand with Room acoustic speech transmission Index (RaSTI) value >0.5.	√	√	
12	Processor LED's and all keys are working properly	√		
13	Check for Microphone locations & the sensitivity by paging	√		√
14	Play a soft music & check sound quality	√		

Specifications For Fire Fighting and Detection

Specifications for Fire Fighting and Detection

A. General Fire Alarm System Description

- 1) Fire detection and Alarm System shall consist of Fire Alarm Control Panels, various types of equipments like Detectors, hooters, Strobes, monitor & control modules, Repeater panel, and different types of cables located at various strategic locations of the building.
- 2) In case of a Fire alarm initiation by an alarm initiating device, the audio-visual fire alarm shall be generated at the respective Fire Alarm Control Panels and at Repeater panel located in the Control Room, various location and also initiate signal to operate hooters located in various locations.
- 3) All types of addressable detectors/ interface units shall be compatible with the fire alarm panel.
- 4) All the alarm initiating devices that are asked for to be self addressable type shall be of self addressable type. In case of non addressable detectors the detector status shall be monitored through a Conventional Zone Interface Module (CZIM) to send the analogue information available from the detector to FACP. The BIDDER shall clearly indicate what are all the device/ detectors which are not self addressable in type and shall include CZIM module to make that device/ detector addressable. The CZIM module cost shall also be considered as included in the detector cost.
- 5) The detector shall be suitable to connect to the control unit via a four wire circuit (Class –A wiring) as per NFPA.
- 6) The Fire Alarm System envisaged for this Building is “2-WireAnalogAddressable” type.
- 7) The communication between detectors and the FACP is by means of digital communication over 2-wire, which further provides power to the detectors, devices & Sounders. There shall be A/D and D/A conversion happening inside the detectors and FACP.
- 8) All the detectors shall be incorporated with microprocessors and shall be provided with Analog to Digital Converter (ADC), which enables the detector to provide linear output corresponding to the quantity of smoke or fire, the detector encounters.
- 9) All types of detectors offered will be of restorable type i.e. suitable for operating afresh after each actuation on alarm without replacement or adjustment.
- 10) The sensitivity of each sensor shall be individually adjusted from the FACP to suit the condition so each location. Each detector shall have self-test facility, which is monitored in the FACP. Each detector shall have drift compensation.
- 11) The response sensitivity shall also be field adjustable and not only from fire panel over a wide range to suit site conditions. It shall be possible to test the sensitivity of a detector in the field. The sensitivity/ threshold value of detectors which are cross zoned must be compatible.
- 12) The FACP shall also check each sensor for contamination of dust/ dirt and give signal for

“Service” in case of accumulation of dust/ dirt reaches a preset limit.

- 13) The fire alarm system shall work without any problem both in networked mode and in standalone mode.
- 14) The electronic circuit shall be of solid state and of safe design and virtually hermetically sealed to have resistance to humidity and corrosion and to prevent its operation from being impaired by dust and dirt.
- 15) The circuit shall be protected against usual electrical transients, electromagnetic and electro static interference (EMI&RFI) present in the Building.
- 16) Reverse polarity or fault in the field wiring shall not damage the detector.
- 17) No moving parts subject to wear & tear shall be provided.
- 18) All types of detectors & devices offered shall have a inbuilt fault isolator. The fire detectors shall be plug in type. Suitable locking device shall be supplied alongwith each detector. It shall be inserted into or removed from the standard base by simple push twist mechanism to facilitate easy exchange/ cleaning and maintenance.
- 19) The system shall have following self diagnostic features:
 - Detector cabling shall be completely supervised or open circuit and short circuit and exact location of fault shall be displayed in the panel under Trouble/Faults.
 - Unauthorized removal of a detector head from its base shall be supervised to give an alarm on the connected control panel.
 - Annunciation shall be provided for DC fuse blown and loss of main AC supply etc.
 - Alarm verification features.

B. Analogue Addressable Fire Alarm Control Panel (FACP)

The FACPs used in the Building shall confine to the EN54 standards having the following features:

Features

- 1) All the FACPs provided shall have the capacity to expand from 1 to 32 loops for Future expansion.
- 2) Each loop shall accommodate maximum 254 detectors and devices in any combination with a loop length capable up to 1.6 kms with 2C x 1.5 sqmm cable.
- 3) It shall have facility to discriminate between a real fire alarm and false alarms.
- 4) FACP will function as fully stand-alone panel & also networked too their FACP switch peer to peer communication.

- 5) Each FACP shall have a possibility of accommodating redundant controller to takeover in case of a Failure in the Primary Controller and also redundant loop card for each loop to takeover in case of a Failure in the Primary Loop Card.
- 6) Each FACP shall have inbuilt LCD colour touch screen (320*240 pixels) to clearly indicate the location of fire, type of device activated other indications like service requirement of a component, etc.
- 7) It shall have a provision for battery storage.
- 8) In case of a Loop Card Failure, the FACP shall allow to replace the Loop card without switching off the panel and reprogramming.
- 9) The FACP shall have facility such that alteration or access to the stored program shall be done through a pass-code, for protection against unauthorized personnel interference.
- 10) The FACP shall be capable of PA Integration with the use of RS232 module or with the use of relays.
- 11) FACP shall have provision to accept 230V single phase, 50Hz supply.
- 12) All the major components like processor, memory, etc shall be available as spare in case of emergency requirement.
- 13) FACP shall have inbuilt buzzer to alert the personnel in case of maintenance requirement.
- 14) FACP shall be programmed for sequence of events to happen in case of fire like closing of fire dampers, shutting down supply fans for HVAC, Deactivating the access control system and activating the hooters with the help of a control relay module provided near the system to be activated.
- 15) The fire alarm control panel shall be suitable or Class-A type of wiring as per NFPA-72.
- 16) The fire alarm control panel shall work on positive sequence as per NFPA – 72.
- 17) The fire alarm control panel shall be capable of disabling an individual detector, a group and or zone of for building maintenance purposes. Facility shall be provided on the FACP for simulating the fire condition to enable testing of the various alarm circuits.
- 18) All the fire alarm modules (*loop cards, networking cards, and communication card. Etc.*) should be hot pluggable and hot swappable to facilitate easy replacement of faulty modules. All the electronic components shall be compatible to non-air-conditioned environment for working satisfactorily.
- 19) The fire alarm control panel normal power supply failure shall be annunciated audio-visually.
- 20) In case of multiple alarms the multiple alarm indication shall be ON. The multiple alarm indication shall be displayed in chronological order.
- 21) FACP shall have the facility such that each detector can be identified as a separate zone.

- 22) The FACP shall be reset only by authorized users after the clearance of a fault.
- 23) Whenever there is a third party actuation to happen, like closing of fire dampers, switching off supply/ exhaust units etc, the actuation shall happen only when the fire signal is received from two different initiating devices located in a zone connected to different fire alarm panels. The communication between the FACP's shall happen with two pair cables and the fire alarm status of one panel shall be communicated to the second panel in which the control relay module of the third party devices connected to. Inter panel communication is a must and needs to be provided for controlled actuations. All the necessary systems to ensure reliable communications between panels are to be built in to the FACP's.
- 24) FACP shall have the facility to silence / acknowledge/ reset the alarm. Apart from the FACP, Repeater panel present in the control room shall have the facility to silence/ acknowledge/ reset the alarm of all FACP's.
- 25) The FACP shall have **FALSE ALARM REDUCTION** algorithms like
- Alarm Verification, Dual Detector/Group Dependency, and Intermediate Alarm Storage to eliminate False alarms due to Dirt/Dust/Disturbance values.
 - EMC/EMI Monitoring - To inform the possibility of a false alarm caused due to interferences from sources such as Motors, power cables, Wi-Fi routers, fluorescent lamps, network switches, mobile signals...etc. The panel shall display the EMI/EMC Current and Average Values reported by the detector. The User/Installer shall have access to this reading during Maintenance (with password protection).
- 26) When fire condition is confirmed, the following sequence of annunciation will take place on the FACP:

Alarm Condition	Audible Alarm	Visual Alarm
First Fire Condition	ON	ON FLASHING/ Description of area of fire origin with detector type
Acknowledge (First Alarm)	OFF	ON STEADY
New Fire Alarm Condition (after acknowledge of First alarm)	ON	ON FLASHING
Acknowledge (New fire alarm)	OFF	ON STEADY
Back to normal	OFF	ON STEADY
Reset	OFF	OFF
Reset Before Normal	OFF	ON STEADY

Construction details

- 1) The FACP shall have an ingress protection of at least IP – 30.

- 2) The housing containing the fire alarm control panel shall be of 2 mm thick steel construction finished in colour as per relevant standard.
- 3) It shall be capable of being surface, semi-flush or fully flush mounted with additional bezel. The fully flush bezels shall be painted to specification, stainless steel or brass as required.
- 4) The FACP's shall be provided with triplicate earthing terminals on the either side. The grounding terminal G1 shall be for safe type grounding, G2 shall be for shield grounding and G3 shall be for signal grounding.
- 5) The panel shall be completely factory wired, absolutely ready-in all respects for installation at site and termination of all external cabling. The internal wiring of the panel shall be carried out with 650V grade, stranded copper wires of size rated for the current in the corresponding circuit. The minimum size of the wire shall not be less than 0.8sq.mm for electronic circuits and 1.5 sq.mm for electrical circuits & 16SWG for grounding.
- 6) All the wiring shall be done using ferrules having indelible marking.
- 7) Cable entry for the FACP from the bottom.
- 8) FACP shall mount in wall.

CPU

- 1) The FACP shall have a process or which shall be of at-least 32 bit, which shall be designed to accept all the inputs and process the outputs within the time stipulated by the standards.
- 2) A redundant CPU shall be provided with the same configuration which shall be made as hot standby incase of failure of the main CPU, the standby shall take over without the system.
- 3) The CPU shall have the facility to communicate with other FACP's and process the fire signals received from other FACP's to actuate third party device.
- 4) The capacity of the processor shall be adequately designed include all input/ output signals and various functional requirements.
- 5) The processor shall be designed in such a way that the parameters in the repeater panels shall be refreshed in 1 sec.
- 6) It shall have its own, built in advanced microprocessor, sophisticated software and extensive memory for storing the logs of alarms, times and action taken report.

C. Loop Modules

The loop module shall have a microprocessor inbuilt & shall be capable of handling 254 detectors/devices in any combination.

It shall have a line length up to 1600m or 3000m depending upon the configuration & cable type.

It shall have an LED test button.

The loop module shall be encapsulated & shall be hot pluggable.

The front fascia of the loop cards shall be visible for easy identification of faults.

In case of the failure of loop card, it should be replaced without the need of any additional programming.

D. Repeater Panels

- 1) It shall be a LCD touch screens same as main panel. The MMI shall be the same as the main Controller.
- 2) Repeater panels shall be suitable for Wall mounting which will be displayed all the major entrances and staircases which will enable the staff and fire fighting personnel to exactly locate the fire.
- 3) It shall be compatible to receive data from FACP's.
- 4) Audio visual Alarms during fire shall be generated in case of fire.
- 5) It shall connect to any of the Fire Panels in the Network using a 2 core – 1.5 sq.mm wire.
- 6) The Power supply to the Repeater Panel shall be drawn from the nearest Fire Panel and also be supervised by the Main Panel.
- 7) The Repeater Panel shall display Messages like Alarm & Fault similar to the Main Panel and shall be accessed only by Authorized Users through a passcode.
- 8) The Repeater Panel shall be connected to the Main Panel and other repeater panels in such a way – 1 pt Failure in the cable shall not affect the performance and shall intimate the exact location of failure in all Panels.
- 9) The Repeater Panel shall be equipped with a Key switch that allows Authorized users to Acknowledge/Reset Alarms.
- 10) The Repeater Panel shall be equipped with 2 different power inputs. On failure of primary power, the secondary shall take over.
- 11) The Repeater panel shall allow the users to login locally or login to the remote FACP.
- 12) The Repeater panel shall allow to create users with different access levels locally and shall also allow users of panels to login based on access levels.
- 13) The repeater panels shall integrate with the main panels without any additional interface or the bidder shall consider necessary accessories required to complete the system and quote as part of this model.

E. Intelligent Addressable Dual Optical Smoke/Heat (Multisensor) Detector

The Intelligent Addressable Multi sensor Detector with 2 LED's-Infrared & Blue used in this Building shall confine to the relevant standards having the following features:

- 1) It shall be combination of Smoke detection and heat detection. The smoke detection system shall work on Light scattering type principle using Infrared & Blue Led's, and the Heat detection system shall be of Rate of rise of temperature and Fixed Temperature.
- 2) The Intelligent Addressable Multi sensor Detector shall be of Spot type and Addressable type.
- 3) The Intelligent Addressable Multi sensor Detector shall be addressed either by DIP switches or through Programming from the Panel.
- 4) The Detector shall monitor EMC/EMI values in the surroundings on a continuous basis and report the current & average values to the panel. The detector and the panel shall together avoid the possibility of false alarm caused due to interferences from sources such as Motors, power cables, Wi-Fi routers, fluorescent lamps, network switches, mobile signals etc.
- 5) All the detectors shall have a visible multi-color LED to indicate the healthiness/ trouble/ alarm condition of the detector. The LED shall be located in such a way that it shall be visible from all the 360 degree from below. In some cases where the visibility of the detector is obstructed by cable trays, false ceiling etc. Facility for connecting the detector to a response indicator has to be present. The response indicator derives the power to glow from the loop.
- 6) It shall possess False alarm immunity and a superior signal to noise ratio.
- 7) It shall have a Built in signal processor.
- 8) It shall be within built fault isolators. (Detectors without Inbuilt Isolators may be considered with separate Isolator Base)
- 9) It shall have drift compensation facility built in.
- 10) The detectors shall communicate the ambient reading to the FACP on time to time basis, and the FACP shall make the decision about the current status of the detector, whether it is in fire /pre-alarm/ maintenance requirement etc.
- 11) The detector shall have at least 15 levels of sensitivity settings based on the application and room where it is installed.
- 12) The detector shall provide a chamber maid plug to blow out the dust/dirt using a blower.
- 13) In case of a failure, panel shall allow to replace the detector with the same type without the need of additional programming.
- 14) The detector shall be programmed to work as Optical only or Thermal only detectors. It shall a provision to switch off any component (optical or thermal) of the detector.

- 15) The detector shall work with 2 different sensitivity settings at any point of time and the User shall have access to choose the desired settings without programming or Laptop/PC for configuration.
- 16) The detector shall change sensitivity settings based on day/night mode or with schedules based on the programming.
- 17) The detector shall have Intermediate Alarm Storage, Dual Detector Dependency, Dual group Dependency features that shall be programmed based on site application.
- 18) The detector shall be capable of detecting both smoldering fires and open fires and shall be EN54 / VdS approved.

F. Intelligent Addressable Optical Smoke/ Heat (Multi sensor) Detector

The Intelligent Addressable Multi sensor Detector used in this Building shall confine to the relevant standards having the following features:

- 1) It shall be combination of Smoke detection and heat detection. The smoke detection system shall work on Lights catering type principle using Infrared and the Heat detection system shall be of Rate of rise of temperature and Fixed Temperature.
- 2) The Intelligent Addressable Multi sensor Detector shall be of Spot type and Addressable type.
- 3) The Intelligent Addressable Multi sensor Detector shall be addressed either by DIP switches or through Programming from the Panel.
- 4) The Detector shall monitor EMC/EMI values in the surroundings on a continuous basis and report the current & average values to the panel. The detector and the panel shall together avoid the possibility of false alarm caused due to interferences from sources such as Motors, power cables, Wi-Fi routers, fluorescent lamps, network switches, mobile signal etc.
- 5) All the detectors shall have a visible multi-color LED to indicate the healthiness /trouble/ alarm condition of the detector. The LED shall be located in such a way that it shall be visible from all the 360 degree from below. In some cases where the visibility of the detector is obstructed by cable trays, false ceiling etc. Facility for connecting the detector to a response indicator has to be present. The response indicator derives the power to glow from the loop.
- 6) It shall possess False alarm immunity and a superior signal to noise ratio.
- 7) It shall have a Built in signal processor.
- 8) It shall be with inbuilt fault isolators. (Detectors without Inbuilt Isolators may be considered with separate Isolator Base).
- 9) It shall have drift compensation facility built in.

- 10) The detectors shall communicate the ambient reading to the FACP on time to time basis, and the FACP shall make the decision about the current status of the detector, whether it is in fire/ pre-alarm/ maintenance requirement etc.
- 11) The detector shall have at least 15 levels of sensitivity settings based on the application and room where it is installed.
- 12) The detector shall provide a chamber maid plug to blow out the dust/dirt using a blower.
- 13) In case of a failure, panel shall allow to replace the detector with the same type without the need of additional programming
- 14) The detector shall be programmed to work as Optical only or Thermal only detectors. It shall a provision to switch off any component (optical or thermal) of the detector.
- 15) The detector shall work with 2 different sensitivity settings at any point of time and the User shall have access to choose the desired settings without programming or Laptop/PC for configuration.
- 16) The detector shall change sensitivity settings based on day/night mode or with schedules based on the programming.
- 17) The detector shall have Intermediate Alarm Storage, Dual Detector Dependency, Dual group Dependency features that shall be programmed based on site application.
- 18) The detector shall be capable of detecting both smoldering fires and open fires and shall be EN54 /VdS approved.

G. Intelligent Addressable Dual Optical Smoke Detector with 2 LED's-Infrared & Blue

The Intelligent Addressable Photo electric smoke Detector with 2 LED's-Infrared & Blue used in this Building shall confine to the relevant standards having the following features:

- 1) The smoke detection system shall work on Light scattering type principle using Infrared & Blue Led's.
- 2) The Intelligent Addressable smoke Detector shall be of Spot type and Addressable type.
- 3) The Intelligent Addressable Smoke Detector shall be addressed either by DIP switches or through Programming from the Panel.
- 4) The Detector shall monitor EMC/EMI values in the surroundings on a continuous basis and report the current & average values to the panel. The detector and the panel shall together avoid the possibility of false alarm caused due to interferences from sources such as Motors, power cables, Wi-Fi routers, fluorescent lamps, network switches, mobile signal etc.
- 5) All the detectors shall have a visible multi color LED to indicate the healthiness / trouble/ alarm condition of the detector. The LED shall be located in such a way that it shall be visible from all the 360 degree from below. In some cases where the visibility of the detector is obstructed by cable trays, false ceiling etc. Facility for connecting the detector

to a response indicator has to be present. The response indicator derives the power to glow from the loop.

- 6) It shall possess False alarm immunity and a superior signal to noise ratio.
- 7) It shall have a Built in signal processor.
- 8) It shall be with inbuilt fault isolators. (Detectors without Inbuilt Isolators may be considered with separate Isolator Base)
- 9) It shall have drift compensation facility built in.
- 10) The detectors shall communicate the ambient reading to the FACP on time to time basis, and the FACP shall make the decision about the current status of the detector, whether it is in fire/ pre-alarm/ maintenance requirement etc.
- 11) The detector shall have at least 3 levels of sensitivity settings based on the application and room where it is installed.
- 12) The detector shall provide a chamber maid plug to blow out the dust/dirt using a blower.
- 13) In case of a failure, panel shall allow to replace the detector with the same type without the need of additional programming
- 14) The detector shall work with 2 different sensitivity settings at any point of time and the User shall have access to choose the desired settings without programming or Laptop/PC for configuration.
- 15) The detector shall change sensitivity settings based on day/night mode or with schedules based on the programming.
- 16) The detector shall have Intermediate Alarm Storage, Dual Detector Dependency, Dual group Dependency features that shall be programmed based on site application.
- 17) The detector shall be capable of detecting both smoldering fires and open fires and shall be EN54 /VdS approved.

H. Intelligent Addressable Optical Smoke Detector

The Intelligent Addressable Photo electric smoke Detector with Infrared LED used in this Buildingshallconfinetotherelevantstandardshavingthefollowingfeatures

- 1) The smoke detection system shall work on Light scattering type principle using Infrared Led's.
- 2) The Intelligent Addressable smoke Detector shall be of Spot type and Addressable type.
- 3) The Intelligent Addressable Smoke Detector shall be addressed either by DIP switches or through Programming from the Panel.

- 4) The Detector shall monitor EMC/EMI values in the surroundings on a continuous basis and report the current & average values to the panel. The detector and the panel shall together avoid the possibility of false alarm caused due to interferences from sources such as Motors, power cables, Wi-Fi routers, fluorescent lamps, network switches, mobile signal etc.
- 5) All the detectors shall have a visible multi color LED to indicate the healthiness/ trouble/ alarm condition of the detector. The LED shall be located in such a way that it shall be visible from all the 360 degree from below. In some cases where the visibility of the detector is obstructed by cable trays, false ceiling etc. Facility for connecting the detector to a response indicator has to be present. The response indicator derives the power to glow from the loop.
- 6) It shall possess False alarm immunity and a superior signal to noise ratio.
- 7) It shall have a Built in signal processor.
- 8) It shall be with inbuilt fault isolators. (Detectors without Inbuilt Isolators may be considered with separate Isolator Base)
- 9) It shall have drift compensation facility built in.
- 10) The detectors shall communicate the ambient reading to the FACP on time to time basis, and the FACP shall make the decision about the current status of the detector, whether it is in fire/ pre-alarm/ maintenance requirement etc.
- 11) The detector shall have at least 3 levels of sensitivity settings based on the application and room where it is installed.
- 12) The detector shall provide a chamber maid plug to blow out the dust/dirt using a blower.
- 13) In case of a failure, panel shall allow to replace the detector with the same type without the need of additional programming
- 14) The detector shall work with 2 different sensitivity settings at any point of time and the User shall have access to choose the desired settings without programming or Laptop/PC for configuration.
- 15) The detector shall change sensitivity settings based on day/night mode or with schedules based on the programming.
- 16) The detector shall have Intermediate Alarm Storage, Dual Detector Dependency, Dual group Dependency features that shall be programmed based on site application.
- 17) The detector shall be capable of detecting both smoldering fires and open fires and shall be EN54 /VdS approved.

I. Intelligent Addressable Heat Detector

The Intelligent Addressable Heat Detector used in this Building shall confine to the relevant standards having the following features:

- 1) The Heat detection system shall be of Rate of rise of temperature and Fixed Temperature.
- 2) The Heat Detector shall be of Spot type and Addressable type.
- 3) The Heat Detector shall be addressed either by DIP switches or through Programming from the Panel.
- 4) The Detector shall monitor EMC/EMI values in the surroundings on a continuous basis and report the current & average values to the panel. The detector and the panel shall together avoid the possibility of false alarm caused due to interferences from sources such as Motors, power cables, Wi-Fi routers, fluorescent lamps, network switches, mobile signal etc.
- 5) All the detectors shall have a visible multi-color LED to indicate the healthiness/ trouble/ alarm condition of the detector. The LED shall be located in such a way that it shall be visible from all the 360 degree from below. In some cases where the visibility of the detector is obstructed by cable trays, false ceiling etc. Facility for connecting the detector to a response indicator has to be present. The response indicator derives the power to glow from the loop.
- 6) It shall possess False alarm immunity and a superior signal to noise ratio.
- 7) It shall have a Built in signal processor.
- 8) It shall be with inbuilt fault isolators. (Detectors without Inbuilt Isolators may be considered with separate Isolator Base)
- 9) It shall have drift compensation facility built in.
- 10) The detectors shall communicate the ambient reading to the FACP on time to time basis, and the FACP shall make the decision about the current status of the detector, whether it is in fire/ pre-alarm/ maintenance requirement etc.
- 11) In case of a failure, panel shall allow to replace the detector with the same type without the need of additional programming
- 12) The detector shall work with 2 different sensitivity settings at any point of time and the User shall have access to choose the desired settings without programming or Laptop/PC for configuration.
- 13) The detector shall change sensitivity settings based on day/night mode or with schedules based on the programming.
- 14) The detector shall have Intermediate Alarm Storage, Dual Detector Dependency, Dual group Dependency features that shall be programmed based on site application.
- 15) The detector shall be capable of detecting both smoldering fires and open fires and shall be EN54 /VdS approved.

J. Intelligent Addressable Ultra flat Invisible Smoke Detector

The Intelligent Addressable Invisible Ultra flat smoke Detector with 2 Nos. of Optical sensors and a Pollution sensor shall conform to the relevant standards having the following features:

- 1) The detector can be installed in areas with high aesthetic requirements and the possibility of color toning. In addition the detectors are suitable for areas with heightened dust exposure.
- 2) Smooth, easily cleanable detector surface.
- 3) There should not be any optical chamber inside the smoke detector and the detector should not be projected down from the ceiling.
- 4) Detector should be Ultra slim design and lies flush with the ceiling, which does not destroy the appearance of attractive rooms.
- 5) Quick, easy insertion and exchange of detectors (click and lock principle).
- 6) Easily-visible two-color LED for display of alarm, trouble and test mode. The control of an external detector alarm display should be possible.
- 7) Should have integrated isolators, so that loop will continue to function in case of wire interruption or short circuit of a detector.
- 8) Programmable sensitivity i.e. can be adjusted to the area of operation.
- 9) Automatic or manual address allocation with or without auto-detection via integrated rotary switches.
- 10) A pre-alarm is signaled when 50 % of alarm threshold is reached (indicator in the event database of the fire panel).
- 11) The EMC security fulfills the guidelines according to VdS 2110 as well as UL 268.
- 12) The smoke detection system shall work on Light scattering type principle using Dual detection sensors.
- 13) The LED's inside the detectors transmit the light at a defined angle into the light scattering area. In case of fire, the light is scattered by the smoke particles and strikes the photo diodes (2), which transform the quantity of light into a proportional electrical signal.
- 14) The various light-emitting and photo diodes of the sensor are individually controlled by the detector electronics. Consequently, signal combinations are produced that are independent of each other and ideally suitable for the detection of smoke, which makes it possible to differentiate between smoke and interference agents (insects, objects). In addition, the time characteristics and the correlation of the optical sensor signals for the fire or interference detection are evaluated.
- 15) The contamination level on the detector surface is continually measured by the pollution sensor; the result is evaluated and indicated in three stages on the fire panel.

Contamination of the detector surface leads to active adaptation of the threshold (drift compensation) and to a fault indication in the case of heavy contamination.

- 16) Interference effects from daylight and commercial lighting sources should be filtered out with an optical daylight filter and by the use of electronic filtering and phase-locked rectification (ambient light stability: glare test DIN EN 54-7).
- 17) The detector shall have Intermediate Alarm Storage, Dual Detector Dependency, Dual group Dependency features that shall be programmed based on site application.

K. Addressable Ventilation Duct Smoke Detectors

The detector shall have housing for accommodating a special detector that detects smoke in ventilation ducts, with input and output for air sample extraction, streamlined connection pipes for optimum air flushing of the detector, with dust-proof connection board for the loop outside the air flow, with air intake and exhaust pipe, seals and the required installation material

The Duct smoke Detector used in this Building shall confine to the relevant standards having the following features:

- 1) The smoke detection system shall work on Light scattering type principle using Infrared. The detector shall better false alarm immunity and shall have a processor inbuilt with ISP.
- 2) Duct Detector shall be Addressable type.
- 3) The Dual Detector shall be loop powered and addressed either by DIP switches or through Programming from the Panel.
- 4) All the detectors shall have a visible multi-color LED to indicate the healthiness/ trouble/ alarm condition of the detector. The LED shall be located in such a way that it shall be visible from all the 360 degree from below. In some cases where the visibility of the detector is obstructed by cable trays, false ceiling etc. Facility for connecting the detector to a response indicator has to be present. The response indicator derives the power to glow from the loop.
- 5) It shall possess False alarm immunity and a superior signal to noise ratio.
- 6) It shall have a Built in signal processor.
- 7) It shall be with inbuilt fault isolators. (Detectors without Inbuilt Isolators may be considered with separate Isolator Base)
- 8) It shall have drift compensation facility built in.
- 9) The detectors shall communicate the ambient reading to the FACP on time to time basis, and the FACP shall make the decision about the current status of the detector, whether it is in fire/ pre-alarm/ maintenance requirement etc.
- 10) The detector shall have at least 3 levels of sensitivity settings.
- 11) The detector shall provide a chamber maid plug to blow out the dust/dirt using a blower.

- 12) In case of a failure, panel shall allow to replace the detector with the same type without the need of additional programming
- 13) The detector shall work with 2 different sensitivity settings at any point of time and the User shall have access to choose the desired settings without programming or Laptop/PC for configuration.
- 14) The detector shall change sensitivity settings based on day/night mode or with schedules based on the programming.
- 15) The detector shall have Intermediate Alarm Storage, Dual Detector Dependency, Dual group Dependency features that shall be programmed based on site application.
- 16) The detector shall have Air intake and exhaust pipe , extendable upto 3m
- 17) The detector shall have necessary filters in the air intake and exit pipes.
- 18) The detector considered shall be a special detector designed for Duct applications and not a Spot type Optical detector.
- 19) The detector shall be EN54 /VdS approved.

L. Manual Call Points

The Manual call points (MCP) used in the building shall confine to the relevant standard having the following features:

- 1) Manual call points shall be of Double action - break glass type with Push Button.
- 2) The mounted arrangement shall be such that it can be either surface mounted or flush mounted.
- 3) Each addressable MCP will comprise of an electronic circuit built in addressing capability.
- 4) The MCPs shall be provided with in built fault isolator. (the bidder shall consider a external isolator if not inbuilt)
- 5) The MCP shall have a LED to indicate Alarms
- 6) The MCP shall be EN54/ VdS approved

M. Control relay module (CRM)

The Control Relay Modules used in this Building shall confine to the relevant standards having the following features:

- 1) The CRM shall provide a dry potential contact / provide activating a variety of auxiliary devices and other fire fighting/ ventilation equipment.

- 2) The CRM shall have in built fault isolator module. (bidder shall consider external isolators if not inbuilt)
- 3) It shall have a capability of handling at least 1A @ 30VDC to integrate with third party system.
- 4) The CRM shall be addressable either by Dip switch or by the Panel.
- 5) The CRM shall be loop powered and shall be EN54/ VdS approved.

N. Monitor Module (Input module) (MM)

The Monitor Modules used in this Building shall confine to the relevant standards having the following features:

- 1) The MM shall provide 2 inputs and these inputs shall work independently to monitor 3rd party devices and shall allow to program with different parameters.
- 2) The MM shall have in built fault isolator module. (bidder shall consider external isolators if not inbuilt)
- 3) The MM shall be programmed to monitor contacts, Voltage and EOL resistor as per site applications.
- 4) The MM when programmed to monitor contacts shall also allow to program to monitor either open/close contacts.
- 5) The MM shall be addressable either by Dip switch or by the Panel.
- 6) The MM shall be loop powered and shall be EN54/ VdS approved.

O. Addressable interface (Conventional Zone Interface module - CZIM)

The CZIM Modules used in this building shall confine to the relevant standard shaving the following features:

- 1) Addressable interface units will be provided for all non-addressable detectors/ devices such as **beam detectors or to integrate existing conventional detectors, etc.** to assign an address to such detectors and to be compatible with addressable FACP.
- 2) Each conventional detector will have its own addressable unit in the form of CZIM Modules for individual address. The addressable unit will facilitate connection of non-addressable detectors in the same circuit/ loop consisting of addressable detectors.
- 3) It shall supervise the circuit of open dry contact /IP device & signal alarms during change of state of detectors.
- 4) The interface device shall have an LED, which flashes during polling of the FACP.

- 5) It shall have in built fault isolator module or the bidder shall consider additional isolator modules.
- 6) The CZIM shall be capable of powering the Detectors through the Aux Source and shall supervise the cable, aux power and the external power supply. The CZIM shall communicate Faults and Troubles related to Detector, Power supply to the Panel.
- 7) The CZIM shall allow to reset conventional detectors from the panel.
- 8) The CZIM shall offer 2 separate zones, 2 Aux power circuits and shall monitor the external power supply and supervise the zone cables.
- 9) The CZIM shall allow Intermediate Alarm Storage, Dual detector & Dual group dependency based on site applications.
- 10) The CZIM shall allow to configure the conventional zones with Different EOL and Alarm resistor based on the existing detector type.
- 11) The CZIM shall either be din rail mount or Surface mount.
- 12) The CZIM shall have the intelligence to detect faults like 4 wire short...etc.
- 13) The CZIM shall be EN54 / VdS approved

P. Beam (Optical Beam)Smoke detector

The Beam detectors used shall confine to the relevant standards having the following features:

- 1) The beam detectors shall having a separate Transmitter (Tx) & receiver (Rx)
- 2) Beam detectors shall be externally powered via Conventional Zone Interface module (CZIM). The module shall supervise the External Power Supply, Aux Power to the Transmitter and Receiver.
- 3) ItwillcommunicatetoFACPthroughaddressableCZIMsothateachdetectorwillhaveindividuala ddress. The CZIM shall have inbuilt fault isolators.
- 4) The beam detector shall be suitable to protect the distance from 10 meters to 100 meters range.
- 5) The beam detectors shall communicate the ambient reading to the FACP on time to time basis, and the FACP shall make the decision about the current status of the detector, whether it is in fire/ pre-alarm/ maintenance requirement etc.
- 6) It shall have provision for Wall/ ceiling mounting.
- 7) Beam detector shall have Response time less than 20 sec.
- 8) The response threshold values, tests shall be as per NFPA72.

It shall have feature such that in case of accidental change of alignment, it shall report an error , it shall raise a maintenance request to the FACP.

Q. Sounder

The Sounder used in this Building shall confine to the relevant standards having the following features:

- 1) The Sounder shall be an Addressable loop powered sounder. (Bidder shall consider external power supply, cable, conduits, modules required for activating externally powered sounders and include the costing as part of the item – Sounders)
- 2) The Sounder shall have in built fault isolator module. (bidder shall consider external isolators if not inbuilt)
- 3) The Sounder shall either be addressed by Dip switch or by the Panel.
- 4) The Sounder shall be placed in the detection loop only and a separate loop or cables for sounders shall not be used
- 5) The sounder shall have a sound pressure level of 90dB and the volume shall be adjusted from the Fire Alarm Panel
- 6) The sounder shall be capable of programming at least 32 different tones for alarm detection in different floors or at different time intervals.
- 7) The sounder shall be tested and maintained with ease from the FACP
- 8) The Volume levels for Testing and Drill shall be programmed as per site conditions.
- 9) The Sounder shall consume a minimal current of <5mA and thus allowing to connect at least 25 loop powered sounders in the same loop.
- 10) The Sounder shall be capable of either accommodating a Flasher or a Detector and shall work as Sounder cum strobe or Sounder cum detector base.
- 11) The Sounder shall have a feature of synchronizing with other sounders in the loop.
- 12) The Sounder shall be loop powered and shall be EN54/VdS approved.

R. Strobe

The Strobe used in this Building shall confine to the relevant standards having the following features:

- 1) The Strobe shall be an Addressable loop powered Strobe. (Bidder shall consider external power supply, cable, conduits, modules required for activating externally powered Strobes and include the costing as part of the item – Strobes)

- 2) The Strobe shall have inbuilt fault isolator module.(bidder shall consider external isolators if not inbuilt)
- 3) The Strobe shall either be addressed by Dip switch or by the Panel.
- 4) The Strobe shall be placed in the detection loop only and a separate loop or cables for Strobe shall not be used
- 5) The Strobe shall have a red flash light and shall flash at minimum of 1Hz
- 6) The Strobe shall be tested and maintained with ease from the FACP
- 7) The Strobe shall also be part of Testing and Drill and shall be programmed as per site conditions.
- 8) The light output shall be at least 2 cd.
- 9) The Strobe shall consume a minimal current of 10mA and thus allowing to connect at least 10 loop powered strobes in the same loop.
- 10) The Strobe shall be capable of either fixing it in a Sounder and shall work as Sounder cum strobe as per site conditions.
- 11) The Strobe shall be loop powered and shall be EN54/ VdS approved.

S. Remote Indicator

The Remote indicator used in this Building shall conform to the relevant standards having the following features:

- 1) The remote indicator is used when the automatic detector is installed in a place hidden or not visible like in closed rooms, false ceilings or walls.
- 2) The remote indicator should be 360° view, for both wall mount and ceiling mount.
- 3) The remote indicator shall be IP 40 rating.

LIST OF PREFERRED MAKES

S.NO	SUBJECT	APPROVED MAKE
1	Addressable Fire alarm Control Panel	Bosch, Siemens, Simplex, UTC, Tyco
2	Addressable Detectors	Bosch, Siemens, Simplex, UTC, Tyco
3	Manual Call Points	Bosch, Siemens, Simplex, UTC, Tyco

4	Sounders/ Strobes	Bosch, Siemens, Simplex, UTC, Tyco
5	Remote Indicators	Bosch, Siemens, Simplex, UTC, Tyco

**Specifications
For
Communication, Building Automation and
Access Control**

Specifications for Communication, Building Automation and Access Control

1. SCOPE :

The specification of Video Surveillance System covers technical specification and requirement of IP Video Surveillance Systems consisting of Indoor IP dome cameras, Indoor IP PTZ cameras, outdoor IP P/T/Z dome cameras, Video Management Software, Recording servers, switches, colour monitor etc for surveillance of the facility from a centralized location.

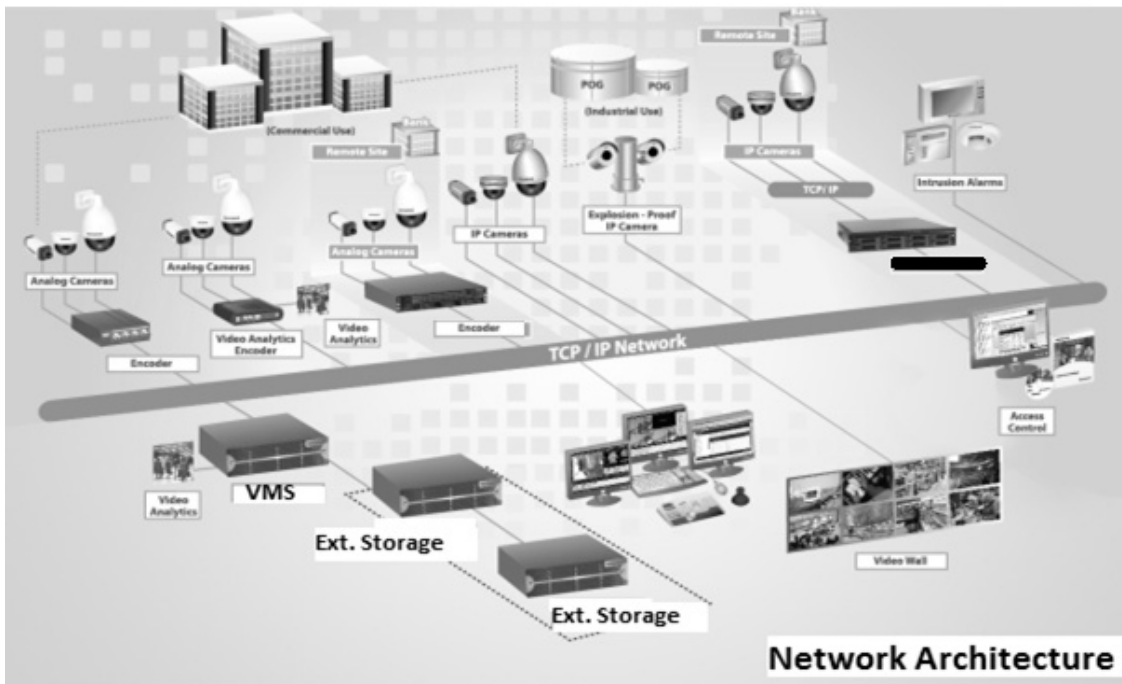
Video Surveillance System shall be an IP enabled system. The recording of the video shall be on an open architecture, non embedded based recorder server from reputed manufacturers like IBM/HP/Dell. The system shall be able to work on a fiber optic backbone network. The entire system shall be based on non proprietary open architecture where the Video Management software can work and integrate with any make of standard cameras and encoders, and IT hardware.

2. SYSTEM DESCRIPTION

- A. The Video Management Software should be a fully digital IP-based video surveillance system licensed for 32 camera channels and atleast 5 client viewing station.
- B. The VMS should work with the latest compression technologies viz MPEG-4 and H.264 and should be capable to interface with IP cameras streaming both compressions.
- C. Video Surveillance System shall consist of indoor, outdoor IP cameras, recording Servers and PC's and associated Ethernet cable, fiber cable, video cable, power cable, twisted pair cable etc. Bidder should consider all necessary network equipment and accessories to provide a LAN / WAN infrastructure dedicated for video surveillance on a fibre optic backbone network which should be not less than 1 Gbps speed.
- D. The software should provide a single GUI that monitors, records, and offers analysis functionality to deliver the timely, accurate information required for effectively responding to any challenge.
- E. The VMS shall have client station software. The client should offer multi-monitor options, and have drag and drop options and the ability to switch any particular camera onto any monitor through drag operation.
- F. It should be possible to set up a video wall from the software.
- G. Each camera shall have a video at 1.3 MP and 25/30 frames per second for viewing the videos during live and D1 @ 25/30 frames per second for recording purpose.

3. SYSTEM ARCHITECTURE

The following diagram explains the relationship of various system and integration components:



4. GENERAL REQUIREMENTS:

- I. Manufactured camera products shall have quality system compliance and shall be UL, CE (EN) and FCC certified.
- II. The Video Management software, NVR, Joystick and Cameras should be of the same make.
- III. All firmware upgrades shall be free of cost. All the IP cameras shall be accessible and programmable from the control room by authorized personnel only.
- IV. Every control room of surveillance system shall be capable of getting connected to the optical or other communication backbone.
- V. The power supply available shall be 220 V / 50 Hz AC +/- 10%. All modules of the surveillance system should work using this power supply only with requisite converters, if required.
- VI. All the cameras and other modules of Video Surveillance System shall be modular in construction. In case of up-gradation of such modules in future, it shall be possible to upgrade them without replacing the entire modules.

5. TECHNICAL REQUIREMENTS:

The Video Surveillance System shall consist of:

i) CAMERA SPECIFICATIONS

a) 720P/ 1.3 MP Resolution Vari-focal Indoor Dome should have following features:

- 720P @ 60fps; 1.3M real-time @ 25fps
- H.264 (high profile / main profile / baseline) and MJPEG simultaneously
- Comprehensive I/O ports: MIC in, audio out, video out, DI, DO, RJ45, uSD
- Built in Power over Ethernet (PoE); Gigabit (1000Base-T) Ethernet
- Support various protocols: RTSP, UPnP, 3GPP, HTTPS, Samba
- Event trigger action: Send to NAS, send to FTP, send to Email, voice alert, go preset and tour, notify to
- ONVIF compliant

Specifications	
Analog / IP	IP
Type of Camera	Dome Camera
Effective Pixel	1280 X 720
Image Device	1/3" Sony Exmor image sensor
Minimum Illumination	0.5 Lux at F1.4
IRIS	DC IRIS
S/N Ratio	50Db
Lens	3.3 - 12mm vari-focal lens
Alarm	1in/1 out
Audio Encoder	RTSP: G.711 64kbps, G.726 32kbps, AAC (option, by request)
Audio Streaming	One-way or two-way
Microphone	External microphone input
Video Encoder	H.264, MPEG4 and MJPEG simultaneously (Tri-encoders)
Video Profile	12-profile simultaneously H.264 high profile, main profile and baseline
Frame Rate	720P mode: 1280x720, 720x576, 320x180, 160x80 @ 60fps 1.3M mode: 1280x1024, 800x600, 720x576, 320x240 @ 25/30fps
Region of Interest	Max. 3 ROI. Editable range
Area of Interest	Max. 2 AOI. Editable range
IRIS Exposure Control	Auto mode / Outdoor mode / Manual mode Manual mode: 1/25 - 1/47,000 seconds

Image Setting	AE, AWB; 3D Noise reduction; Digital WDR; Color, brightness, sharpness, contrast, Hue; Mirror/Flip; Privacy Masks; Text, time and date overlay; Overlay image on video
Streaming	Simultaneously multi-profile streaming; Streaming over UDP, TCP, HTTP, or HTTPS; M-JPEG streaming over HTTP (server push); Controllable frame rate and bandwidth; Constant and variable bit rate (MPEG4 / H.264); Region of Interest (ROI)
On Screen Display	Text, time and date overlay; Editable OSD (bitmap format)
Supported Protocol	IPv4, IPv6, TCP, UDP, HTTP, HTTPS, SMTP, FTP, NTP, DNS, DDNS, DHCP, DIPS, ARP, Bonjour, UPnP, RTSP, RTP, RTCP, IGMP, PPPoE, Samba, ICMP, SNMP
Security	Password protection, IP address filtering, HTTPS encrypted data transmission, user access log
Ethernet	10/100/1000M auto negotiation
Access User	8 simultaneous uni cast users
Network Interface	ONVIF
Local Storage	Micro SDHC Card Slot
Motion Detection	10-zone video motion detection with included or excluded options
Event Detection	Intelligent motion detection; audio detection; camera tampering
Audio Detection	Audio level 0 - 100
Camera Tampering	Camera dis-focus / move direction / mask
Alarm Events	File upload via FTP or email; File upload via Samba to NAS; Notification via email, HTTP, and TCP; External output activation; Audio alerting output; Micro SD card local storage
Video Buffer	Pre- and post- alarm buffering
Power Supply	12V DC/ 24 VAC
PoE	IEEE 802.3af
Operating Humidity	0% ~ 80% (non-condensing)
Operating Temperature	-10°C ~ 50°C
Browser	IE 8.0 or later

Connector	RJ-45 10Base-T/100Base-TX/1000Base-T; 12VDC power jack; 1 alarm input and 1 output; Audio out; External MIC input; Video out; Factory default reset; mSD card
Certification	CE, FCC & UL

b) 720P/ 1.3 MP Resolution Varifocal Outdoor IR Box Camera should have following Features:

- 720P @ 60fps; 1.3M real-time @ 25fps
- H.264 (high profile / main profile / baseline) and MJPEG simultaneously
- Comprehensive I/O ports: MIC in, audio out, video out, DI, DO, RJ45, uSD
- Built-in IR LED and ICR for day & night surveillance without color shift
- Built in Power over Ethernet (PoE); Gigabit (1000Base-T) Ethernet
- Support various protocols: RTSP, UPnP, 3GPP, HTTPS, Samba
- Event trigger action: Send to NAS, send to FTP, send to Email, voice alert, go preset and tour, notify to
- ONVIF compliant

Specifications	
Analog / IP	IP
Type of Camera	IR Box Camera
Effective Pixel	1280 x 1024 pixels
Image Device	1/3" Sony Exmor image sensor
Minimum Illumination	0.5 Lux at F1.4 & 0 Lux on IR on
IRIS	DC IRIS
IR	20 mtr IR Distance
S/N Ratio	50Db
Lens	3.3 - 12mm vari-focal lens
Alarm	1in/1 out
Audio Encoder	RTSP: G.711 64kbps, G.726 32kbps, AAC (option, by request)
Audio Streaming	One-way or two-way
Microphone	External microphone input
Video Encoder	H.264, MPEG4 and MJPEG simultaneously (Tri-encoders)
Video Profile	12-profile simultaneously H.264 high profile, main profile and baseline
Frame Rate	720P mode: 1280x720, 720x576, 320x180, 160x80 @ 60fps

	1.3M mode: 1280x1024, 800x600, 720x576, 320x240 @ 25/30fps
Region of Interest	Max. 3 ROI. Editable range
Area of Interest	Max. 2 AOI. Editable range
IRIS Exposure Control	Auto mode / Outdoor mode / Manual mode Manual mode: 1/25 - 1/47,000 seconds
Image Setting	AE, AWB; 3D Noise reduction; Digital WDR; Color, brightness, sharpness, contrast, Hue; Mirror/Flip; Privacy Masks; Text, time and date overlay; Overlay image on video
Streaming	Simultaneously multi-profile streaming; Streaming over UDP, TCP, HTTP, or HTTPS; M-JPEG streaming over HTTP (server push); Controllable frame rate and bandwidth; Constant and variable bit rate (MPEG4 / H.264); Region of Interest (ROI)
On Screen Display	Text, time and date overlay; Editable OSD (bitmap format)
Supported Protocol	IPv4, IPv6, TCP, UDP, HTTP, HTTPS, SMTP, FTP, NTP, DNS, DDNS, DHCP, DIPS, ARP, Bonjour, UPnP, RTSP, RTP, RTCP, IGMP, PPPoE, Samba, ICMP, SNMP
Security	Password protection, IP address filtering, HTTPS encrypted data transmission, user access log
Ethernet	10/100/1000M auto negotiation
Access User	8 simultaneous unicast users
Network Interface	ONVIF
Local Storage	Micro SDHC Card Slot
Motion Detection	10-zone video motion detection with included or excluded options
Event Detection	Intelligent motion detection; audio detection; camera tampering
Audio Detection	Audio level 0 - 100
Camera Tampering	Camera dis-focus / move direction / mask
Alarm Events	File upload via FTP or email; File upload via Samba to NAS; Notification via email, HTTP, and TCP; External output activation; Audio alerting output; Micro SD card local storage
Video Buffer	Pre- and post- alarm buffering

Power Supply	12V DC/ 24 VAC
PoE	IEEE 802.3af
Operating Humidity	0% ~ 80% (non-condensing)
Operating Temperature	-10°C ~ 50°C
IP Protection	IP66
Browser	IE 8.0 or later
Connector	RJ-45 10Base-T/100Base-TX/1000Base-T; 12VDC power jack; 1 alarm input and 1 output; Audio out; External MIC input; Video out; Factory default reset; mSD card
Certification	CE, FCC & UL

c.30X 25/20fps 1MPIP PTZ, H.264, True Day/Night Outdoor Weatherproof High Speed Dome Camera should have following features:

- 720P high resolution
- 30x, TDN, WDR, HLC, 3DNR
- Electronic image stabilization
- H.264 High Profile / MJPEG, VBR / CBR, dual streams
- Motion detection, network fail detection, privacy zones
- Pan: 360° continuous rotation; Tilt: 0° - 90° rotation; 256 presets, no blind spot
- 2 alarm input and 1 output, SD card support, RS-485, audio input and output, analog video output
- Edge storage - 32G
- IP66; IK-10 vandal proof
- ONVIF Profile S

Specifications	
Analog / IP	IP
Type of Camera	High Speed Dome PTZ Camera
Video Format	1280 (H) x 720 (V) PAL
Image Device	1/4" CMOS 1.3M
Minimum Illumination	0.15lx @ 50IRE (color); 0.01lx @ 50IRE(B/W)
Electronic Shutter	1/30~1/13,000 Sec
Signal-to-Noise Ratio	> 50dB(AGC Close)
HLC	HLC ON/OFF
Angular Field of View (Horizontal)	54.8°(wide)-2.01°(tele)
Video Encoder	H.264 High Profile, Motion JPEG simultaneously

Dual Stream	Stream 1: 720P (1280 x 720), Q1080P (960 x 544) Stream 2:D1 (720 x 576), VGA (640 x 480), Q720P (640 x 360), CIF (352 x 288), QVGA (320 x 240), QCIF (176 x 144)
Encoding Control	CBR/VBR/GOP
Frame Rate	Up to 25fps PAL for all profiles
Streaming	Constant and variable bit rate
Dual Streaming	Stream 1: D1 (704 x 576), CIF (352 x 288) Stream 2: CIF (352 x 288), QCIF (176 x 144)
Protocols	IPv4, TCP, UDP, HTTP, HTTPS, SMTP, FTP, NTP, DNS, DDNS, DHCP, ARP, UPnP, RTSP, RTP, RTCP, PPPoE, ICMP, SNMP
Lens	f=3.5mm~101mm
Day / Night	ICR (Auto)
Auto Gain Control	On
S/N Ratio	50dB or better
Pan Angle	360° Rotation Capability
Tilt Angle	0° ~90°
Pan Speed	0.1°~300°/Sec
Tilt Speed	0.1°~300°/Sec
Preset Speed	300°/Sec
Accuracy	0.1°
Preset Positions	256 Maximum
Auto Scan	ON/OFF
White Balance	Indoor/Outdoor/ATW
Wide Dynamic	ON/OFF
Zoom	30x Optical Zoom, 12x Digital Zoom
PTZ Tours (Pattern)	4 Programmable
Protocol	Pelco D/P
Alarm Events	Go to PTZ preset position, and go to a tour; Notification via email, File upload via FTP or email
Protection Class	IP66 Rating, weather and vandal proof
Ethernet	10/100M auto negotiation
Housing	IP66, with Heater, IK 10 Vandal Proof
Certificate	CE, FCC

ii)PC Work Station For Clients Stations:

1.1 The PC shall be able to provide high graphics display and with DVD-Drive 52 x, PS/2 mouse and keyboard.

1.2 PC Work Station shall be of minimum configuration:

- **Processor: Intel ® i5 750 2.66 GHz**
- **System Memory (RAM): 4 GB**
- **Optical Drive: DVD-R**
- **Floppy Drive: 3.5 inch 1.44 MB**

- **Hard Disk Drives: 250G, Ensure 20G available space**
- **Network Interface Card (NIC): Dual or compatible pair of NICs, with each port having 1 Gbps capacity.**
- **Human Interface: 102-key keyboard and a mouse pointing device**
- **Graphics Adapter: NVIDIA 1GB Independent Graphic Card**
- **Operating System: Original software CDs and startup installation diskettes for:**
- **Windows® 7 Professional 64-bit (WOW64mode) OR Windows® 7 Professional 32-bit**
- **.Net Framework 4.0**
- **Windows Media Player Version 9 or 10**
- **McAfee VirusScan 7.1.0, McAfee VirusScan 8, or Symantec Antivirus V10**

iii) RECORDING-CUM-VIDEO MANAGEMENT SERVER:

VMS SOFTWARE FEATURES:

The VMS application software shall have license for 32 cameras and 5 clients' licenses

A. Architecture:

Multi-location:

System shall work on an enterprise class environment over the TCP/IP network. The system shall be designed on central site connected with multiple remote sites along with the following required conditions / aspects:

- System shall be capable of local recording, local monitoring and video management at each local site. The system ideally shall not transmit any video through remote VMS Database Server (to optimize the WAN bandwidth) for any local access to videos (LIVE and recorded). System shall be capable of Video monitoring (LIVE / Recorded), system & user management through a master central location.
- The system shall be designed & proposed in a way that in the event of connection failure between central VMS Database Server & local location, system shall continue to work & deliver the key functions at local site i.e. local monitoring and local recording.
- VMS should connect to all sites simultaneously.
- Any camera of any location up to 16/32/64 should be able to be viewed on a single workstation

C. **Open Standard Support:** VMS Software shall be ONVIF compliant so that it can integrate with multiple digital IP cameras.

D. **Health Status** – VMs should display health status of all the recorders.

E. **System Integration:** VMS software shall have Integration capabilities with electronic access control system, Intrusion detection systems if required in future.

Integration capabilities of the system shall be measured on below mentioned aspects as a minimum:

VMS shall support integration with Access Control & Intrusion Detection System. It shall support real time linkage of digital video clips to their associated alarms from the access control & intrusion alarm system. System Administrators shall configure video segments

by specifying pre- and post-alarm time marks, then link those defined video segments to specific alarms. The software shall provide at least 10 minutes of tagged pre and post activity recording per event.

In an event of an alarm generated by Access Controller or Intrusion Detection System the software shall ensure that the operator is automatically provided with the CCTV video from the designated camera to view the alarm location as soon as the alarm is received, allowing the operator to visually assess the event and also providing continuous recording. The software shall also automatically focus the nearest PTZ cameras to view to the point of alarm.

In an event of a card being shown to a card reader (where there is camera located near the door), the system shall capture a video clip containing at least 2 minutes before the card swipe, during card swipe event & 2 minutes after card swipe and bundle them together & tag them along with the card event database. When the card event is retrieved then it should be possible to play the associated video clip of that particular Event/Alarm.

VMS shall support defining multiple rule logics which can be assigned to any alarm to run automatically when those alarms received in the system. There shall not be any limitation in defining such rule logic. Example of such rule is "in case there is an alarm received from a zone of Intrusion Detection System, then specific Camera assigned to that Zones shall automatically Pop up on the VMS-Client GUI and start recording based on the Pre & Post record time defined during the configuration and defined set of Access Controlled doors shall go into Locked/Unlocked state as defined.

VMS shall support operation from Central consol but not limited as defined below:-

Intrusion Alarm integration operation:

- Arm, disarm, bypass status shall be displayed on VMS-Client machine.
- Zones can be sorted by status.
- Arm, disarm, bypass operation can be implemented to all the zones.

Access Control Integration Operation:

- User name, card No., card type, privilege and reader No. can be gained upon swiping card.
- Door control can be fulfilled manually or automatically assigned in rule defined in the system.
- Above information shall be able to be logged in system database.

- F. **Service Stability:** VMS shall integrate with sandbox framework to ensure crash of server will not result in service crash. It will also try to restart a crashed server to increase system accessibility and stability.
- G. **Compression Techniques:** System shall use various compression techniques simultaneously to utilize storage and network bandwidth effectively. Video compression techniques shall including H.264, MPEG-4 and M-JPEG as minimum.
- H. **Multi Operations:** Managing pentaplex user operations of attached recording devices simultaneously, including live viewing, recording, playback, and handling the exchange of data between the server and a remote workstation.

- I. **Live View:** Live viewing of up to 16cameras on a single VMS-Client on 1080p resolution. VMS-Client application shall have capability to connect to 4 monitors & 16 cameras can be viewed on one Monitor.
- J. **Alarm Management:** System shall receive alarms & events from multiple video, access and alarm devices. It shall provide capability of Alarm & event viewing, management and interlocking. Alarm interlock logic shall reside in VMS Server which will trigger device to execute preset operations on receiving of an alarm.
- K. **Reports:** Log Report shall be used to search the device alarm events, device operations, user login, and web operation. It shall also be used to set queries to get results quickly. Log reports shall be exported in XML, CSV, TIFF, PDF, Web Archive and Excel file formats.
- L. **Search:** System shall manage investigation, post-recording motion detection, motion detection-based recording, Alarm (from any of integrated solution CCTV, Access Control and Intrusion Detection) Based recording and search tools with advanced search capabilities of the recording devices.
- M. **User Rights:** System shall provide multi-level user access rights for viewing and managing access to the recorder functions. The user level shall range from 0 to 255; the bigger the number, the higher the control priority is.
- N. **Recording Modes:** System shall support recording modes of continuous, scheduled, manual, event and alarm-based recording.
- O. **Network:** System shall support for both multicast and unicast network topologies and communication protocols.
- P. **Video Analytics:** The server should support video analytics server or edge based video analytics on CCTV cameras. The system shall be able to detect Person/Vehicle Entering restricted area, Person/Vehicle moving in wrong direction, Person/Vehicle tress-passing (trip-wire), Camera Sabotage and Video loss. Video Analytics server to be considered additionally if server based analytics is being proposed and per camera licenses to be quoted as per requirement.
- Q. **IP Camera Connectivity – VMS** should be capable of connecting to IP camera's in future.
- R. **Rule engine:** This capability shall allow for custom scripts and to provide both customization and third party integration. Rules Engine Service shall provide functions such as rules analysis, state monitoring and rules management. By way of logical programming for various devices and event alarms in graphical editing interface, Rules Engine Service shall perform automatic execution of rules when emergency occurs. The visual dynamic user interface shall make it easy to acknowledge alarm circumstances and allows prompt response in case on emergency.
- S. **Client Application:** System shall provide unified VMS-Client login to users. User shall be able to login from any PC loaded with VMS-Client application. User shall have the option of two modes of user logins:
 - i. Online login: User shall be able to login when at least one VMS service online.
 - ii. Offline login: User shall be able to login when there is no VMS service online after user at least success one time online login.
- T. **Hardware:** System shall utilize off-the-shelf computer workstations, servers, networking and storage equipment. No proprietary hardware shall be acceptable.

VMS OPERATOR FEATURES:

VMS shall provide the following operator functions:

- A. **Configuration:** The operator (with Administrator privileges) shall have the option to configure the system. It shall support live updates of all configurations. The configurations shall provide the option to add/edit/delete recorders, cameras, switchers, keyboards, users and roles, sites, recording rule, rule engine service etc. Configuration of video recording trigger service and device recovery service parameter shall be basic feature of VMS.
- B. **Log Report:** The operator shall be able to view following log reports:
 - a. Device alarm log report.
 - b. Device operation log report.
 - c. User login log report.
 - d. Web operation log report.

VMS-CLIENT FEATURES:

VMS-Client Application shall have below mentioned features:

- A. **Live View:** Main video viewing screen capable of showing 1, 4, 9, 16 and other customized split layout of live or recorded video. Standard presets may be customized to the user preferences.
- B. **Scenarios:** Current view can be saved as scenario and allowing the user to restore this view at any later point in time. These scenarios shall be modified, overwrite or deleted as and when required.
- C. **Drag and Drop:** VMS-Client application shall provide drag and drop functionality. Particular video device can be dragged onto main video viewing screen to view live video.
- D. **Favorites:** VMS-Client application shall have feature to save favorites, where user can create a device/scenario folder and drag devices/scenarios into it so that these can be quickly accessed.
- E. **Patrol:** VMS-Client application shall provide user the capability of configuring and running video patrol sequences to automatically play videos of multiple channels in specified windows by turns. A patrol shall include several scenarios and a scenario includes several video channels.
- F. **PTZ Control:** Support both analog and digital PTZ through GUI and the keyboard. PTZ control shall be used for adjusting PTZ movement and setting the focus, aperture and preset bit of the camera.
- G. **Snapshot:** Capable of capturing snapshot of live video and allowing user to export snapshot. Snapshot tool shall be available in video window itself. Only the authorized users shall have snapshot functionality.
- H. **Video Export:** VMS-Client shall have capability of download and export recorded video from recorders. Exported video clip shall be in OEM's native format to ensure data integrity. Download link to the player shall be provided with video exported.

- I. **Playback:** VMS-Client shall be able to playback recorded video from recorders. Different playback modes shall be there as 8x, 16x, 32x, 64x, frame by frame and backward playback. Client should also be able to hear the recorded audio.
- J. **Instant Playback:** Allow the user to view and save 30sec ago instant playback for any playing live video. It shall be used for monitoring emergent situation. This function shall be enabled by default, if required, user may disable this function.
- K. **Recording:** Allows the user to initiate recording through GUI. Recording can be initiated remotely on DVR/Encoder and locally on VMS-Client PC.
- L. **Alarm Management:** Capability of complete alarm management for the alarms coming from recorders, switchers, intrusion detection systems and access control systems. Alarm Management shall be based on below mentioned aspects:
 - i. User shall get the pop-up message for response plan upon receiving the alarm so that same response plan can be followed by each operator.
 - ii. **E-mail notification can be sent out which shall include alarm information and User editable information along with individual alarm. One or multi receiver addresses and SMTP can be assigned for E-Mail notification.**
- M. **E-Maps:** VMS-Client shall have capability to upload GIS Map which shall support .shp, AutoCAD, bmp, jpg, png format file. These maps can be interlinked with 8 levels. Devices including cameras, access control readers and intrusion detectors shall be planted on maps. E-map application shall have below mentioned functionalities:
 - i. Video verification can be displayed within 1 second after alarm is triggered.
 - ii. Multi video verification (at least four) can be triggered by same alarm input.
 - iii. Alarm can come from any kind of event notification which system can recognize.
 - iv. Software should have 8 layer multi emap monitoring.
 - v. Simultaneous pop up of 4 Alarm videos on emap
- N. **Surrounding Camera View:** VMS-Client application shall have facility of surrounding camera view. It shall support setting presets in surrounding cameras.
 - i. In a surround view, video from a specific device shall be playing in the centre and the other surround videos will be from surrounding video devices. Once the object moves to some other camera's FOV, operator can pull that camera in the center and surrounding videos from the associated surrounding camera plays in the surround views. Every video device can be configured one surround view with related 12 surrounding cameras. There shall not be any limit in defining such surround views.
 - ii. Surround video can be called through keyboard and VMS-Client operation.
 - iii. Surround video can be configured through web or VMS-Client.
- O. **Alternate Camera View:** For continuous monitoring, system shall have alternative view functionality. Every camera can be assigned an alternative view camera. If one camera is unavailable, operator can achieve alternative camera to get same/similar scene.
 - i. Alternative view camera can be called through keyboard and VMS-Client operation.
 - ii. Alternative view camera can be assigned through web configuration or through Client.

- P. **Operations:** Option to perform various operations through context menu on a particular video (live/recorded/patrol). These operations shall include: Full screen, point and drag, enable square select, digital zoom, start recording, stop recording, take snapshot, show surrounding cameras, trigger alternative view.
- Q. **Timeline Control:** Ability to manage timeline control of the recording device, which provides camera recording statistics. Timeline control shall have following features: time slider, time search, time jump, play controls. Timeline control shall also include dedicated buttons for step reverse and step forward and keyboard shortcuts for playback operations.
- R. **Keyboard Functionality:** VMS-Client shall be controllable by a keyboard controller connected to the VMS server and shall have following major features: Selecting layout, ending monitor commands, switching operations, PTZ control operations. PTZ control latency shall be less than 500ms
- S. **Search:** The search facility shall include search based on date and time, device type, trigger type, alarm, operator, location and site. The search facility shall be able to search records in specified recorder.
- T. **Device and Service Status:** VMS-Client shall be capable to show the running status of Event & Control services, Rule Engine service and VMS site in bottom status bar. It shall also monitor connected devices status.
- U. **Server Usage:** VMS-Client shall provide facility to view CPU, Memory and Network usage information.

VMS-cum-Recording Server Specifications

Specifications	
Operation System	Windows Server 2008 Standard 64 bit, SQL Server 2008 Express
CPU	Quad Core Intel® 8MB 3.1 GHz
Memory	8 GB
System Hard Disk	3.5" SATA (7200 RPM) upto 32 TB
Network	2 Gigabit NICs
Storage Disk Interface	16 x 3.5" Swappable Trays
Hot Swappable Disk	Yes
RAID Levels	RAID 0, 1, 5, 6, 10, 50 and 60
RAID Management	Support Multi RAID Levels and Stripe Size
RAID Feature	Support RAID Banding; Support Hot spare and automatic hot rebuild; Allow online capacity expansion within the enclosure; Local audible event notification alarm
Power Supply	AC 90V ~ 264V Full range, 47Hz ~ 63Hz
Operating Temperature	10 °C ~ 35 °C
Relative Humidity	10% ~ 85% Non-condensing
Certification	CE, FCC

vi) Digital Keyboard with Joystick:

1. It should be a fully programmable keyboard controller with LCD screen.
2. It should have following features:
 - A. The Joystick should have interactive / intuitive buttons & Status display LCD.
 - B. It should be fully programmable with customized menus.
 - C. Integral back-lit LCD touch screen.
 - D. Ergonomic design with padded wrist rest.
 - E. Variable-speed joystick with integral zoom control.
 - F. Multiple interface options (RS-232, RS-485 and TCP/IP).
 - G. Two jog/shuttle controls.
 - H. Dedicated keys for commonly used functions.
 - I. Dynamic menu selection.
 - J. All programming should be stored in flash memory.
3. It should comply with the following specifications:
 - Input Voltage: 10-16VDC
 - Power: 10 Watts
 - Control: Elastomeric push-button switches, 320x240 graphics LCD with touch-screen-Proportional 3-axis joystick, 2 Jog/Shuttle switches, and LCD
 - Pan/Tilt Functions: Rate-proportional pan left, pan right, tilt up, tilt down
 - Lens Functions: Zoom in, zoom out, focus near, focus far, iris open, and iris close
 - Control Ports: COM1 - RJ-12 connector (RS-485 only) COM2 - RJ-12 connector (RS-485) or 10BaseT Ethernet RJ-12 connector (RS-232) COM3 - DB-9 connector (RS-232 only)
 - Keyboard Port: 6-pin mini-DIN for QWERTY keyboard
 - Communication Speeds: 9600 to 38.4K baud
 - Control Output Modes : RS-232, RS-485 or TCP/IP
 - Operating Distances: 4000' (1219 m) maximum w/ RS-485 and 32 devices 50' (12.7 m) maximum w/ RS
 - Ambient Temperature: 32°F to 122°F (0°C - 50°C)
 - Ambient Humidity: 0% to 95% (non-condensing)

IP platform will support five clients.

vii) LAYER -2 MANAGEABLE SWITCH

- Number of ports: 12/24 Nos. 10/ 1000 base-TX RJ45 ports 2 Combo 1000 base T/ SFP with 1 No singlemode 1000 base Fiber LX duplex port module.
- Switch: Fabric 8.8 Gbps
- Packet forwarding: 6.6 Mbps
- Transmission Method: Store and forward
- MAC Address Table: 8 K entries per device
- MAC Address learning: Dynamic entries: automatic update, static entries: user defined
- Packet Buffer Memory: 16 Mbytes per device
- Power Supply: AC 230 V @ 50 Hz

vii) LAYER -3 MANAGEABLE SWITCH

- Number of ports: 32/48 No 10/ 100/ 1000 base TX RJ 45 port to connect to L2 switch uplink and NVR box
- Switch Fabric: 48 Gbps
- Packet forwarding: 35 Mbps
- Transmission Method: Store and forward
- MAC Address Table: 16 K entries per device
- Packet Buffer Memory: 16 Mbytes per device
- Power Supply: AC 230 V @ 50 Hz

viii) CABLES

S. No.	Connectivity	Cable Type	Connector
1	Camera to L2 Switch	UTP CAT 6	RJ45
2	L2 Switch to L3 Switch in control room	Single Mode Fiber/ UTP CAT 6	SC/ RJ45
3	L3 Switch to Video Wall Switches	UTP CAT 6	RJ45
4	From L3 switches to NVR/ NAS Box	UTP CAT 6	RJ45
5	From power source to PTZ camera	3x1.5 sq mm PVC Insulated power cable	

ix) INSTALLATION OF UTP CABLE

- Cables should be dressed and terminated in accordance with the manufacturer's recommendations and/ or best industry practices.
- Pair untwist at the termination should not exceed one-half an inch.
- Bend radius of the cable in the termination area should not be less than 4 times the outside diameter of the cable.
- The cable jacket should be maintained as close as possible to the termination point.
- Cables should be neatly bundled and dressed to their respective panels or blocks. Each panel or block should be fed by an individual bundle separated and dressed back to the point of cable entrance into the rack or frame.
- The distance between UTP data cable and any power cable should be more than 4 inches.
- Each cable should be clearly labeled on the cable jacket behind the patch panel at a location that can be viewed without removing the bundle support ties. Cables labeled within the bundle, where the label is obscured from view should not be acceptable.
- Cables should be installed in continuous lengths from origin to destination (no splices).
- Horizontal distribution cables should be bundled into groups of not greater than 40 cables. Cable bundle quantities in excess of 40 cables may cause deformation of the bottom cable switch in the bundle.
- Cables should not be attached to ceiling grid or lighting support wires.
- Any cable damaged or exceeding recommended installation parameters during installation should be replaced by the contractor prior to final acceptance at no cost.
- A self-adhesive label or PVC marker ferules should identify the Cables. A cable label should be applied to the cable behind the faceplate on a section of cable that can be accessed by removing

the cover plate. Similar label or marker ferrules should also be placed on a section of the cable near to the patch panel termination.

m) Pulling tension on 4-pair UTP cables should not exceed 25-pounds for a single cable or cable bundle. The pathway should be adequately sized so as not to exceed the 80% cross-section fill of cables. The pathway should be securely installed in the facility.

n) Care should be taken when pulling cables into trucking to avoid damage due to snagging. Trucking partitions should be used to separate the data cables from power, and bridges should be used where data cables have to cross the mains.

x) POWER WIRING SYSTEM

Rigid PVC (heavy duty) Conduit Wiring System as per IS: 9537.

xi) MATERIALS

Conduits

- (i) All rigid conduit pipes shall be of PVC and be ISI marked. The wall thickness shall be not less than 1.6 mm for conduit upto 32 mm dia and less than 2 mm for conduits above 32 mm dia.
- (ii) The maximum number of PVC insulated cables conforming to ISI: 694-1990 that can be drawn in one conduit as per standard norms. Conduit sizes shall be selected accordingly in each room.
- (iii) No conduit less than 20 mm in diameter shall be used. Flexible conduits will only be permitted for interconnections between switchgear, DB's and conduit terminations in wall. All flexible conduits used in the system should be Halogen free, flame retardant and self extinguishing polyamide conduits.

Conduit Accessories

- The conduit wiring system shall be complete in all respects, including their accessories.
- All conduit accessories shall be of solvent cement plastering type and under no circumstances pin grip type of clamp grip type accessories shall be used.
- Bends, couplers, etc. shall be solid type in recessed type of works and may be solid or inspection type as required.
- Saddles for surface conduit work on wall shall not be less than 0.55 mm (24 gauge) for conduit up to 25 mm dia. and not less than 0.9 mm (20 gauge) for larger diameter.
- The minimum width and the thickness of clips used for fixing conduit to steel joints, and clamps shall be per standard norms.

Outlets

- The switch box or regulator box shall be made of metal on all sides, except on the front. In case of cast boxes, the wall thickness shall be at least 2 mm and in case of welded mild steel sheet boxes, the wall thickness shall not less than 1.2 mm (18 gauge) for boxes upto a size of 20 cm x 30 cm, and above this size 1.6 mm (16 gauge) thick MS boxes shall be used. The metallic boxes shall be duly painted with anticorrosive paint before erection.
- An earth terminal with stud and 2 metal washers shall be provided in each MS box for termination of protective conductors and for connection to socket outlet/ metallic body of fan regulator etc.
- Clear depth of the box shall not be less than 60 mm, and this shall be increased suitably to accommodate mounting of fan regulators in flush pattern. The fan regulators can also be mounted on the switch box covers, if so stipulated in the tender specifications, or if so directed by the Engineer-in-charge.
- Except where otherwise stated, 3 mm thick phenol laminated sheets as per clause shall be fixed on the front with brass or cadmium plated iron screws as approved by the Engineer-in charge.

Wires

Wires shall comply the following features:

- PVC insulated with a rating of 105 deg. C bright annealed electrotype grade (99.9% pure)copper standard conductors multi drawn simultaneously (Unilay, twisted conductors) for uniformity of resistance, dimension and flexibility.
- Color coded as below:
Phase – R - Red
Phase – Y - Yellow
Phase – B - Blue
Neutral - Black
Earth – Green

Installation

- Common aspects for recessed and surface conduit works

Conduit joints

- The conduit work of each circuit or section shall be completed before the cables are drawn in.
- Conduit pipes shall be joined by means of couplers and accessories only.
- Cut ends of conduit pipes shall have no sharp edges, nor any burrs left to avoid damage to the insulation of conductors while pulling through such pipes.

Bends in conduit

- All necessary bends in the system, including diversion, shall be done either by neatly bending the pipes without cracking with a bending radius of not less than 7.5 cm, or alternatively by inserting suitable solid or inspection type normal bends, elbows or similar fittings, or by fixing cast iron inspection boxes, whichever is most suitable.
 - No length of conduit shall have more than four bends from outlet to outlet.
- Additional requirements for recessed conduit work.

i) Making

- a. The chase in the wall shall be neatly made, and of ample dimensions to permit the conduit to be fixed in the manner desired.
- b. In the case of buildings under construction, the conduit shall be buried in the wall before plastering, and shall be finished neatly after erection of conduit.
- c. In case of exposed brick/ rubble masonry work, special care shall be taken to fix the conduit and accessories in position along with the building work.

ii) Fixing conduits in chase

- a. The conduit pipe shall be fixed by means of staples hooks or by means of saddles, not more than 60 cm part, or any other approved means of fixing.
- b. All joints of conduits pipes shall be treated with some approved preservative compound to secure protection.

iii) Fixing conduits in RCC work

- a. The conduit pipe shall be laid in position and fixed to the steel reinforcement bard by steel binding wires before the concreting is done. The conduit pipes shall be fixed firmly to the steel reinforcement bars to avoid their dislocation during pouring of cement concrete and subsequent tamping of the same.

b. Fixing of standard bends or elbow shall be avoided as far as practicable, and all curves shall be maintained by bending the conduit pipe itself with a long radius which will permit easy drawing in of conductors.

c. Location of inspection/ junction boxes in RCC work should be identified by suitable means to avoid unnecessary chipping of the RCC slab subsequently to locate these boxes.

iv) Fixing inspection boxes

a. Suitable inspection boxes of the minimum requirement shall be provided to permit inspection, and to facilitate replacement of wires, if necessary.

b. These shall be mounted flush with the wall or ceiling concrete. Minimum 65 mm depth junction boxes shall be used in roof slabs and the depth of the boxes in other places shall be as per IS: 2667 – 1977.

v) Fixing switch boxes and accessories

Switch boxes shall be mounted flush with the wall. All outlets such as switches socket outlets ,etc. shall be flush mounting type, unless otherwise specified in the Additional Specifications.

vi) Bunching of cables

a. Cables shall be always be bunched so that the outgoing and return cables are drawn into the same conduit.

b. In case of three phase loads, separate conduits shall be run for each phase from the distribution boards to the load points, or outlets as the case may be.

Access Control System

I. Software

1. System Overview

- 1.1. The Integrated Security Management System (ISMS) shall be a modular, networked access control system capable of handling large proprietary corporations with multiple remote sites, alarm monitoring, video imaging, badging, paging, guard tour. The system shall allow for easy expansion or modification of inputs, outputs, and remote control stations.
- 1.2. The system control at the central computer location shall be under a single software program control, shall provide full integration of all components, and shall be alterable at any time, depending upon the facility requirements. Reconfiguration shall be accomplished online through system programming, without hardware changes.
- 1.3. The software program shall be a true 32-bit, 3-tier client/server, ODBC compliant application based on Microsoft tools and standards. The software program shall operate in one of the following environments; Windows 2003 Server, Windows Vista Business, Windows XP Professional SP2, Windows 2000 Professional or Server using Service Pack 4.
- 1.4. The system shall support multiple communication servers on a LAN/WAN, to provide distributed networking capabilities, which significantly improve system performance.
- 1.5. The database architecture shall be MSDE 2000 as standard with the capability to utilize Microsoft SQL Server 2005; SQL Server 2005 Express Edition or SQL Server 2000.
- 1.6. The system shall have the capability to communicate with the control panels via LAN/WAN connections utilizing industry standard communication protocol.
- 1.7. The software program shall use Abstract Devices (ADV) for representing hardware devices in the system. The ADVs shall be used in Floor Plans to provide the user interface to control and monitor the system, and shall also be used in the Data Trees to organize, display, and control system information.
- 1.8. The system shall support both manual and automatic responses to alarms entering the system. Each alarm shall be capable of initiating a number of different actions, such as activation of remote devices, door control, and activation of WAV files.

- 1.9. The system shall provide both supervised and non-supervised alarm point monitoring. Upon recognition of an alarm, the system shall be capable of arming or disarming alarm points both manually and automatically, by time of day, and by day of week.
- 1.10. Access control functions shall include validation based on time of day, day of week, holiday scheduling, site code and card number verification, automatic or manual retrieval of cardholder photographs, and access validation based on positive verification of card, card and PIN, card or pin, pin only and Site Code only.
- 1.11. Alarm events with defined priorities shall be able to pop-up automatically in an Alarm event window for operator attention. The pop-up shall display the name of the event (reader, alarm point, cardholder or system alarm), time, date, site, account, if a card event the card number, type of event and cardholder name. An event counter shall also display the number of times the event was reported to the Alarm event monitor prior to Acknowledgement or Clearing the event. Event instructions shall be made available by double clicking on the event.
- 1.12. The Alarm event window shall allow the operator to initiate a physical response to the event as well as a written response. Responses shall include but not be limited to: acknowledge, clear, open a pre-programmed floor plan, energize, de-energize, pulse, time pulse, add comment, shunt or un-shunt.
- 1.13. Assigned passwords shall be possible to define the levels of system operation for each individual operator. System operation for individual operators shall include, but not be limited to, restricted time periods for login, available accounts and default language selection at login. Operator actions range from no view or control rights to basic monitoring including the ability to block the viewing of card and or personal identification numbers, to full control of the system including programming.
- 1.14. The system programming shall be user friendly, and capable of being accomplished by personnel with no prior computer experience. A quick start wizard shall allow the operator to easily program a system including basic time zones, access panels (IP connection, Modem Pools or direct connections to an RS-232 port), card activation to a general purpose access area and deactivation date. The software shall utilize drop boxes for all previously entered system-required data. The programming shall be MENU driven and include online "Help" or "Tutorial" information, as well as online data entry examples. The Help shall be available by using the F1 key. When using the F1 help access, the help menu will provide detailed information relative to the operation that the user is performing without the need to key in additional search parameters. An operation Tutorial shall also be provided with the access control software. The contents of the Tutorial shall include, but not be limited to: Floor plan setup and control, Visitor management integration, and Intrusion integration and operation.
- 1.15. After installation, the Customer shall be able to perform hardware configuration changes. These hardware configuration changes shall include, but not be limited to, door open time, door contact shunt time, point and reader names, when and where a cardholder is valid, and the ability to add or modify card databases as desired; For the intrusion system, any function that can be programmed from a physical keypad shall also be available from the system's virtual keypad, without the services of the Contractor or Manufacturer.

- 1.16. Equipment repair shall be able to be accomplished on site, by module replacement, utilizing spare components.

Basic System Capabilities

The following functional capabilities are considered essential for the system described in this specification. The capabilities are to be considered standard, without the need for add-on software or hardware.

o General

- i. All databases will have the ability to ADD, DELETE, REPORT, VIEW or EDIT information.
- ii. Provide storage of all system transactions in a retrievable file.
- iii. Log all events by time and date with reference to GMT.
- iv. Provide capability to store all or selected system transactions to a disk file.
- v. Provide ability for CUSTOMER to make system configuration changes such as, but not limited to door open time, door contact shunt time, point and reader names, when and where a cardholder is valid, and the ability to add or modify card databases at any time.
- vi. Support "Global Anti-pass back", allowing cardholder to enter/exit any card reader on the same RS485 drop line.
- vii. Duress feature where when a PIN is used in conjunction with a card read, the number of digits are selected at the keypad where the PIN number is a value of one different from the normal PIN.
- viii. Provide mode of system operation that stores system commands that were not accepted by the hardware.
- ix. Provide mode of system operation that requires the operator to enter a response to an event when acknowledging it from the alarm view window.
- x. Provide mode of system operation that allows acknowledged alarms to be automatically cleared.
- xi. Provide mode of system operation where un-acknowledged events will cause the computer to continuously emit a pulsating beep until all un-acknowledged alarms are acknowledged. A momentary silence feature shall allow the beeping to cease for up to 60 seconds. The silence feature shall also provide a visual count down to when the beeping will begin again.
- xii. Provide mode of system operation where when an acknowledged, but not cleared event will be reissued requiring acknowledgement when the event changes to an alarm or trouble state.
- xiii. Provide mode of system operation that does not allow the operator to clear an alarm prior to it being restored to normal.
- xiv. Provide ability for manual operator control of system output relays. The manual functions shall include the ability to energize, de-energize, return to time zone, or pulse the output relay. The pulse time shall be a programmable setting.
- xv. Provide ability for manual operator control of system doors. The manual functions shall include the ability to Lock, Un-Lock, Shunt, Un-Shunt and Return to Time Zone.
- xvi. Provide ability to automatically display stored "video image" of cardholder

- xvii. The cardholder “video image” pop-up shall be activated based on a priority level set to the cardholder or reader. Information in the pop-up shall include, but not be limited to the cardholder’s primary image a live video pop-up showing the person who initiated the pop-up, entrance name, time, date, cardholder name, and status. User shall be able to display up to 40 note fields. The size of the pop-up(s) shall be adjustable by the operator.
- xviii. Support multiple card reader technology including Proximity, Wiegand effect, Biometrics, Magnetic stripe, Bar Code, Keypad, Card/keypad (PIN), High-speed long range Vehicle ID, Smart Card
- xix. Provide a means for scheduled automatic backups of any or all database system files. A means to restore these files from a simple menu shall exist.
- xx. Provide the ability to address up to 2 serial communication ports, where each port can be configured for either hardwired or dial-up. When configured for dial-up, any one port can support multiple dial-up locations.
- xxi. Communication from the access control server to the remote control panels shall be selectable. Communication options shall be via RS-485 converter, dial-up, leased line from a defined communication port or by LAN/WAN using an IP address for direct connection to the remote RS-485 converter via network interface card. When using IP addressing it shall be unacceptable to use a communication port converter device on the communication server side of the transmission. A minimum of 64 such IP connections shall be allowed.
- xxii. All commands and updates to the panels shall be verified and shall automatically retry if communications have failed.
- xxiii. Provide the ability to select ACK/NAK communication feature by communications port for either dial-up or hardwire.
- xxiv. Provide a system scheduler that shall automatically:
 1. Call remote locations to retrieve history transactions and update panel information, including time and date.
 2. Activate or deactivate cards locally or at remote dial-up sites.
 3. Initiate a pre-programmed command/event/action.
 4. Synchronize system to controller time.
- xxv. Provide the ability to initiate an alarm based on a transaction state. A transaction state shall be defined as but not limited to Normal, Alarm, Trouble, Ajar, Trace, Not Found, Anti-Passback Violation, PIN Violation, Time Zone Violation, Site Code Violation and System Alarms including Panel Com, Panel Power Failure, Modem Pool, Guard Tour, and Tamper.
- xxvi. A host grant mode of operation shall exist that requires the host computer to grant accesses to “valid” cards. An alternate host grant mode shall allow the card access information to be downloaded along with unlocking the door for “valid” cards.

o Card Database

- i. Provide a simple card and card holder database import utility. The utility shall be password protected and accessible only to administrators of the access control system. Information that can be imported shall include but not be limited to: First Name, Last Name, card number, activation date, de-activation date, status, up to 40 note fields and photo images. A simple CSV (comma separated value) file shall be used for the importing of data and image file names.

- ii. Cardholder information shall include unique card number up to 15 digits and optional Personal Identification Number.
- iii. Allow multiple cards per cardholder.
- iv. Allow for up to 32 access levels to be assigned to a card, or a single “precision” access level. When using “precision” access levels it shall be possible to create a unique access level per card using an existing access level as a baseline template. This customized card access level shall have both beginning and ending dates.
- v. Provide 40 user definable fields.
- vi. Each card holder note filed shall allow the option to be entered as free form data or structured data. Structured data shall be by use of a template or drop list. The template and drop list shall be created by the operator. The capacity of the template shall allow for up to 65,000 characters.
- vii. Provide special card options that include, but are not limited to:
 - 1. Time zone reference, which defines valid time.
 - 2. Visitor use, which provides a specified activation date and expiration date (spanning years).
 - 3. Trigger control value, which can initiate a predefined procedure at the intelligent control independent from any control function from the system computer.
- viii. Provide a card “Trace” function. The Trace function shall allow normal access control, but will provide a tracking alarm at the system monitor.
- ix. Provide ability to store digital images and written signature of cardholder.
- x. Provide the ability to priorities specific card usage from 1 to 99 with separate priority options for Anti-pass back, Trace, PIN Violation, Normal, Not Found, Expired, Host Grant, Site Code and Time Zone card activities or violations.
- xi. Allow the user the ability to assign an operator message per card event state.
- xii. Upon editing card information, the updated information shall be sent automatically to the appropriate access control panel, when hardwired, with no other user intervention. If the port is dial-up, the entry will be stored on disk and shall be updated when connection is made to the remote loop. If the scheduler is used, then card updates shall be sent based on scheduling.
- xiii. In a traditional (Wiegand) 5-digit card database, the numbers 0 and 65,535 shall not be valid card numbers as some devices transmit these numbers on an improper read.
- xiv. In a 15-digit card database, the number 0 shall not be a valid card number as some devices transmit this number on an improper read.
- xv. A card shall have the ability to be allowed to access one or selected accounts up to all available accounts.

o Access Levels

- i. It shall provide the ability to define specific times of access, specific readers for access, provide a template of a defined access level detail, where changes can be made to the template and saved as a new access level detail and provide an access control tree structure that allows groupings of entrances. User shall have the ability to group program all entrances on the branch or make specific changes to individual entrances.

o Alarm Monitoring – Alarms Only View

- i. Report alarm point activity.
- ii. Provide colour for each specific alarm point action of “Alarm”, “Normal” and “Trouble”, conditions.

- iii. Provide the ability to access the default floor plan graphic for any active alarm point by a right click option, to acknowledge any alarm, card, or reader activity based on priority and to bypass alarms in the system
- iv. Execute alarm notification in all modes of operation.
- v. Provide display of system activity with the higher priorities displayed at the top of the list with identical points stacked with a frequency count of each point's change of state.
- vi. Provide ability for the operator to acknowledge and clear alarms from display. Prior to acknowledgment, the user shall be allowed to enter a response per alarm. The system shall offer a means to require acknowledgement of an alarm before it can be cleared.
- vii. Provide a display of the most current transactions in real time.
- viii. Provide the ability for dynamic alarm monitoring of alarm points in real time on the system computer's video display terminal.
- ix. Provide an alarm view filter that is structured as a tree allowing the operator to select individual devices or groups of devices to be viewed.
- x. Provide a "Panel Not Responding" alarm if communication to a panel is lost.
- xi. Provide real time printing of alarms as they occur by line printing with a dot matrix printer or provide printing of alarms, one page at a time, using typical Windows page printing.

○ **Alarm Monitoring/System Control – Tree View**

- i. Provide the ability for dynamic alarm monitoring of alarm points in real time on the system computer's video display terminal
- ii. Provide colour and icon shapes for each specific alarm point action of "Alarm", "Normal" and "Trouble", and "Shunted".
- iii. Access control panels in the alarm tree, like alarm points, shall also indicate if they are in the buffered mode of operation as well as any "system" related alarm such as "Tamper" or "Primary Power Loss" or Loss of communication.
- iv. Devices connected to the communication server shall provide additional popup information as to the communication port or IP connection the device is programmed for.
- v. Provide a means to launch a Virtual keypad from an intrusion panel partition to monitor the physical keypad remotely and to administer programming changes via the Virtual keypad.

○ **Operator Database**

- i. The software shall allow the assignment of operator levels to define the system components that each operator has access to view, operate, change or delete.
- ii. The ability to view, edit or delete cardholder sensitive information such as note fields, card number and PIN shall be definable by field per operator.
- iii. Define the accounts that the operator has access to.
- iv. Provide the ability to log operator actions in the history files.
- v. Provide default language to be used based on operator's login.
- vi. Provide specified time periods that the operator can log in.

○ **Reports**

- i. Provide reporting capability for printing of selected system transactions from the disk files by specific time and date selection, range from time and date to time and date, or from start time to end time each day of the selected date range.

- ii. Provide feature to generate a history report for an alarm point(s) state. An alarm point state shall be defined as Normal, Alarm, Trouble, or Ajar.
- iii. Provide feature to generate a history report of system alarms. A system alarm state shall be defined by panel and include any of the following information: communication, ground fault, power, panel reset, low voltage, panel tamper, and loop communication.
- iv. Provide feature to generate a history report for a card(s) state. A card state shall be defined as Normal, Trace, Not Found, Anti-Passback Violation, PIN Violation, Time Zone Violation, Site Code Violation, or Expired card. Additional search criteria shall include cardholders that meet up to at least 3-note field restriction and filter the report with defined reader location(s).
- v. Provide feature to generate a history report for system operator(s) activities. The report shall include time, date, operator name the device associated with the action and the type of action performed by the operator. Activities shall include but not limited to: acknowledged and cleared transactions, door and relay control such as unlock, lock; door and input control such as shunt, unshunt; login, logout, panel initialization, panel buffer and panel unbuffer.
- vi. Provide complete database reporting of all data programmed into the system data files.
- vii. Provide a means to define how long a card holder has been in a defined area. This report shall allow the time to be accumulated representing an attendance report. The definable filters shall include time/date range, reader(s) definition, card number, card holder and note field. The output of the report shall allow sort options to include First Name, Last Name, Event Time, and Card Number. The sorted data shall be selectable as Alpha or Numeric sorting and Ascending or Descending.
- viii. Provide feature to generate a report based on the frequency of usage of a card. The report shall allow the operator to define a time/date period, a minimum and maximum usage limit, a means to define which reader or readers should be used to filter the report and the ability to further define the type of card to be reported on based on note field selections. This report shall also provide a disposition function. The cards meeting the filtering criteria shall be acted upon based on the disposition setting. Disposition settings shall include but not be limited to: Report only, De-activate the card or Re-assign to a specified an access level. This report shall be available in the event scheduler. When defining when to run the report an option to select the number of previous days to run the report against shall be provided. As an example a scheduled weekly report for the last 14 days could generate allowing for an overlap of time if desired.
- ix. Provide a means to create report templates. Report templates shall include, but not be limited to, History and Card Holder information. The templates shall be able to be assigned to a scheduler to run automatically per the scheduler settings.

○ **Tracking/Muster Report**

- i. A tracking feature shall allow the system operator to identify an area and the person(s) in that area, which shall be defined by readers representing an IN or OUT read status.
- ii. Defined areas shall provide an automatic update of how many cardholders are in the area.
- iii. A view displaying all card holders in a defined tracking or muster area shall have the ability to be sorted in columns where by clicking on the column the data in the column shall be sorted. At a minimum, the columns can be sorted by: Card Number, Status, Card Holder, Reader, and Time/Date.

- iv. A Muster area shall be defined by a reader(s) used to “muster” individuals in the event of an emergency.
- v. Reports shall be generated for all muster or tracking areas in the system.
- vi. Tracking areas shall include “nested” areas. Nesting allows for various reports from a large area to smaller areas within the large area.
- vii. A Tracking and Muster area screen shall be continually updated with the most recent card activity, therefore minimizing the time required generating a report.
- viii. A history-priming feature shall load history activities for the defined amount of hours when the software is started. This priming feature shall be implemented in the event that the system computer is offline when a muster call is initiated, thereby allowing the implementation of the tracking and muster features of the software. The history priming time shall be operator selectable in 1-hour increments up to 99 hours.

○ **Time Zones**

- i. Time zone definitions shall include Starting time, Ending time, Days of the week, and Holiday override.
- ii. Minimum time zones that can be assigned to a panel shall be 63 and maximum unlimited.
- iii. Holidays shall be definable in two different time zones allowing different time schedule to be programmed for each holiday type.

○ **Floor Plan Graphic**

- i. Provide the ability to import floor plan graphics stored in a WMF format and to associate all hardware devices (access, intrusion) to floor plan graphics allowing the user to control and monitor the system.
- ii. Provide the ability to link floor plan graphics together in a hierarchy fashion and allow multiple floor plan views to be displayed simultaneously.

○ **Special System Functions**

The manufacturer of the system shall provide in the system software the following unique applications as standard:

i. Guard Tour

- Guard Tour shall allow the operator to program a series of guard check points that must be activated to accomplish the task of a Guard Tour.
- The check point shall be either reader points or alarm contact points or a mixture.
- The Guard Tour can be timed sequential allowing travel time between points with +/- tolerance. This type of tour shall allow alarms to be generated for early, missed or late events.
- The Guard Tour can be un-sequenced with no time parameters.
- The Guard Tour shall be started by two methods, Manual or Scheduled by the access control system scheduler.

ii. ID Badging System/Video Image System

- Allow any card data fields to be assigned to a badge.

- Allow a stored cardholder image to be associated to any background. Each cardholder shall have any one of the background layouts associated to it.
- Provide the ability to create temporary or permanent badges.
- Badges shall be printed without the need to assign an access level or access control card number. Numbers and access levels may be assigned after the print process.
- Provide image export capability. Image shall be exported utilizing the cardholder's name as the file name in .jpg format.
- Provide unlimited custom badge layouts (only limited by the hard disk capacity).
- Provide 24-bit (16.7 Million) color palette for background design or foreground text and all fonts supported by Windows.
- Provide import capabilities of background information by video camera or via BMP, JPG, or TGA files.
- Provide for multiple bitmap images to be imported onto the badge layout.
- Provide video capture capability from a compatible TWAIN device, DirectX device or from a compatible video capture device, such as a high-resolution color camera.
- Provide ability for multiple card enrollment/badging stations on networked system.
- Provide signature capture or import capability for up to 99 signatures that can be previewed in the cardholders badge or printed on the cardholder's card.
- Provide the capability to have a front and back layout selected for a cardholder and the ability to print the card in one step (requires suitable printer) without the need to reinsert the card.
- Provide the capability to encode a magnetic stripe with information from any of the card data fields to include, but not be limited to: First Name, Last Name, Card Number, Activation date, Expiration Date or any data from the card holders note field.

iii. Networking

- Provide networking capabilities (LAN or WAN) as allowed by the computer's operating system license.
- The access control software shall support two networking methods. By default, Domain controlled networks shall be the standard configuration providing secure networking communications. The ability to work on less secure peer-to-peer (Workgroup) networks shall be allowed for lower security installations. The functionality shall be one or the other and not run in both modes at the same time.
- Provide the ability for a network system to support concurrent users up to the license limit, i.e., one station adding cards and making badges, another station monitoring alarms, yet another running data base report, another controlling door openings and alarm shunting, and so on.
- The workstation shall have the same UI (user interface) functionality as the Server, except the workstation shall not be able to perform database maintenance functions.

2. System Products

○ Communication Ports And Loops

The computer shall have two serial communication ports. If additional ports are required, they shall be provided by installing additional compatible multi-port cards. Instead of communication ports a LAN/WAN solution is acceptable using standard 10/100/1000 Ethernet connections.

System communication ports shall be expandable up to a maximum of 255 ports.

Each communication port shall support one of the following configurations. Local direct connect loop or multiple remote loops via modem. A local RS485 multi-drop communication loop shall support up to eight intelligent controllers, 128 readers or 1024 output relays or monitor up to 1024 alarm points. Remote configuration shall be supported.

- **Front End Software Specifications**

- i. Databases: The software shall provide edit, add, delete, search, sort, and print options for records in selected databases.
- ii. Printer Output: The software shall direct user-selected activity to the Windows supported printer.
- iii. Monitor Display: The software shall display all system activity on a colour monitor in real time, except for remote locations configured as dial-up. The software shall allow a WAV file to be played upon all alarm conditions. The software shall provide an acknowledge function for all incoming alarm messages that are defined for alarm acknowledgment.
- iv. Disk Storage: The software shall store user-selected activity on the hard disk. Report options shall recall selected history information from the hard disk. The user may request report information based on selected cardholders, specific areas and/or specific times. The software shall allow archiving by defined dates.
- v. English Descriptions: The software shall support descriptive names for all database entries. The card database shall include name, number, PIN, access level, status, activation, and expiration date or limited usage and 40 user-defined fields.

- **Front End Software Requirements**

- i. Password Protection: The software shall provide multi-level password protection, with user-defined operator name/password combinations. Name/password log-on shall restrict operators to selected areas of the program. The software shall allow the assignment of operator levels to define the system components that each operator has access to view, operate, change or delete.
- ii. Action Messages: The software shall allow recall of user created text messages upon any condition.
- iii. Graphics: The software shall allow recall of user created screen graphics, upon alarm/trouble/normal conditions. These graphics shall allow the user to go from a general area to a specific area in various layers or stages and shall allow the user to monitor and control system devices from floor plans.
- iv. Manual Panel Control: The software shall allow manual control of selected inputs, outputs and groups of outputs. Manual panel control shall include pulse, timed pulse, and energize/de-energize or return to time zone options for output points and shunt/ unshunt or return to time zone options for input points. For entrances and readers manual control shall include but be limited to Lock, Un-Lock, Disable, Card only, Card-Pin only, Pin only, exit only and site code only. For partitions monitored by the intrusion panel the

control shall include but not be limited to arm away, arm stay, disarm, refresh and provide a virtual keypad for the partition. For zones monitored by the intrusion panel the control shall include but not be limited to bypass, un by pass and refresh. Intrusion panel output control shall included activate, deactivate and refresh.

v. Video Imaging/ID Badging:

- a The Video Image/ID Badging software shall store cardholder images on hard disk. Stored images shall be displayed upon request.
- b Custom card backgrounds shall be displayed upon request.

ACCESS CONTROL FIELD HARDWARE DEVICES

The security management system shall be equipped with access control field hardware required to receive alarms and administer all access granted/denied decisions. All field hardware shall meet FCC CE C-Tick requirements. The system shall include the 2-reader intelligent controller.

The IP-enabled controller is an advanced access control panel capable of providing solutions for medium to large applications. The controller provides power and flexibility with its 32-bit CPU architecture, TCP/IP protocol support, flash memory for firmware and large local card holder database.

The controller is designed to operate off-line, making access control decisions independently from a PC or other controlling device. It can also be connected to a host computer for system configuration, alarm monitoring and direct control. Connectivity to the host computer is accomplished via TCP/IP network connection.

The board combines intelligent controller and reader interface into one complete unit. It connects for two readers via Wiegand controlling two doors. The controller can support up to 62 doors via RS485 multi-drop communication where 30 downstream controllers are connected to the gateway controller. This architecture can reduce the usage on LANs by using only one TCP/IP address to 62 doors. It accommodates a card database of 55,000 cards, and a transaction buffer of 45,000 transactions. It is designed with tile mounting configuration.

Specifications

Database:

- Cardholder capacity: 55,000
- Transaction storage: 45,000
- Flash programming for firmware revision updates
- Access level: 128
- Holidays: 255
- Time zone: 127
- Card reader formats: 128 Wiegand format support
- Credential facility codes: 8
- Dedicated tamper alarm
- Dedicated power fail alarm
- Real time clock:
 - Geographic time zone support

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- Leap year support
- Embedded web server to configure network attributes

Environment:

- Temperature: 0 to 50° C operational
-55 to 85° C storage
- Humidity: 0 to 85% RHNC

Communication:

- Ethernet port connected to TCP/IP network as master panel
- RS485 multi-drop connection for downstream panels

Onboard I/O:

- 2 Readers, expandable to 62 readers per gateway controller
- 8 Supervised inputs
- 4 Relay outputs

Operational Functionality:

- Operational modes:
 - Card only
 - Card and PIN
- Maximum site codes: 8 digit
- Anti-Passback support:
 - Local
 - Global
 - Forgiveness
- Interlocks: 256

Approvals:

- CE/FCC/C-TICK

**III Biometric Fingerprint cum Proximity Card Reader :
2.5.1.**

S. No.	Features	Specifications
1.	Make	As Per Approved Make
2.	Model	As Per Approved Make
3.	Processor	533MHz DSP
4.	Memory	8MB flash + 8MB RAM
5.	Fingerprint Sensor	500 dpi optical sensor
6.	Capturing	Fingerprint, RF Card, RF card + Fingerprint
7.	Identification Speed	2,000 match in 1 second
8.	Fingerprint Capacity	10,000 templates (5,000 users, 2 fingerprints per user)
9.	Log Capacity	50,000 events

S. No.	Features	Specifications
10.	Network Interface	TCP/IP, RS485
11.	Wiegand	Configurable up to 64 bits
12.	TTL I/O	2 inputs for exit switch and door sensor
13.	Internal Relay	Deadbolt, EM lock, door strike, automatic door
14.	Display	Multi-color LED
15.	Audio	Multi-tone buzzer
16.	Certifications	CE , RoHS

Standard Read Range Smart Card Reader:

- Reader shall be read only reader
- Provide surface mounting style 13.56 MHz contactless smart card readers suitable for minimal space mounting configurations as shown on the project plans.
- Contactless smart card readers shall comply with ISO 15693, ISO 14443A (CSN), and ISO 14443B and shall read credentials that comply with these standards.
- Contactless smart card readers shall output credential data in compliance with the SIA AC-01 Wiegand standard as follows:
 - Reads standard proximity format data from cards and outputs data as encoded.
 - Reads card serial number (CSN) of a MIFARE card with configurable outputs as 26-bit, 32-bit, 34-bit, 40-bit, or 56-bit.
- Data security with cards shall use 64-bit authentication keys to reduce the risk of compromised data or duplicate cards. The contactless smart card reader and cards shall require matching keys in order to function together. All RF data transmission between the card and the reader shall be encrypted, using a secure algorithm. Card readers shall be provided with keys that are compatible with the cards.
- The reader shall be of potted, polycarbonate material, sealed to a NEMA rating of 4X (IP65).
- The contactless smart card reader shall provide the ability to change operational features in the field through the use of a factory-programmed command card. Additionally, firmware may be updated by flashing the reader. Command card operational programming options shall include:
 - Output configurations
 - LED & Audio configurations
 - Keypad configurations
- Contactless smart card readers shall provide the following programmable audio/visual indication:
 - An audio transducer shall provide various tone sequences to signify: access granted, access denied, power up, and diagnostics.
 - A high-intensity light bar shall provide clear visual status (red/green/amber) that is visible even in bright sunlight.

- Typical contactless smart card read range shall be:
 - 2" – 3" (5.0 – 7.6 cm) using card
- Contactless smart card readers shall meet the following physical specifications:
 - Dimensions: 1.90" x 4.04" x .80" (4.83cm x 10.26 cm x 2.03 cm)
 - Weight: 3.2.oz (90.7 g)
 - Material: UL94 Polycarbonate
 - Three-part design with separate mounting plate, reader body, and cover.
 - Colour: Black.
- Contactless smart card readers shall meet the following electrical specifications:
 - Operating voltage: 10 – 16 VDC, reverse voltage protected. Linear power supply recommended.
 - Current requirements: (average/peak) 61/178mA @ 12 VDC
- Contactless smart card readers shall meet the following certifications:
 - UL 294
 - Canada/UL 294
 - FCC Certification
 - Canada Radio Certification
 - EU and CB Scheme Electrical Safety
 - EU – R&TTE Directive
 - CE Mark (Europe)
 - IP55 Rated
 - C-Tick (New Zealand/Australia/Taiwan)
- Contactless smart card readers shall meet the following environmental specifications:
 - Operating temperature: -30 to 150 degrees F (-35 to 65 degrees C)
 - Operating humidity: 5% to 95% relative humidity non-condensing
 - Weatherized design suitable to withstand harsh environments
- Contactless smart card reader cabling requirements shall be:
 - Cable distance: (Wiegand): 500 feet (150m)
 - Cable type: 5-conductor #22 AWG with overall shield
 - Standard reader termination: 18" (.5m) cable pigtail
- Warranty of contactless smart card readers shall be lifetime against defects in materials and workmanship.

Contact Less Smart Card:

Access cards shall be used with access readers to gain entry to access controlled areas / zones (e.g.; doors, gates, turnstiles , barriers etc.) and to hold information specific to the user. Provide (specify quantity) (badge protectors with clips or other accessories), of a type acceptable to the Architect.

Cards shall meet the following criteria:

- The card shall meet the following standards for contactless smart cards: ISO 15693 and ISO 14443B2.

- The card shall meet ISO 7810 specifications for length, width, thickness, flatness, card construction and durability, and shall be in a form suitable for direct two-sided dye-sublimation or thermal transfer printing on the specified badge printer.
- Card will be 2Kb card.

II. Electromagnetic Lock:

1.01 Single Leaf doors.

1.01.1 Surface Mount Electromagnetic Lock with built in magnetic read switch contractor shall consider the U , L , Z brackets based on the site conditions accordingly

1.01.2 The EM Lock shall have minimum with following specifications

- Suitable for surface mount on single leaf doors
- Current Draw: 500mA / 12V, 250mA / 24V
- Dual Voltage: 12V / 24 V
- Holding Force: About 600 lbs
- Built-in magnetic read switch and Voltage Spike Suppressor
- UL Listed

1.02 Double Leaf doors.

1.02.1 Surface Mount Electromagnetic Lock with built in magnetic read switch contractor shall consider the U , L , Z brackets based on the site conditions accordingly

1.02.2 The EM Lock shall have minimum with following specifications

- Suitable for surface mount on double leaf doors
- Current Draw: 1A / 12V, 500 mA / 24V
- Dual Voltage: 12V / 24 V
- Holding Force: About 600 lbs
- Built-in magnetic read switch and Voltage Spike Suppressor
- UL Listed

III. Cable:

Following shall be the cables for the various components of the networked access control system

1.01 Reader - six conductor shielded, 18 AWG

1.02 Power - twisted pair, 18AWG

1.03 RS-485 - 24 AWG, 4,000 ft. (1,200 m) max., 2 twisted pairs' with shield (120W, 23pF)

1.04 RS-232 – 8 conductors 24 AWG, 25 ft. (7.6 m) max.

1.05 Alarm input – 2 conductor twisted pair, 30 ohms max.

VOLUME-II

SCOPE OF WORK

SCOPE OF WORK

Civil and interior works

1. Disposal of building rubbish / malba / similar unserviceable, dismantled or waste materials by mechanical means, including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge, beyond 50 m initial lead, for all leads including all lifts involved
2. Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in :Cement mortar 1:6 (1 cement : 6 coarse sand)
3. Half brick masonry with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level Cement mortar 1:4 (1 cement : 4 coarse sand)
4. 12 mm cement plaster of mix: 1:4 on 230mm thick brick walls (1 cement : 4 coarse sand)
5. 15mm cement plaster on the rough side of single or half brick wall of mix: 1:4 (1 cement : 4 coarse sand)
6. Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position :Second class teak wood
7. Providing and fixing glazed shutters for doors, windows and clerestory windows using 4 mm thick float glass panes including black enamelled ISI marked M.S. butt hinges with necessary screws. 35 mm thick
8. Extra for providing heavy sheet float glass panes instead of ordinary float glass in glazed doors, windows and clerestory window shutters. (Area of opening for glass panes excluding portion inside rebate shall be measured). 5.5 mm thick instead of 4 mm thick
9. Extra for providing heavy sheet frosted glass panes 5.5 mm thick instead of ordinary float glass panes 5.5 mm thick in doors, windows and clerestory window shutters. (Area of opening for glass panes excluding portion inside rebate shall be measured).
10. Providing and fixing ISI marked flush door shutters conforming to IS: 2202 (Part I) decorative type, core of block board construction with frame of 1st class hard wood and well matched teak 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters: 35 mm thick including ISI marked Stainless Steel butt hinges with necessary screws.
11. Providing and fixing IS : 3564 marked aluminium extruded section body tubular type universal hydraulic door closer with double speed adjustment with necessary accessories and screws etc. complete.

12. Providing and fixing paneling on wall, on G.I hat furring channel 22-25 depth with grid size 600mmx 600mm both ways fixed to wall, columns in any profile and covered with 8mm plywood of approved make and finished with veneer duly polished as approved on exposed faces with grooves as per design. The rates shall include all hardware, fittings, adhesives, beadings, lippings etc as directed by the architect.
13. Providing and fixing 1st Class Teak wood/Rubeer wood skirting wherever required as per carved profile of size 75mm wide x 15mm thick duly melamine polished. Fixing details as per drawing and as directed by architect
14. Providing and fixing 1st quality Ceramic glazed wall tiles conforming to IS : 15622 (thickness to be specified by the manufacture) of approved make in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer-in-Charge in skirting, risers of steps and dados over 12 mm thick bed of cement Mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm including pointing in white cement mixed with pigment of matching shade complete. Size of Tile 300 x 600 mm (Make: Kajaria Series Equisite Satin Matte)
15. Providing and laying Polished Glazed Vitrified Tiles (PGVT) in different sizes (thickness to be specified by the manufacturer) with water absorption's less than 0.08% and conforming to IS : 15622 (Kajaria, equivalent make) in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 coarse sand) including grouting the joints with white cement and matching pigments etc complete. Size of Tile 1000 x 1000 mm (Make: Kerrogres Kajaria Premium Series)
16. Providing and fixing 18 mm thick gang saw cut mirror polished (premoulded and prepolished) machine cut granite for kitchen platform, vanity counters, window sills, facias and similar locations of required size of approved shade, colour and texture laid over 20mm thick base cement mortar 1:4 (1 cement : 4 coarse sand) with joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edge to give high gloss finish etc complete at all levels. Granite of any colour and shade. Area of slab over 0.50 sqm
17. Providing and laying **Anti skid ceramic glazed floor tiles** 300 x 300 mm (thickness to be specified by the manufacturer) of 1st quality conforming to IS: 13755 of approved brand in all colours, shades except white, Ivory, Grey Fume Red Brown laid on 20 mm thick bed of Cement Mortar 1:4 (1 cement:4 coarse sand) including pointing the joints with white cement and matching pigments etc. complete.
18. Providing and laying 25 mm thick sorted **Kota stone slab flooring** in different shades and pattern as shown on drawing and approved by Architect over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab including rubbing and polishing complete with base of cement mortar 1:4 (1 cement : 4 coarse sand)
19. Providing and laying **Italian marble flooring** in different shades and pattern as shown on drawing and approved by Architect over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab including

rubbing and polishing complete with base of cement mortar 1:4 (1 cement : 4 coarse sand)

20. Providing and fixing of laminated 12 mm thick **Wooden flooring** with proper non glue fixing details and proper base and finishing as per manufactures specifications and to the satisfaction of the EIA/architect. Flooring (Make: Unitex, Armstrong or equivalent make)
21. Providing and fixing of **wooden false ceiling** with 12 mm commercial ply and 4 mm decorative veneer finish as per approved make, colour and texture with melamine polish as per design, drawings, specification and direction of Engineer-in-Charge/Site Engineer.
22. Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes , finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills, diffusers, cutouts made with frame of perimeter channels suitably fixed, all complete as per drawings, specification and direction of the Engineer in Charge but excluding the cost of painting with Fully Perforated Gypsum Plaster Board of size 1200 x 2400x12.5 mm having approx. 15 % perforated area with perforation size and pattern as approved by the Engineer in charge and as per manufacturer's specification, with all 4 side tapered and backed by acoustical tissue with NRC value not less than 0.60
23. Providing and Fixing 15 mm thick densified tegular edged eco friendly light weight calcium silicate false ceiling tiles of approved texture spintone/ cosmos / Hexa or equivalent of size 595 x 595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanised steel sections (galvanising @ 120 grams per sqm including both side) consisting of main 'T' runner suitably spaced at joints to get required length and of size 24x38 mm made from 0.33 mm thick (minimum) sheet, spaced 1200 mm centre to centre, and cross "T" of size 24x28 mm made out of 0.33 mm (Minimum) sheet, 1200 mm long spaced between main'T' at 600 mm centre to centre to form a grid of 1200x600 mm and secondary cross 'T' of length 600 mm and size 24 x28 mm made of 0.33 mm thick (Minimum) sheet to be inter locked at middle of the 1200x 600 mm panel to form grid of size 600x600 mm, resting on periphery walls /partitions on a Perimeter wall angle pre-coated steel of size(24x24X3000 mm made of 0.40 mm thick (minimum) sheet with the

help of rawl plugs at 450 mm centre to centre with 25 mm long dry wall screws @ 230 mm interval and laying 15 mm thick densified edges calcium silicate ceiling tiles of approved texture (Spintone / Cosmos/hexa) in the grid, including, cutting/ making opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc., wherever required. Main 'T' runners to be suspended from ceiling using G.I. slotted cleats of size 25x35x1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm G.I. adjustable rods with galvanised steel level clips of size 85 x 30 x 0.8 mm, spaced at 1200 mm centre to centre along main 'T', bottom exposed with 24 mm of all Tsections shall be pre-painted with polyster baked paint, for all heights, as per specifications, drawings and as directed by engineer-in-charge. Note :- Only calcium silicate false ceiling area will be measured from wall to wall. No deduction shall be made for exposed frames/opening (cut outs) having area less than 0.30 sqm. The calcium silicate ceiling tile shall have NRC value of 0.50 (Minimum), light reflection > 85%, noncombustible as per B.S. 476 part IV, 100% humidity resistance and also having thermal conductivity <0.043 w/m 0 KC.

24. Providing and fixing GI Clip in Metal Ceiling System of 600x600 mm module which includes providing and fixing 'C' wall angle of size 20x30x20 mm made of 0.5 mm thick pre painted steel along the perimeter of the room with help of nylon sleeves and wooden screws at 300 mm center to centre, suspending the main C carrier of size 10x38x10 mm made of G.I steel 0.7 mm thick from the soffit with help of soffit cleat 37x27x25x1.6 mm, rawl plugs of size 38x12 mm and C carrier suspension clip and main carrier bracket at 1000 mm c/c. Inverted triangle shaped Spring Tee having height of 24 mm and width of 34 mm made of GI steel 0.45 mm thick is then fixed to the main C carrier and in direction perpendicular to it at 600 mm centers with help of suspension brackets. Wherever the main C carrier and spring T have to join, C carrier and spring T connectors have to be used. All sections to be galvanized @ 120 gms/ (both side inclusive), fixing with clip in tiles into spring 'T' with : GI Metal Ceiling Clip in plain Beveled edge global white color tiles of size 600x600 and 0.5 mm thick with 25 mm height, made of G I sheet having galvanizing of 100 gms/ sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation.
25. Providing and Fixing Insulation Acoustic false ceiling in AHU Rooms
26. Providing and applying plaster of paris putty of 2 mm thickness over plastered surface to prepare the surface even and smooth complete
27. Applying one coat of cement primer of approved brand and manufacture on wall surface
28. Wall & ceiling painting with plastic emulsion paint of approved brand and manufacture to give even shade.
 - a) Two or more coats on new work.

SANITARY WARE INSTALLATION

29. Supply, installation, testing and commissioning of vitreous china single trap syphonic pattern having back inlet, supporting chair wall hung water closet with Flush Valve and CP brass flush bend (European type) water closet with seat and lid, with C.P. brass hinges and rubber buffers, adapter, rubber joints fixed to W.C., C.P. brass screwed washers including cutting and making good the walls and floors wherever required and HDPE wc pan connector including jointing with white cement complete in all respects. **(EWC - preferred make KOHLER Model No. K-18131K – WD - Patio or Make: American Standard CAT No. 3116/460000S-WT or Make: Roka Cat No. RS346657000) Wall hung W.C. pan with white plastic seat & lid "Thermoset moulded (bakelite) IS 2548 Part I**
30. Providing and Fixing of **low noise contact-free infrared dual flush mechanism for wc with manual override button** with internal isolating valve including roughing -in-set for single flush: 6 l factory setting, 3,5 - 9 l adjustable ,stagnation flush: every 24 hours after last flush, range of room monitoring 500 - 800 mm adjustable mechanical actuation (Comprises Plastic Shell Casing; preassembled water path out of DR brass; Isolating valve/Connection G 3/4" external thread, right; Flow through plug G 3/4 " external thread; cleaning cover; height adjustable flush pipe with construction plug ; Flow pressure 1.2 to 5 bar ;Flush Volume 1-1.3 ltr/sec ; Fitting connection : G 3/4" (DN 20), External thread right and Design control button (Front panel out of plastic chrome) for two flush volume - (Economy button- 3 l and main flush volume adjustable between 4.5 to 9 l) inclusive self closing cartridge with automatic jet cleaning needle Noise Class -I ; Material : all parts conducting water out of dezincification -resistant water **(Preferred make : Schell, Model no. 01 194 00 99 with 01 546 28 99 and 01 853 00 99 or Make: Grohe-37751000 tectron 505 or make: Geber Model - 44-912)**
31. Supply, installation, testing and commissioning vitreous china flat back large urinal complete with concealed wall hangers, fully automatic photoelectric cell operated No-touch urinal flushing system (Battery/electrical operated vandal proof- twin flush (pre & post use) operation), flush mounted sensors complete in all respects in fully operational conditions, C.P. brass flush pipe with C.P. clamps and screws, C.P. flange with spreader, 32 mm C.P. cast brass bottle trap and pipe to wall with wall flange complete including cutting and making good the walls and floors where required. [Preferred Make Euronics-Kinox-KUF or Make: Hindware Senso Art Cat. No.: 60018 OR Make : Schell Model - 01 196 00 99) 32 mm nominal bore CP cast bottle trap with extension pipe rubber adopter for waste connection
32. Supply, installation, testing & commissioning wash basin with CP waste coupling of standard pattern, 32 mm dia C.P. cast brass bottle tarp & union, 32 mm dia C.P. pipe to wall and C.P. wall flange, complete including cutting and making good the walls where required. **(Preferred Make KOHLER Model No. K-2215IN or Make: Roka Diverta or Make Hindware10080)**
33. Supply, installation, testing & commissioning wash basin with CP waste coupling of standard pattern, 32 mm dia C.P. cast brass bottle tarp & union, 32 mm dia C.P. pipe to wall and C.P. wall flange, complete including cutting and making good the walls where required. **(Preferred Make KOHLER Model No. K-11341T-1-0 or Make : Roka or Make Hindware 91014) - Handicap's Toilet**

34. Supply, installation, testing & commissioning of self-closing wash basin mixer tap with self-closing cartridge with hot water limiter ; manual actuation and automatic closing action should Comprises: mounting accessories for single-hole installation and with technical data: as fl ow volume 5 l/min Independent of pressure ; fl ow pressure: 1 to 5 bar ; fl ow time: approx. 7 s Material: Housing material: brass DIN EN **(Model no. 02 151 06 99 of Schell)**
35. Supply, installation, testing and commissioning of wall mounted Stainless Steel Handicap Grab bar (dimension: 860x275x100mm) including cutting & making good the walls. **(Preferred Make: EURONICS, Cat No. : EGR S02 or Make : Jaquar Cat AHN 1507 or Utec Model TVB 7800) - Handicap Toilet**
36. Supply, installation, testing & commissioning of **Regulating Angle valve** with Comfort handle, with extended push rod, push rosette Ø 54 mm ; Material – Brass DIN EN / Noise Class I ; **Connection: 1/2"/DN 15, Outlet: 1/2"/DN 15** ; Chrome / Weight 0.130 KG per piece (**Model no. 05 217 06 99 of Schell or Make :Jaquar, Model: 23055 or Make:KOHLER, Model: K-11565IN-7-CP) or Equivalent**
37. Supply, installation, testing and commissioning **toilet paper holder** including cutting and making good the walls. **[Make:Kohler , Model: 5633IN-CP].**
38. Supply, insatallation, testing and commissioning automatic soap dispenser with stainless steel lid and brackets fixed to wooden cleats with C.P. brass screws. **.(Preferred Make: EURONICS, Model : ES 08A or Make : Utech UT324 or Make : Jaquar DJ0160AS)**
39. Supply, installation, testing and commissioning ABS health spray unit comprising of CP flexible hose, spary, wall flange etc. complete. **(Make: Schell, Model no. 03 295 06 99 or Make :KOHLER, Model : K-12925IN-CP or Make : Jaquar Model : 573)**
40. Supply, installation, testing and commissioning C.P. brass air purifier fixed to wooden cleats with C.P. brass screws complete. **(Preferred Make : EURONICS, Model : EA 03 or Make Utech Model- UT630 or Make: GEM, Model : 39300)**
41. Supply, insatallation, testing and commissioning stainless steel paper towel dispenser. **(Preferred Make : EURONICS, Model : EP01 or Make : TOSHI, Model : A-726 or Make :Utech UT TVB 4001)**
42. Supply, installation, testing and commissioning **Towel ring in polished chrome** including cutting and making good the walls. **[Make:Kohler , Model: K-5631IN-CPP].**
43. Supply, installation, testing and commissioning C.P. brass **twin coat hooks** fixed on toilet door with C.P. brass screws **[Make:Kohler,Model: 5635IN-CP].**
44. Supply, installation, testing and commissioning of stainless steel braided flexible hoses with inliner EPDM Which can bear the maximum pressure of 10 bar and maximum temperature of 90 degree Celsius with bending radius of 25 r with length 500 mm with Union nut connection of 1/2" **(Model no. 09 042 06 99 of Schell)**

45. Providing And Fixing stainless steel fully automatic "No Touch" hand drier suitable to operate on 220 volts, single phase 50 hz., A.C. power supply **(Preferred Make : EURONICS, Model : KINOX (KJD 1) or Make : TOSHI, Model : HK-1800SA or Make Utech M06-ACS)**
46. Supply, installation, testing and commissioning stainless steel sink, R.S. or C.I. brackets painted, 40 mm C.P. waste, S.S. sink drain grating (bucket removable type), 40 mm C.P. cast brass bottle trap with necessary union complete including 15mm C.P. brass quarter turn counter type mixing fitting for kitchen sink with swinging spout complete including cutting and making good the walls where required. Stainless steel sink, single bowl with drain board. Overall size 915X460 mm Bowl size 408x350x180 mm. **[Make : Jayna Model ATL05 or Make Nirali or Make : Jaquar, Sink mixer Jaquar mixer Model 11163, Make Parryware Model PW-AGATE-G0639A1, Make Hindware Axxis Sink Mixer]**
47. Supply, installation, testing and commissioning stainless steel sink, R.S. or C.I. brackets painted, 40 mm C.P. waste, S.S. sink drain grating (bucket removable type), 40 mm C.P. cast brass bottle trap with necessary union complete including 15mm C.P. brass quarter turn counter type mixing fitting for kitchen sink with swinging spout complete including cutting and making good the walls where required. Stainless steel sink, single bowl without drain board. Overall size 480x405 mm Bowl size 408x350x180 mm. **[Make : Jayna Model ATL01 or Make Nirali or Make : Jaquar) - JC & panty**
48. Providing and fixing horizontal type storage hot water heater within-built pressure relief valve, rated for inlet water pressure upto 8 bar complete in all respects including inlet, outlet connections, fixing bolts etc. and testing complete. (Make: JAQUAR - AO SMITH or Make Venus or Make Racold) **Capacity 10 litres**
49. Providing and fixing horizontal type storage hot water heater within-built pressure relief valve, rated for inlet water pressure upto 8 bar complete in all respects including inlet, outlet connections, fixing bolts etc. and testing complete. (Make: JAQUAR - AO SMITH or Make Venus or Make Racold) **Capacity 25 litres**
50. Providing and fixing horizontal type storage hot water heater within-built pressure relief valve, rated for inlet water pressure upto 8 bar complete in all respects including inlet, outlet connections, fixing bolts etc. and testing complete. (Make: JAQUAR - AO SMITH or Make Venus or Make Racold) **Capacity 35 litres**
51. Providing and fixing horizontal type storage hot water heater within-built pressure relief valve, rated for inlet water pressure upto 8 bar complete in all respects including inlet, outlet connections, fixing bolts etc. and testing complete. (Make: JAQUAR - AO SMITH or Make Venus or Make Racold) **Capacity 50 litres**
52. Providing/Fixing straight /offset type Macfit single body push fit type WC pan connector with factory supplied spring loaded seal guard of **McAlpine, UK** with integral single mould sealing fins made of flexible EVA body, including bush/adaptor for use with C.I. Pipe as supplied with the pan connector (if required).

53. DRAINAGE INSTALLATION

54. Providing and fixing floor drain with 50mm outlet and 100 mm inlet with SS grating having 50mm seal for indirect floor drain (**Make: McAlpine Model: MRFG3**).
55. Providing and fixing floor drain (FD) with 50mm outlet and 100 mm inlet with SS grating having 19mm seal for indirect floor drain (FD) (**Make: McAlpine Model:MRFG4** (for horizontal outlet/mrfg4v (for vertical outlet).
56. Cleanout plug
57. Providing and fixing sound insulated POLO KAL NG piping system with 3 layer pipe made of PP-C + PP-MV + PP-C in Blue Ral 5014 (halogen and calcium free) colour, push-fit type, food safe, high impact and stiffness as per ON EN 1451-1 and DIN 19560 offering sound levels of not more than 21 dBA at a flow rate of 4 l/s and having pipe ring stiffness as per 1S0/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, with all necessary fittings in blue colour as per ON EN 1451-1 and DIN 19560 all fitted with factory fitted lip ring. (**Make: POLOPLAST, REHAU**) **110 mm dia POLO KAL NG**
58. Providing and laying cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm and down gauge) 75 mm in bed and all round POLO KAL soil and waste pipe. 110 mm dia POLO KAL NG
59. Providing and fixing sound insulated POLO KAL NG piping system as per ON EN 1451-Part 1-6 & EN 12056 Part 1-5 with 3 layer pipe made of PP-C + PP-MV + PP-C in Blue Ral 5014 (halogen and calcium free) colour, push-fit type, food safe, having high impact and stiffness, offering sound levels of not more than 21 dBA at a flow rate of 4 l/s and having pipe ring stiffness as per 1S0/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, with all necessary fittings in blue colour, fitted with factory fitted lip ring (For Indirect waste/ Wash Basin/Urinal/Sink/Floor Drain) (Make: POLOPLAST, REHAU) 40 mm nominal bore
60. Providing and fixing sound insulated POLO KAL NG piping system as per ON EN 1451-Part 1-6 & EN 12056 Part 1-5 with 3 layer pipe made of PP-C + PP-MV + PP-C in Blue Ral 5014 (halogen and calcium free) colour, push-fit type, food safe, having high impact and stiffness, offering sound levels of not more than 21 dBA at a flow rate of 4 l/s and having pipe ring stiffness as per 1S0/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, with all necessary fittings in blue colour, fitted with factory fitted lip ring (For Indirect waste/ Wash Basin/Urinal/Sink/Floor Drain) (Make: POLOPLAST, REHAU) 50 mm nominal bore
61. Nugreen grease separator SS 304 NGT 20 - Supply with direct suction Pipe inlet and outlet 40/50 dia. flange, grease separator plant according to Free Standing in Frost free areas and under sink installation of polyethylene material with integrated sludge trap, domed cover made of Polymer with snap fit closures and sealed odor -tight , with installed suction system in flow direction left or right for disposal both from sludge trap and grease separating chamber and with flange connection for intake pipe according. Integrated sludge trap of 10 ltrs and volumes at 9 ltrs. Dimensions to be within 426 mm x 296 mm X 350 mm(L X W X H) .
62. Providing, fixing testing, and commissioning of CPVC) pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 &

- fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].1/2 Inch dia pipe (Sch. - 11)
63. Providing, fixing testing, and commissioning of CPVC) pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].3/4 Inch dia pipe (Sch. - 11)
64. Providing, fixing testing, and commissioning of CPVC) pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].1 Inch dia pipe (Sch. - 11)
65. Providing, fixing testing, and commissioning of CPVC) pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].1-1/4 Inch dia pipe (Sch. - 11)
66. Providing, fixing testing, and commissioning of CPVC) pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].1-1/2 Inch dia pipe (Sch. - 11)
67. Providing, fixing testing, and commissioning of CPVC) pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].2 Inch dia pipe (Sch. - 11)
68. P/F Highly flexible water supply pipes in PE-RT type 1 and PE-RT type 2 with additional layers (5 layer), in ivory colour, of food grade quality with maximum continous pressure handling capability (10 bar at 70 degree C) including PPSU fittings for for press connection and end fittings in DZR brass. (for internal Hot Water application). POLO FIT - POLOPLAST -Germany. 16mm OD
69. P/F Highly flexible water supply pipes in PE-RT type 1 and PE-RT type 2 with additional layers (5 layer), in ivory colour, of food grade quality with maximum continous pressure handling capability (10 bar at 70 degree C) including PPSU fittings for for press connection and end fittings in DZR brass. (for internal Hot Water application). POLO FIT - POLOPLAST -Germany. 20mm OD

70. Providing and fixing 9 mm thick insulation with Arm flex elastomeric nitrile rubber sheets for hot water pipes in wall chases complete with plastering 16mm ID [9 mm thick insulation]
71. Providing and fixing 9 mm thick insulation with Arm flex elastomeric nitrile rubber sheets for hot water pipes in wall chases complete with plastering 20mm ID [9 mm thick insulation]
72. Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16). 15 mm dia nominal bore
73. Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16). 20 mm dia nominal bore
74. Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16). 25 mm dia nominal bore
75. Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16). 32 mm dia, nominal bore
76. Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16). 40 mm dia, nominal bore
77. Making Connection with existing vertical water supply lines complete including all accessories and fittings 40 nominal bore
78. Making Connection with existing vertical water supply lines complete including all accessories and fittings 25 nominal bore
79. Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS: 1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded). 25 mm nominal bore
80. Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS: 1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded). 32 mm nominal bore
81. Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS: 1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic

enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).40 mm nominal bore

82. Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS: 1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).50 mm nominal bore
83. Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS: 1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).65 mm nominal bore
84. Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).80 mm nominal bore
85. Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS: 1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).100 mm nominal bore
86. Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS: 1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).150 mm nominal bore
87. Providing and fixing 15 mm dia gunmetal sprinkler head with quartz bulb and set to operate at specified temperature. Sprinkler head shall carry UL-FM approval (Make: Tyco / Viking / Globe) .Temperature of operation 68 deg.C.Chrome plated pendent type with powder coated twin rosette plate.
88. Providing and fixing 15 mm dia gunmetal sprinkler head with quartz bulb and set to operate at specified temperature. Sprinkler head shall carry UL-FM approval (Make: Tyco /

Viking / Globe) .Temperature of operation 68 deg.C. Chrome Plated/powder coated concealed type sprinkler head with all plates and accessories.

89. Providing and fixing 25 mm dia, 700mm to 1200mm long flexible stainless steel (SS 304) pipe for making final connection of sprinkler head with sprinkler system piping network including 2 nos. 25mm diameter G.I. connector, G.I. Nipple, Reducer, elbow and threaded jointing complete as per detail. (Make: NEWAGE / Viking /TYCO/GETECH). 700mm long
90. Providing and fixing 25 mm dia, 700mm to 1200mm long flexible stainless steel (SS 304) pipe for making final connection of sprinkler head with sprinkler system piping network including 2 nos. 25mm diameter G.I. connector, G.I. Nipple, Reducer, elbow and threaded jointing complete as per detail. (Make : NEWAGE / Viking /TYCO/GETECH).1000mm long
91. Providing and fixing 25 mm dia, 700mm to 1200mm long flexible stainless steel (SS 304) pipe for making final connection of sprinkler head with sprinkler system piping network including 2 nos. 25mm diameter G.I. connector, G.I. Nipple, Reducer, elbow and threaded jointing complete as per detail. (Make : NEWAGE / Viking /TYCO/GETECH).1200mm long
92. Providing and fixing 25 mm dia, 700mm to 1200mm long flexible stainless steel (SS 304) pipe for making final connection of sprinkler head with sprinkler system piping network including 2 nos. 25mm diameter G.I. connector, G.I. Nipple, Reducer, elbow and threaded jointing complete as per detail. (Make : NEWAGE / Viking /TYCO/GETECH).1500mm long
93. Dismantling and refixing of existing MS pipes including all works like welding, support fixing, painting, testing complete in all respects. 25 mm nominal bore
94. Dismantling and refixing of existing MS pipes including all works like welding, support fixing, painting, testing complete in all respects. 32 mm nominal bore
95. Dismantling and refixing of existing MS pipes including all works like welding, support fixing, painting, testing complete in all respects. 40 mm nominal bore
96. Dismantling and refixing of existing MS pipes including all works like welding, support fixing, painting, testing complete in all respects. 50 mm nominal bore
97. Making connection with existing main header including butterfly valve, flanges and accessories required. 150 mm nominal bore
98. Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16). 25 mm dia nominal bore

PORTABLE FIRE EXTINGUISHERS:

99. Providing & fixing of 2kg clean agent gas based residue free stored pressure FE-36 Dupont - HFC-236fa (HEXAFLUOROPROPANE–CF₃-CH₂-CF₃) multipurpose type having 0% ODP with magnetic pressure gauge having the facility to check with the

magnetic pressure kit on site pressurised by dry nitrogen, can height 341MM, diameter is 108 MM Gross weight 3.6Kg, empty weight 1.6 Kg, discharge time is minimum 6 sec, controllable discharge mechanism, embossed fire rating as per the BS EN 3- 21B, BIS 15683 marked with EPDM Hose with helium leak detection tested and certificate enclosed, range 4 mtr with plastic yellow safety seal with pull marked on it, Warranty 5 year. (Make Kanex / Safe Guard / Getech) - Capacity 2.0 kg

100. Providing & fixing of 2kg clean agent gas based residue free stored pressure FE-36 Dupont - HFC-236fa (HEXAFLUOROPROPANE–CF₃-CH₂-CF₃) multipurpose type having 0% ODP with magnetic pressure gauge having the facility to check with the magnetic pressure kit on site pressurised by dry nitrogen, can height 341MM, diameter is 108 MM Gross weight 3.6Kg, empty weight 1.6 Kg, discharge time is minimum 6 sec, controllable discharge mechanism, embossed fire rating as per the BS EN 3- 21B, BIS 15683 marked with EPDM Hose with helium leak detection tested and certificate enclosed, range 4 mtr with plastic yellow safety seal with pull marked on it, Warranty 5 year. (Make Kanex / Safe Guard / Getech) - Capacity 2.0 kg.
101. Providing & fixing of 2kg clean agent gas based residue free stored pressure FE-36 Dupont - HFC-236fa (HEXAFLUOROPROPANE–CF₃-CH₂-CF₃) multipurpose type having 0% ODP with magnetic pressure gauge having the facility to check with the magnetic pressure kit on site pressurised by dry nitrogen, can height 341MM, diameter is 108 MM Gross weight 3.6Kg, empty weight 1.6 Kg, discharge time is minimum 6 sec, controllable discharge mechanism, embossed fire rating as per the BS EN 3- 21B, BIS 15683 marked with EPDM Hose with helium leak detection tested and certificate enclosed, range 4 mtr with plastic yellow safety seal with pull marked on it, Warranty 5 year. (Make Kanex / Safe Guard / Getech) Capacity - Capacity 6 Kg.
102. 5Kg Automatic ceiling mounted Fire Suppression Extinguisher Direct Low Pressure, Dupont™ Clean Agent FE 36 Zero ODP, Stored Pressure Type, fitted with Pressure Gauge, Discharge Time 32 Seconds approx, Applicable on class A, B, C and electrically started fires, With suitable support (UPS ROOM) - For Below Ceiling Level **(Make Kanex / Safe Guard / Getech)**

EXIT SIGNAGES

103. Providing and fixing signages printed on photo luminescent U1000 aluminium sheet of 1.0 mm (+/-10%) containing Lumigen II as base chemical, covered under UV stabilized coating and of appropriate size (Glo-lite or eq. Make) including fixing on wall, door, ceiling etc. with proper clamps, hangers, cleats, anchor fasteners etc. complete in all respects as directed by Engineer-in-charge

ELECTRICAL WORKS

104. Wiring for light point/fan point/exhaust fan point/call bell point with 1.5 Sq.Mm FRLS PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit, with modular switch, modular plate, suitable GI box and earthing the point with 1.5 Sq.Mm FRLS PVC insulated copper conductor single core cable etc. as required. Group C

105. Wiring for power plug with 2 x 4 Sq.Mm. FRLS PVC insulated, copper conductor single core cable in surface / recessed medium class PVC conduit along with 1 no 4 Sq.Mm FRLS PVC insulated copper conductor single core cable for loop earthing as required.
106. Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 2 X 2.5 sq. mm + 1 X 2.5 sq. mm earth wire.
107. Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 2 x 4sq.mm. + 1 x 4 sq.mm. Earth wire
108. Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 2 x 6 sq.mm. + 1 x 6 sq.mm. Earth wire
109. Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 4 x 6 sq.mm + 2 x 6 sq.mm. Earth wire
110. Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 2 x 10 sq.mm. + 1 x 10 sq.mm. Earth wire
111. Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 4 x 10 sq.mm. + 2 x 10 sq.mm. Earth wire
112. Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 4 x 16 sq.mm. + 2 x 16 sq.mm. Earth wire

S/F light plug point Modular type accessories:-

113. Supply and fixing of suitable size **GI box with modular plate and cover** in front on surface or in recess including providing and fixing 3 pin 5/6 amps modular socket outlet and 5/6 amps. Modular switch, connection etc. as required. (For light plugs to be used in non residential buildings).
114. Supply and fixing of suitable size **GI box with modular plate and cover** in front on surface or in recess, including providing and fixing 6 pin 5/6 & 15/16 amps modular socket outlet and 15/16 amps. Modular switch, connection etc. as required.
115. Supplying and Fixing Call Bell/ Buzzer Suitable for single phase, 230 Volts, Complete as required.
116. Supplying and fixing **20 amps**, 240 volts, SPN, industrial type socket outlet, with 2 poles and earth metal enclosed plug top along with 20 amps. "C" curve, **SP MCB** in sheet steel

enclosure, on surface or in recess, with chained metal cover for the socket outlet, and complete with connections, testing and commissioning etc. as required.

117. Supply and fixing of stepped type electronic **fan regulator** on the existing modular plate switch box including connections but excluding modular plate etc. as required.
118. Supply and fixing **modular blanking plate** on the existing modular plate & switch box excluding modular plate as required.
119. Supplying and fixing **5 amps. to 32 amps.** rating, 240 volts 'C' series, **miniature circuit breaker (MCB)** suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required. single pole
120. Supplying & fixing single pole, **blanking plate** in the existing MCB DB complete etc. as required.
121. Supplying and fixing following way, prewired TP&N MCB distribution board of steel sheet for 415 volts, on surface /recess, complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required (But without MCB / RCCB / Isolators).
122. Supplying and fixing following way, prewired TP&N MCB distribution board of steel sheet for 415 volts, on surface /recess, complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required (But without MCB / RCCB / Isolators). 4 way (4 + 12), Double door
123. Supplying and fixing following way, prewired TP&N MCB distribution board of steel sheet for 415 volts, on surface /recess, complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required (But without MCB / RCCB / Isolators). 6 way (4 + 18), Double door
124. Supplying and fixing following way prewired SP&N MCB distribution board of steel sheet for 240 volts on surface / recess, complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate bus bar, interconnections, powder painted including earthing etc. as required. (But without MCB / RCCB / Isolator) 2 + 8 way/10 way, Double door

S/F DP MCB Isolator

125. Supplying and fixing following rating, Double pole, 240 V, isolator in the existing MCB DB complete with connections, testing and commissioning etc. 40 Amps

S/F DP (RCCB)

126. Supplying and fixing following rating, double pole, (single phase and neutral), 240 volts, residual current circuit breaker (RCCB), having a sensitivity current upto 300 milliamperes in the existing MCB DB complete with connections, testing and commissioning etc. as required. 40 Amps

S/F 4P MCB Isolator

127. Supplying and fixing following rating, four pole, 415 V, isolator in the existing MCB DB complete with connections, testing and commissioning etc. 63 Amps
128. Supplying and fixing following size / modules, GI box along with modular base & cover plate for modular switches in recess etc as required 1 or 2 Module (75 mm x 75 mm)
129. Supplying and fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc as required. Telephone Socket outlet
130. Supplying and fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc as required. TV Antenna socket outlet
130. Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required : 20 mm.
131. Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required : 25 mm.
132. Supply and drawing following pair, 0.5 sq.mm. FRLS PVC insulated annealed copper conductor, unarmoured telephone cable in the existing surface / recessed steel/ PVC conduit as required. 2 Pair
133. Supply and drawing co-axial **TV cable RG-6 grade, 0.7 mm**. Solid copper conductor PE insulated, shielded with fine tinned copper braid and protected with PVC sheath in the existing surface / recessed steel/ PVC conduit as required.
134. Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects. 50 pair krone

135. Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects. 100 pair krone
136. Supplying, laying, testing and commissioning of following size annealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. 50 pair
137. Supplying, laying, testing and commissioning of following size annealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. 100 pair
138. Supply and Erecting modular type computer jack RJ 45 ISI mark approved make with mounting plate and box with wiring connections complete.
139. Supplying & installing UTP networking Cat-6 cable suitable for LAN/WAN computer network working as per catalogue no. DC6CAUTP4P3X.

SUB HEADS (IV):- MISCELLANEOUS

140. Providing and fixing **M.V. danger notice plate** of 200mmx150mm made of mild steel, atleast 2mm thick and vitreous enamelled white on both sides and with inscription single red colour on front side as required.
141. Providing and fixing **hexagonal fan box** circular/ Hexagonal cast iron or M.S. sheet box for ceiling fan clamp, of internal dia 140 mm, 73 mm height, top lid of 1.5 mm thick M.S. sheet with its top surface hacked for proper bonding, top lid shall be screwed into the cast iron/ M.S. sheet box by means of 3.3 mm dia round headed screws, one lock at the corners. Clamp shall be made of 12 mm dia M.S. bar bent to shape as per standard drawing.

SUPPLY OF LIGHTING FIXTURES

142. **SURFACE type 18W LED PEARL SQUARE** as per CROMPTON GREAVES Cat No : LCDSPL-R-18-CDL or Equivalent
143. Recessed mounted 15W LED CROM LED as per CROMPTON GREAVES Cat No : LCDD-15-CDL or Equivalent
144. **SURFACE mounted 12 W LED PEARL ROUND** as per CROMPTON GREAVES Cat No : LCDSPL-R-12-CDL or Equivalent
145. **Surface mounted 20 W LED TUBE LIGHT** fitting as per HAVELLS Cat No : LHEXCEP7UN1W020 or Equivalent

146.**40W LED PANEL** as per CROMPTON GREAVES Cat No : LCTAR1-40-CDL or Equivalent

147.**MIRROR LIGHT** as per CROMPTON GREAVES Cat No :LCL-10-CDL or Equivalent

SUPPLY OF CEILING & EXHAUST FANS

148. Supply of AC 230/250 volts, 50 HZ ceiling fan with standard down rod, blades, 2 nos. caps & regulator etc. ISI marked complete as required. 1200 mm sweep (fusion-50 5*)

149. Supply of AC 230/250 volts, 50 HZ exhaust fans including providing nuts, bolts, mounting frame and other accessories etc. complete (Make: Bajaj / Crompton / Havells) ,300 mm sweep 900 rpm

150. Supply of Wall Mounted Fan (Airboll Hi Speed). ISI marked complete as required.

151. Installation, testing and commissioning of pre-wired, fluorescent fitting / compact fluorescent fitting of all types, complete with all accessories and tubes etc. directly on ceiling / wall, including connection with 1.5 sq. mm. FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required.

152. Installation, testing and commissioning of ceiling fan including wiring the down rod of standard length (upto 30 cm.) with 1.5 sq. mm. FRLS PVC insulated, copper conductor, single core cable, including providing and fixing phenolic laminated sheet cover on the fan box etc. as required.

153. Installation of exhaust fan in the existing opening, including making good the damage, connection, testing, commissioning etc. as required Upto 450 mm sweep

154.**FLOOR DISTRIBUTION BOARD - 5TH FLOOR** :Design, manufacture, supply, testing and commissioning of **Floor Distribution boards** fabricated out of 16 SWG CRCA sheet steel, IP52, wall / floor mounting type. The sheet steel shall undergo minimum 7 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 /240 V electrolytic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect. **INCOMER**: Main Incomer 250 Amps FP MCCB, MCCB terminals shall be suitable to receive connection on one side and Busbar connection on the other side. **BUSBAR**: 300 amps TPN busbar chamber of suitable length with Aluminium busbars (1.0 A/sqmm for AL). **INDICATING PANEL**: 3 nos phase indicating lamps each backed up with MCB and switch shall be provided for incomer. Provide CT operated ammeter with selector switch for incomer. Provide 0-500 Volts range Volt Meter with selector switch for incomer. **OUTGOINGS** : 3 nos. outgoing with 63A TPN MCB's (LIGHT DB 5th FLOOR) 2 nos. outgoing with 63A DP MCB's (LIGHT DB 5th FLOOR) 3 nos. outgoing with 63A TPN MCB's (POWER DB 5th FLOOR) 1 nos. outgoing with 100A TPN MCCB's (40 KVA UPS) 1 nos. outgoing with 125A TPN MCCB's (FLOOR DISTRIBUTION BOARD 6th FLOOR). All Items complete as above

- 155.**FLOOR DISTRIBUTION BOARD -6TH FLOOR** :Design, manufacture, supply, testing and commissioning of **Floor Distribution boards** fabricated out of 16 SWG CRCA sheet steel, IP52, wall / floor mounting type. The sheet steel shall undergo minimum 7 tank treatment followed by finishing powder coating of min 60 micron thickness. The board includes 415 /240 V electrolytic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect. **INCOMER**: Main Incomer 125 Amps FP MCCB, MCCB terminals shall be suitable to receive connection on one side and Busbar connection on the other side. **BUSBAR**: 160 amps TPN busbar chamber of suitable length with Aluminium busbars (1.0 A/sqmm for AL). **INDICATING PANEL**: 3 nos phase indicating lamps each backed up with MCB and switch shall be provided for incomer. Provide CT operated ammeter with selector switch for incomer. Provide 0-500 Volts range Volt Meter with selector switch for incomer. **OUTGOINGS**: 2 nos. outgoing with 63A TPN MCB's (LIGHT DB 6th FLOOR), 2 nos. outgoing with 63A DP MCB's (LIGHT DB 6th FLOOR), 3 nos. outgoing with 63A TPN MCB's (POWER DB 5th FLOOR) . All Items complete as above
- 156.**UPS BOARD** : Design, manufacture, supply, testing and commissioning of **UPS Distribution boards** fabricated out of 16 SWG CRCA sheet steel, IP52, wall / floor mounting type. The sheet steel shall undergo minimum 7 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 /240 V electrolytic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect. **INCOMER**: Main Incomer 100 Amps FP MCCB, MCCB terminals shall be suitable to receive connection on one side and Busbar connection on the other side. **BUSBAR**: 125 amps TPN busbar chamber of suitable length with Aluminium busbars (1.0 A/sqmm for AL). **INDICATING PANEL**: 3 nos phase indicating lamps each backed up with MCB and switch shall be provided for incomer. Provide CT operated ammeter with selector switch for incomer. Provide 0-500 Volts range Volt Meter with selector switch for incomer. **OUTGOINGS**: 2 nos. outgoing with 63A TPN MCB's (UPS DB 5th FLOOR) 3 nos. outgoing with 63A DP MCB's (UPS DB 6th FLOOR). All Items complete as above.

HVAC

- 157.**Floor mounted precision type air-conditioning units**: Supply, installation, testing and commissioning of "Air Cooled Ductable type PAC Unit"consisting of Condensing Unit and all internal electrical with control panel of the unit and all internal electrical power and control wiring accessories and ancillary items like thermostats/MS frames etc of below non. Cooling capacity Complete in all respect as per drawings & specifications for precise temperature control required for the server areas. Capacity of presion units 3400 cfm (8.5 TR)
- 158.**Floor mounted precision type air-conditioning units** Supply, installation, testing and commissioning of copper refrigerant piping between the indoor and the outdoor unit complete with all supports, joints. Refrigerant pipe insulation and accessories for the above unit. (Approved makes of precision units :STULTZ/Blue Box/Emerson)
- 159.**Floor Mounted and Ceiling Suspended Air Handling Units**: Testing and commissioning of Double skin construction type sheet metal sectionalised construction draw thru type Air
- OIL e-TENDER NO. CCI3576P17- INTERIOR WORK S NBCC

Handling Units Each Air Handling Units is with filter section with prefilters, chilled water coils of copper tube & Al.Fins construction, air vent, squirrel cage induction motor, centrifugal fans and vibration isolators, mixing box belt drive and vibration isolators. Coil size shall be selected for a max. face velocity of 500 FPM and static shall be as marked Motor shall be suitable for 415V/3Ph/50Hz AC supply of below capacities: (Cost of relocation of CS units if required as per RCP shall be included) : 13,000 cfm with 4 row cooling coil (Floor mounted units) (filters used for initial commissioning shall be removed and new set installed)

160. Floor Mounted and Ceiling Suspended Air Handling Units: Testing and commissioning of Double skin construction type sheet metal sectionalised construction draw thru type Air Handling Units Each Air Handling Units is with filter section with prefilters, chilled water coils of copper tube & Al.Fins construction, air vent, squirrel cage induction motor, centrifugal fans and vibration isolators, mixing box belt drive and vibration isolators. Coil size shall be selected for a max. face velocity of 500 FPM and static shall be as marked Motor shall be suitable for 415V/3Ph/50Hz AC supply of below capacities: (Cost of relocation of CS units if required as per RCP shall be included) : 7,500 cfm with 4 row cooling coil (Ceiling mounted units) (filters used for initial commissioning shall be removed and new set installed)

161. Floor Mounted and Ceiling Suspended Air Handling Units: Testing and commissioning of Double skin construction type sheet metal sectionalised construction draw thru type Air Handling Units Each Air Handling Units is with filter section with prefilters, chilled water coils of copper tube & Al.Fins construction, air vent, squirrel cage induction motor, centrifugal fans and vibration isolators, mixing box belt drive and vibration isolators. Coil size shall be selected for a max. face velocity of 500 FPM and static shall be as marked Motor shall be suitable for 415V/3Ph/50Hz AC supply of below capacities: (Cost of relocation of CS units if required as per RCP shall be included) : 6,500 cfm with 4 row cooling coil (Ceiling mounted units) (filters used for initial commissioning shall be removed and new set installed)

162. Floor Mounted and Ceiling Suspended Air Handling Units : Testing and commissioning of Double skin construction type sheet metal sectionalised construction draw thru type Air Handling Units Each Air Handling Units is with filter section with prefilters, chilled water coils of copper tube & Al.Fins construction, air vent, squirrel cage induction motor, centrifugal fans and vibration isolators ,mixing box belt drive and vibration isolators .Coil size shall be selected for a max. face velocity of 500 FPM and static shall be as marked Motor shall be suitable for 415V/3Ph/50Hz AC supply of below capacities: (Cost of relocation of CS units if required as per RCP shall be included) : 6,500 cfm with 4 row cooling coil (Ceiling mounted units) 5000 cfm with 4 row cooling coil (Ceiling mounted units) (filters used for initial commissioning shall be removed and new set installed)

Rectangular Ductwork:

163. Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows splitter, dampers, vanes, hangers, supports etc. as per approved drawings and specifications of following sheet thickness complete as required. 24 Gauge (thickness 0.63 mm sheet) (Approved Makes : TATA/SAIL/ISPAT)

164. Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows splitter, dampers, vanes, hangers, supports etc .as per approved drawings and specifications of following sheet thickness complete as required. 22 Gauge (thickness 0.80 mm sheet) (Approved Makes : TATA/SAIL/ISPAT)
165. Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows splitter, dampers, vanes, hangers, supports etc .as per approved drawings and specifications of following sheet thickness complete as required. 20 Gauge (thickness 1.00 mm sheet) (Approved Makes : TATA/SAIL/ISPAT)
166. XLPE Duct Insulation: Supply, installation ,testing and commissioning of fire retardant cross linked polyethylene insulation (XLPE) on ducts complete as per the drawings and specifications of following sizes.9 mm thickness. (Approved Makes
167. Duct Accoustic Lining: Plenum with 25mm thick risn bonded glass wool having density of 32 kg/m³, 25mmx25mm GI section of 1.25 mm thick at 600mm c/c covered with reinforcement plastic. Suplly and fixing of acoustic lining of supply air duct and to inside surface of duct with cadmium plate nuts,bolts,stick pin,CPRX compound etc. complete as required and the specification.(Approved Makes : UP Twiga/KIMMCO/Owens Corning)
168. Grilles/Diffusers/Louvers/VCDs/FDs: Supply & fixing of powder coated extruded Aluminium of Supply air Grilles with Aluminium volume controle damper as per specifications and drawings. (Approved Makes : Tristar/Conaire/Caryaire)
169. Supply & fixing of powder coated extruded Aluminium of Return/exhaust air Grilles with louvers but without volume controle damper complete as required. as per specifications and drawings. (Approved Makes : Tristar/Conaire/Caryaire)
170. Supply, fixing, testing and commissioning of supply air diffuseres of powder coated aluminium with aluminium volume controle dampers with anti smudge ring & removable core. (Approved Makes : Tristar/Conaire/Caryaire)
171. Supply, installation, testing and commissioning of MS powder coated grilles with dampers, louvers for Fresh air intake. (Approved Makes : Tristar/Conaire/Caryaire)
172. Supply, installation, testing and commissioning of GI construction Volume control Dampers complete with neoprene rubber, gaskets, nuts, bolts, linkages, flanges etc as per drawings and specifications (Approved Makes : Tristar/Conaire/Caryaire)
173. Supply, fixing,testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required sizes i/c control wiring ,the damper shall be motorised and spring return so as to close the damper in the event of powder failure automatically and open the same in case of powder being restored. The spring return action shall be inbuilt mechanism and not externally mounted. The damper shall also be closed in the event of fire signal complete as required and as per specifications. (Approved Makes : Tristar/Conaire/Caryaire) : Fire Damper

174. Supply, fixing, testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required sizes i/c control wiring, the damper shall be motorised and spring return so as to close the damper in the event of powder failure automatically and open the same in case of powder being restored. The spring return action shall be inbuilt mechanism and not externally mounted. the damper shall also be closed in the event of fire signal complete as required and as per specifications. (Approved Makes : Tristar/Conaire/Caryaire) : Actuator
175. Supply, installation, testing and commissioning of flexible duct connections constructed of fire resistance flexible double canvas sleeve as per the drawings and specifications. (Approved Makes : Tristar/Conaire/Caryaire)
176. Power Cabling : Supply, installation, testing and commissioning of PVC insulated sheathed 1.1 KV grade armoured Al. power cables from various panels upto their respective equipment on MS painting perforated trays with appropriate clamps/fixing arrangements as per specifications and drawings. (Havells/Batra Henlay/PRG/Skytone): 3 C X 6 mm² Aluminium Cable
177. Power Cabling : Supply ,installation, testing and commissioning of PVC insulated sheathed 1.1 KV grade armoured Al. power cables from various panels upto their respective equipment on MS painting perforated trays with appropriate clamps/fixing arrangements as per specifications and drawings.(Havells/Batra Henlay/PRG/Skytone): 3 C X 4 mm² Aluminium Cable
178. Supply, installation, testing and commissioning of perforated 2mm CRCA sheet steel powder coated cable trays of following sizes complete with joints, coupling plates and nut bolts etc including providing and fixing of MS hangers etc as required as per the drawings and specifications 150mm wide and 50 mm deep
179. Supply, installation, testing and commissioning of perforated 2mm CRCA sheet steel powder coated cable trays of following sizes complete with joints, coupling plates and nut bolts etc including providing and fixing of MS hangers etc as required as per the drawings and specifications 3000mm wide and 62.5 mm deep
180. Supply, installation, testing and commissioning of perforated 2mm CRCA sheet steel powder coated cable trays of following sizes complete with joints, coupling plates and nut bolts etc including providing and fixing of MS hangers etc as required as per the drawings and specifications 450mm wide and 62.5 mm deep
181. Earthing: Supply, installation, testing and commissioning of double earthing continuity conductor of GSS from Panels to respective equipment as per drawings and specifications. 6 SWG wire
182. Earthing: Supply, installation, testing and commissioning of double earthing continuity conductor of GSS from Panels to respective equipment as per drawings and specifications. 6 SWG wire

AUDIO VISUAL WORKS

183. 6W Recessed Ceiling speakers with following features:- Complete Aluminium grille and Metal baffle, line matching transformer 100/70V line. Variable wattage tapings of 6 / 3 / 1.5, Effective frequency range 110-14kHz (BS6840), SPL@1m/1W=91dB, snap on spring mounting, Peak SPL 97dB complete with necessary mounting hardware & accessories. - HEINRICH/ATEIS/Barth
184. Supply, Installation, testing and commissioning of fully programmable Background music + 16 zone paging + voice message alarm • Built-in 8 inputs 16 outputs audio matrix, in weekly scheduled timer, 16 zone speaker selector for remote paging console, 6 channel power sequencer Built-in MP3 player of 2GB memory card through SD card slot, monitor With telephone paging, fire alarm and remote paging console interface, with regular program and stored program • With Mic emergency announcement and CD/MP3 manual priority broadcast With memory function alter power off Make: Heinrich/Shure /Sennheiser/ATEIS
185. Supply Installation testing and commissioning of 120W RMS Four Channel Class-D Digital Power Amplifier with Switch power technology for power electricity saving, Separate PFC Design for highest reliability, Separate Power Supply System. Amplifier shall have Following Features: 250W RMS per Channel, Amplifier Output 100V, Supply input AC 220 +/- 10% - 50/60Hz, Short Circuit, Power, Temperature, Overload Protection, Auto Cooling Fans. THD <0.1%, Frequency Response 40Hz - 20 kHz, AC & DC Fuse, SNR >80dB. **Acceptable Make - HEINRICH, LAPP, Bittner**
186. CD player - As per OEM Approved
187. 2 core Shielded 1.5SQ mm Speaker Cable - HEINRICH/Belden/Bonton
188. 19" Rack for the Equipment Installation - President/Valrack/HEINRICH/ATEIS
189. Projection System with LCD Technology with native resolution of 1280 x 800, 4000 ANSI lumens, 16:10 aspect ratio. Contrast 2000:1 and above. Projector Should be supplied with Ceiling Mount Kit- Acceptable Make - Panasonic/Christie/Barco
190. 120" Diagonal Motorized Projector Screen with Tensioned - as per approved OEM
191. 5"+1.5" Coaxial Ceiling speaker with ABS cover, 30W, 100V, cutout 185mm, ABS baffle & back cover, metal grille. The Speaker shall have following Feature: Max SPL > 101 dB, Frequency Response 90-20kHz. The Speaker shall have multiple tapping. Make: Heinrich/ATEIS /Barth
192. Supply, Installation, Testing & Commissioning of Intelligent conference system .it can support 60 units delegate and chairman microphone, it could be extended to support 200 units microphone by adding more Extension power supply unit , suitable for government,

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restaurants, conference rooms, training and education, the board of directors of the company meeting room with Frequency response 100 hz - 18000 hz, Power 115W, Input Voltage 18V, Five Limit Switch and Free speech Mode.
Make: Heinrich/Shure /Sennheiser

193. Supply, Installation, Testing & Commissioning of Intelligent conference system, Flush mount boundary layer delegate microphone unit, speaking button, LED for the indication and with Frequency Response 100-16KHz, Sensitivity -40dB±2dB, Reference sound-receiving distance 20-120cm. Make: Heinrich/Shure /Sennheiser

194. Supply, Installation, Testing & Commissioning of Intelligent conference system, Flush mount boundary layer Chairman microphone unit, speaking button and LED for the indication, With president priority key; Chairman microphone should having highest priority and should be able to terminate all microphone. Frequency Response 100-16KHz, Sensitivity -40dB±2dB, Reference sound-receiving distance 20-120cm. Make: Heinrich/Shure /Sennheiser

195. Supply Installation Testing & Commissioning of 24 channels Mixing console with 4-Sub-group, 8-Mono, Stereo returns distortion degree <.02% @1 Khz, out put chennal 3 main output; 4 output group; 2 CH aux output; 2 CH CD/TAPE auxiliary output; 2 CH 1 CH stereo headphone output make HEINRICH UK, ATEIS, SENNEISER

196. Supply Installation testing and comisioning of 250W RMS Dual Channel Class-D Digital Power Amplifier with Switch power technology for power electricity saving, Separate PFC Design for highest reliability, Separate Power Supply System. Amplifier shall have Following Features: 250W RMS per Channel, Amplifier Output 100V, Supply input AC 220 +/- 10% - 50/60Hz, Short Circuit, Power, Temperature, Overload Protection, Auto Cooling Fans. THD <0.1%, Frequency Response 40Hz - 20kHz, AC & DC Fuse, SNR >80dB. **Acceptable Make - HEINRICH, LAPP, Bittner**

197. Supply, Installation, Testing & Commissioning of Lapel Wireless Mic & Handeld Microphone system set dynamic, hypercardioid 55-18,000 Hz S/N ratio >90dB 1 -channel true diversity receiver (UHF), Rugged 9.5" metal housing, 16 pre-programmed UHF frequencies, AutoScan/ACT-function, PLL-synthesised technology, Pilot tone recognition: Acceptable Make - Shure/Heinrich/AKG

198. Supply, Installation, Testing & Commissioning of Cable Cubby with HDMI, VGA Input & Power Input. Acceptable Make-Kramer/Heinrich/Extron

199. Supply & laying of VGA Cable - As per OEM Approved

200. Supply & laying of Microphone Cable - HEINRICH/Belden/Bonton

201. Supply & laying of Speaker Cable - HEINRICH/Belden/Bonton

202. VGA Switcher Suitable for 10 Input and 2 Output or more. - Kramer/Extron or Equivalent

203. 19" Rack for the Equipment Installation - President/Valrack/HEINRICH/ATEIS

204. n5"+1.5" Coaxial Ceiling speaker with ABS cover, 30W, 100V, cutout 185mm, ABS baffle & back cover, metal grille. The Speaker shall have following Feature: Max SPL > 101 dB, Frequency Response 90-20kHz. The Speaker shall have Multiple tapping. Make: Heinrich/ATEIS /Barth
205. Supply, Installation, Testing & Commissioning of Intelligent conference system .it can support 60 units delegate and chairman microphone, it could be extended to support 200 units microphone by adding more Extension power supply unit , suitable for government, restaurants, conference rooms, training and education, the board of directors of the company meeting room with Frequency response 100 hz - 18000 hz, Power 115W, Input Voltage 18V, Five Limit Switch and Free speech Mode. Make: Heinrich/Shure /Sennheiser
206. Supply, Installation, Testing & Commissioning of Intelligent conference system, Flush mount boundary layer delegate microphone unit, speaking button, LED for the indication and with Frequency Response 100-16KHz, Sensitivity -40dB±2dB, Reference sound-receiving distance 20-120cm. Make: Heinrich/Shure /Sennheiser
207. Supply, Installation, Testing & Commissioning of Intelligent conference system, Flush mount boundary layer Chairman microphone unit , speaking button and LED for the indication, With president priority key; Chairman microphone should having highest priority and should be able to terminate all microphone. Frequency Response 100-16KHz, Sensitivity -40dB±2dB, Reference sound-receiving distance 20-120cm. Make: Heinrich/Shure /Sennheiser
208. Supply Installation testing and commissioning of 280W RMS Mixer amplifier with 3 Mic input and 2 Line input. 280W RMS Power Output, Amplifier Output 100V, Supply input AC 220 +/- 10% - 50/60Hz, Short Circuit Protection, Emergency input with Chime, Having Function of Tuner, MP3 Player, Pre-amplifier, and Power amplifier in one Unit. Acceptable Make - HEINRICH,ATEIS,Labgruppen, Bittner
209. Supply & Fixing of cables and Connector for HDMI Cable,VGA Cable, Speaker Cable for above system OEM Approved

Communication system

210. Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects. : 5 pair krone Box
211. Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects : 20 pair krone Box

212. Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects : 100 pair krone Box
213. Supplying, laying, testing and commissioning of following size annealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. : 5 pair Krone
214. Supplying, laying, testing and commissioning of following size annealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. : 20 pair krone
215. Supplying, laying, testing and commissioning of following size annealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. : 100 pair krone
216. Supply and Erecting modular type computer jack RJ 45 ISI mark approved make with mounting plate and box with wiring connections complete.
217. Supplying & installing UTP networking Cat-6 cable suitable for LAN/WAN computer network working as per catalogue no. DC6CAUTP4P3X.
218. Supply and installation of 6 port CAT 6 patch panel modular type complete as required as per catalogue no. DC6PP24UKY1U.
219. Supply, installation, testing and commissioning of 6 Port 10/100 Edge Switch.
220. Supply, installation, testing and commissioning of CAT 6 giga speed patch cord 1.2m or equivalent feet and factory terminal at both ends as per catalog no.DC6PCURJ01GYM.
221. Supply, installation, testing and commissioning of wall mounted data rack 12 U with glass door hardware, cable manager, cooling fans power points etc.
222. Supply, laying and end terminations including connections of 6 core outside plant cable corrugated steel tape armoured, loose tube, gel filled fiber single mode armoured fibre optical cable in wall/floor/ground complete as required in one segment with fiber connector as per catalog no. DFCAOO9GSTO6.
223. Supply, installation, testing and commissioning of 24 Port 10/100 Edge Switch.
224. Supply, installation, testing and commissioning of Media Converter.
225. Supply, installation, testing and commissioning of Core Switch 24 port 10/100/1000

226. Supply, installation, testing and commissioning of EPABX System Non-Blocking, ISDN / ATM, Initially Equipped with: Trunk Side: Total
 \$ 01 (30 Channel) PRI Line Interface
 \$ 08 P&T Line Extension side:
 Total Extension : =100
 \$ 15 Digital Extensions interface
 \$85 Analog Extensions interface

227. S/F MODULAR BOXES, BASE & COVER PLATE :-Supplying and fixing following size / modules, GI box along with modular base & cover plate for modular switches in recess etc as required S/F MODULAR BOXES, BASE & COVER PLATE :-

228. Supplying and fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc as required Telephone Socket outlet

229. Supplying and fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc as required TV Antenna socket outlet

230. Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required : 20 mm.

231. Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required : 25 mm.

232. Supply and drawing following pair, 0.5 sq.mm. FRLS PVC insulated annealed copper conductor, unarmoured telephone cable in the existing surface / recessed steel/ PVC conduit as required. 2 Pair

233. Supply and drawing co-axial TV cable RG-6 grade, 0.7 mm. Solid copper conductor PE insulated, shielded with fine tinned copper braid and protected with PVC sheath in the existing surface / recessed steel/ PVC conduit as required.

Fire Fighting and Detection System

234. SERVER ROOM NO - 235 Cub mtr - Supply , Installation , Testing and commissioning of Cylinder UL listed / CCOE Approved, complete with UL listed valve assembly and arrangement for supervisory switch connection for monitoring cylinder pressure, a pressure guage with a safety burst disc ,electronic control head / Solenoid, pressure operated control, head, flexible hose, strap, NRV and a safety cap. HFC 125 Gas.(Quantity would be as per the volume given above and as per the ULcertification.) CLEAN AGENT (HFC125) (UL Listed) with Zero Ozone Depletion Potential (ODP), has appearance/colour: Colourless gas and has citrus like odour. 2 X 67.5 Litres Cylinder filled with HFC 125 (62 kgs approx.) (Main System)

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- 235. UPS/Electrical Room - 119 Cub mtr** Supply , Installation , Testing and commissioning of Cylinder UL listed / CCOE Approved, complete with UL listed valve assembly and arrangement for supervisory switch connection for monitoring cylinder pressure, a pressure guage with a safety burst disc ,electronic control head / Solenoid, pressure operated control, head, flexible hose, strap, NRV and a safety cap. HFC 125 Gas.(Quantity would be as per the volume given above and as per the UL certification.) CLEAN AGENT (HFC125) (UL Listed) with Zero Ozone Depletion Potential (ODP), has appearance/colour: Colourless gas and has citrus like odour. 1 X 67.5 Litres Cylinder filled with HFC 125 (63 kgs approx.) (Main System)
236. Discharge Nozzle (UI Listed) calibrated as per Computer Generated Results.
237. Supply, installation, testing and commissioning of Piping with ASTM sch. 40 pipe
238. Supply, Installation, testing and commissioning of Microprocesssor based 1 Loop analogue addressable type fire alarm control panel with 80 character LCD display four access levels 500 event historical logging.
239. Supply, Installation, testing and commissioning of Laser-Based Absolute Smoke Detection system with Single pipe inlet aspiration detector for Up to 100 m2 (1000 sq. ft.) coverage; Programmable Alarm Thresholds; Offline/online configuration capability; Instant Fault Finder; AutoLearn Smoke; AutoLearn Flow; Multiple Event Logging in separate logs; Event log – up to 1000 events. Alarm Threshold Setting Range: 0.005% - 3.0% obs/m (0.0015% - 0.915% obs/ft)
240. Supply, Installation, testing and commissioning of Power Supply Unit for above detector 230 V AC to 24 V DC 3 Amp. Power Supply should be with 24 hour
241. Supply, Installation, testing and commissioning of 25 mm dia CPVC pipe for Aspiration detectors complete in all respect as required.
242. Supply, Installation, testing and commissioning of Analoge addressable Photoelectric Smoke detector with mounting based LED, Address Switch to programme the detectors from 01- 99, with BASE complete as required.
243. Supply of Gas Release Panel/Built in Module with 2-Zone Fire detection and 1-Zone gas discharge module with binary switch timer for release delay and potential free contact to relay "Gas Release" signal to main panel.The panel should also have LCD display for the different functions
244. Supply, Installation, testing and commissioning of 2C x 1.5 sq.mm armoured cable
245. Supply, Installation, testing and commissioning of Addressable Manual Call Point (Break Glass), Address Switch to programme the Manual Pull Station from 01- 99, complete as required as per specifications..
246. Supply, Installation, testing and commissioning of Hooter cum Flasher
247. Supply, Installation, testing and commissioning of Manual Abort Station (Pull Type)

- 248. Supply, Installation, testing and commissioning of Manual Release Station (Pull Type).
- 249. Supply, Installation, testing and commissioning of Addressable control module for Hooter, Address Switch to programme the modules from 01- 99, complete as required as per specifications.
- 250. Supply, Installation, testing and commissioning of Addressable relay module for Cross Zoning, Address Switch to programme the modules from 01- 99, complete as required as per specifications.
- 251. Supply, Installation, testing and commissioning of Addressable monitor modules for Abort Station & Release station Address Switch to programme the modules from 01- 99, complete as required as per specifications
- 252. Photoluminiscent Gas Release caution sign board complete with fixing arrangements
- 253. Supply of Electric Gas Release caution sign boards (24 V DC) for approved locations.

Building Automation system

- 254. FIRE ALARM & PA SYSTEM: Supply, Installation, Testing & Commissioning of the followings: Addressable Analog Addressable Fire Detection, Alarm and evacuation System. Networkable Microprocessor based multiloop capacity, Networkable analogue addressable type fire alarm control panel with 640 character LCD display / Touch Screen Display. The panel should be equipped with sufficient numbers of loop with 15% Spare capacity in each loop. The panel shall be capable of taking atleast 200 analog addressable devices in one loop in any combination quantities of the Detectors and Devices. Four access levels, flash EPROM sufficient numbers of programmable relay controls for controlling AHUs, pressurization fans, ventilation fans at fire pump room, monitoring of fire sprinkler and fire hydrant pump, 240 volts AC power supply, automatic battery charger, 24 volts sealed lead acid batteries sufficient for 24 hours normal working and then be capable of operating the system for 2 hours during an emergency conditions as required. The Panel shall have capability to accommodate & support backnet card for BMS interfacing. (UL / EN Approved) 2 Loop Capacity
- 255. Networkable & Microprocessor based 640 □ characters LCD / Touch Screen LCD Display Network Repeater panel. The LCD shall Display all events / detectors, devices status of complete systems in the networked, the repeater shall be equipped with Mounting options etc. (UL / EN Approved).
- 256. Automatic Analog addressable Photo - Thermal multicriteria detector with mounting Base. The Detector's Alarm LED shall be viewable from 360 Degree, The Detector shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the GI Mounting Box and the hardware etc. as required. (UL / EN Approved).

257. Automatic Analog addressable Duct Detector with Duct Housing and Duct probe tubes complete with Photoelectric Smoke Detector with mounting Base. The Detector's Alarm LED shall be viewable from 360 Degree, The Detector shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the GI Mounting Box and the hardware etc. as required. (UL / EN Approved).
258. Automatic Addressable control module for AHU & Stair Pressurization fan, The Module shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the GI Mounting Box and the hardware etc. as required. (UL / EN Approved).
259. Supply, installation, testing and commissioning of Automatic Addressable Monitor module for Flow Switch Monitoring etc. The Module shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the GI Mounting Box and the hardware etc. as required. (UL / EN Approved).
260. Addressable Manual call Station. The Call Point shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the Mounting Box and the hardware etc. as required. (UL / EN Approved).
261. Addressable electronic Sounder. The Sounder shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the Mounting Box and the hardware etc. as required. The Sounders shall be Loop powered i.e. should not require additional cable to feed the Power & shall be programmable from the Fire Panel for Multiple type of tones selection. (UL / EN Approved).
262. Supply, installation, testing and commissioning of full duplex Fire Fighter's talk Back system with operator command centre and sufficient no. of point. The full duplex emergency communication system shall be able to display customized address of the location from which the Call is being made to the Fire Fighter's command Centre.
263. Addressable Fire Fighter's Telephone Jack for full duplex emergency communication with the Fire Fighter's commands Centre.
264. Supply, installation, testing and commissioning of 2way communication Fire Fighter's Handset Nos complete with suitable leads for insersion.
265. Supply, installation, testing and commissioning of Liscenced GRAPHICAL alarm monitoring and management Software to pin point the location of the Fire. The software shall identify the alarm events in the System and shall graphically indicate the pin point area in the Floor Plans. (At Control Room).
266. Supply, installation, testing and commissioning of Networked PC BASED GRAPHICAL FACILITIES MONITORING SYSTEM with Dual Core 2.0 GHz Pentium® IV processor with 512 MBytes of RAM with 22" flat-screen LCD monitor, sound card. It shall and speakers, and 500 Giga Byte hard disk. It shall operate under Microsoft® Windows® XP Professional / Windows Software, complete with ethernet port, DVD Drive, 4 GB RAM, multimedia Speakers, Multimedia Keyboard,

Optical wireless Mouse, 650 VA UPS etc. complete as required.
(At Control Room)

267. Supply and laying of following size of M.S, Conduit pipe in recess including all accessories MS pull/junction boxes, GI fish wire of 6 SWG, fixing hardware etc., including cutting, chasing the walls/floor and plastering the chased portion and making good the damages etc., complete as required. **25 mm dia**
268. Supply and laying of following size of M.S, Conduit pipe in recess including all accessories MS pull/junction boxes, GI fish wire of 6 SWG, fixing hardware etc., including cutting, chasing the walls/floor and plastering the chased portion and making good the damages etc., complete as required. **32 mm dia**
269. Supply and drawing of 2 C x 1.5 Sq.mm. Sheathed anneled flexible copper Conductor FRLS cable in existing M. S. Conduit, Complete with termination and testing as per requirement.
270. Supply and drawing of 4 C x 1.5 Sq.mm. anneled flexible copper Conductor, Copper braided shielding and overall Sheathed FRLS cable in existing M. S. Conduit, Complete with termination and testing as per requirement.
271. Supply, installation, testing and commissioning of 19" Equipment Rack with power coated finish with front lockable Door with M. S. Framed translucent Acrylic material, 2 Nos of fans for heat exhaust, Top & Bottom entry knock outs, back side lockable Door , inbuilt MCB, Power Points, raceways and partitions, one no. sliding Tray etc. complete as required to house the PC and other Equipment.
272. Digital Public Address system:-
273. SITC of IP based PA Controller capable of handling 8 zones, Digital audio controller complying to IEC EN 60849 /DVA016 with built-in high and low pass filters and parametric equalizer. Within built 500W digital amplifier and 8 Outputs Led Indication of each zone independent output control button and volume control. network input , BGM input local emergency Mic INPUT, can work with 1 Extra stand by amplifier, when the inbuilt amplifier come out faulty the standby amplifier take over automatically. Support 24Vdc input interface
274. Power Amplifier SCPA500 /70V, 100V& 4-16 ohm, 2 channel power amplifier , Inrush restraint and softstart ,Integrated electronic protection against thermal overload and shortcircuit. Temperature controlled fans, airflow from front to rear. Method of control: Class AB. Power output of amplifier: 1 x 500W sin. /100V. Output range: 50 Hz – 22kHz; 0/-0,5 dB. Signal to noise ratio (not valuated): > 105 dB Channel separation: > 75 dB. THD (total harmonic distortion): < 0,08%. Input level at max. Output voltage: 0 dBu. The amplifier has to be switched into Stand-by Mode in case of power loss by the control centre.
275. Digital Call Station 8 zone. Fully digital call station with electret microphone (cardioid-characteristics) on flexible 300mm swan neck complete with wideband loudspeaker for monitoring, pre-listen and intercom operation for the networked PA system. -Permanent inaudible supervision of

the microphone and its capsule in accordance to EN 60849. 16 free programmable and label able keys.

- 276. Supply, Installation, Testing & Commissioning of Volume Controller for all the closed areas.
- 277. Supply, Installation, Testing & Commissioning of 6W , transformer tapping 100 volt line multitap , driver impedance 8 ohm , SPL @ 1m, 1 Watt ,(Ceiling speaker)
- 278. Supply, Installation, Testing and Commissioning of Wall mountable type column type Speaker 6 watt , SPL 90 dB, Freq response 200-15000 Hz, rated input voltage 100 Volts, & rated impedance 1667 Ohms,
- 279. Supply, Installation, Testing & Commissioning of Music source CD/MP3 Player 1 U table top and rack mount clearly visible LCD display , micro computer and touch button operation complete as required.
- 280. Supply and drawing of 2x 1.5 sq. mm ATC Copper conductor cable/ wire in existing M. S. Conduit, Complete with termination and testing as per requirement.
- 281. Supply laying and fixing of 25mm Conduit pipe with all accessories etc. as complete as required
- 282. Supply, installation, testing and commissioning of 19" Equipment Rack with power coated finish with front lockable Door with M. S. Framed translucent Acrylic material, 2 Nos of fans for heat exhaust, Top & Bottom entry knock outs, back side lockable Door , inbuilt MCB, Power Points, raceways and partitions, one no. sliding Tray etc. complete as required

CCTV

- 284. **CCTV** : Supply, Installation, Testing & Commissioning of IP CCTV Monitoring, Recording & Streaming System: IP DOME (Indoor): 1.3 Megapixel @ 25fps, 2 Megapixel @ 15fps, H.264 Compression, 1/3" Low Illumination Aptina Cmos, Hisilicon DSP, IP Vandal Dome Camera with 2 Megapixel HD 2.8-12mm Varifocal Lens, 30 IR LED upto 25 meters, 1.0 Lux Colour, 0.5 Lux B/w, I/O- 1 In/1 Out, Audio- Mic/1 Out, Triple Streaming, Image Snapshot, Full Screen Monitoring, 3 Privacy Mask areas, Supports CBD & VBR, 3 Motion Detection areas, Triggered action by Mail, FTP, Simultaneous upto 10, Video Format in AVI & JPEG, Supports Video Playback and Delete. Supports D-WDR, 3D-DNR, Brightness, Contrast, Hue, AES, IRIS Level, Manual Shutter, Night Mode, Supports POE, Supports Cell phone, PDA, 3GPP. ONVIF Support etc. all complete.
- 285. Supply, Installation, Testing & Commissioning of IP CCTV Monitoring, Recording & Streaming System: IP BULLET :2 Megapixel @ 25fps, 3 Megapixel @ 15fps, H.264 Compression, 1/3" Low Illumination Aptina Cmos, IP Bullet Camera with 2 megapixel HD 2.8 - 12MM varifocal lens, 48 IR LED upto 35 meters, I/O- 1 In/1 Out, Audio- Mic/1 Out, Triple Streaming, Image Snapshot, Full Screen Monitoring, 3 Privacy Mask areas, Supports CBD & VBR, 3 Motion Detection areas, Triggered action by Mail, FTP, Save to SD Card, Relay, Simultaneous upto 10, 2 Way Audio, Video Format in AVI & JPEG, Supports Video Playback and Delete. Supports D-WDR, 3D-DNR, Brightness, Contrast,

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Hue, AES, IRIS Level, Manual Shutter, Night Mode, Supports POE, Supports Cell phone, PDA, 3GPP. ONVIF Support etc. all complete.

- 286. Supply, installation, testing & commissioning of 16 – channel colour Digital Video Mgmt system with 16 cameras inputs Built in multiplexer, Digital Video recorder, Video motion Detection system, with external alarm inputs & outputs, TCPIP network feature & server software, 2 x HDD slots for future storage expansion, 1200 GB Hard Disk Drive to be able to achieve recording in SVHS quality @ 24 hour mode complete as per required and as per specification.
- 287. Supply, installation, testing & commissioning of colour high resolution monitor 21 inch coloured complete as required
- 288. Supply, installation, testing & commissioning of power supply unit without SMF batteries complete as required. (One no. for set of 5 cameras).
- 289. Supplying and drawing co-axial TV cable RG-6 grade, 0.7 mm solid copper conductor PE insulated, sheided with fine tinned copper braid and protected with PVC sheath in the existing surface/ recessed steel/ PVC conduit as required.
- 290. Supply, Installation, testing and commissioning of RG-11 coaxial shielded cable for Video Signal. (For long distance)
- 291. Supply, Installation, testing and commissioning of 2x1.5 mm² PVC insulated, ATC conductor shielded copper conductor cable for Data communication in existing PVC Conduit.

ACCESS CONTROL SYSTEM

- 292. Supply of centralised Access Door controller capable of controlling 91 readers and 87 pushbuttons releases along with individual access door controllers/ Reader modules, required interface module for connecting to existing PC, software for Access control systems, Time attendance module, Global Anti pass back feature, power supply unit with SMF batteries etc. complete as per specifications and as required.
- 293. Supply of Proximity Digital Card Reader with a range of 3.5" complete as required and as per specification complete as required.
- 294. Supply of Proximity Digital Card Reader with Keypad with a range of 3.5" complete as required and as per specification complete as required.
- 295. Supply of Proximity Card
- 296. Supply of single Electromagnetic lock, 1200 lbs along with magnetic contact complete as required, for double leaf door

297. Supply of single Electromagnetic lock, 600 lbs along with magnetic contact complete as required, for single leaf door
298. Supply of Exit push button complete as required. - as on where required
299. Supply of Panic Bar complete as required.
300. 8 Core 0.75 Sqmm PVC Sheathed Shielded Multistranded Cable in PVC Conduit

FURNITURE

301. Executive Director Table (Main Table+ERU+Back Unit) (Arrive) - Supplying and placing in position Main desk with 4 nos. of Back Units of the following specifications. The Main table shall be of size 3600 Width mm x 1080 mm Depth x 750 mm height. Top surface of the table shall be made up of MDF (Medium density fibre) board duly finished with Veneer and final coating of PU. The Main desk should contain in Smart Case - space slides effortlessly in style. The mobile Pedestal shall be of size 480 Width mm x 640 Depth mm x 600 Height mm. Mobile pedestal shall be coated of MDF (medium density fiber) with veneer coating and PU coating. The ERU Top shall be of MDF (medium density fiber) board duly finished with veneer and final PU coating. Size of ERU top 1900 Width mm x 480 Depth mm x 550 (not from ground with castors). The main desk is provided with the wire management system also there is perfect storage side unit. The Size of the Back unit shall be 1000 mm width x 480 mm Depth x 2035 mm height. The back unit shall be made up of MDF board duly finished with veneer & final finish by PU coating. The mobile unit can be bought in multiples. PU coating hardness 1.5H.

302. Executive Director Chair (Halo VHB) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-95.4cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16 +/- 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 +/- 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assembly shall be made of 2.54 +/- 0.03 cm x 0.16 +/- 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features: 360° revolving type, Knee Tilt system, Seat & back tilting ratio of 1: 1.5, Front pivot for tilt with feet resting on ground ensuring more comfort, Tilt tension adjustment, 5-position locking with antilock back mechanism which should prevent the backrest from impacting the user when the lock is

released, Static seat depth adjustment 5.0 +/- 0.5cm with 5 position locking. The chair shall be provided with pneumatic height adjustment which shall have stroke of 9.0 +/- 0.3 cm. The bellow should be single piece duly blow moulded in black polypropylene. The pedestal shall be made of die-cast aluminium with buffing finish. it shall be fitted with 5 nos twin wheel castor. The size of the pedestal shall be 67.0 +/- 0.5 cm pitch-centre-dia (77.0 +/- 1.0 cm with castors). The twin wheel castors shall be made of Nylon injection moulded in black color. Overall dimensions of Chair shall be, Width of Chair - 77cm, Depth of Chair - 77 cm as measured from pedestal below. Height of back from ground - min 128.0 to max 137.0 cms. Seat height - min 49.9cm to max 58.9 cm. Dimensions tolerance / variations shall be within +/- 1 cm.

Executive Director & Director Visitor Chair (Halo Visitor)

303. Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be (W)-53cm x (H)-73cm & size of seat shall be (W)-54.6cm x (D)-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16+/- 2 kgf as per IS: 7888 for 25% compression. The fixed type mechanism shall be made with a 0.8+/- 0.05cm thick HR steel spine welded to it and black powder coated. Overall dimensions of Chair shall be- Width of Chair - 59cm, Depth of Chair - 68.5 cm as measured from pedestal below. Height of back from ground -89.5cm. Seat height - 46.5cm. Dimensions tolerance / variations shall be within +/- 1 cm.

304. Executive Director & Director Sofa Set 3 +1+1 (Plush)

Supplying

and placing in position set of 3+1+1 sofa of dimensions 1120 x 1030 x 600 for 1 seater & 2260 x 1030 x 600 for 3 seater. Upholstery : Material : Pure Leather, Shade : Dark Brown, Thickness : 1mm. Frame Material : Pine wood, Moisture content : 12%, Foam Material : Slab stock, Foam Density : 30 kg/m³ at seat and backrest. Webbing Make: S spring + Belt. Material of Belt : Nylon of 50 mm thickness, S spring material : Metal of 3.8 mm of thickness Legs Material : Pine wood with PVC bush at base. Executive Director & Director Sofa Set 3 +1+1

305. Executive Director & Director Center Table (Crystalline)

Supplying and placing centre table of dimensions: 1000 x 600 x 450 having 8mm tempered glass top with MDF under structure and PVC covering. Pu paint strip on glass top with silver powder. Glass top attached to the understructure via UV disc. Load bearing capacity: 30 Kg. Executive Director & Director Center Table

306. Executive Director & Director Side Table (Crystalline)

Supplying and placing corner table of dimensions: 600 x 600 x 540 having 8mm tempered glass top with MDF under structure and PVC covering. Pu paint strip on glass top with silver powder. Glass top attached to the understructure via UV disc. Load bearing capacity : 20 Kg. Executive Director & Director Side Table

307. **Executive Director & Director Round Table (Talk Pod- Membrane)** Supplying and placing in position POD of the following specifications. 4 Seater Round POD 1200 Dia size shall be 1200 dia x 750. Top shall be 25 mm thick base material shall be 25 mm thick

MDF board .0.4 mm PVC membrane foil using wrap technology. The foil shall be pre-coated with PU layer for better scratch and wear resistant. 0.6 mm balancing laminate on bottom surface. The vertical cladding shall be 18 mm thick base material shall be 18 mm MDF board. 0.4 mm PVC membrane foil using wrap technology . The foil shall be pre-coated with PU layer for better scratch and wear resistant. 0.6 mm balancing laminate on bottom surface. Legs and Top /Bottom plate shall be made from 1.6 mm Matt silver Anodized Aluminium extrusion. Legs Assembled together with 8 mm thick MS powder coated sheet at bottom and 3 mm thick MS powder sheet coated at the top . The MS base shall be having provision for wire entry and glide fixing. Access Flap and Switch Mounting Tray made from matt silver anodized aluminium extrusion and plastic moulded components to facilitate access of electrical / data / voice sockets access from top.

- 308. Executive Director & Director Revolving Discussion Chairs (Halo RV)** Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-73cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16+/- 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 +/- 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assy. shall be made of 2.54+/- 0.03cm x 0.16 +/- 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore 'A' hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features: 360° revolving type without back tilt. The chair shall be provided with pneumatic height adjustment which shall have stroke of 12.0 +/- 0.3 cm. The base should be made up of 3 piece telescopic type & injection moulded in black polypropylene. The pedestal shall be made of die-cast aluminium with buffing finish. it shall be fitted with 5 nos twin wheel castor. The size of the pedestal shall be 67.0 +/- 0.5 cm pitch-centre-dia (77.0 +/- 1.0 cm with castors). The twin wheel castors shall be made of Nylon injection moulded in black color. Overall dimensions of Chair shall be, Width of Chair - 77cm, Depth of Chair - 77 cm as measured from pedestal below. Height of back from ground - min 99.4 to max 111.4 cms. Seat height - min 43.4cm to max 55.4 cm. Dimensions tolerance / variations shall be within +/- 1 cm.

- 309. Book Storages (Book Case)**
Supplying and placing in position bookcase of the following specifications. 4 Door Book Case shall have the configuration of 914mm (W) x320mm (D) x1742mm (H). The unique design provides the right rigidity to the Top hinged doors, which shall facilitate easy use. The Book Case shall be made from prime quality CRCA steel with anti rusting treatment. It shall have a Rigid Knock Down Construction. The Top Panel, Back Panel and Side Panel are made from 0.7mm high yield CRCA and other components from 0.8mm CRCA. Each door shall have a 6 Lever Cam Lock with Common Key. 3mm thick glass should be used in each door for clear inside vision which shall be secured in a metal frame through a rubber gasket. Scissor Mechanism should be provided in each door for receding inside the top of every compartment and it shall ensure parallel and smooth movement. Each door should be provided with plastic side end caps as handle which is easy to grip. Each compartment shall have a storage shelf with a UDL capacity of max 80 Kg. The 2 Door

Book Case shall have 18mm PLB Top straight edge with PVC lipping. The finishing shall include Epoxy powder coated to the thickness of 50 microns (+/- 10).

310. Director Table (Main Table+ERU + Back Unit+ Tower units) (Jefferson)

Supplying and placing in position Main desk of the following specifications. The Main desk RHS size shall be : 2400 Width mm x 1104 Depth mm x 735 Height mm. The top panel shall be 40 mm thick(18 mm MDF + 18 mm MDF batons + 4 mm Natural Veneer) Veneered portion of work surface is finished with high gloss polyester. The under structure shall be having legs made from 1.6 mm thick MS clad with the strips of MFC (Medium Density fiber).Hollow construction of legs facilitates wire management .The modesty & side panel should be 18 mm thick MDF plus pigmented black and coated with melamine. The storage shall be having drawer unit body shall be constructed from 18 mm thick MDF boards has combination of 2 box drawers + 1 filling drawer . Drawers should be mounted on double extension ball slides + drawer fronts should be of natural veneer coated with High gloss Polyester and made of 23 mm (18 mm MDF + 4 mm Natural Veneer + 1 mm DL) and drawer body made of 14 mm MDF (12 mm MDF + 1 mm DL + 1 mm DL). The ERU LHS size shall be : 1400 Width mm x 580 Depth mm x 690 Height. The top panel shall be 40 mm thick(18 mm MDF + 18 mm MDF batons + 4 mm Natural Veneer) Veneered portion of work surface is finished with high gloss polyester. The under structure shall be having the modesty panel of 18 mm thick MDF plus pigmented black and coated with melamine. The storage shall be having drawer unit body shall be constructed from 18 mm thick MDF boards has combination of 2 box drawers + 1 filling drawer . Drawers should be mounted on double extension ball slides + drawer fronts should be of natural veneer coated with High gloss Polyester and made of 23 mm (18 mm MDF + 4 mm Natural Veneer + 1 mm DL) and drawer body made of 14 mm MDF (12 mm MDF + 1 mm DL + 1 mm DL). The Back unit size shall be of : 1860 Width mm x 580 Depth mm x 690 Height mm. The door shall be 23 mm thick (18 mm thick Batons + 4 mm Veneer + 1 mm Backing Decorated (BDL)) . The Shelves and Partitions should be of 18 mm thick MDF (Medium density fiber) + Pigmented Black and coated with Melamine. The Tower Unit size shall be: 1700 Width mm x 400 Depth mm x 1200 Height mm . Panels shall be 18 mm thick MDF (Medium density fiber) Pigmented Black. The glass should be 12 mm thick and glass shall be Float glass plus the edges shall be Diamond cut Polished.

311. Director Chair (Halo HB)

Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-80cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16+/- 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 +/- 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assy. shall be made of 2.54+/- 0.03cm x 0.16 +/- 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore 'A' hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features: 360° revolving type, Knee Tilt system, Seat & back tilting ration of 1: 1.5, Front pivot for tilt with feet resting on ground ensuring more comfort, Tilt tension adjustment, 5-position locking with antilock back mechanism which should prevent the backrest from impacting the user when the lock

is released, Static seat depth adjustment 5.0 +/- 0.5cm with 5 position locking. The chair shall be provided with pneumatic height adjustment which shall have stroke of 9.0 +/- 0.3 cm. The bellow should be single piece duly blow moulded in black polypropylene. The pedestal shall be made of die-cast aluminium with buffing finish. it shall be fitted with 5 nos twin wheel castor. The size of the pedestal shall be 67.0 +/- 0.5 cm pitch-centre-dia (77.0 +/- 1.0 cm with castors). The twin wheel castors shall be made of Nylon injection moulded in black color. Overall dimensions of Chair shall be, Width of Chair - 77cm, Depth of Chair - 77 cm as measured from pedestal below. Height of back from ground - min 113.5 to max 122.5 cms. Seat height - min 49.9cm to max 58.9 cm. Dimensions tolerance / variations shall be within +/- 1 cm.

GM Table (Main Table+joining table+ERU+ back unit + 2 Book Case (Maestro)

312. Supplying and placing in position main desk of the following specifications. The main desk shall be of size 1800 Width mm x 900 Depth mm x 750 Height mm. The table top shall be 25 mm thick MFC (Melamine Faced Chipboard) also there should be 30 mm MDF (Medium density fiberboard) black pad. The modesty panel shall be of 18 mm thick MFC (Melamine faced chipboard).The leg of the main desk shall be of 25 mm MFC plus 30 mm MDF right and left pad.The main table should be of duck noise profile edge in order to enhance the workspace aesthetics. The joining table RHS shall be of size 1050 Width mm x 1200 Depth mm x 750 Height mm. The top panel shall be 25 mm thick with MFC (Melamine Faced Chipboard).The leg of the joining table shall be of metal. Polyurethane Coated joining table. The return desk size shall be 1200 Width mm x 600 Depth mm x 730 Height mm. The top panel shall 25 mm thick MFC (Melamine Faced Chipboard) .The Modesty panel shall be 18 mm thick MFC coated. The leg of the return desk shall be 25 mm thick MFC (Melamine faced chipboard) plus the right and left pad should be 30 mm thick MDF (medium density fiber) coated. back unit size shall be 1400 Width mm x 470 Depth mm x 760 Height mm.The top panel size shall be 25 mm thick MFC (Melamine faced chipboard) . The door panels and all other panels should be 18 mm thick MFC (Melamine faced chipboard) .The handle shall be of metal.

313.	GM	Chair	(Sedna	VHB)

Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed moulded reconstituted wood & upholstered with leather and moulded polyurethane foam. Size of back shall be (W)-46.0cm, (H)-57.0cm & size of seat shall be (W)-49.0cm x (D)-49.5cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16+/- 2 kgf as per IS: 7888 for 25% compression. The back rest should be connected to the mechanism with a drop-lift mechanism which can be adjusted in the range of 7.0+/-0.5cm for the comfortable back support to suitable individual need. Armrests should be pressure die casted in polished aluminium with PP arm tops. The mechanism of chair shall have following features:360 degree revolving type, Seat/Back tilt ratio of 1:3, Synchronized tilt, Back tilt with 4 position locking and Side tilt tension adjustment knob should be operated while taking back support for better adjustment of comfort. The chair shall be provided with pneumatic height adjustment which shall have stroke of 10.0 +/- 0.3 cm. The pedestal shall be made of die-cast polished aluminium. it shall be fitted with 5 nos twin wheel castor. The size of head rest shall be (W) 26.0cm x 12.0cm (L). The size of the pedestal shall be 65.0 +/- 0.5 cm pitch-centre-dia (75.0 +/- 1.0 cm with castors). The twin wheel castors shall be injection moulded in black polypropylene. Overall dimensions of Chair shall be, Width of Chair - 75.0cm, Depth of Chair - 75.0 cm as measured from pedestal below. Height from ground - min 113.5 to max

138.0 cms. Seat height - min 41.0cm to max 51.0 cm. Dimensions tolerance / variations shall be within +/- 1 cm.

Visitor Chair (Sedna Visitor)

314. Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed moulded reconstituted wood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be (W)-45.0cm, (H)-49.0cm & size of seat shall be (W)-49.0cm x (D)-49.5cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16 +/- 2 kgf as per IS: 7888 for 25% compression. The under structure should be welded structure made up of M.S.E.R.W. elliptical tube and the under structure should powder coated with 40-60 micron DFT (Dry film thickness) Overall dimensions of Chair shall be, Width of Chair - 51.0cm, Depth of Chair - 66.5 cm as measured from base. Height from ground - 96.0 cm. Seat height -48.0 cm. Dimensions tolerance / variations shall be within +/- 1 cm.

315. Sofa 1 Seater (Plunge 1) Supplying
and placing in position 1 Seater Sofa of dimensions 900 W x 800 D x 685 H with PU Upholstery and tropical wood frame. Foam: Moulded foam at seat and back of density 45 Kg/cubic m. wooden element of Rubber wood, Nylon webbing. Coffee Tray: Alluminium with powder coated

316. Sofa 3 Seater (Plunge 3) Supplying
and placing in position 3 Seater Sofa of dimensions 1970 W x 800 D x 685 H with PU Upholstery and tropical wood frame. Foam: Moulded foam at seat and back of density 45 Kg/cubic m. Wooden element of Rubber wood, Nylon webbing. Coffee Tray: Alluminium with powder coated

317. GM & DGM Center Table (Glaze) Supplying
and placing in position Center table of Dimensions 1100 x 600 x 500. 8 mm tempered glass top, 1 6 mm tempered bottom glass for storage, Silver powder coated. Glass under structure. Glass attached to the under structure via UV disc. Load bearing capacity: 30Kg

318. GM & DGM Corner Table (Glaze) Supplying
and placing in position corner table of Dimensions 600 x 600 x 450. 8 mm tempered glass top, 1 6 mm tempered bottom glass for storage, Silver powder coated. Glass under structure. Glass attached to the under structure via UV disc. Load bearing capacity : 20Kg

319. DGM (Main Table+ ERU+ back unit) {Orion (1950 x 750) + (1050 x 500)}
Supplying and placing in position Main Desk 1950 W x 750 D size shall be 1950 Width mm x 750 Depth mm x 733 Height mm . The top work surface shall be made from 25 mm thick PLT plus the Edge banded with matching PVC lipping. The grommet cutout shall be on primary worktop for alignment worktops connected by table connector. The Modesty panel shall be 18 mm MDF with PU painted in both sides. The Pedestal top shall be supporting wooden with soft closing drawers. There shall be a combination of 18 and 25 mm PLT also the edge shall be banded with matching PVC lipping file Hanger inside the

file drawer , side central lock. Secondary (L) + Ped 1050 W x 500 D size shall be 1050 Width mm x 500 Depth mm x 733 Height mm . The top work surface shall be made of 25 mm thick PLT . Edge banded with matching PVC lipping and Grommet cutout on primary worktop. Also for alignment worktops shall be connected by table connector. Secondary Archival Storage size shall be 900 Width mm x 1200 Depth mm x 450 Height mm . The Secondary archival storage shall be a wooden wardrobe with 3 point locking and push to open doors. The design shall be handle less. There shall also be combination of 18 mm & 25 mm PLT plus Edge shall be banded with matching PVC lipping.

320. DGM Chair (NRG HB)

Supplying and placing in position chair of the following specifications. The seat shall made of injection molded plastic outer and inner in polypropylene talc filled. plastic inner is upholstered with synthetic leather cover and moulded polyurethane foam and lumbar foam. The back shall made of injection molded plastic outer in nylon material and inner in polypropylene talc filled. Seat dimensions should be 48.4cm (W) x 52 cm (D) and back as 49.0cm(W) x 73.0cm(H). High Resilience polyurethane foam shall be moulded with density 55+/-2 kg/m³ and back hardness load 11+/-2 kgf as per IS:7888 for 25% compression and seat hardness load 20+/-2 kgf as per IS:7888 for 25% compression. The lumbar support foam insert shall made from visco-elastic slow recovery memory foam, moulded with density=60+/-5kg/m³ and hardness=6.5+/-1.5 at 25% compression and recovery time 12+/-1 sec. Armrest shall have 4 ranges of adjustments- 1. Up-down adjustment: 8 steps (8.0+/-0.5cm range), 2. Swivel adjustment: 3 positions, 9degree+/-2 swivel each side. 3. Width adjustment: Any position (2.0+/-0.5cm range each armtop) 4. To-Fro adjustment: Any position(4.0+/-0.5cm range) Height adjustment shall be in armrest structure and all other adjustments should be provided in pad which is fixed to armrest structure, The mechanism of chair shall have following features:360 degree revolving type, Seat/Back tilt ratio of 1:2, Active Bio-Synchro mechanism, 5 position tilt limiter giving option of variable tilt angle to the chair. Front-Pivot for tilt with feet resting on ground and continuous lumbar support should ensure more comfort. Pneumatic height adjustment should have an adjustment stroke of 10+/-0.3 cm. The size of the pedestal shall be 65.0 +/- 0.5 cm pitch-centre-dia (75.0 +/- 1.0 cm with castors). The twin wheel castors shall be injection moulded in black polypropylene. Overall dimensions of Chair shall be, Width of Chair - 75.0cm, Depth of Chair - 75.0 cm as measured from pedestal below. Height from ground - min 101.2 to max 110.2cm. Seat height - min 46.0cm to max 56.0cm. Dimensions tolerance / variations shall be within +/- 1 cm.

Visitor Chair (NRG Visitor)

321. Supplying and placing in position chair of the following specifications. The seat shall made of injection molded plastic outer and inner in polypropylene talc filled. Plastic inner is upholstered with synthetic leather cover and moulded polyurethane foam and lumbar foam . The back shall made of injection molded plastic outer in nylon material and inner in polypropylene talc filled. Seat dimensions should be 48.4cm (W) x 52.0cm (D) and back as 49.0cm (W) x 64.6cm(H). High Resilience polyurethane foam shall be moulded with density 55+/-2 kg/m³ and back hardness load 11+/-2 kgf as per IS:7888 for 25% compression and seat hardness load16+/-2 kgf as per IS:7888 for 25% compression. The lumbar support foam insert shall made from visco-elastic slow recovery memory foam, moulded with density=60+/-5kg/m³ and hardness=6.5+/-1.5 at 25% compression and recovery time 12+/-1 sec

The tubular visitor frame shall be powder coated(DFT 40-60 microns) cantilever structure and made of dia 2.54+/-0.03cm x 0.2+/-0.016cm thick MSERW tube with a connecting M.S spine welded to it. Overall dimensions of Chair shall be, Width of Chair - 57.5cm, Depth of Chair - 63.2 cm as measured from base below. Height from ground -99.6cm. Seat height - 49.3cm. Dimensions tolerance/variations shall be within +/- 1 cm.

322. Sofa 2 Seater (D Alpina) Supplying
and placing in position 2 Seater sofa of the following specifications. upholstery in Synthetic Leather. Polyester fiber wadding 175 GSM (18 mm). PU foam of 32d, 28d, 23d in various position. Expanded PF sheet for load distribution in seats. Durable rubber webbings of 50 mm & 70 mm. Cotton webbing on wooden surface to prevent sharp edges. Commercial ply – 12 to 15 mm as per design requirement. Pinewood of various thickness and length duly dried as base structure. All structures are joined with stapling. The overall dimension of the sofa shall be 1360 mm (W) x 850 mm (D) X 890mm (H). The seat height shall be of 420 mm. The sofa comes in a tropical wooden frame.

323. Sofa 3 Seater (D Alpina) Supplying
and placing in position 2 Seater sofa of the following specifications. upholstery in Synthetic Leather. Polyester fiber wadding 175 GSM (18 mm). PU foam of 32d, 28d, 23d in various position. Expanded PF sheet for load distribution in seats. Durable rubber webbings of 50 mm & 70 mm. Cotton webbing on wooden surface to prevent sharp edges. Commercial ply – 12 to 15 mm as per design requirement. Pinewood of various thickness and length, duly dried as base structure. All structures are joined with stapling. The overall dimension of the sofa shall be 1820 mm (W) x 850 mm (D) X 890mm (H). The seat height shall be of 420 mm. The sofa comes in a tropical wooden frame.

324. Chief Engineer Table (Main Table+ ERU+ back unit) Orion (1650 x 600) + (1050 x 500)
Supplying and placing in position Main Desk 1650 W x 600 D size shall be 1650 Width mm x 600 Depth mm x 733 Height mm . The top work surface shall be made from 25 mm thick PLT plus the Edge banded with matching PVC lipping. The grommet cutout shall be on primary worktop for alignment worktops connected by table connecto . The Modesty panel shall be 18 mm MDF with PU painted in both sides. The Pedestal top shall be supporting wooden with soft closing drawers. There shall be a combination of 18 and 25 mm PLT also the edge shall be banded with matching PVC lipping file Hanger inside the file drawer, side central lock. Secndry (L) + Ped 1050 W x 500 D size shall be 1050 Width mm x 500 Depth mm x 733 Height mm. The top work surface shall be made of 25 mm thick PLT. Edge banded with matching PVC lipping and Grommet cutout on primary worktop. Also for allignment worktops shall be connected by table connector. Secondary Archival Storage size shall be 900 Width mm x 1200 Depth mm x 450 Height mm . The Secondary archival storage shall be a wooden wardrobe with 3 point locking and push to open doors. The design shall be handle less . There shall also be combination of 18 mm & 25 mm PLT plus Edge shall be banded with matching PVC lipping.

325. Chief Engineer Chair (Kareena HB) Supplying
and placing in position chair of the following specifications. The seat shall be made up of 1.2+/-0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with fabric or synthetic leather and moulded polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood upholstered with replaceable fabric or synthetic leather upholstery covers and moulded polyurethane foam.

The moulded polyurethane foam shall be of density $45 \pm 2 \text{ kg/m}^3$ and hardness load $16 \pm 2 \text{ kgf}$ as per IS: 7888 for 25% compression. The dimensions of seat shall be- 51.0cm (W) x 48.0cm (D) and of back shall be 48.0cm (W) x 76.0cm (H). The armrest top shall be made of moulded polyurethane and mounted on to a drop lift height adjustable type M.S tubular armrest support chrome plated. The armrest height shall be adjustable up to $6.5 \pm 0.5 \text{ cm}$ in 5 steps and also has swivel adjustment of $22 \text{ degree} \pm 2$ on both sides. The mechanism of the chair shall have following features: 360° revolving type, Knee tilt synchro mechanism, Tilt tension adjustment, Single point control, 4 position locking with anti shock feature, Seat depth adjustment of $6.0 \pm 0.5 \text{ cm}$ should be locked in 6 positions. The backrest shall consist of a sliding up down mechanism, Which can be adjusted in the range of $7.5 \pm 0.5 \text{ cm}$ and should be locked in 4 positions for correct position of lumbar support. The chair shall be provided with pneumatic height adjustment which shall have stroke of $9.0 \pm 0.3 \text{ cm}$. The pedestal shall be fabricated from $0.2 \pm 0.02 \text{ cm}$ thick HR sheet, chrome plated and assembled with injection moulded black polypropylene hub cap. The size of the pedestal shall be $66.0 \pm 0.5 \text{ cm}$ pitch-centre-dia ($76.0 \pm 1.0 \text{ cm}$ with castors). The twin wheel castors shall be made black nylon. Overall dimensions of Chair shall be, Width of Chair - 76.0cm, Depth of Chair - 76.0cm as measured from pedestal below. Height from ground - min 101.5 to max 117.5cm. Seat height - min 46.9 to max 55.9cm. Dimensions tolerance / variations shall be within $\pm 1 \text{ cm}$.

326. Visitor Chair (Kareena Visitor)

Supplying

and placing in position chair of the following specifications. The seat shall be made up of $1.2 \pm 0.1 \text{ cm}$ thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with fabric or synthetic leather and moulded polyurethane foam. The back shall be made up $1.2 \pm 0.1 \text{ cm}$ thick hot pressed plywood upholstered with replaceable fabric or synthetic leather upholstery covers and moulded polyurethane foam. The moulded polyurethane foam shall be of density $45 \pm 2 \text{ kg/m}^3$, and hardness load $16 \pm 2 \text{ kgf}$ as per IS:7888 for 25% compression. The dimensions of seat shall be- 51.0cm(W) x 48.0cm(D) and of back shall be 48.0cm(W) x 64.5cm(H). The armrest top shall be made of moulded polyurethane and mounted on to a fixed type M.S tubular armrest support chrome plated. The Arm support has static vertical adjustment of $\pm 1.5 \pm 0.05 \text{ cm}$. The backrest shall consist of a fixed type mechanism i.e no back up/down adjustment. The leg frame welded assembly shall be chrome plated, made from $3.5 \pm 0.03 \text{ cm} \times 1.5 \pm 0.02 \text{ cm} \times 0.16 \pm 0.0128 \text{ cm}$ thick elliptical MSERW tube and provided with a base plate for seat fixing. Overall dimensions of Chair shall be, Width of Chair - 66.5cm, Depth of Chair - 58.0cm as measured from pedestal below. Height from ground - 88.5cm. Seat height - 45.0cm. Dimensions tolerance / variations shall be within $\pm 1 \text{ cm}$.

327. Secretary Table(Main Table+ERU) Finnesse Table-5026+ ERU 3616 Supplying and placing the executive table of following specifications. Main Table (1500 x 750 x 740) having top and side panel 25mm thick plain particle board(PPB) clad with 0.6 mm thick post formed laminate and 1mm thick backing laminate (BDL). Flat edge duly sealed with 2mm thick PVC beading and modesty panel of 18mm thick plain particle board(PPB) clad with 1.0mm thick decorative laminate(DL) on both sides. Edge sealed with 2mm thick PVC beading with Side Unit of size 1050 x 450 x 705 mm with 25mm thick plain particle board(PPB) clad with 0.6 mm thick post formed laminate and 1mm thick backing laminate (BDL). Flat edge duly sealed with 2mm thick PVC beading and 18mm thick plain particle board(PPB) clad with 1.0mm thick decorative laminate(DL) on both sides. Edge sealed with 2mm thick PVC beading and The mobile pedestal of same family.

328. Secretary Chair/ Conference Chair (Beat MB)

Supplying and

placing in position chair of the following specifications. The seat shall be made up of 1.2+/- 0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with leatherette, over molded High Resilience polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood. The HR polyurethane foam shall be of density 55+/-2kg/m³ and hardness load 16 +/- 2kgf as per IS: 7888 for 25% compression. The dimensions of seat shall be- 49.0cm (W) x 51.4cm (D) and of back shall be 51.6cm (W) x 65.7cm(H). The armrest top is PU molded over metal insert and the height adjustable armrest structure is powder coated. The armrest height shall be adjustable up to 8.0+/-0.5cm in 8 steps. The mechanism of the chair shall have following features: 360° revolving type, Front Pivot synchro mechanism, Tilt tension adjustment, Single point control, 4 positions locking with anti shock feature, Seat/back tilting ratio of 1:2. The back can be adjusted in 5 positions manually for correct position of lumbar support. Stroke of height adjustable spine is 7 cm. The chair shall be provided with pneumatic height adjustment which shall have stroke of 10.0 +/- 0.3 cm. The pedestal shall be injection molded in black 30% glass filled Nylon and fitted with 5 nos. twin wheel castors. The size of the pedestal shall be 66.0+/- 0.5 cm pitch-centre-dia (76.1 +/- 1.0 cm with castors). The twin wheel castors shall be injection molded in black nylon. The seat can be slid horizontally as per user convenience having a stroke slide of 5 cm. Overall dimensions of Chair shall be, Width of Chair - 76.1cm, Depth of Chair - 76.1cm as measured from pedestal below. Height from ground - min 102.0 to max 119.0cm. Seat height - min 45.0 to max 55.0cm. Dimensions tolerance / variations shall be within +/- 1 cm.

329. Visitor Chair (Beat Visitor)

Supplying

and placing in position chair of the following specifications. The seat shall be made up of 1.2+/-0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with leatherette, over molded High Resilience polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood. The HR polyurethane foam shall be of density 55+/-2kg/m³, and hardness load 16+/-2kgf as per IS:7888 for 25% compression. The dimensions of seat shall be- 49.0cm (W) x 51.4cm (D) and of back shall be 51.6cm (W) x 65.7cm(H). Armrests shall be fixed and the tubular frame is powder coated (DFT 40-60microns) cantilever structure & made of Dia.Ø 2.54 ±0.03cm.x 0.2 ±0.016cm.thk. M.S. E.R.W Tube with a connecting M.S. Spine welded to it. Back spine is fitted to the frame assembly.

330. Cabinets (VSDU-8)

Overall

Dimensions of VSDU - 8 shall be 900mm(W)x450mm(D)x1830mm(H). The top shall be Metal top (1 mm add in unit height) .The Rigid Knock Down Construction, Back , Sides and Door shall be made from Glass for visibility of content . Sliding door arrangement shall have sliding door with top hanging arrangement to prevent derailment. Each door shall be provided with 2 plastic roller having steel ball bearing for smooth movement of door & less noise .VSDU 8 shall have glass door for visibility of the content. Locking shall be 5 lever cam lock for safe locking. Handle shall be plastic flush & recessed handle. Shelving shall have Height wise adjustable shelf mounting. Uniformly Distributed Load Capacity of the shelf is 40 Kg maximum. VSDU - 8 shall have 4 no. of adjustable full shelves. Accessories optional shall be cradle with pipes for hanging instadex files. Leveler shall be screw type leveler with hex plastic base and overall finish shall be epoxy polyester coated to the thickness of 50 microns. For VSDU 8 - A4 size box file can be stored vertically on four shelves and clear space above fifth shelf is 220 mm.

331. Engineer's Manager Module cubicle (Wish 3000 x 1500) Providing and placing WISH panel & tile based modular workstation, with partition thickness as 52.4 mm thk and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles are fabric tackable & white board. Bottom tiles - Plain metal. SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tackable along with white board. INTERMEDIATE BLOCKS Intermediate blocks are given in DL finish. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. MODESTY PANELS WITH ASSEMBLY LEG - 25 MM THK PLB modesty has been given on the front of the main worktop which is attached to the partition on one end with gable end bkts and on the other end with metal powder coated frontier leg. Side panels or legs - out of 25 mm thk prelam particle board with flat pvc lipping edge banding considered only on the open end conditions or metal powder coated legs at the end and shared condition. System shall also have 120 mm high powder coated standalone panel legs to give the system an elevated look. Worksurface - Main table recta out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 1650 mm w x 800 mm d and ERU table recta of size 1050 mm w x 450 mm d. Pedestals with or without legs - Nova pedestal flat metal front, full ht free standing central locking of size 390 mm w x 435 mm d x 646 mm ht 3dr = 2box+1file. CPU trolley - with castors KBPT with/without mousetray - plastic/metal/articulated. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring.

332. Cabinets/ passage area storage {Echo HDU (1219 x 750)} Supplying and placing the all wood storage unit of size 750 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door Panels are made from 18 mm PLB with 2 mm Edge band on all edges and a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.

333. Assistant Table (Mayfair) Supplying and placing in position Main desk of the following specifications. Main Desk size shall be 900 Width x 600 Depth x 750 Height. The Top shall be in white cedar and black and shall be 18 mm PLB with PVC lipping. The side panels shall be 18 mm thick PLT with PVC. The Modesty panel shall be 18 mm thick PLT. The Modesty panel shall be in a combination of black & white cedar.

334. Assistant/Reading Chair (Bravo Mid Back) Supplying and placing in position chair of the following specifications. The seat and back shall be made up of 1.2 ±0.1cm. thick hot-pressed plywood measured as per QA method described in

OCP-QLTA-P14-18 and upholstered with fabric upholstery covers and moulded Polyurethane foam. The back foam shall be designed with contoured lumbar support for extra comfort. The seat shall be extra thick foam on front edge to give comfort to popliteal area. The dimensions of back shall be 47.5 cm(W) x 58.0 cm(H) and of seat shall be 47.0 cm (W) x 48.0 cm (D). The HR polyurethane foam shall be moulded with density= 45 ± 2 kg/m³ and hardness load 16 ± 2 kgf as. per IS:7888 for 25% compression. The one-piece armrests shall be injection moulded from black Co-polymer Polypropylene. The mechanism shall be designed with 360° revolving type, Upright-position locking, Tilt tension adjustment, Seat/back tilting ratio of 1:3. The pneumatic height adjustment shall has an adjustment stroke of 12.0 ± 0.3 cm. The bellow shall be 3 piece telescopic type and injection moulded in black Polypropylene. The pedestal shall be injection moulded in black 33% glass-filled Nylon-66 and fitted with 5 nos. twin wheel castors. The pedestal shall be 66.3 ± 0.5 cm. pitch-center dia. (76.3 ± 1.0 cm with castors). The twin wheel castors shall be injection moulded in Black Nylon. Overall Dimensions of Chair shall be Seat Height - min 42.5 to max 54.5cm, Height - min 85.5 to max 97.5cm, Width & Depth of Chair as measured from pedestal - Width-76.3 cm and Depth-76.3 cm.

335. Plotting Room Workstation (Linea 3600 x 900) Providing and placing 2 LINEA DESK based modular workstation of size 1800 x 900 with System ht - 750 mm UNDERSTRUCTURE: Comprising of metal powder coated cross connectors between legs, legs made up of metal powder coated finish and the entire assembly is fixed to the worktop with the help of ABS plastic spacers 20 mm high which gives the floating look to the w/s module. . The respective finishes for the screens shall be fabric. Wire Management : Metal powder coated Cable pole of size 170mm w x 85 mm d x 705 mm ht/ is given to pull wires from the floor junction box upto the power box fixed under neath the worktop. Aluminium access flaps on worktop above power box cut out for accessing switches. Worksurface - out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 1800 mm w x 900 mm d each. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 10 mm of uneven flooring.

336. Peak Centre/ Mail Room Workstation (Wish 1800 x 600) Providing and placing WISH panel & tile based modular workstation, with partition thickness as 52.4 mm thk and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles are fabric tackable & white board. Bottom tiles - Plain metal. SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tackable along with white board. INTERMEDIATE BLOCKS Intermediate blocks are given in DL. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. END PANEL: a 52.4 mm thk end panel is fitted with the main spine of 52.4 mm in the following size 2' wide and 4'0" ht. Following finishes are given on intermediate block DL, bottom block metal and top block fabric. Worksurface - Main table recta out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 2400 mm w x 600 mm d Pedestals with or without legs - Nova pedestal flat metal front, free standing central locking of size 390 mm w x 585 mm d x 646 mm ht 3dr = 2box+1file. CPU trolley - with castors KBPT with/without mousetray - plastic/metal/articulated Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring.

337. Library Centre table (Victoria) Providing and placing Centre Table of Dimensions: 1200 x 600 x 450. Rubber wood under frame. High density plywood top with 24 mm thickness. Curved legs with ethnic design. Load bearing capacity of 50 Kg

338. Library Corner Table (Edward) Providing and placing Corner Table of Dimensions: 600 x 600 x 480. Rubber wood under frame. High density plywood top with 24 mm thickness. Curved legs with ethnic design. Load bearing capacity of 30 Kg

339. Meeting Table (CONCLVE 10 B.CONV 1500D) Conclve 10 B. Conv 1500 D size shall be 3200 Width mm x 1500 Depth mm x 750 Height mm . Top work surface shall be 12 mm thick tougher glass with back painted design on to under side and crystal edge polish finish. The construction shall be Knock down Construction. The Under structure shall have all panels made from 36 mm thick Pre-laminated board with 2 mm thick PVC edge beading . Under structure also consists of storage for CPU , projector and paper storage . Provision for glass adjustment for glass aligning. The Wire Management shall have Legrand electrical used for wire management on to centre support beam panel and CPU storage area for socket connections, RJ11,RJ45 .

340. Conference Table (Talk Modular Memrance) Supplying and placing in position Conference table of the following specifications. The top of Conference Table shall be 25 mm thick base material shall be 25 mm MDF board plus 0.4 mm PVC membrane foil using wrap around technology. The foil is pre - coated with PU layer for better scratch and wear resistance. 0.6 mm balancing laminate on bottom surface. The Squeeze Leg Assembly shall be nickel chrome plated made from Dia 50.8 x 1.6 mm thick MS ERW tube. Leg Assembled together with a plastic glide at bottom and a powder coated leg connector made from aluminium alloy at top. Cross Member and connectors shall be powder coated cross member made from 1.5 mm thick aluminium extrusion fixed with work surface by plastic moulded table support connector. Powder coated connectors made from Aluminium alloy fixed at both ends of cross members. Squeeze Leg Assembly and connectors are assembled together to strengthen complete under structure. Laminate Modesty shall be 18 mm thick base material shall be 16 mm Plain particle board. Post - Laminated with 0.6 mm Top laminate on either side also there shall be 2 mm thick PVC edge banding of matching colour on outer edges of modesty. Work surface and Modesty are assembled together with powder coated Modesty bracket made from 2 mm thick MS sheet . Metal Perforated Modesty shall be 18 mm thick Powder coated metal perforated modesty with stiffener made from 0.8 mm thick MS sheet. Work surface and Modesty are assembled together with powder coated Modesty bracket made from 2 mm thick MS sheet. The Access Flap and Switch Mounting Tray shall be made from Matt silver anodized aluminium extrusion and plastic moulded components to facilitate access of electrical/ data /voice sockets access from top. Powder coated switch mounting tray made from 0.8 mm and 1.5 mm MS sheet .Switches to be mounted on tray as per requirement

341. Cabinets-2 (Unite) Construction & Material Knockdown construction. Prime Quality CRCA 0.8mm thk for all the body panels and shelves. Door Opening Twin door with self closing hinges Door Wood

(18 mm PLT) Handle • Aesthetically appealing recessed plastic handle for wooden Doors.
 • 3 point locking mechanism in • Height wise Adjustable Shelf Mounting • Uniformly Distributed Load capacity per each shelf is 80 Kg Maximum 2 nos. Adj. Shelves. Top Options Wooden Top (PLB) 25 mm thk. PF or Wooden Top (PLB) 25 mm thk. Plain or 14 mm thk Metal top (Add to unit height) Skirting Options 152 mm High, 125 mm High – add to unit height Leveler Screw type adjustable Leveler with plastic base (Add in unit height min. 18 mm & additional 10 mm adjustment) Finish: Epoxy polyester powder coating finish 50 +/-10 microns. Stack ability / Reversibility / Connectivity • Can be stacked with any of Unite range of storages. • Unit can be stacked such that its front Fascia is opposite to that of other units. • Can be connected with Grid Partition in select situations. • Work top anchoring option on demand. Back panel Unit has its own back; additionally GRID tiles can be mounted if required.E44

342. Ccanteen Table (Time out 4 Seater)

Supplying and

placing in position Canteen table of the following specifications. 4 Seater PU Coated size shall be 1135 Width mm x 1175 Depth mm x 750 Height mm . Top shall be 25 mm thick base material shall be 25 mm MDF board . On top PU painting of minimum 2H hardness with 75% glass as per color chart .Combination color graphics on the centre . Brown Laminate on bottom specially profiled edges for comfort. The Under structure shall be having bend pipe structure of MS powder coated. Pipe dia 38 mm, 2 mm thick and it shall be fitted with top by SS machine screws. Legs shall be of MS powder coated and 38 mm dia. pipe legs are fixed with inderstructure and table top. Glide shall be of Plastic fixed at the under structure to prevent the damage of table top during stacking.

343. Canteen Chair (Unwind Café)

Supplying and placing in position cafe chairs of the following specifications. The seat and back shall be one piece injection moulded in high impact strength polypropylene. The dimensions of seat shall be 52.5 cm (W) X 53.2 cm (D) and of back shall be 51.6 cm (W) X 40.5 cm (H). The Tubular welded frame is made from Dia 2.22 ± 0.03 x 0.12 ± 0.0128 cm and 3.5 ± 0.03 cm x 1.5 ± 0.03 cm x 0.12 ± 0.0128 cm SS 202 grade tube. The tubes are buff polished to give shiny finish. Overall Dimensions of Chair shall be Seat Height - 45.0 cm, Height - 84.5cm, Width & Depth of Chair as measured from pedestal - Width-52.5cm and Depth-55.8 cm.

344. 3 Arc Reception Table (First impression)

Supplying

and placing in position Reception table of the following specifications. Top shall be of Rubberwood with clean Matt PU finish 18 mm thick , inside radius - 700 mm , outside radius - 1350 mm and depth - 650 mm . Cork shall be 18 mm thick of rubber. Glass shall be Frostered 10 mm thick diamond cut finishing on edges, inside radius shall be - 1202.5 mm, otside radius - 1402.5 mm and depth - 200 mm. The Modesty Panel shall be MS Perforated sheet below work surface: 0.8 mm (thick) x 665 mm (height) x 1345 mm (flat length). Above Work surface: 0.8 mm (thick) x 260 mm (height) x 1345 mm (flat length). The legs shall be of MS tube 1.6 mm thick diameter 50.8 mm and height 604 mm

345. Reception Chairs (Gallop Mesh)

Supplying

and placing in position chair of the following specifications. The seat shall be made of Injection molded Plastic outer & inner. Plastic Inner shall be upholstered with fabric and moulded Polyurethane foam. The back shall be made of 1.2 ±0.1em. hot-pressed plywood measured as per QA method described in OCP-QLTA-P14-18 & upholstered with fabric and moulded Polyurethane foam and back covers. The back foam shall be designed with contoured lumbar support for extra comfort. Dimensions of Back shall be: (W) 46.0 cm x

(H) 50.5 Cm, and of Seat : (W)46.0cm x (D) 48.0 cm. The HR polyurethane foam shall be moulded with Density= 45 $\pm$ 2 kg/m³ and back hardness load 12 $\pm$ 2 kgf and seat hardness load 16 $\pm$ 2 as per IS:7888 for 25% compression. spine cap shall be made up of Polypropylene which covers the back frame and spine junction. The armrests shall have only Up-Down adjustment- 8.0 $\pm$ 0.5cm (8 positions) which shall be provided in armrest structure. Armrest Top is made up of PU with metal insert fitted on the armrest structure. The adjustable tilting mechanism shall be designed with the following features:

- 360° revolving type.
- Front-pivot for tilt with feet resting on ground and continuous lumbar support ensuring more comfort.
- Side tilt tension adjustment can be operated in seating position.
- 4-position Tilt limiter giving options of variable tilt angle to the chair (5 steps: 0° to 20° $\pm$ 2° tilting).
- Seat/back tilting ratio of 1:2., Seat depth adjustment shall be integrated in the seat through a sliding mechanism. The pneumatic height adjustment shall have an adjustment of 10.0 $\pm$ 0.3cm. The pedestal shall be injection moulded in black 30% glass-filled Nylon and fitted with 5 nos. twin wheel castors. The pedestal shall be 66.1 $\pm$ 0.5cm. pitch-center dia (76.1 $\pm$ 1.0cm with castors). The twin wheel castors shall be injection moulded in black Polypropylene. Overall dimensions shall be as Seat Height - min 45.2 to max 55.2cm, Height - min 96.3 to max 106.3cm. Width & Depth of Chair as measured from pedestal - Width-76.1 cm and Depth-76.1 cm.

246. Sofa 1 Seater (Jinerio)

Supplying

and placing in position sofa of the following specifications. Upholstery: Microfibre with Polyester Laminate Frame Material: Kiln dried wood Seat Foam: Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density: 34 kg/ cubic m. Back Foam : Slab stock foam with recron fill at back and arms. Foam Density: 34 kg/cubic m. Webbing Material: S- spring along with nylon strips. The overall dimension of the sofa shall be 1060 mm (W) x 912 mm (D) X 830mm (H). The upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.

347. Sofa 2 Seater (Jinerio)

Supplying

and placing in position sofa of the following specifications. Upholstery: Microfibre with Polyester Laminate Frame Material : Kiln dried wood Seat Foam : Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density: 34 kg/ cubic m. Back Foam : Slab stock foam with recron fill at back and arms. Foam Density: 34 kg/cubic m. Webbing Material: S- spring along with nylon strips. The overall dimension of the sofa shall be 1572 mm(W) x 912 mm (D) X 830mm (H). The upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.

348. Sofa 3 Seater (Jinerio)

Supplying

and placing in position sofa of the following specifications. Upholstery: Microfibre with Polyester Laminate Frame Material: Kiln dried wood Seat Foam: Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density: 34 kg/ cubic m. Back Foam: Slab stock foam with recron fill at back and arms. Foam Density: 34 kg/cubic m. Webbing Material: S- spring along with nylon strips. The overall dimension of the sofa shall be 2072 mm (W) x 912 mm (D) X 830mm (H). The

upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.

349. Centre table (Bloom)

Supplying and placing in position Center table of following specifications. The overall size shall be : Width - 1000 mm, Depth-600, Height - 428 mm. Material : Glass of 08 mm thk tempered, Solid rubber wood legs and frame, MS sheet as bottom shelf. PU Coated rubber wood parts with a clear glass. Metal frames are powder coated in shade Black to the thickness of 40-80 microns.

350. Corner Table (Bloom)

Supplying and placing in position Corner table of following specifications. Overall Size: Width - 500 mm, Depth-500, Height - 428 mm. Material: Glass of 08 mm thk tempered, Solid rubber wood legs and frame, MS sheet as bottom shelf. PU Coated rubber wood parts with clear glass. Metal frames are powder coated in shade Black to the thickness of 40-80 microns.

351. Magzine Racks (PDR)

Supplying and placing in position public waiting sofa with following specifications: Overall Dimensions of Steel Body With Retractable Tray + Fittings shall be 290mm(W) x 400mm(D) x 1890mm(H). Rigid Knock down construction. Prime quality CRCA steel shall be used panels from 0.8 mm thick. Side panels shall be 27 mm thick prelaminated particle board (PLB) with laminate on both sides .Stackability shall be having add-on units stacked width wise to form a bank of racks having common side panel .5 Level Racks per unit. Display Tray suitable for magazines, penodicals. Aesthetically appealing metal tray at an angle for easy viewing. Receding facility to access the storage behind. Sliding on plastic rollers . Behind Storage shelving shall have 5 level behind storage shelf and uniformly distributed load capacity per each shelf is 35 Kg maximum. Finish should be epoxy polyester powder coated to the thickness of 50 microns

352. Optimizer 1 (Single Static 3 Bay 15')

Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3. The Construction shall be rigid knock down made out of 0.8 thick CRCA steel conforming to IS: 513 . Each body shall have a main unit plus add on units (1,2,3,4,5) . Finish shall be Epoxy polyester powder coated thickness of 40 microns. Shelf construction shall be made from CRCA steel 0.8 mm thick IS: 513 .Uniformly distributed load capacity of 80 Kg . Undercarriage shall have construction in welded frame made of HR sheet 3.15 mm thick conforming to IS: 10748 . Finish shall be epoxy polyester powder coat of approved color & shade with a dry film thickness of minimum 40 microns .The Movements shall be Drive Type configuration : In case of D2 & D3 movement of units is achieved mechanically through a PU Drive Wheel and Sprocket -Chain-Tensioner arrangement mounted rigidly onto body size .For D3 each movable undercarriage shall be provided with 2 rollers on the shaft for driving , 2 antifriction ball bearing for rolling and 4 antifriction ball bearing for guiding between rail . Fittings shall be centralized locking arrangement through locking stiffener mounted onto back of single last unit so that it gets locked on channels when all the units are brought together. The Recess handle lock is of Godrej make & placed at suitable height. This arrangement occupies a space of 90.0 mm. When the last unit is twin movable, hinged doors are provided for the end bodies, so in this case locking stiffener is mounted onto drive unit cover ; and with tile fascia option , it will be mounted in the recess

of vertical trim . Each Drive Type units shall have Locking Knob near the drive wheel for manual locking of individual units when a person is using those units. Knob shall be rotated to unlock position when units are to be moved. End stoppers shall be provided to prevent derailment. Door locking shall be having hinged doors of recessed die cast handle cum lock giving 3 way locking through a lever & shooting bolts . Guide channels shall have 'J' section 2 mm thick HR & 25 mm Square bright bar. Fasteners shall be galvanized/blackodized/Zn plated .The label holder shall be made from 2 mm thick clear transparent acrylic sheet. Also total no. of loading levels per under structure shall be 15 for SD3. Fascia(tiling) 3 tile pattern fascia option on drive side panel plus 3 tile pattern fascia on non-drive side panel plus 3 tile pattern fascia option on back panel of single last plus 3 tile pattern fascia option on back panel of single static . The tiles are held together by stiffeners & fasteners in 2 vertical metal trims.

353. Optimizer 1 (Twin Mobile 3 bay 15)
Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3.

354. Optimizer 1 (Single last 3 Bay 15')
Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3.

355. Optimizer 1 (Channels 6') Overall
Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3

356. Optimizer 1 (Channels 9') Overall
Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3

357. Optimizer 2 (Single Static 3 Bay 18') Overall
Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3. The Construction shall be rigid knock down made out of 0.8 thick CRCA steel conforming to IS : 513 . Each body shall have a main unit plus add on units (1,2,3,4,5) . Finish shall be Epoxy polyester powder coated thickness of 40 microns . Shelf construction shall be made from CRCA steel 0.8 mm thick IS: 513 .Uniformly distributed load capacity of 80 Kg . Undercarriage shall have construction in welded frame made of HR sheet 3.15 mm thick conforming to IS : 10748 . Finish shall be epoxy polyester powder coat of approved color & shade with a dry film thickness of minimum 40 microns .The Movements shall be Drive Type configuration : In case of D2 & D3 movement of units is achieved mechanically through a PU Drive Wheel and Sprocket -Chain-Tensioner arrangement mounted rigidly onto body size .For D3 each movable undercarriage shall be provided with 2 rollers on the shaft for driving , 2 antifriction ball bearing for rolling and 4 antifriction ball bearing for guiding between rail . Fittings shall be centralized locking arrangement through locking stiffener mounted onto back of single last unit so that it gets locked on channels when all the units are brought together. The Recess handle lock is of Godrej make & placed at

suitable height. This arrangement occupies a space of 90.0 mm. When the last unit is twin movable, hinged doors are provided for the end bodies, so in this case locking stiffener is mounted onto drive unit cover; and with tile fascia option, it will be mounted in the recess of vertical trim. Each Drive Type units shall have Locking Knob near the drive wheel for manual locking of individual units when a person is using those units. Knob shall be rotated to unlock position when units are to be moved . End stoppers shall be provided to prevent derailment. Door locking shall be having hinged doors of recessed die cast handle cum lock giving 3 way locking through a lever & shooting bolts . Guide channels shall have 'J' section 2 mm thick HR & 25 mm Square bright bar. Fasteners shall be galvanized/blackodized/Zn plated .The label holder shall be made from 2 mm thick clear transparent acrylic sheet. Also total no. of loading levels per understructure shall be 15 for SD3. Fascia(tiling) 3 tile pattern fascia option on drive side panel plus 3 tile pattern fascia on non-drive side panel plus 3 tile pattern fascia option on back panel of single last plus 3 tile pattern fascia option on back panel of single static . The tiles are held together by stiffeners & fasteners in 2 vertical metal trims.

358. Optimizer 2 (Twin Mobile 3 bay 18') Overall
Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3.

359. Optimizer 1 (Single last 3 Bay 18') Overall
Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3.

360. Optimizer 2 (Channels 6') Overall
Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3.

361. Optimizer 2 (Channels 6') Overall
Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3.

362. Passage Area Storages {Echo HDU (1219 x 900)} Supplying and placing the all wood storage unit of size 900 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door Panels are made from 18 mm PLB with 2 mm Edge band on all edges and a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and

HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.

363. Passage Area Storages {Echo HDU (1219 x 1050)}

Supplying

and placing the all wood storage unit of size 1050 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door Panels are made from 18 mm PLB with 2 mm Edge band on all edges and a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.

364. Managerial table (Linea Managerial Module)

Supplying and

placing Manager Table with Table top - Made of 25Mm Thick Prelaminate Partical Board. Main Table-1350mmW x 600mmD x 750mm H with ERU-900mmW x 450mmD x 750mm H. The Tables Will Be Lipped With Pvc Edge Band of 2.0Mm Thickness. Understructure - Work top Is Supported On Ms Sq Leg 40 X 40mm thick & Supporting beams. Wire Management - 150Ht, Cable Tray with Separator For Power And Data Cable Management. Ms Vertical Cover for Wire Entry, All table tops to have wire manager. Pedestal size- 390mm W x 435mm D x 656mm

365. Cabinets (Gain 450 x 500)

Providing and placing 1980 mm Ht (2100 mm including skirting) Storage consisting (400 x 500 x 2100) units. of in completely knocked down construction. overall dimesnions 1500 x 500 x 2100. Door Opening Twin door with self closing hinges. The add on units can be stacked width wise to form a row of storages having a common side pannel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513. Heightwise adjustable sheves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.Epoxy Polyster powder coated to the thickness of 50 microns.Doors consdtruction made up of MDF & honeycomb with backing and decorative laminates. Self Closing Hinges and Mazak Handle. 2 mm thick lipping on all edges and 3 way locking mechanism.

366. Cabinets (Gain 500 x 500)

Providing and

placing 1980 mm Ht (2100 mm including skirting) Storage consisting (500 x 500 x 2100) units. of in completely knocked down construction. overall dimensions 1500 x 500 x 2100. Door Opening Twin door with self closing hinges. The add on units can be stacked width wise to form a row of storages having a common side pannel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513. Heightwise adjustable sheves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.Epoxy Polyster powder coated to the thickness of 50 microns.Doors consdtruction made up of MDF & honeycomb

with backing and decorative laminates. Self Closing Hinges and Mazak Handle. 2 mm thick lipping on all edges and 3 way locking mechanism.

367. Cabinets (Gain 800 x 500) Providing and placing 1980 mm Ht (2100 mm including skirting) Storage consisting (800 x 500 x 2100) units. of in completely knocked down construction. overall dimensions 1500 x 500 x 2100. Door Opening Twin door with self closing hinges. The add on units can be stacked width wise to form a row of storages having a common side pannel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513. Heightwise adjustable sheves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.Epoxy Polyster powder coated to the thickness of 50 microns.Doors consdtruction made up of MDF & honeycomb with backing and decorative laminates. Self Closing Hinges and Mazak Handle. 2 mm thick lipping on all edges and 3 way locking mechanism.

368. Cabinets (Gain 1000 x 500) Providing and placing 1980 mm Ht (2100 mm including skirting) Storage consisting (1000 x 500 x 2100) units. of in completely knocked down construction. overall dimensions 1500 x 500 x 2100. Door Opening Twin door with self closing hinges. The add on units can be stacked width wise to form a row of storages having a common side pannel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513. Heightwise adjustable sheves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.Epoxy Polyster powder coated to the thickness of 50 microns.Doors consdtruction made up of MDF & honeycomb with backing and decorative laminates. Self Closing Hinges and Mazak Handle. 2 mm thick lipping on all edges and 3 way locking mechanism.

369. Table (Linea 1800 x 900) Providing and placing LINEA DESK based modular workstation with System ht - 750 mm UNDERSTRUCTURE: Comprising of metal powder coated cross connectors between legs, legs made up of metal powder coated finish and the entire assembly is fixed to the worktop with the help of ABS plastic spacers 20 mm high which gives the floating look to the w/s module. The respective finishes for the screens shall be fabric. Wire Management: Metal powder coated Cable pole of size 170mm w x 85 mm d x 705 mm ht/ is given to pull wires from the floor junction box upto the power box fixed under neath the worktop. Aluminium access flaps on worktop above power box cut out for accessing switches. Work surface - out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 1800 mm w x 900 mm d. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 10 mm of uneven flooring.

370. Full Ht Partitions (Wish Full Ht Wall) Full Height partition shall be a modular system with overall thickness of 75mm for creating rooms/spaces and enclosures of varying sizes and offer multiple elevations incorporating together functional and decorative finishes. The system also shall offers features and options of doors, shelf and worktop fixing while having provisions for mounting of accessories like motorized blinds, access control. The offering shall include both single and double glazed partition. Main Frame Structure: Main structure shall be a combination of different Aluminium Sections made from Aluminium alloy 63400-WP and shall be powder coated with Epoxy Polyester or Anodized, varying in heights and widths to make a full height cabin up to 3000 mm below the false ceiling level. The frame structure shall be

made by joining Aluminium Extrusions by means of brackets made of 3 mm Thk HR (IS-2062) and screws. Overall thickness of panel assembly shall be 66 mm. In elevations, the width of tiles shall vary from 300mm to 2400mm in pitch of 150mm and heights shall vary from 600 mm to 2400 mm (actual 534 mm to 2136 mm) in pitch of 600 mm. The system shall provide to make junctions straight partition panels as per approved layout. The super structure above false ceiling level shall consist of True ceiling mounting bracket which shall hold wooden batten frame work made from Rubber wood (50x50xlength of partition). The partition panel extrusions shall be grouted to this superstructure. The system shall have provision for leveling adjustment to compensate for floor unevenness (up to 40 mm) as well as false ceiling height difference(up to 15 mm). Provision shall be provided Horizontal adjustment at wall side with adjustment up to 20 mm. Fabric Tile: Fabric Non-tack tiles shall be made of 9.0 mm thick PLB / PLT boards(IS: 12823:1990) edge banded with 0.5 mm thick PVC lipping, and upholstered with approved fabric on front side. The overall thickness of tile shall be 10mm. Fabric Tackable tiles shall be made of 0.7mm thick GI Sheet (IS-277), with 8mm thick P.E. foam glued to it on front side which are fabric upholstered on front side. The overall thickness of tile shall be 9 mm. Stiffeners made of GI Sheet (IS-277) shall be provided at the back of the tile. White Board tile: Back painted glass of 5 mm Shall be provided for glass finished writing board in the panel itself. Alternatively regular wooden white board shall also be provided as per approved finishes. Wooden DL tiles: Wooden DL tile of 9 mm thK PLB edge banded with 0.5 mm thk PVC lipping with approved design of laminate shade shall be provided as per approved panel elevations. Glass Door With Hinges: Single side opening Glass door shall be provided with Hinges, Lock with handle and Door Closer. The door shall be made of 10mm Thk clear Toughened glass (IS-2835). Single Side Opening door shall have provision for opening on LH side and RH side. Door Shutter Size shall be of 2200 x 956 mm. Doors shall of 1050 mm width and 2250 mm height only. Door including the frame width shall be of 1050mm. The full glass panels shall range from 300 mm to 1200 mm max. Height of single panel of glass shall be up to 8'0". Full height of panel shall be max up to 10' with skirting ht shall be of 120 mm. Worktops for cabin module shall be provided in opaque partitions and shall be of sizes – 1500, 1650 and 1800 mm width and with 600/750 mm depth. Return worktop shall be of size 900mm – 1800 mm (in pitch of 150 mm). Provision of wire management through the panels vertically shall be possible. Wiring intake into the panel from flooring as well as ceiling shall be provided. Provision in panel width up to 1200 mm width for 2 slots of 100 x 25 at a distance of 100 mm from the edge of the panel shall be provided. Beyond 1200 mm to 2400 mm, the slots shall increase from 2 to 4 nos. the intermediate slots shall be equidistance from the end slots. The end slots shall be same as the ones in the 1200 mm w panels. Provision to provide wire management in full glazed panel in separate power post should be possible.

371. Low Ht Partitions (Wish Low Ht Wall): Providing and placing panel & tile based partition with thickness as 52.4 mm thk and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles are fabric tackable & white board. Bottom tiles - Plain metal. SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tackable along with white board. INTERMEDIATE BLOCKS Intermediate blocks are given in DL finish. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring. Partition thickness of 52.4 mm (minimum 50mm) thick including powder coated Aluminium trims and supported on Legs for better air circulation and helps in keeping floor clean.

Panels Construction - Each panel consists of 2 nos. of vertical extrusions made of aluminum. Horizontal extrusions made of aluminium at every division of tile/block. These panels are supported on legs with levellers at various locations depending on the layout requirement.

Bottom fram : Fabricated bottom frame for 52.4mm (minimum thickness 50mm) panel comprises of L-channels made of 2mm thick CRCA steel (IS: 513), formed plates of 3mm thick HR steel (IS: 2062) & ERW steel tube of size 35x15x1.6mm thick in oval cross section (IS: 7138) welded together. Powder Coating with average 50 to 60 micron thickness of epoxy powder coating. GABLE END PANEL : Gable end panels are made of 25mm thick Prelaminated board and brackets are made from 2.0mm thick MS CRCA grade D as per IS : 513. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried up to the panels through concealed conduits inside the blocks. Wires runs through the system from Bottom tile and extended to the top at various locations by the help of 2 nos. vertical wire managers in each panels. Cable Duct: Cable duct shall be made from 0.8 mm thick M.S. CRCA Grade D as per IS: 513 - 1994. It is constructed with two parts, one is body & another is cover. It holds the cables & gives aesthetic appearance by covering all cables entry, which are moving upward to the Panels. Size of Cable duct is 107mm W X 154 mm H X 21 mm D. Side legs - Metal powder coated legs at the end. System shall also have 120 mm high powder coated standalone panel legs to give the system an elevated look. Single side legs are fabricated by CO2 welded MS Tube of section 38 mm x 25 mm (IS: 7138 ERW Tube, 38 mm x 25 mm x 16bg) with the base plate of the MS plate of 35x22x5mm (IS: 2062, 5 mm HR) over which an M8 Leveler is fitted.

GRAPHICS/ SIGNAGES

372. Providing and fixing of graphics/signages (including printing of direction, entry, exit, department name etc.) with self-glowing signs 12"x6" as per specification and direction of Engineer-in-Charge.

373. Providing and fixing of graphics/signages (including printing of direction, entry, exit, department name etc.) with backlit/ SS Plate signs 12"x6" as per specification and direction of Engineer-in-Charge.

374. Providing & fixing of flex/ film with color printing on Glass/ partition/ wall as per specifications and direction of EIC/ Architect complete.

375. Providing & fixing of SS backlit logo on wall/ partition as per specifications and direction of EIC/ Architect complete.

PRICE SCHEDULE

**INTERIOR WORKS FOR 5TH. AND 6TH. FLOOR OF OFFICE BUILDING AT NBCC
CENTRE, OKHLA, NEW DELHI**

Srl. No.	Description	Qty. (A)	Unit	Rate (B) (Rs.)	Amount (Rs.) (AxB)
1	Demolishing R.C.C. work manually/ by mechanical means including stacking of steel bars and disposal of unserviceable material within 50 metres lead as per direction of Engineer - in- charge.	121.40	M3		
2	Demolishing brick work manually/ by mechanical means including stacking of serviceable material and disposal of unserviceable material within 50 metres lead as per direction of Engineer-in-charge. In cement mortar	188.50	M3		
3	Disposal of building rubbish / malba / similar unserviceable, dismantled or waste materials by mechanical means, including loading, transporting, unloading to approved municipal dumping ground or as approved by Engineer-in-charge, beyond 50 m initial lead, for all leads including all lifts involved	1365.10	M3		
4	Brick work with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level in all shapes and sizes in :Cement mortar 1:6 (1 cement : 6 coarse sand)	21.34	M3		
5	Half brick masonry with common burnt clay F.P.S. (non modular) bricks of class designation 7.5 in superstructure above plinth level up to floor V level Cement mortar 1:4 (1 cement : 4 coarse sand)	369.77	M2		
6	12 mm cement plaster of mix: 1:4 on 230mm thick brick walls (1 cement : 4 coarse sand)	185.59	M2		
7	15mm cement plaster on the rough side of single or half brick wall of mix: 1:4 (1 cement : 4 coarse sand)	925.12	M2		
8	Providing wood work in frames of doors, windows, clerestory windows and other frames, wrought framed and fixed in position :Second class teak wood	3.19	M3		
9	Providing and fixing glazed shutters for doors, windows and clerestory windows using 4 mm thick float glass panes including black enamelled ISI marked M.S. butt hinges with necessary screws. 35 mm thick	147.84	M2		
10	Extra for providing heavy sheet float glass panes instead of ordinary float glass in glazed doors, windows and clerestory window shutters. (Area of opening for glass panes excluding portion inside rebate shall be measured). 5.5 mm thick instead of 4 mm thick	147.84	M2		
11	Extra for providing heavy sheet frosted glass panes 5.5 mm thick instead of ordinary float glass panes 5.5 mm thick in doors, windows and clerestory window shutters. (Area of opening for glass panes exluding portion inside rebate shall be measured).	147.84	M2		

12	Providing and fixing ISI marked flush door shutters conforming to IS: 2202 (Part I) decorative type, core of block board construction with frame of 1st class hard wood and well matched teak 3 ply veneering with vertical grains or cross bands and face veneers on both faces of shutters : 35 mm thick including ISI marked Stainless Steel butt hinges with necessary screws.	69.30	M2		
13	Providing and fixing IS : 3564 marked aluminium extruded section body tubular type universal hydraulic door closer with double speed adjustment with necessary accessories and screws etc. complete.	82.00	M2		
14	Providing and fixing paneling on wall, on G.I hat furring channel 22-25 depth with grid size 600mmx 600mm both ways fixed to wall, columns in any profile and covered with 8mm plywood of approved make and finished with veneer duly polished as approved on exposed faces with grooves as per design. The rates shall include all hardware, fittings, adhesives, beadings, lippings etc as directed by the architect.	488.60	M2		
15	Providing and fixing 1st Class Teak wood/Rubeer wood skirting wherever required as per carved profile of size 75mm wide x 15mm thick duly melamine polished. Fixing details as per drawing and as directed by architect	148.06	RMT		
16	Providing and fixing 1st quality Ceramic glazed wall tiles conforming to IS : 15622 (thickness to be specified by the manufacture) of approved make in all colours, shades except burgundy, bottle green, black of any size as approved by Engineer-in-Charge in skirting, risers of steps and dados over 12 mm thick bed of cement Mortar 1:3 (1 cement : 3 coarse sand) and jointing with grey cement slurry @ 3.3kg per sqm including pointing in white cement mixed with pigment of matching shade complete. Size of Tile 300 x 600 mm (Make : Kajaria Series Equisite Satin Matte)	260.43	M2		
17	Providing and laying Polished Glazed Vitrified Tiles (PGVT) in different sizes (thickness to be specified by the manufacturer) with water absorption's less than 0.08% and conforming to IS : 15622 (Kajaria, equivalent make) in all colours and shades, laid on 20mm thick cement mortar 1:4 (1 cement : 4 coarse sand) including grouting the joints with white cement and matching pigments etc complete. Size of Tile 1000 x 1000 mm (Make: Kerrogres Kajaria Premium Series)	2216.36	M2		
18	Providing and fixing 18 mm thick gang saw cut mirror polished (premoulded and prepolished) machine cut granite for kitchen platform, vanity counters, window sills, facias and similar locations of required size of approved shade, colour and texture laid over 20mm thick base cement mortar 1:4 (1 cement : 4 coarse sand) with joints treated with white cement, mixed with matching pigment, epoxy touch ups, including rubbing, curing, moulding and polishing to edge to give high gloss finish etc complete at all levels. Granite of any colour and shade. Area of slab over 0.50 sqm	26.40	M2		

19	Providing and laying Anti skid ceramic glazed floor tiles 300 x 300 mm (thickness to be specified by the manufacturer) of 1st quality conforming to IS: 13755 of approved brand in all colours, shades except white, Ivory, Grey Fume Red Brown laid on 20 mm thick bed of Cement Mortar 1:4 (1 cement:4 coarse sand) including pointing the joints with white cement and matching pigments etc. complete.	257.43	M2		
20	Providing and laying 25 mm thick sorted Kota stone slab flooring in different shades and pattern as shown on drawing and approved by Architect over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab including rubbing and polishing complete with base of cement mortar 1:4 (1 cement : 4 coarse sand)	117.02	M2		
21	Providing and laying Italian marble flooring in different shades and pattern as shown on drawing and approved by Architect over 20 mm (average) thick base laid over and jointed with grey cement slurry mixed with pigment to match the shade of the slab including rubbing and polishing complete with base of cement mortar 1:4 (1 cement : 4 coarse sand)	82.23	M2		
22	Providing and fixing of laminated 12 mm thick Wooden flooring with proper non glue fixing details and proper base and finishing as per manufactures specifications and to the satisfaction of the EIA/architect.Flooring (Make : Unitex, Armstrong or equivalent make)	245.13	M2		
23	Providing and fixing of wooden false ceiling with 12 mm commercial ply and 4 mm decorative veneer finish as per approved make, colour and texture with melamine polish as per design, drawings, specification and direction of Engineer-in-Charge/Site Engineer.	77.90	M2		

24	Providing and fixing false ceiling at all height including providing and fixing of frame work made of special sections, power pressed from M.S. sheets and galvanized with zinc coating of 120 gms/sqm (both side inclusive) as per IS : 277 and consisting of angle cleats of size 25 mm wide x 1.6 mm thick with flanges of 27 mm and 37mm, at 1200 mm centre to centre, one flange fixed to the ceiling with dash fastener 12.5 mm dia x 50mm long with 6mm dia bolts, other flange of cleat fixed to the angle hangers of 25x10x0.50 mm of required length with nuts & bolts of required size and other end of angle hanger fixed with intermediate G.I. channels 45x15x0.9 mm running at the spacing of 1200 mm centre to centre, to which the ceiling section 0.5 mm thick bottom wedge of 80 mm with tapered flanges of 26 mm each having lips of 10.5 mm, at 450 mm centre to centre, shall be fixed in a direction perpendicular to G.I. intermediate channel with connecting clips made out of 2.64 mm dia x 230 mm long G.I. wire at every junction, including fixing perimeter channels 0.5 mm thick 27 mm high having flanges of 20 mm and 30 mm long, the perimeter of ceiling fixed to wall/partition with the help of rawl plugs at 450 mm centre, with 25mm long dry wall screws @ 230 mm interval, including fixing of gypsum board to ceiling section and perimeter channel with the help of dry wall screws of size 3.5 x 25 mm at 230 mm c/c, including jointing and finishing to a flush finish of tapered and square edges of the board with recommended jointing compound , jointing tapes , finishing with jointing compound in 3 layers covering upto 150 mm on both sides of joint and two coats of primer suitable for board, all as per manufacturer's specification and also including the cost of making openings for light fittings, grills.	1774.21	M2		

25	Providing and Fixing 15 mm thick densified tegular edged eco friendly light weight calcium silicate false ceiling tiles of approved texture spintone/ cosmos / Hexa or equivalent of size 595 x 595 mm in true horizontal level, suspended on inter locking metal grid of hot dipped galvanised steel sections (galvanising @ 120 grams per sqm including both side) consisting of main 'T' runner suitably spaced at joints to get required length and of size 24x38 mm made from 0.33 mm thick (minimum) sheet, spaced 1200 mm centre to centre, and cross "T" of size 24x28 mm made out of 0.33 mm (Minimum) sheet, 1200 mm long spaced between main'T' at 600 mm centre to centre to form a grid of 1200x600 mm and secondary cross 'T' of length 600 mm and size 24 x28 mm made of 0.33 mm thick (Minimum) sheet to be inter locked at middle of the 1200x 600 mm panel to from grid of size 600x600 mm, resting on periphery walls /partitions on a Perimeter wall angle pre-coated steel of size(24x24X3000 mm made of 0.40 mm thick (minimum) sheet with the help of rawl plugs at 450 mm centre to centre with 25 mm long dry wall screws @ 230 mm interval and laying 15 mm thick densified edges calicum silicate ceiling tiles of approved texture (Spintone / Cosmos/hexa) in the grid, including, cutting/ making opening for services like diffusers, grills, light fittings, fixtures, smoke detectors etc., wherever required. Main 'T' runners to be suspended from ceiling using G.I. slotted cleats of size 25x35x1.6 mm fixed to ceiling with 12.5 mm dia and 50 mm long dash fasteners, 4 mm G.I. adjustable rods with galvanised steel level clips of size 85 x 30 x 0.8 mm, spaced at 1200 mm centre to centre along main 'T', bottom exposed with 24 mm of all Tsections shall be pre-painted with polyster baked paint. for all heights. as per	74.75	M2		
26	Providing and fixing GI Clip in Metal Ceiling System of 600x600 mm module which includes providing and fixing 'C' wall angle of size 20x30x20 mm made of 0.5 mm thick pre painted steel along the perimeter of the room with help of nylon sleeves and wooden screws at 300 mm center to centre, suspending the main C carrier of size 10x38x10 mm made of G.I steel 0.7 mm thick from the soffit with help of soffit cleat 37x27x25x1.6 mm, rawl plugs of size 38x12 mm and C carrier suspension clip and main carrier bracket at 1000 mm c/c. Inverted triangle shaped Spring Tee having height of 24 mm and width of 34 mm made of GI steel 0.45 mm thick is then fixed to the main C carrier and in direction perpendicular to it at 600 mm centers with help of suspension brackets. Wherever the main C carrier and spring T have to join, C carrier and spring T connectors have to be used. All sections to be galvanized @ 120 gms/ (both side inclusive), fixing with clip in tiles into spring 'T' with : GI Metal Ceiling Clip in plain Beveled edge global white color tiles of size 600x600 and 0.5 mm thick with 25 mm height, made of G I sheet having galvanizing of 100 gms/ sqm (both sides inclusive) and 20% perforation area with 1.8 mm dia holes and having NRC of 0.5, electro statically polyester powder coated of thickness 60 microns (minimum), including factory painted after bending and perforation.	234.03	M2		
27	Providing and Fixing Insulation Acoustic false ceiling in AHU Rooms	389.87	M2		

28	Providing and applying plaster of paris putty of 2 mm thickness over plastered surface to prepare the surface even and smooth complete	3653.19	M2		
29	Applying one coat of cement primer of approved brand and manufacture on wall surface	3653.19	M2		
30	Wall & ceiling painting with plastic emulsion paint of approved brand and manufacture to give even shade. a) Two or more coats on new work.	3653.19	M2		
31	Supply, insatallation, testing and commissioning of vitreous china single trap syphonic pattern having back inlet, supporting chair wall hung water closet with Flush Valve and CP brass flush bend (European type) water closet with seat and lid, with C.P. brass hinges and rubber buffers, adapter, rubber joints fixed to W.C., C.P. brass screwed washers including cutting and making good the walls and floors wherever required and HDPE wc pan connector including jointing with white cement coomplete in all respects. (EWC - preferred make KOHLER Model No. K-18131K – WD - Patio or Make: American Standard CAT No. 3116/4600000S-WT or Make: Roka Cat No. RS346657000) Wall hung W.C. pan with white plastic seat & lid "Thermoset moulded (bakelite) IS 2548 Part I	24.00	Each		
32	Providing and Fixing of low noise contact-free infrared dual flush mechanism for wc with manual override button with internal isolating valve including roughing -in-set for single flush: 6 l factory setting, 3,5 - 9 l adjustable ,stagnation flush: every 24 hours after last flush, range of room monitoring 500 - 800 mm adjustable mechanical actuation (Comprises Plastic Shell Casing; preassembled water path out of DR brass; Isolating valve/Connection G 3/4" external thread, right; Flow through plug G 3/4 " external thread;cleaning cover; height adjustable flush pipe with construction plug ; Flow pressure 1.2 to 5 bar ;Flush Volume 1-1.3 ltr/sec ; Fitting connection : G 3/4" (DN 20), External thread right and Design control button (Front panel out of plastic chrome) for two flush volume - (Economy button- 3 l and main flush volume adjustable between 4.5 to 9 l) inclusive self closing catridge with automatic jet cleaning needle Noise Class -I ; Material : all parts conducting water out of dezincification -resistan global white color tiles of size 600x600 and 0.5 mm thick with 25 mm height, made of G I sheet having galvanizing of 100 gms/ sqm (both sides inclusive) and	24.00	EA		

33	Supply, installation, testing and commissioning vitreous china flat back large urinal complete with concealed wall hangers, fully automatic photoelectric cell operated No-touch urinal flushing system (Battery/electrical operated vandal proof- twin flush (pre & post use) operation), flush mounted sensors complete in all respects in fully operational conditions, C.P. brass flush pipe with C.P. clamps and screws, C.P. flange with spreader, 32 mm C.P. cast brass bottle trap and pipe to wall with wall flange complete including cutting and making good the walls and floors where required. [Preferred Make Euronics-Kinox-KUF or Make: Hindware Senso Art Cat. No.: 60018 OR Make : Schell Model - 01 196 00 99) 32 mm nominal bore CP cast bottle trap with extension pipe rubber adopter for waste connection	8.00	EA		
34	Supply, installation, testing & commissioning wash basin with CP waste coupling of standard pattern, 32 mm dia C.P. cast brass bottle tarp & union, 32 mm dia C.P. pipe to wall and C.P. wall flange, complete including cutting and making good the walls where required. (Preferred Make KOHLER Model No. K-2215IN or Make: Roka Diverta or Make Hindware10080)	18.00	EA		
35	Supply, installation, testing & commissioning wash basin with CP waste coupling of standard pattern, 32 mm dia C.P. cast brass bottle tarp & union, 32 mm dia C.P. pipe to wall and C.P. wall flange, complete including cutting and making good the walls where required. (Preferred Make KOHLER Model No. K-11341T-1-0 or Make : Roka or Make Hindware 91014) - Handicap's Toilet	4.00	EA		
36	Supply, installation, testing & commissioning of self-closing wash basin mixer tap with self-closing cartridge with hot water limiter ; manual actuation and automatic closing action should Comprises: mounting accessories for single-hole installation and with technical data: as fl ow volume 5 l/min Independent of pressure ; fl ow pressure: 1 to 5 bar ; fl ow time: approx. 7 s Material: Housing material: brass DIN EN (Model no. 02 151 06 99 of Schell)	22.00	EA		
37	Supply, installation, testing and commissioning of wall mounted Stainless Steel Handicap Grab bar (dimension : 860x275x100mm) including cutting & making good the walls. (Preferred Make: EURONICS, Cat No. : EGR S02 or Make : Jaquar Cat AHN 1507 or Utec Model TVB 7800) - Handicap Toilet	4.00	EA		
38	Supply, installation, testing & commissioning of Regulating Angle valve with Comfort handle, with extended push rod, push rosette Ø 54 mm ; Material – Brass DIN EN / Noise Class I ; Connection: 1/2"/DN 15, Outlet: 1/2"/DN 15 ; Chrome / Weight 0.130 KG per piece (Model no. 05 217 06 99 of Schell or Make :Jaquar, Model: 23055 or Make:KOHLER, Model: K-11565IN-7-CP) or Equivalent	96.00	EA		

39	Supply, installation, testing and commissioning toilet paper holder including cutting and making good the walls. [Make:Kohler , Model: 5631IN-CP].	24.00	EA		
40	Supply, insatallation, testing and commissioning automatic soap dispenser with stainless steel lid and brackets fixed to wooden cleats with C.P. brass screws. .(Preferred Make: EURONICS, Model : ES 08A or Make : Utech UT324 or Make : Jaquar DJ0160AS)	18.00	EA		
41	Supply, installation, testing and commissioning ABS health spray unit comprising of CP flexible hose, spary, wall flange etc. complete. (Make: Schell, Model no. 03 295 06 99 or Make :KOHLER, Model : K-12925IN-CP or Make : Jaquar Model : 573)	24.00	EA		
42	Supply, installation, testing and commissioning C.P. brass air purifier fixed to wooden cleats with C.P. brass screws complete. (Preferred Make : EURONICS, Model : EA 03 or Make Utech Model- UT630 or Make: GEM, Model : 39300)	6.00	EA		
43	Supply, insatallation, testing and commissioning stainless steel paper towel dispenser. (Preferred Make : EURONICS, Model : EP01 or Make : TOSHI, Model : A-726 or Make :Utech UT TVB 4001)	6.00	EA		
44	Supply, installation, testing and commissioning Towel ring in polished chrome including cutting and making good the walls. [Make:Kohler , Model: K-5631IN-CPP].	18.00	EA		
45	Supply, installation, testing and commissioning C.P. brass twin coat hooks fixed on toilet door with C.P. brass screws [Make:Kohler,Model: 5635IN-CP].	24.00	EA		
46	Supply, installation, testing and commissioning of stainless steel braided flexible hoses with inliner EPDM Which can bear the maximum pressure of 10 bar and maximum temperature of 90 degree Celsius with bending radius of 25 r with length 500 mm with Union nut connection of 1/2" (Model no. 09 042 06 99 of Schell)	64.00	EA		
47	Providing And Fixing stainless steel fully automatic "No Touch" hand drier suitable to operate on 220 volts, single phase 50 hz., A.C. power supply (Preferred Make : EURONICS, Model : KINOX (KJD 1) or Make : TOSHI, Model : HK-1800SA or Make Utech M06-ACS)	6.00	EA		
48	Supply, installation, testing and commissioning stainless steel sink, R.S. or C.I. brackets painted , 40 mm C.P. waste, S.S. sink drain grating (bucket removable type), 40 mm C.P. cast brass bottle trap with necessary union complete including 15mm C.P. brass quarter turn counter type mixing fitting for kitchen sink with swinging spout complete including cutting and making good the walls where required. Stainless steel sink, single bowl with drain board. Overall size 915X460 mm Bowl size 408x350x180 mm. [Make : Jayna Model ATL05 or Make Nirali or Make : Jaquar, Sink mixer Jaquar mixer Model 11163, Make Parryware Model PW-AGATE-G0639A1, Make Hindware Axxis Sink Mixer)	1.00	EA		

49	Supply, installation, testing and commissioning stainless steel sink, R.S. or C.I. brackets painted , 40 mm C.P. waste, S.S. sink drain grating (bucket removable type), 40 mm C.P. cast brass bottle trap with necessary union complete including 15mm C.P. brass quarter turn counter type mixing fitting for kitchen sink with swinging spout complete including cutting and making good the walls where required. Stainless steel sink, single bowl without drain board. Overall size 480x405 mm Bowl size 408x350x180 mm. [Make : Jayna Model ATL01 or Make Nirali or Make : Jaquar) - JC & panty	5.00	EA		
50	Providing and fixing horizontal type storage hot water heater within-built pressure relief valve, rated for inlet water pressure upto 8 bar complet in all respects including inlet, outlet connections, fixing bolts etc. and testing complete. (Make: JAQUAR - AO SMITH or Make Venus or Make Racold) Capacity 10 litres	6.00	EA		
51	Providing and fixing horizontal type storage hot water heater within-built pressure relief valve, rated for inlet water pressure upto 8 bar complet in all respects including inlet, outlet connections, fixing bolts etc. and testing complete. (Make: JAQUAR - AO SMITH or Make Venus or Make Racold) Capacity 25 litres	5.00	EA		
52	Providing and fixing horizontal type storage hot water heater within-built pressure relief valve, rated for inlet water pressure upto 8 bar complet in all respects including inlet, outlet connections, fixing bolts etc. and testing complete. (Make: JAQUAR - AO SMITH or Make Venus or Make Racold) Capacity 35 litres	4.00	EA		
53	Providing and fixing horizontal type storage hot water heater within-built pressure relief valve, rated for inlet water pressure upto 8 bar complet in all respects including inlet, outlet connections, fixing bolts etc. and testing complete. (Make: JAQUAR - AO SMITH or Make Venus or Make Racold) Capacity 50 litres	1.00	EA		
54	Providing/Fixing straight /offset type Macfit single body push fit type WC pan connector with factory supplied spring loaded seal guard of McAlpine, UK with integral single mould sealing fins made of flexible EVA body, including bush/adaptor for use with C.I. Pipe as supplied with the pan connector (if required).	10.00	EA		
55	Providing and fixing floor drain with 50mm outlet and 100 mm inlet with SS grating having 50mm seal for indirect floor drain (Make: McAlpine Model: MRFG3).	26.00	EA		
56	Providing and fixing floor drain (FD) with 50mm outlet and 100 mm inlet with SS grating having 19mm seal for indirect floor drain (FD) (Make: McAlpine Model:MRFG4 (for horizontal outlet/mrfg4v (for vertical outlet).	18.00	EA		
57	Cleanout plug	10.00	EA		

58	Providing and fixing sound insulated POLO KAL NG piping system with 3 layer pipe made of PP-C + PP-MV + PP-C in Blue Ral 5014 (halogen and calcium free) colour, push-fit type, food safe, high impact and stiffness as per ON EN 1451-1 and DIN 19560 offering sound levels of not more than 21 dBA at a flow rate of 4 l/s and having pipe ring stiffness as per ISO/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, with all necessary fittings in blue colour as per ON EN 1451-1 and DIN 19560 all fitted with factory fitted lip ring. (Make: POLOPLAST, REHAU) 110 mm dia POLO KAL NG	102.00	Rm		
59	Providing and laying cement concrete 1:2:4 (1 cement: 2 coarse sand: 4 graded stone aggregate 20 mm and down gauge) 75 mm in bed and all round POLO KAL soil and waste pipe. 110 mm dia POLO KAL NG	102.00	Rm		
60	Providing and fixing sound insulated POLO KAL NG piping system as per ON EN 1451-Part 1-6 & EN 12056 Part 1-5 with 3 layer pipe made of PP-C + PP-MV + PP-C in Blue Ral 5014 (halogen and calcium free) colour, push-fit type, food safe, having high impact and stiffness, offering sound levels of not more than 21 dBA at a flow rate of 4 l/s and having pipe ring stiffness as per ISO/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, with all necessary fittings in blue colour, fitted with factory fitted lip ring (For Indirect waste/ Wash Basin/Urinal/Sink/Floor Drain) (Make: POLOPLAST, REHAU) 40 mm nominal bore	69.00	Rm		
61	Providing and fixing sound insulated POLO KAL NG piping system as per ON EN 1451-Part 1-6 & EN 12056 Part 1-5 with 3 layer pipe made of PP-C + PP-MV + PP-C in Blue Ral 5014 (halogen and calcium free) colour, push-fit type, food safe, having high impact and stiffness, offering sound levels of not more than 21 dBA at a flow rate of 4 l/s and having pipe ring stiffness as per ISO/DIS 9969 and tightness as per EN 1277/B and C and DIN 19560, with all necessary fittings in blue colour, fitted with factory fitted lip ring (For Indirect waste/ Wash Basin/Urinal/Sink/Floor Drain) (Make: POLOPLAST, REHAU) 50 mm nominal bore	40.00	Rm		
62	Nugreen grease separator SS 304 NGT 20 - Supply with direct suction Pipe inlet and outlet 40/50 dia. flange,grease separator plant according to Free Standing in Frost free areas and under sink installation of polyethylene material with integrated sludge trap, domed cover made of Polymer with snap fit closures and sealed odor -tight , with installed suction system in flow direction left or right for disposal both from sludge trap and grease separating chamber and with flange connection for intake pipe according. Integrated sludge trap of 10 ltrs and volumes at 9 ltrs. Dimensions to be within 426 mm x 296 mm X 350 mm(L X W X H) .	6.00	Each		

63	Providing, fixing testing, and commissioning of CPVC pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].15mm dia pipe (Sch. - 11)	300.00	RM		
64	Providing, fixing testing, and commissioning of CPVC pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].20mm dia pipe (Sch. - 11)	50.00	RM		
65	Providing, fixing testing, and commissioning of CPVC pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].25mm dia pipe (Sch. - 11)	115.00	RM		
66	Providing, fixing testing, and commissioning of CPVC pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.].32mm dia pipe (Sch. - 11)	90.00	RM		
67	Providing, fixing testing, and commissioning of CPVC pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.]. 40 dia pipe (Sch. - 11)	25.00	RM		
68	Providing, fixing testing, and commissioning of CPVC pipe as per CTS SDR-11 - pipe material as per ASTM D 1784 and pipe dimension and specs as per ASTM D 2846 & fittings such as tees, elbows, reducers, male/female connector, clamps etc. , jointing with CPVC solvent cement as per manufacturer recommendations conforming to ASTM-F493 complete. (Exposed Pipe) [Pipe running in shaft and terrace etc.]. 50 dia pipe (Sch. - 11)	25.00	RM		

69	P/F Highly flexible water supply pipes in PE-RT type 1 and PE-RT type 2 with additional layers (5 layer), in ivory colour, of food grade quality with maximum continuous pressure handling capability (10 bar at 70 degree C) including PPSU fittings for for press connection and end fittings in DZR brass. (for internal Hot Water application). POLO FIT - POLOPLAST -Germany. 16mm OD	80.00	Rm		
70	P/F Highly flexible water supply pipes in PE-RT type 1 and PE-RT type 2 with additional layers (5 layer), in ivory colour, of food grade quality with maximum continuous pressure handling capability (10 bar at 70 degree C) including PPSU fittings for for press connection and end fittings in DZR brass. (for internal Hot Water application). POLO FIT - POLOPLAST -Germany. 20mm OD	45.00	Rm		
71	Providing and fixing 9 mm thick insulation with Arm flex elastomeric nitrile rubber sheets for hot water pipes in wall chases complete with plastering 16mm ID [9 mm thick insulation]	44.00	Rm		
72	Providing and fixing 9 mm thick insulation with Arm flex elastomeric nitrile rubber sheets for hot water pipes in wall chases complete with plastering 20mm ID [9 mm thick insulation]	7.00	Rm		
73	Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16).15 mm dia nominal bore	4.00	Each		
74	Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16).20 mm dia nominal bore	9.00	Each		
75	Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16).25 mm dia nominal bore	17.00	Each		
76	Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16).32 mm dia, nominal bore	4.00	Each		
77	Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16).40 mm dia, nominal bore	2.00	Each		
78	Making Connection with existing vertical water supply lines complete including all accessories and fittings 40 nominal bore	4.00	Each		
79	Making Connection with existing vertical water supply lines complete including all accessories and fittings 25 nominal bore	6.00	Each		
80	Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, conforming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded). 25 mm nominal bore	730.00	M		

81	Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amaendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more caots of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).32 mm nominal bore	46.00	M		
82	Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amaendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more caots of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).40 mm nominal bore	83.00	M		
83	Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amaendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more caots of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).50 mm nominal bore	64.00	M		
84	Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amaendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more caots of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).65 mm nominal bore	68.00	M		

85	Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).80 mm nominal bore	52.00	M		
86	Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).100 mm nominal bore	44.00	M		
87	Providing and fixing of following sizes of mild steel pipe, flanges and fittings such as bends, tees, reducers, rubber insertions and galvanized nuts and bolts, blank flanges, confirming to IS:1239-1974 Part-I and Part-II (Heavy Class) with upto-date amendments including fixing the pipe on wall/ceiling with suitable galvanized strip/clamps/bracket and painting with one coat of anti-corrosive paint/primer and two or more coats of synthetic enamel paint etc. complete as required. (Jointing : Pipe Diameter up to 50mm - Screwed / Groove Fittings, Above 50 mm - welded).150 mm nominal bore	42.00	M		
88	Providing and fixing 15 mm dia gunmetal sprinkler head with quartz bulb and set to operate at specified temperature. Sprinkler head shall carry UL-FM approval (Make : Tyco / Viking / Globe) .Temperature of operation 68 deg.C.Chrome plated pendent type with powder coated twin rosette plate.	255.00	Each		
89	Providing and fixing 15 mm dia gunmetal sprinkler head with quartz bulb and set to operate at specified temperature. Sprinkler head shall carry UL-FM approval (Make : Tyco / Viking / Globe) .Temperature of operation 68 deg.C. Chrome Plated/powder coated concealed type sprinkler head with all plates and accessories.	150.00	Each		
90	Providing and fixing 25 mm dia, 700mm to 1200mm long flexible stainless steel (SS 304) pipe for making final connection of sprinkler head with sprinkler system piping network including 2 nos. 25mm diameter G.I. connector, G.I. Nipple, Reducer, elbow and threaded jointing complete as per detail. (Make : NEWAGE / Viking /TYCO/GETECH). 700mm long	25.00	Each		

91	Providing and fixing 25 mm dia, 700mm to 1200mm long flexible stainless steel (SS 304) pipe for making final connection of sprinkler head with sprinkler system piping network including 2 nos. 25mm diameter G.I. connector, G.I. Nipple, Reducer, elbow and threaded jointing complete as per detail. (Make : NEWAGE / Viking /TYCO/GETECH).1000mm long	160.00	Each		
92	Providing and fixing 25 mm dia, 700mm to 1200mm long flexible stainless steel (SS 304) pipe for making final connection of sprinkler head with sprinkler system piping network including 2 nos. 25mm diameter G.I. connector, G.I. Nipple, Reducer, elbow and threaded jointing complete as per detail. (Make : NEWAGE / Viking /TYCO/GETECH).1200mm long	190.00	Each		
93	Providing and fixing 25 mm dia, 700mm to 1200mm long flexible stainless steel (SS 304) pipe for making final connection of sprinkler head with sprinkler system piping network including 2 nos. 25mm diameter G.I. connector, G.I. Nipple, Reducer, elbow and threaded jointing complete as per detail. (Make : NEWAGE / Viking /TYCO/GETECH).1500mm long	30.00	Each		
94	Dismantling and refixing of existing MS pipes including all works like welding, support fixing, painting, testing complete in all respects. 25 mm nominal bore	20.00	M		
95	Dismantling and refixing of existing MS pipes including all works like welding, support fixing, painting, testing complete in all respects. 32 mm nominal bore	10.00	M		
96	Dismantling and refixing of existing MS pipes including all works like welding, support fixing, painting, testing complete in all respects. 40 mm nominal bore	10.00	M		
97	Dismantling and refixing of existing MS pipes including all works like welding, support fixing, painting, testing complete in all respects. 50 mm nominal bore	10.00	M		
98	Making connection with existing main header including butterfly valve, flanges and accessories required. 150 mm nominal bore	5.00	Each		
99	Providing and fixing brass ball valve with SS 304 Stem and ball, teflon seat complete (PN-16). 25 mm dia nominal bore	5.00	Each		
100	Providing & fixing of 2kg clean agent gas based residue free stored pressure FE-36 Dupont - HFC-236fa (HEXAFLUOROPROPANE-CF3-CH2-CF3) multipurpose type having 0% ODP with magnetic pressure gauge having the facility to check with the magnetic pressure kit on site pressurised by dry nitrogen, can height 341MM, diameter is 108 MM Gross weight 3.6Kg, empty weight 1.6 Kg, discharge time is minimum 6 sec, controllable discharge machanisim, embossed fire rating as per the BS EN 3- 21B, BIS 15683 marked with EPDM Hose with helium leak detection tested and certificate enclosed, range 4 mtr with plastic yellow safety seal with pull marked on it, Warranty 5 year. (Make Kanex / Safe Guard / Getech) - Capacity 2.0 kg	16.00	Each		

101	Providing and fixing stored pressure vessel ABC Powder type fire extinguishers consisting of seamless cylindrical body, squeeze lever discharge valve fitted with pressure indicating guage internal discharge tube, 30 cms long high pressure discharge hose, discharge nozzle, suspension bracket, conforming to IS : 13849 finished externally with red enamel paint and fixed to wall with brackets complete with internal charge. (Make Kanex / Safe Guard / Getech) - Capacity 2 Kg.	6.00	Each		
102	Providing and fixing stored pressure vessel ABC Powder type fire extinguishers consisting of seamless cylindrical body, squeeze lever discharge valve fitted with pressure indicating guage internal discharge tube, 30 cms long high pressure discharge hose, discharge nozzle, suspension bracket, conforming to IS : 13849 finished externally with red enamel paint and fixed to wall with brackets complete with internal charge. (Make Kanex / Safe Guard / Getech) - Capacity 6 Kg.	16.00	Each		
103	5Kg Automatic ceiling mounted Fire Suppression Extinguisher Direct Low Pressure, Dupont™ Clean Agent FE 36 Zero ODP, Stored Pressure Type, fitted with Pressure Gauge, Discharge Time 32 Seconds approx, Applicable on class A, B, C and electrically started fires, With suitable support (UPS ROOM) - For Below Ceiling Level (Make Kanex / Safe Guard / Getech)	20.00	Each		
104	Providing and fixing signages printed on photoluminescent U1000 aluminium sheet of 1.0 mm (+/-10%) containing Lumigen II as base chemical, covered under UV stablized coating and of appropriate size (Glo-lite or eq. Make) including fixing on wall, door, ceiling etc. with proper clamps, hangers, cleats, anchor fasteners etc. complete in all respects as directed by Engineer-in-charge	1440.00	Square inch		
105	Wiring for light point/fan point/exhaust fan point/call bell point with 1.5 Sq.Mm FRLS PVC insulated copper conductor single core cable in surface / recessed medium class PVC conduit, with modular switch, modular plate,suitable GI box and earthing the point with 1.5 Sq.Mm FRLS PVC insulated copper conductor single core cable etc. as required. Group C	850.00	Point		
106	Wiring for power plug with 2 x 4 Sq.Mm. FRLS PVC insulated, copper conductor single core cable in surface / recessed medium class PVC conduit along with 1 no 4 Sq.Mm FRLS PVC insulated copper conductor single core cable for loop earthing as required.	1785.00	M		
107	Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 2 X 2.5 sq. mm + 1 X 2.5 sq. mm earth wire.	4083.00	M		
108	Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 2 x 4sq.mm. + 1 x 4 sq.mm. Earth wire	40.00	M		

109	Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 2 x 6 sq.mm. + 1 x 6 sq.mm. Earth wire	80.00	M		
110	Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 4 x 6 sq.mm. + 2 x 6 sq.mm. Earth wire	250.00	M		
111	Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 2 x 10 sq.mm. + 1 x 10 sq.mm. Earth wire	200.00	M		
112	Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 4 x 10 sq.mm. + 2 x 10 sq.mm. Earth wire	350.00	M		
113	Wiring for circuit / submain wiring alongwith earth wire with the following sizes of PVC insulated, copper conductor single core cable in surface/ recessed medium class PVC conduit as required. 4 x 16 sq.mm. + 2 x 16 sq.mm. Earth wire	200.00	M		
114	Supply and fixing of suitable size GI box with modular plate and cover in front on surface or in recess including providing and fixing 3 pin 5/6 amps modular socket outlet and 5/6 amps. modular switch, connection etc. as required. (For light plugs to be used in non residential buildings).	460.00	Each		
115	Supply and fixing of suitable size GI box with modular plate and cover in front on surface or in recess, including providing and fixing 6 pin 5/6 & 15/16 amps modular socket outlet and 15/16 amps. modular switch, connection etc. as required.	119.00	Each		
116	Supply and Fixing Call Bell/ Buzzer Suitable for single phase, 230 Volts, Complete as required.	2.00	Each		
117	Supplying and fixing 20 amps , 240 volts, SPN, industrial type socket outlet, with 2 poles and earth metal enclosed plug top along with 20 amps. "C" curve, SP MCB in sheet steel enclosure, on surface or in recess, with chained metal cover for the socket outlet, and complete with connections, testing and commissioning etc. as required.	2.00	Each		
118	Supply and fixing of stepped type electronic fan regulator on the existing modular plate switch box including connections but excluding modular plate etc. as required.	126.00	Each		
119	Supply and fixing modular blanking plate on the existing modular plate & switch box excluding modular plate as required.	24.00	Each		
120	Supplying and fixing 5 amps. to 32 amps. rating, 240 volts 'C' series, miniature circuit breaker (MCB) suitable for inductive load of following poles in the existing MCB DB complete with connections, testing and commissioning etc. as required. single pole	376.00	Each		

121	Supplying & fixing single pole, blanking plate in the existing MCB DB complete etc. as required.	74.00	Each		
122	Supplying and fixing following way, prewired TP&N MCB distribution board of steel sheet for 415 volts, on surface /recess, complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required (But without MCB / RCCB / Isolators). 4 way (4 + 12), Double door	2.00	Each		
123	Supplying and fixing following way, prewired TP&N MCB distribution board of steel sheet for 415 volts, on surface /recess, complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required (But without MCB / RCCB / Isolators). 6 way (4 + 18), Double door	4.00	Each		
124	Supplying and fixing following way, prewired TP&N MCB distribution board of steel sheet for 415 volts, on surface /recess, complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate, interconnections, powder painted including earthing etc. as required (But without MCB / RCCB / Isolators). 8 way (4 + 24), Double door	10.00	Each		
125	Supplying and fixing following way prewired SP&N MCB distribution board of steel sheet for 240 volts on surface /recess, complete with loose wire box, terminal connectors for all incoming and outgoing circuits, duly prewired with suitable size FRLS PVC insulated copper conductor up to terminal blocks, tinned copper bus bar, neutral link, earth bar, din bar, detachable gland plate bus bar, interconnections, powder painted including earthing etc. as required. (But without MCB / RCCB / Isolator) 2 + 8 way/10 way, Double door	4.00	Each		
126	Supplying and fixing following rating, Double pole, 240 V, isolator in the existing MCB DB complete with connections, testing and commissioning etc. 40 Amps	4.00	Each		
127	Supplying and fixing following rating, double pole, (single phase and neutral), 240 volts, residual current circuit breaker (RCCB), having a sensitivity current upto 300 milliamperes in the existing MCB DB complete with connections, testing and commissioning etc. as required. 40 Amps	48.00	Each		

128	Supplying and fixing following rating, four pole, 415 V, isolator in the existing MCB DB complete with connections, testing and commissioning etc. 63 Amps	16.00	Each		
129	Supplying and fixing following size / modules, GI box along with modular base & cover plate for modular switches in recess etc as required 1 or 2 Module (75 mm x 75 mm)	120.00	Each		
130	Supplying and fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc as required. Telephone Socket outlet	120.00	Each		
131	Supplying and fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc as required. TV Antenna socket outlet	2.00	Each		
132	Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required : 20 mm.	1800.00	M		
133	Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit as required : 25 mm.	20.00	M		
134	Supply and drawing following pair, 0.5 sq.mm. FRLS PVC insulated annealed copper conductor, unarmoured telephone cable in the existing surface / recessed steel/ PVC conduit as required. 2 Pair	2400.00	M		
135	Supply and drawing co-axial TV cable RG-6 grade, 0.7 mm. Solid copper conductor PE insulated, shielded with fine tinned copper braid and protected with PVC sheath in the existing surface / recessed steel/ PVC conduit as required.	30.00	M		
136	Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects. 50 pair krone	1.00	Nos.		
137	Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects. 100 pair krone	1.00	Nos.		
138	Supplying, laying, testing and commissioning of following size annealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. 50 pair	50.00	M		

139	Supplying, laying, testing and commissioning of following size annealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. 100 pair	50.00	M		
140	Supply and Erecting modular type computer jack RJ 45 ISI mark approved make with mounting plate and box with wiring connections complete.	120.00	Nos.		
141	Supplying & installing UTP networking Cat-6 cable suitable for LAN/WAN computer net working as per catalog no. DC6CAUTP4P3X.	3600.00	M		
142	Providing and fixing M.V. danger notice plate of 200mmx150mm made of mild steel, atleast 2mm thick and vitreous enamelled white on both sides and with inscription single red colour on front side as required.	20.00	Each		
143	Providing and fixing hexagonal fan box circular/ Hexagonal cast iron or M.S. sheet box for ceiling fan clamp, of internal dia 140 mm, 73 mm height, top lid of 1.5 mm thick M.S. sheet with its top surface hacked for proper bonding, top lid shall be screwed into the cast iron/ M.S. sheet box by means of 3.3 mm dia round headed screws, one lock at the corners. Clamp shall be made of 12 mm dia M.S. bar bent to shape as per standard drawing.	126.00	Each		
144	PROVIDING & FIXING SURFACE type 18W LED PEARL SQUARE as per CROMPTON GREAVES Cat No : LCDSPL-R-18-CDL or Equivalent	233.00	Each		
145	PROVIDING & FIXING Recessed mounted 15W LED CROM LED as per CROMPTON GREAVES Cat No : LCDD-15-CDL or Equivalent	210.00	Each		
146	PROVIDING & FIXING SURFACE mounted 12 W LED PEARL ROUND as per CROMPTON GREAVES Cat No : LCDSPL-R-12-CDL or Equivalent	80.00	Each		
147	PROVIDING & FIXING Surface mounted 20 W LED TUBE LIGHT fitting as per HAVELLS Cat No : LHEXCEP7UN1W020 or Equivalent	59.00	Each		
148	PROVIDING & FIXING 40W LED PANEL as per CROMPTON GREAVES Cat No : LCTAR1-40-CDL or Equivalent	106.00	Each		
149	PROVIDING & FIXING MIRROR LIGHT as per CROMPTON GREAVES Cat No :LCL-10-CDL or Equivalent	22.00	Each		
150	Supply of AC 230/250 volts, 50 HZ ceiling fan with standard down rod, blades, 2 nos. caps & regulator etc. ISI marked complete as required. 1200 mm sweep (fusion-50 5*)	126.00	Nos.		
151	Supply of AC 230/250 volts, 50 HZ exhaust fans including providing nuts, bolts, mounting frame and other accessories etc. complete (Make : Bajaj / Crompton / Havells) ,300 mm sweep 900 rpm	4.00	Nos.		
152	Supply of Wall Mounted Fan (Airboll Hi Speed). ISI marked complete as required.	10.00	Nos.		
153	Installation, testing and commissioning of pre-wired, fluorescent fitting / compact fluorescent fitting of all types, complete with all accessories and tubes etc. directly on ceiling / wall, including connection with 1.5 sq. mm. FRLS PVC insulated, copper conductor, single core cable and earthing etc. as required.	710.00	Each		

154	Installation, testing and commissioning of ceiling fan including wiring the down rod of standard length (upto 30 cm.) with 1.5 sq. mm. FRLS PVC insulated, copper conductor, single core cable, including providing and fixing phenolic laminated sheet cover on the fan box etc. as required.	126.00	Each		
155	Installation of exhaust fan in the existing opening, including making good the damage, connection, testing, commissioning etc. as required Upto 450 mm sweep	4.00	Each		
156	FLOOR DISTRIBUTION BOARD - 5TH FLOOR :Design, manufacture, supply, testing and commissioning of Floor Distribution boards fabricated out of 16 SWG CRCA sheet steel, IP52, wall / floor mounting type. The sheet steel shall undergo minimum 7 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 /240 V electrolytic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect. INCOMER : Main Incomer 250 Amps FP MCCB, MCCB terminals shall be suitable to receive connection on one side and Busbar connection on the other side. BUSBAR : 300 amps TPN busbar chamber of suitable length with Aluminium busbars (1.0 A/sqmm for AL). INDICATING PANEL : 3 nos phase indicating lamps each backed up with MCB and switch shall be provided for incomer. Provide CT operated ammeter with selector switch for incomer. Provide 0-500 Volts range Volt Meter with selector switch for incomer. OUTGOINGS : 3 nos. outgoing with 63A TPN MCB's (LIGHT DB 5th FLOOR) 2 nos. outgoing with 63A DP MCB's (LIGHT DB 5th FLOOR) 3 nos. outgoing with 63A TPN MCB's (POWER DB 5th FLOOR) 1 nos. outgoing with 100A TPN MCCB's (40 KVA UPS) 1 nos. outgoing with 125A TPN MCCB's (FLOOR DISTRIBUTION BOARD 6th FLOOR). All Items complete as above	1.00	SET		

157	FLOOR DISTRIBUTION BOARD -6TH FLOOR :Design, manufacture, supply, testing and commissioning of Floor Distribution boards fabricated out of 16 SWG CRCA sheet steel, IP52, wall / floor mounting type. The sheet steel shall undergo minimum 7 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 /240 V electrolytic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect. INCOMER : Main Incomer 125 Amps FP MCCB, MCCB terminals shall be suitable to receive connection on one side and Busbar connection on the other side. BUSBAR : 160 amps TPN busbar chamber of suitable length with Aluminium busbars (1.0 A/sqmm for AL). INDICATING PANEL : 3 nos phase indicating lamps each backed up with MCB and switch shall be provided for incomer. Provide CT operated ammeter with selector switch for incomer. Provide 0-500 Volts range Volt Meter with selector switch for incomer. OUTGOINGS : 2 nos. outgoing with 63A TPN MCB's (LIGHT DB 6th FLOOR), 2 nos. outgoing with 63A DP MCB's (LIGHT DB 6h FLOOR), 3 nos. outgoing with 63A TPN MCB's (POWER DB 5th FLOOR) . All Items complete as above	1.00	SET		
158	UPS BOARD : Design, manufacture, supply, testing and commissioning of UPS Distribution boards fabricated out of 16 SWG CRCA sheet steel, IP52, wall / floor mounting type. The sheet steel shall undergo minimum 7 tank treatment followed by finishing powder coating of min 60 micron thickness. the board includes 415 /240 V electrolytic Aluminium Bus Bar, removable gland plates, cable glands, including connection with outgoing feeders complete in all respect. INCOMER : Main Incomer 100 Amps FP MCCB, MCCB terminals shall be suitable to receive connection on one side and Busbar connection on the other side. BUSBAR : 125 amps TPN busbar chamber of suitable length with Aluminium busbars (1.0 A/sqmm for AL). INDICATING PANEL : 3 nos phase indicating lamps each backed up with MCB and switch shall be provided for incomer. Provide CT operated ammeter with selector switch for incomer. Provide 0-500 Volts range Volt Meter with selector switch for incomer. OUTGOINGS : 2 nos. outgoing with 63A TPN MCB's (UPS DB 5th FLOOR) 3 nos. outgoing with 63A DP MCB's (UPS DB 6h FLOOR). All Items complete as above	1.00	SET		
159	Floor mounted precision type air-conditioning units :Supply,installation,testing and commissioning of "Air Cooled Ductable type PAC Unit"consisting of Condensing Unit and all internal electrical with control panel of the unit and all internal electrical power and control wiring accessories and ancilliary items like thermostats/MS frames etc of below non. cooling capacity Complete in all respect as per drawings & specifications for precise temperature control required for the server areas. Capacity of presion units 3400 cfm (8.5 TR)	4.00	Nos.		

160	Floor mounted precision type air-conditioning units Supply,installation,testing and commissioning of copper refrigerant piping between the indoor and the outdoor unit complete with all supports,joints. refrigerant pipe insulation and accessories for the above unit. (Approved makes of precision units :STULTZ/Blue Box/Emerson)	40.00	Rmt		
161	Floor Mounted and Ceiling Suspended Air Handling Units : Testing and commissioning of Double skin construction type sheet metal sectionalised construction draw thru type Air Handling Units Each Air Hndling Units is with filter section with prefilters,chilled water coils of copper tube & Al.Fins construction,air vent,squirrel cage induction motor,centrifugal fans and vibration isolators ,mixing box belt drive and vibration isolators.Coil size shall be selected for a max.face velocity of 500 FPM and static shall be as marked Motor shall be suitable for 415V/3Ph/50Hz AC supply of below capacities: (Cost of relocation of CS units if required as per RCP shall be included) : 13,000 cfm with 4 row cooling coil (Floor mounted units) (filters used for initial commissioning shall be removed and new set installed)	4	Nos.		
162	Floor Mounted and Ceiling Suspended Air Handling Units : Testing and commissioning of Double skin construction type sheet metal sectionalised construction draw thru type Air Handling Units Each Air Hndling Units is with filter section with prefilters,chilled water coils of copper tube & Al.Fins construction,air vent,squirrel cage induction motor,centrifugal fans and vibration isolators ,mixing box belt drive and vibration isolators.Coil size shall be selected for a max.face velocity of 500 FPM and static shall be as marked Motor shall be suitable for 415V/3Ph/50Hz AC supply of below capacities: (Cost of relocation of CS units if required as per RCP shall be included) : 7,500 cfm with 4 row cooling coil (Ceiling mounted units) (filters used for initial commissioning shall be removed and new set installed)	2	Nos.		
163	Floor Mounted and Ceiling Suspended Air Handling Units : Testing and commissioning of Double skin construction type sheet metal sectionalised construction draw thru type Air Handling Units Each Air Hndling Units is with filter section with prefilters,chilled water coils of copper tube & Al.Fins construction,air vent,squirrel cage induction motor,centrifugal fans and vibration isolators ,mixing box belt drive and vibration isolators.Coil size shall be selected for a max.face velocity of 500 FPM and static shall be as marked Motor shall be suitable for 415V/3Ph/50Hz AC supply of below capacities: (Cost of relocation of CS units if required as per RCP shall be included) : 6,500 cfm with 4 row cooling coil (Ceiling mounted units) (filters used for initial commissioning shall be removed and new set installed)	1	No.		

164	Floor Mounted and Ceiling Suspended Air Handling Units : Testing and commissioning of Double skin construction type sheet metal sectionalised construction draw thru type Air Handling Units Each Air Handling Units is with filter section with prefilters, chilled water coils of copper tube & Al.Fins construction, air vent, squirrel cage induction motor, centrifugal fans and vibration isolators ,mixing box belt drive and vibration isolators.Coil size shall be selected for a max.face velocity of 500 FPM and static shall be as marked Motor shall be suitable for 415V/3Ph/50Hz AC supply of below capacities: (Cost of relocation of CS units if required as per RCP shall be included) : 6,500 cfm with 4 row cooling coil (Ceiling mounted units) 5000 cfm with 4 row cooling coil (Ceiling mounted units) (filters used for initial commissioning shall be removed and new set installed)	3	Nos.		
165	Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows splitter, dampers, vanes, hangers, supports etc.as per approved drawings and specifications of following sheet thickness complete as required. 24 Gauge (thickness 0.63 mm sheet) (Approved Makes : TATA/SAIL/ISPAT)	1000	Sqm		
166	Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows splitter, dampers, vanes, hangers, supports etc.as per approved drawings and specifications of following sheet thickness complete as required. 22 Gauge (thickness 0.80 mm sheet) (Approved Makes : TATA/SAIL/ISPAT)	800	Sqm		
167	Supply, installation, balancing and commissioning of factory fabricated GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows splitter, dampers, vanes, hangers, supports etc.as per approved drawings and specifications of following sheet thickness complete as required. 20 Gauge (thickness 1.00 mm sheet) (Approved Makes : TATA/SAIL/ISPAT)	100	Sqm		
168	XLPE Duct Insulation :Supply, installation, testing and commissioning of fire retardant cross linked polyethylene insulation (XLPE) on ducts complete as per the drawings and specifications of following sizes.9 mm thickness. (Approved Makes	1750	Sqm		
169	Duct Accoustic Lining : Plenum with 25mm thick risn bonded glass wool having density of 32 kg/m3 , 25mmx25mm GI section of 1.25 mm thick at 600mm c/c covered with reinforcement plastic . Suplly and fixing of acoustic lining of supply air duct and to inside surface of duct with cadmium plate nuts, bolts, stick pin, CPRX compound etc. complete as required and the specification.(Approved Makes : UP Twiga/KIMMCO/Owens Corning)	200	Sqm		

170	Grilles/Diffusers/Louvers/VCDs/FDs :Supply & fixing of powder coated extruded Aluminium of Supply air Grilles with Aluminium volume control damper as per specifications and drawings. (Approved Makes : Tristar/Conaire/Caryaire)	2	Sqm		
171	Supply & fixing of powder coated extruded Aluminium of Return/exhaust air Grilles with louvers but without volume control damper complete as required. as per specifications and drawings. (Approved Makes : Tristar/Conaire/Caryaire)	45	Sqm		
172	Supply,fixing,testing and commissioning of supply air diffusers of powder coated aluminium with aluminium volume control dampers with anti smudge ring & removable core. (Approved Makes : Tristar/Conaire/Caryaire)	20	Sqm		
173	Supply,installation,testing and commissioning of MS powder coated grilles with dampers,louvers for Fresh air intake. (Approved Makes : Tristar/Conaire/Caryaire)	3	Sqm		
174	Supply,installation,testing and commissioning of GI construction Volume control Dampers complete with neoprene rubber,gaskets,nuts,bolts,linkages,flanges etc as per drawings and specifications (Approved Makes : Tristar/Conaire/Caryaire)	6	Sqm		
175	Supply , fixing ,testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required sizes i/c control wiring ,the damper shall be motorised and spring return so as to close the damper in the event of powder failure automatically and open the same in case of powder being restored.The spring return action shall be inbuilt mechanism and not externally mounted. the damper shall also be closed in the event of fire signal complete as required and as per specifications. (Approved Makes : Tristar/Conaire/Caryaire) : Fire Damper	10	Sqm		
176	Supply , fixing ,testing and commissioning of fire dampers in supply air duct/main branch and return air path as and where required sizes i/c control wiring ,the damper shall be motorised and spring return so as to close the damper in the event of powder failure automatically and open the same in case of powder being restored.The spring return action shall be inbuilt mechanism and not externally mounted. the damper shall also be closed in the event of fire signal complete as required and as per specifications. (Approved Makes : Tristar/Conaire/Caryaire) : Actuator	15	Nos		
177	Supply,installation,testing and commissioning of flexible duct connections constructed of fire resistance flexible double canvas sleeve as per the drawings and specifications. (Approved Makes : Tristar/Conaire/Caryaire)	6	Sqm		

178	Power Cabling : Supply,installation,testing and commissioning of PVC insulated sheathered 1.1 KV grade amoured Al. power cables from various panels upto their respective equipment on MS painting perforated trays with appropriate clamps/fixing arrangements as per specifications and drawings. (Havells/Batra Henlay/PRG/Skytone): 3 C X 6 mm2 Aluminium Cable	60	Rmt		
179	Power Cabling : Supply,installation,testing and commissioning of PVC insulated sheathered 1.1 KV grade amoured Al. power cables from various panels upto their respective equipment on MS painting perforated trays with appropriate clamps/fixing arrangements as per specifications and drawings. (Havells/Batra Henlay/PRG/Skytone): 3 C X 4 mm2 Aluminium Cable	160	Rmt		
180	Supply,installation,testing and commissioning of perforated 2mm CRCA sheet steel powder coated cable trays of following sizes complete with joints,coupling plates and nut bolts etc including providing and fixing of MS hangers etc as required as per the drawings and specifications 150mm wide and 50 mm deep	100	Rmt		
181	Supply,installation,testing and commissioning of perforated 2mm CRCA sheet steel powder coated cable trays of following sizes complete with joints,coupling plates and nut bolts etc including providing and fixing of MS hangers etc as required as per the drawings and specifications 3000mm wide and 62.5 mm deep	125	Rmt		
182	Supply,installation,testing and commissioning of perforated 2mm CRCA sheet steel powder coated cable trays of following sizes complete with joints,coupling plates and nut bolts etc including providing and fixing of MS hangers etc as required as per the drawings and specifications 450mm wide and 62.5 mm deep	50	Rmt		
183	Earthing :Supply,installation,testing and commissioning of double earthing continuity conductor of GSS from Panels to respective equipment as per drawings and specifications. 6 SWG wire	100	Rmt		
184	Earthing :Supply,installation,testing and commissioning of double earthing continuity conductor of GSS from Panels to respective equipment as per drawings and specifications. 8 SWG wire	100	Rmt		
185	6W Recessed Ceining speakers with following features:- Complete Aluminium grille and Metal baffle, line matching transformer 100/70V line. Variable wattage tappings of 6 / 3 / 1.5, Effective frequency range 110-14kHz (BS6840), SPL@1m/1W=91dB,snap on spring mounting, Peak SPL 97dB complete with necessary mounting hardware & accesories. - HEINRICH/ATEIS/Barth	100.00	Each		

186	Supply, Installation, testing and comisioning of fully programmable Background music + 16 zone paging + voice message alarm • Built-in 8 inputs 16 outputs audio matrix ,-in weekly scheduled timer, 16 zone speaker selector for remote paging console, 6 channel power sequencer Built-in MP3 player of 2GB memory cord through SD cord slot, monitor With telephone paging, fire alarm and remote paging console interface, with regular program and stored program • With Mic emergency announcement and CD/MP3 manual priority broadcast With memory function alter power off Make: Heinrich/Shure /Sennheiser/ATEIS	1.00	Each		
187	Supply Installation testing and comisioning of 120W RMS Four Channel Class-D Digital Power Amplifier with Switch power technology for power electricity saving, Separate PFC Design for highest reliability, Separate Power Supply System. Amplifier shall have Following Features: 250W RMS per Channel, Amplifier Output 100V, Supply input AC 220 +/- 10% - 50/60Hz, Short Circuit, Power, Tempreature, Overload Protection, Auto Cooling Fans. THD <0.1%, Frequency Response 40Hz - 20kHz, AC & DC Fuse, SNR >80dB. Acceptable Make - HEINRICH, LAPP, Bittner	2.00	Each		
188	Supply Installation testing and comisioning CD player - As per OEM Approved	1.00	Each		
189	SUPPLY & fixing of 2 core Shielded 1.5SQ mm Speaker Cable - HEINRICH/Belden/Bonton	1,500.00	RM		
190	SUPPLY & fixing 19" Rack for the Equipment Installation - President/Valrack/HEINRICH/ATEIS	1.00	Each		
191	Supply Installation testing and comisioning of Projection System with LCD Technology with native resolution of 1280 x 800 , 4000 ANSI lumens , 16:10 aspect ratio. Contrast 2000:1 and above. Projector Should be supplied with Ceiling Mount Kit- Acceptable Make - Panasonic/Christie/Barco	1.00	Each		
192	Supply & fixing of 120" Diagonal Motorized Projector Screen with Tensioned - as per approved OEM	1.00	Each		
193	Supply & fixing of 5"+1.5" Coaxial Ceiling speaker with ABS cover, 30W, 100V, cutout 185mm, ABS baffle & back cover, metal grille. The Speaker shall have following Feature: Max SPL > 101 dB, Frequency Response 90-20KHZ. The Speaker shall have Multiple tapping. Make: Heinrich/ATEIS /Barth	12.00	Each		
194	Supply, Installation,Testing & Commissioning of Intelligent conference system .it can support 60 units delegate and chairman microphone, it could be extended to support 200 units microphone by adding more Extension power supply unit , suitable for government, restaurants, conference rooms, training and education, the board of directors of the company meeting room with Frequency response 100 hz - 18000 hz, Power 115W, Input Voltage 18V, Five Limit Switch and Free speech Mode. Make: Heinrich/Shure /Sennheiser	1.00	Each		

195	Supply, Installation, Testing & Commissioning of Intelligent conference system, Flush mount boundary layer delegate microphone unit, speaking button, LED for the indication and with Frequency Response 100-16KHz, Sensitivity -40dB±2dB, Reference sound-receiving distance 20-120cm. Make: Heinrich/Shure /Sennheiser	12.00	Each		
196	Supply, Installation, Testing & Commissioning of Intelligent conference system, Flush mount boundary layer Chairman microphone unit, speaking button and LED for the indication, With president priority key; Chairman microphone should having highest priority and should be able to terminate all microphone. Frequency Response 100-16KHz, Sensitivity -40dB±2dB, Reference sound-receiving distance 20-120cm. Make: Heinrich/Shure /Sennheiser	1.00	Each		
197	Supply Installation Testing & Commissioning of 24 channels Mixing console with 4-Sub-group, 8-Mono, Stereo returns distortion degree <.02% @1 KHz, out put chennal 3 main output; 4 output group; 2 CH aux output; 2 CH CD/TAPE auxiliary output; 2 CH 1 CH stereo headphone output make HEINRICH UK, ATEIS, SENNEISER	1.00	Each		
198	Supply Installation testing and comisioning of 250W RMS Dual Channel Class-D Digital Power Amplifier with Switch power technology for power electricity saving, Separate PFC Design for highest reliability, Separate Power Supply System. Amplifier shall have Following Features: 250W RMS per Channel, Amplifier Output 100V, Supply input AC 220 +/- 10% - 50/60Hz, Short Circuit, Power, Tempreature, Overload Protection, Auto Cooling Fans. THD <0.1%, Frequency Response 40Hz - 20kHz, AC & DC Fuse, SNR >80dB. Acceptable Make - HEINRICH, LAPP, Bittner	1.00	Each		
199	Supply, Installation, Testing & Commissioning of Lapel Wireless Mic & Handeld Microphone system set dynamic, hypercardioid 55-18,000 Hz S/N ratio >90dB 1 -channel true diversity receiver (UHF), Rugged 9.5" metal housing, 16 pre-programmed UHF frequencies, AutoScan/ACT-function, PLL-synthesised technology, Pilot tone recognition: Acceptable Make - Shure/Heinrich/AKG	1.00	Each		
200	Supply, Installation, Testing & Commissioning of Cable Cubby with HDMI, VGA Input & Power Input. Acceptable Make-Kramer/Heinrich/Extron	9.00	Each		
201	Supply & laying of VGA Cable - As per OEM Approved	170.00	RM		
202	Supply & laying of Microphone Cable - HEINRICH/Belden/Bonton	170.00	RM		
203	Supply & laying of Speaker Cable - HEINRICH/Belden/Bonton	100.00	RM		
204	VGA Switcher Suitable for 10 Input and 2 Output or more. - Kramer/Extron or Equivalent	1.00	Nos		
205	19" Rack for the Equipment Installation - President/Valrack/HEINRICH/ATEIS AT 5TH FLOOR	1.00	Nos		

206	5"+1.5" Coaxial Ceiling speaker with ABS cover, 30W, 100V, cutout 185mm, ABS baffle & back cover, metal grille. The Speaker shall have following Feature: Max SPL > 101 dB, Frequency Response 90-20kHz. The Speaker shall have Multiple tapping. Make: Heinrich/ATEIS /Barth	8.00	Each		
207	Supply, Installation,Testing & Commissioning of Intelligent conference system .it can support 60 units delegate and chairman microphone, it could be extended to support 200 units microphone by adding more Extension power supply unit , suitable for government, restaurants, conference rooms, training and education, the board of directors of the company meeting room with Frequency response 100 hz - 18000 hz, Power 115W, Input Voltage 18V, Five Limit Switch and Free speech Mode. Make: Heinrich/Shure /Sennheiser	1.00	Each		
208	Supply, Installation,Testing & Commissioning of Intelligent conference system, Flush mount boundry layer delegate microphone unit, speaking button, LED for the indication and with Frequency Response 100-16KHz, Sensitivity - 40dB±2dB,Reference sound-receiving distance 20-120cm. Make: Heinrich/Shure /Sennheiser	7.00	Each		
209	Supply, Installation,Testing & Commissioning of Intelligent conference system, Flush mount boundry layer Chairman microphone unit , speaking button and LED for the indication, With president priority key; Chairman microphone should having highest priority and should be able to terminate all microphone. Frequency Response 100-16KHz, Sensitivity -40dB±2dB,Reference sound-receiving distance 20-120cm. Make: Heinrich/Shure /Sennheiser	1.00	Each		
210	Supply Installation testing and comisioning of 280W RMS Mixer amplifier with 3 Mic input and 2 Line input. 280W RMS Power Output, Amplifier Output 100V, Supply input AC 220 +/- 10% - 50/60Hz, Short Circuit Protection, Emergency input with Chime, Having Function of Tuner, MP3 Player, Pre-amplifier, and Power amplifier in one Unit. Acceptable Make - HEINRICH,ATEIS,Labgruppen, Bittner	1.00	Each		
211	Supply & Fixing of cables and Connector for HDMI Cable,VGA Cable, Speaker Cable for above system OEM Approved	1.00	Lot		
212	Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects. : 5 pair krone Box	1.00	Nos		
213	Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects : 20 pair krone Box	1.00	Nos		

214	Providing, fixing, connecting & testing of Telephone Tag Block krone type in a suitable size 1.6 mm thick dust and vermin proof Sheet steel enclosure duly painted by synthetic enamel over anti corrosive primer, lockable and hinged cover with provision for cable through glands complete in all respects : 100 pair krone Box	1.00	Nos		
215	Supplying, laying, testing and commissioning of following size anealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. : 5 pair Krone	15.00	Nos		
216	Supplying, laying, testing and commissioning of following size anealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. : 20 pair krone	25.00	Nos		
217	Supplying, laying, testing and commissioning of following size anealed tinned copper conductor PVC insulated and sheathed copper conductor, unarmoured telephone cable with suitable clamps, saddles and including making terminal joints complete as required. : 100 pair krone	30.00	Nos		
218	Supply and Erecting modular type computer jack RJ 45 ISI mark approved make with mounting plate and box with wiring connections complete.	123.00	Nos.		
219	Supplying & installing UTP networking Cat-6 cable suitable for LAN/WAN computer net working as per catalog no. DC6CAUTP4P3X.	1845.00	Metre		
220	Supply and installation of 6 port CAT 6 patch panel modular type complete as required as per catalog no. DC6PP24UKY1U.	6.00	Nos.		
221	Supply, installation, testing and commissioning of 6 Port 10/100 Edge Switch.	6.00	Nos.		
222	Supply, installation, testing and commissioning of CAT 6 giga speed patch cord 1.2m or equivalent feet and factory terminal at both ends as per catalog no DC6PCUR101GYM	6.00	Nos.		
223	Supply, installation, testing and commissioning of wall mounted data rack 12 U with glass door hardware, cable manager, cooling fans power points etc	4.00	Nos.		
224	Supply, laying and end terminations including connections of 6 core outside plant cable corrugated steel tape armoured, loose tube, gel filled fiber single mode armoured fibre optical cable in wall/floor/ground complete as required in one segment with fiber connector as per catalog no. DC6A000CCT0C	200.00	Metre		
225	Supply, installation, testing and commissioning of 24 Port 10/100 Edge Switch.	7.00	Nos.		
226	Supply, installation, testing and commissioning of Media Convertor.	7.00	Nos.		
227	Supply, installation, testing and commissioning of Core Switch 24 port 10/100/1000	7.00	Nos.		

228	Supply, installation, testing and commissioning of EPABX System Non-Blocking, ISDN / ATM, Initially Equipped with: `Trunk Side: Total ☐ 01 (30 Channel) PRI Line Interface ☐ 08 P&T LineExtension side: Total Extension : =100 ☐ 15 Digital Extensions interface ☐85 Analog Extensions interface	1.00	Nos.		
229	S/F MODULAR BOXES, BASE & COVER PLATE :- Supplying and fixing following size / modules, GI box along with modular base & cover plate for modular switches in recess etc as required S/F MODULAR BOXES, BASE & COVER PLATE :-	243.00	Each		
230	Supplying and fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc as required Telephone Socket outlet	120.00	Each		
231	Supplying and fixing following modular switch / socket on the existing modular plate & switch box including connections but excluding modular plate etc as required TV Antenna socket outlet	2.00	Each		
232	Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit ~~as required : 20 mm~~	1800.00	M		
233	Supply and fixing of following sizes of medium class PVC conduit along with accessories in surface/recess including cutting the wall and making good the same in case of recessed conduit ~~as required : 25 mm~~	1845.00	M		
234	Supply and drawing following pair, 0.5 sq.mm. FRLS PVC insulated annealed copper conductor, unarmoured telephone cable in the existing surface / recessed steel/ PVC conduit as required. 2 Pair	1920.00	M		
235	Supply and drawing co-axial TV cable RG-6 grade, 0.7 mm. Solid copper conductor PE insulated, shielded with fine tinned copper braid and protected with PVC sheath in the existing surface / recessed steel/ PVC conduit as required.	60.00	M		

236	SERVER ROOM NO - 235 Cub mtr - Supply , Installation , Testing and commissioing of Cylinder UL listed / CCOE Approved, complete with UL listed valve assembly and arrangement for supervisory switch connection for monitoring cylinder pressure,a pressure guage with a safety burst disc ,electronic control head / Solenoid, pressure operated control, head, flexible hose, strap, NRV and a safety cap. HFC 125 Gas.(Quantity would be as per the volume given above and as per the UL certification.) CLEAN AGENT (HFC125) (UL Listed) with Zero Ozone Depletion Potential(ODP), has appearance/colour: Colourless gas and has citrus like odour. 2 X 67.5 Litres Cylinder filled with HFC 125 (62 kgs approx.) (Main System)	2	Set		
237	UPS/Electrical Room - 119 Cub mtr Supply , Installation , Testing and commissioing of Cylinder UL listed / CCOE Approved, complete with UL listed valve assembly and arrangement for supervisory switch connection for monitoring cylinder pressure,a pressure guage with a safety burst disc ,electronic control head / Solenoid, pressure operated control, head, flexible hose, strap, NRV and a safety cap. HFC 125 Gas.(Quantity would be as per the volume given above and as per the UL certification.) CLEAN AGENT (HFC125) (UL Listed) with Zero Ozone Depletion Potential(ODP), has appearance/colour: Colourless gas and has citrus like odour. 1 X 67.5 Litres Cylinder filled with HFC 125 (63 kgs approx.) (Main System)	1	Set		
238	Discharge Nozzle (UI Listed) caliberated as per Computer Generated Results.	6	Nos		
239	Supply, installation, testing and commissioning of Piping with ASTM sch. 40 pipe	1	Lot		
240	Supply, Installation, testing and commissioning of Microprocessor based 1 Loop analogue addressable type fire alarm control panel with 80 character LCD display four access levels 500 event historcal logging.	1	Nos		

241	Supply, Installation, testing and commissioning of Laser-Based Absolute Smoke Detection system with Single pipe inlet aspiration detector for Up to 100 m2 (1000 sq. ft.) coverage; Programmable Alarm Thresholds; Offline/online configuration capability; Instant Fault Finder; AutoLearn Smoke; AutoLearn Flow; Multiple Event Logging in separate logs; Event log – up to 1000 events. Alarm Threshold Setting Range: 0.005% - 3.0% obs/m (0.0015% - 0.915% obs/ft)	2	Nos		
242	Supply, Installation, testing and commissioning of Power Supply Unit for above detector 230 V AC to 24 V DC 3 Amp. Power Supply should be with 24 hour	2	Nos		
243	Supply, Installation, testing and commissioning of 25 mm dia CPVC pipe for Aspiration detectors complete in all respect as required.	24	Mtr.		
244	Supply, Installation, testing and commissioning of Analoge addressable Photoelectric Smoke detector with mounting based LED, Address Switch to programme the detectors from 01-99, with BASE complete as required.	8	Nos		
245	Supply of Gas Release Panel/Built in Module with 2-Zone Fire detection and 1-Zone gas discharge module with binary switch timer for release delay and potential free contact to relay "Gas Release" signal to main panel.The panel should also have LCD display for the different functions	2	Nos		
246	Supply, Installation, testing and commissioning of 2C x 1.5 sq.mm armoured cable	150	Mtr		
247	Supply, Installation, testing and commissioning of Addressable Manual Call Point (Break Glass), Address Switch to programme the Manual Pull Station from 01- 99, complete as required as per specifications..	2	Nos		
248	Supply, Installation, testing and commissioning of Hooter cum Flasher	4	Nos		
249	Supply, Installation, testing and commissioning of Manual Abort Station (Pull Type)	2	Nos		
250	Supply, Installation, testing and commissioning of Manual Release Station (Pull Type).	2	Nos		

251	Supply, Installation, testing and commissioning of Addressable control module for Hooter, Address Switch to programme the modules from 01- 99, complete as required as per specifications.	2	Nos		
252	Supply, Installation, testing and commissioning of Addressable relay module for Cross Zoning, Address Switch to programme the modules from 01- 99, complete as required as per specifications.	6	Nos		
253	Supply, Installation, testing and commissioning of Addressable monitor modules for Abort Station & Release station Address Switch to programme the modules from 01- 99, complete as required as per specifications	9	Nos		
254	Supply of Photoluminescent Gas Release caution sign board complete with fixing arrangements	6	Nos		
255	Supply of Electric Gas Release caution sign boards(24 V DC) for approved locations.	2	Nos		
256	FIRE ALARM & PA SYSTEM : Supply, Installation, Testing & Commissioning of the followings: Addressable Analog Addressable Fire Detection, Alarm and evacuation System. Networkable Microprocessor based multiloop capacity, Networkable analogue addressable type fire alarm control panel with 640 character LCD display / Touch Screen Display. The panel should be equipped with sufficient numbers of loop with 15% Spare capacity in each loop. The panel shall be capable of taking atleast 200 analog addressable devices in one loop in any combination quantities of the Detectors and Devices. Four access levels, flash EPROM sufficient numbers of programmable relay controls for controlling AHUs, pressurization fans, ventilation fans at fire pump room, monitoring of fire sprinkler and fire hydrant pump, 240 volts AC power supply, automatic battery charger, 24 volts sealed lead acid batteries sufficient for 24 hours normal working and then be capable of operating the system for 2 hours during an emergency conditions as required. The Panel shall have capability to accommodate & support backnet card for BMS interfacing. (UL / EN Approved) 2 Loop Capacity	1	Nos.		
257	Networkable & Microprocessor based 640 - characters LCD / Touch Screen LCD Display Network Repeater panel. The LCD shall Display all events / detectors, devices status of complete systems in the networked, The repeater shall be equipped with Mounting options etc. (UL / EN Approved).	1	Nos.		

258	Automatic Analog addressable Photo - Thermal multicriteria detector with mounting Base. The Detector's Alarm LED shall be viewable from 360 Degree , The Detector shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the GI Mounting Box and the hardware etc. as required. (UL / EN Approved).	144	Nos.		
259	Automatic Analog addressable Duct Detector with Duct Housing and Duct probe tubes complete with Photoelectric Smoke Detector with mounting Base. The Detector's Alarm LED shall be viewable from 360 Degree , The Detector shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the GI Mounting Box and the hardware etc. as required. (UL / EN Approved).	7	Nos.		
260	Automatic Addressable control module for AHU & Stair Pressurization fan, The Module shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the GI Mounting Box and the hardware etc. as required. (UL / EN Approved).	12	Nos.		
261	Supply, installation, testing and commissioning of Automatic Addressable Monitor module for Flow Switch Monitoring etc. The Module shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the GI Mounting Box and the hardware etc. as required. (UL / EN Approved).	5	Nos.		
262	Addressable Manual call Station. The Call Point shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the Mounting Box and the hardware etc. as required. (UL / EN Approved).	10	Nos.		
263	Addressable electronic Sounder. The Sounder shall have automatic Electronic addressing feature & each of these shall be equipped with fault Isolator complete with the Mounting Box and the hardware etc. as required. The Sounders shall be Loop powered i.e. should not require additional cable to feed the Power & shall be programmable from the Fire Panel for Multiple type of tones selection. (UL / EN Approved).	10	Nos.		
264	Supply, installation, testing and commissioning of full duplex Fire Fighter's talk Back system with operator command centre and sufficient no. of point . The full duplex emergency communication system shall be able to display customized address of the location from which the Call is being made to the Fire Fighter's command Centre.	1	Sets		
265	Addressable Fire Fighter's Telephone Jack for full duplex emergency communication with the Fire Fighter's command Centre.	10	Nos.		
266	Supply, installation, testing and commissioning of 2way communication Fire Fighter's Handset Nos complete with suitable leads for insersion.	10	Nos.		

267	Supply, installation, testing and commissioning of Liscenced GRAPHICAL alarm monitoring and management Software to pin point the location of the Fire. The software shall identify the alarm events in the System and shall graphically indicate the pin point area in the Floor Plans. (At Control Room).	1	Sets		
268	Supply, installation, testing and commissioning of Networked PC BASED GRAPHICAL FACILITIES MONITORING SYSTEM with Dual Core 2.0 GHz Pentium® IV processor with 512 MBytes of RAM with 22" flat-screen LCD monitor, sound card. It shall and speakers, and 500 Giga Byte hard disk. It shall operate under Microsoft® Windows® XP Professional / Windows Software, complete with ethernet port, DVD Drive, 4 GB RAM, multimedia Speakers, Multimedia Keyboard, Optical wireless Mouse, 650 VA UPS etc. complete as required. (At Control Room)	1	Sets		
269	Supply and laying of following size of M.S, Conduit pipe in recess including all accessories MS pull/junction boxes, GI fish wire of 6 SWG, fixing hardware etc., including cutting, chasing the walls/floor and plastering the chased portion and making good the damages etc., complete as required. 25 mm dia	1200	RM		
270	Supply and laying of following size of M.S, Conduit pipe in recess including all accessories MS pull/junction boxes, GI fish wire of 6 SWG, fixing hardware etc., including cutting, chasing the walls/floor and plastering the chased portion and making good the damages etc., complete as required. 32 mm dia	50	RM		
271	Supply and drawing of 2 C x 1.5 Sq.mm. Sheathed anneled flexible copper Conductor FRLS cablein existing M. S. Conduit, Complete with termination and testing as per requirement.	1700	RM		
272	Supply and drawing of 4 C x 1.5 Sq.mm. anneled flexible copper Conductor, Copper braided shielding and overall Sheathed FRLS cable in existing M. S. Conduit, Complete with termination and testing as per requirement.	10	RM		
273	Supply, installation, testing and commissioning of 19" Equipment Rack with power coated finish with front lockable Door with M. S. Framed translucent Acrylic material, 2 Nos of fans for heat exhaust, Top & Bottom entry knock outs, back side lockable Door , inbuilt MCB, Power Points, raceways and partitions, one no. sliding Tray etc. complete as required to house the PC and other Equipment.	1	No.		

274	SITC of IP based PA Controller capable of handling 8 zones, Digital audio controller complying to IEC EN 60849 /DVA016 with built-in high and low pass filters and parametric equalizer . with in built 500W digital amplifier and 8 Out puts Led Indication of each zone independent output control button and volume control. network input , BGM input local emergency Mic INPUT, can work with 1 Extra stand by amplifier, when the inbuilt amplifier come out faulty the standby amplifier take over automatically. support 24Vdc input interface	1	Set		
275	Power Amplifier SCPA500 /70V, 100V& 4-16 ohm , 2 channel power amplifier , Inrush restraint and softstart ,Integrated electronic protection against thermal overload and shortcircuit. Temperature controlled fans, airflow from front to rear. Method of control: Class AB. Power output of amplifier: 1 x 500W sin. /100V. Output range: 50 Hz – 22kHz; 0/-0,5 dB. Signal to noise ratio (not valuated): > 105 dB Channel separation: > 75 dB. THD (total harmonic distortion): < 0,08%. Input level at max. output voltage: 0 dBu. The amplifier has to be switched into Stand-by Mode in case of power loss by the control centre.	1	Set		
276	Digital Call Station 8 zone. Fully digital call station with electret microphone (cardioid- characteristics) on flexible 300mm swan neck complete with wideband loudspeaker for monitoring, pre-listen and intercom operation for the networked PA system. - Permanent inaudible supervision of the microphone and its capsule in accordance to EN 60849. 16 free programmable and label able keys.	1	Set		
277	Supply, Installation, Testing & Commissioning of Volume Controller for all the closed areas.	5	Nos.		
278	Supply, Installation, Testing & Commissioning of 6W , transformer tapping 100 volt line multitap , driver impedance 8 ohm , SPL @ 1m, 1 Watt ,(Ceiling speaker)	136	Nos		
279	Supply, Installation, Testing and Commissioning of Wall mountable type column type Speaker 6 watt , SPL 90 dB, Freq response 200-15000 Hz, rated input voltage 100 Volts, & rated impedance 1667 Ohms,	2	Nos.		
280	Supply, Installation, Testing & Commissioning of Music source CD/MP3 Player 1 U table top and rack mount clearly visible LCD display , micro computer and touch button operation complete as required.	1	No.		
281	Supply and drawing of 2x 1.5 sq. mm ATC Copper conductor cable/ wire in existing M. S. Conduit, Complete with termination and testing as per requirement.	1360	RM		
282	Supply laying and fixing of 25mm Conduit pipe with all accessories etc. as complete as required	950	RM		

283	Supply, installation, testing and commissioning of 19" Equipment Rack with power coated finish with front lockable Door with M. S. Framed translucent Acrylic material, 2 Nos of fans for heat exhaust, Top & Bottom entry knock outs, back side lockable Door , inbuilt MCB, Power Points, raceways and partitions, one no. sliding Tray etc. complete as required	1	No.		
284	CCTV : Supply, Installation, Testing & Commissioning of IP CCTV Monitoring, Recording & Streaming System: IP DOME (Indoor): 1.3 Megapixel @ 25fps, 2 Megapixel @ 15fps, H.264 Compression, 1/3" Low Illumination Aptina Cmos, Hisilicon DSP, IP Vandal Dome Camera with 2 Megapixel HD 2.8-12mm Varifocal Lens, 30 IR LED upto 25 meters, 1.0 Lux Colour, 0.5 Lux B/w, I/O- 1 In/1 Out, Audio- Mic/1 Out, Triple Streaming, Image Snapshot, Full Screen Monitoring, 3 Privacy Mask areas, Supports CBD & VBR, 3 Motion Detection areas, Triggered action by Mail, FTP, Simultaneous upto 10, Video Format in AVI & JPEG, Supports Video Playback and Delete. Supports D-WDR, 3D-DNR, Brightness, Contrast, Hue, AES, IRIS Level, Manual Shutter, Night Mode, Supports POE, Supports Cell phone, PDA, 3GPP. ONVIF Support etc. all complete.	14	Nos		
285	Supply, Installation, Testing & Commissioning of IP CCTV Monitoring, Recording & Streaming System: IP BULLET :2 Megapixel @ 25fps, 3 Megapixel @ 15fps, H.264 Compression, 1/3" Low Illumination Aptina Cmos, IP Bullet Camera with 2 megapixel HD 2.8 - 12MM varifocal lens, 48 IR LED upto 35 meters, I/O- 1 In/1 Out, Audio-Mic/1 Out, Triple Streaming, Image Snapshot, Full Screen Monitoring, 3 Privacy Mask areas, Supports CBD & VBR, 3 Motion Detection areas, Triggered action by Mail, FTP, Save to SD Card, Relay, Simultaneous upto 10, 2 Way Audio, Video Format in AVI & JPEG, Supports Video Playback and Delete. Supports D-WDR, 3D-DNR, Brightness, Contrast, Hue, AES, IRIS Level, Manual Shutter, Night Mode, Supports POE, Supports Cell phone, PDA, 3GPP. ONVIF Support etc. all complete.	10	Nos		
286	Supply, installation, testing & commissioning of 16 – channel colour Digital Video Mgmt system with 16 cameras inputs Built in multiplexer, Digital Video recorder, Video motion Detection system, with external alarm inputs & outputs ,TCPIP network feature & server software, 2 x HDD slots for future storage expansion, 1200 GB Hard Disk Drive to be able to achieve recording in SVHS quality @ 24 hour mode complete as per required and as per specification.	1	Nos		
287	Supply, installation, testing & commissioning of colour high resolution monitor 21 inch coloured complete as required	1	Nos		
288	Supply, installation, testing & commissioning of power supply unit without SMF batteries complete as required. (One no. for set of 5 cameras).	3	Set		

289	Supplying and drawing co-axial TV cable RG-6 grade, 0.7 mm solid copper conductor PE insulated, sheided with fine tinned copper braid and protected with PVC sheath in the existing surface/ recessed steel/ PVC conduit as required.	450	RM		
290	Supply, Installation, testing and commissioning of RG-11 coaxial shielded cable for Video Signal .(for long distance)	200	RM		
291	Supply, Installation, testing and commissioning of 2x1.5 mm ² PVC insulated, ATC conductor shielded copper conductor cable for Data communication in existing PVC Conduit.	380	RM		
292	Supply of centralised Access Door controller capable of controlling 91 readers and 87 pushbuttons releases along with individual access door controllers/ Reader modules, required interface module for connecting to existing PC, software for Access control systems, Time attendance module, Global Anti pass back feature, power supply unit with SMF batteries etc. complete as per specifications and as required.	1.00	Set		
293	Supply of Proximity Digital Card Reader with a range of 3.5" complete as required and as per specification complete as required.	20.00	Nos		
294	Supply of Proximity Digital Card Reader with Keypad with a range of 3.5" complete as required and as per specification complete as required.	4.00	Nos		
295	Supply of Proximity Card	100.00	Nos		
296	Supply of single Electromagnetic lock,1200 lbs along with magnetic contact complete as required, for double leaf door	35.00	Nos		
297	Supply of single Electromagnetic lock,600 lbs along with magnetic contact complete as required, for single leaf door	35.00	Nos		
298	Supply of Exit push button complete as required.- as on where requiried	20.00	Nos		
299	Supply of Panic Bar complete as required.	7.00	Nos.		
300	8 Core 0.75 Sqmm PVC Sheathed Shielded Multistranded Cable in PVC Conduit	1400.00	Mtr		

301	Executive Director Table (Main Table+ERU+Back Unit) (Arrive) - Supplying and placing in position Main desk with 4 nos. of Back Units of the following specifications. The Main table shall be of size 3600 Width mm x 1080 mm Depth x 750 mm height. Top surface of the table shall made up of MDF (Medium density fibre) board duly finished with Veneer and final coating of PU. The Main desk should contain in Smart Case - space slides effortlessly in style.The mobile Pedestal shall be of size 480 Width mm x 640 Depth mm x 600 Height mm. Mobile pedestal shall be coated of MDF (medium density fiber) with veneer coating and PU coating.The ERU Top shall be of MDF (medium density fiber) board duly finished with veneer and final PU coating. Size of ERU top 1900 Width mm x 480 Depth mm x 550(not from ground with castors).The main desk is provided eith the wire management system also there is perfect storage side unit. The Size of the Back unit shall be 1000 mm width x 480 mm Depth x 2035 mm height. The back unit shall be made up of MDF board duly finished with veneer & final finish by PU coating. The mobile unit can be bought in multiples.PU coating hardness 1.5H. For Executive Director	1.00	Each		
302	Executive Director Chair (Halo VHB) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-95.4cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16+/- 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 +/- 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assy. shall be made of 2.54+/- 0.03cm x 0.16 +/- 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore 'A' hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features : 360° revolving type, Knee Tilt system, Seat & back tilting ration of 1: 1.5, Front pivot for tilt with feet resting on ground ensuring more comfort, Tilt tension adjustment, 5-position locking with antilock back mechanism which should prevent the backrest from impacting the user when the lock is released, Static seat depth adjustment 5.0 +/- 0.5cm with 5 position locking. The chair shall be provided with pneumatic height adjustment which shall have stroke of 9.0 +/- 0.3 cm. The bellow should be single piece duly blow moulded in black polypropylene. The pedestal shall be made of die-cast	1.00	Each		

303	Executive Director & Director Visitor Chair (Halo Visitor) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be (W)-53cm x (H)-73cm & size of seat shall be (W)-54.6cm x (D)-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16 +/- 2 kgf as per IS: 7888 for 25% compression. The fixed type mechanism shall be made with a 0.8 +/- 0.05cm thick HR steel spine welded to it and black powder coated. Overall dimensions of Chair shall be- Width of Chair - 59cm, Depth of Chair - 68.5 cm as measured from pedestal below. Height of back from ground -89.5cm. Seat height - 46.5cm. Dimensions tolerance / variations shall be within +/- 1 cm. Executive Director & Director .	8.00	Each		
304	Executive Director & Director Sofa Set 3 +1+1 (Plush) Supplying and placing in position set of 3+1+1 sofa of dimensions 1120 x 1030 x 600 for 1 seater & 2260 x 1030 x 600 for 3 seater. Upholstery : Material : Pure Leather, Shade : Dark Brown, Thickness : 1mm. Frame Material : Pine wood, Moisture content : 12%, Foam Material : Slab stock, Foam Density : 30 kg/m³ at seat and backrest. Webbing Make: S spring + Belt. Material of Belt : Nylon of 50 mm thickness, S spring material : Metal of 3.8 mm of thickness Legs Material : Pine wood with PVC bush at base. Executive Director & Director Sofa Set 3 +1+1	2.00	Each		
305	Executive Director & Director Center Table (Crystalline) Supplying and placing centre table of dimensions: 1000 x 600 x 450 having 8mm tempered glass top with MDF understructure and PVC covering. Pu paint strip on glass top with silver powder. Glass top attached to the understructure via UV disc. Load bearing capacity : 30 Kg. Executive Director & Director Center Table	2.00	Each		
306	Executive Director & Director Side Table (Crystalline) Supplying and placing corner table of dimensions: 600 x 600 x 540 having 8mm tempered glass top with MDF understructure and PVC covering. Pu paint strip on glass top with silver powder. Glass top attached to the understructure via UV disc. Load bearing capacity : 20 Kg. Executive Director & Director Side Table	2.00	Each		

307	Executive Director & Director Round Table (Talk Pod-Membrance) Supplying and placing in position POD of the following specifications. 4 Seater Round POD 1200 Dia size shall be 1200 dia x 750 . Top shall be 25 mm thick base material shall be 25 mm thick MDF board .0.4 mm PVC membrane foil using wrap technology . The foil shall be pre- coated with PU layer for better scratch and wear resistant . 0.6 mm balancing laminate on bottom surface . The vertical cladding shall be 18 mm thick base material shall be 18 mm MDF board . 0.4 mm PVC membrane foil using wrap technology . The foil shall be pre- coated with PU layer for better scratch and wear resistant . 0.6 mm balancing laminate on bottom surface . Legs and Top /Bottom plate shall be made from 1.6 mm Matt silver Anodized Aluminium extrusion . Legs Assembled together with 8 mm thick MS powder coated sheet at bottom and 3 mm thick MS powder sheet coated at the top . The MS base shall be having provision for wire entry and glide fixing . Access Flap and Switch Mounting Tray made from matt silver anodized aluminium extrusion and plastic moulded components to facilitate access of electrical / data / voice sockets access from top .Executive Director & Director	2.00	Each		
308	Executive Director & Director Revolving Discussion Chairs (Halo RV) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-73cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16 +/- 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 +/- 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assy. shall be made of 2.54 +/- 0.03cm x 0.16 +/- 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore 'A' hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features : 360° revolving type without back tilt. The chair shall be provided with pneumatic height adjustment which shall have stroke of 12.0 +/- 0.3 cm. The below should be made up of 3 piece telescopic type & injection moulded in black polypropylene. The pedestal shall be made of die-cast aluminium with buffing finish. it shall be fitted with 5 nos twin wheel castor. The size of the pedestal shall be 67.0 +/- 0.5 cm pitch-centre-dia (77.0 +/- 1.0 cm with castors). The twin wheel castors shall be made of Nylon injection moulded in black color. Overall dimensions of	28	Each		

309	Book Storages (Book Case) Supplying and placing in position bookcase of the following specifications. 4 Door Book Case shall have the configuration of 914mm(W)x320mm(D)x1742mm(H). The unique design provides the right rigidity to the Top hinged doors , which shall facilitate easy use. The Book Case shall be made from prime quality CRCA steel with anti rusting treatment. It shall have a Rigid Knock Down Construction. The Top Pannel, Back Pannel and Side Pannel are made from 0.7mm high yield CRCA and other components from 0.8mm CRCA. Each door shall have a 6 Lever Cam Lock with Common Key. 3mm thick glass should be used in each door for clear inside vision whih shall be secured in a metal frame through a rubber gasket. Scissor Mechanism should be provided in each door for receding inside the top of every compartment and it shall ensure parallel and smooth movement. Each door should be provided with plastic side end caps as handle which is easy to grip. Each compartment shall have a storage shelf with a UDL capacity of max 80 Kg. The 2 Door Book Case shall have 18mm PLB Top straight edge with PVC lipping. The finishing shall include Epoxy powder coated to the thickness of 50 microns (+/- 10).	45.00	Each		
310	Director Table(Main Table+ERU + Back Unit+ Tower units) (Jefferson) Supplying and placing in position Main desk of the following specifications. The Main desk RHS size shall be : 2400 Width mm x 1104 Depth mm x 735 Height mm.The top panel shall be 40 mm thick(18 mm MDF + 18 mm MDF batons + 4 mm Natural Veneer) Veneered portion of work surface is finished with high gloss polyster.The understructure shall be having legs made from 1.6 mm thick MS clad with the strips of MFC (Medium Density fiber).Hollow construction of legs facilitates wire management .The modesty & side panel should be 18 mm thick MDF plus pigmented black and coated with melamine. The storage shall be having drawer unit unit body shall be constructed from 18 mm thick MDF boards has combination of 2 box drawers + 1 filling drawer . Drawers should be mounted on double extension ball slides + drawer fronts should be of natural veneer coated with High gloss Polyster and made of 23 mm (18 mm MDF + 4 mm Natural Veneer + 1 mm DL) and drawer body made of 14 mm MDF (12 mm MDF + 1 mm DL + 1 mm DL). The ERU LHS size shall be : 1400 Width mm x 580 Depth mm x 690 Heightmm. The top panel shall be 40 mm thick(18 mm MDF + 18 mm MDF batons + 4 mm Natural Veneer) Veneered portion of work surface is finished with high gloss polyster.The understructure shall be having the modesty panel of 18 mm thick MDF plus pigmented black and coated with melamine. The storage shall be having drawer unit unit body shall be constructed from 18 mm thick MDF boards has combination of 2 box drawers + 1 filling drawer . Drawers should be mounted on double extension ball slides + drawer fronts should be of natural veneer coated with High gloss Polyster and made of 23 mm (18 mm MDF + 4 mm Natural Veneer + 1	1.00	Each		

311	Director Chair (Halo HB) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed plywood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be W-53cm, H-80cm & size of seat shall be W-54.6cm x D-49cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16 +/- 2 kgf as per IS: 7888 for 25% compression. The seat and back should be arrested together with spine made of 0.8 +/- 0.05 cm thick HR steel and should be powder coated in black with 40-60 micron DFT (Dry film thickness). The armrest assembly should be made up of armrest tube, PU armrest and the armrest top. The armrest tube assy. shall be made of 2.54 +/- 0.03cm x 0.16 +/- 0.0128 cm M.S E.R.W support tubes and chrome plated. The P.U armrest shall be made up of black integral skin polyurethane with 50-70 shore 'A' hardness reinforced with M.S insert. The armrest top shall be made up of ABS & upholstered with foam & leather. The mechanism of the chair shall have following features : 360° revolving type, Knee Tilt system, Seat & back tilting ration of 1: 1.5, Front pivot for tilt with feet resting on ground ensuring more comfort, Tilt tension adjustment, 5-position locking with antilock back mechanism which should prevent the backrest from impacting the user when the lock is released, Static seat depth adjustment 5.0 +/- 0.5cm with 5 position locking. The chair shall be provided with pneumatic height adjustment which shall have stroke of 9.0 +/- 0.3 cm. The bellow should be single piece duly blow moulded in black polypropylene. The pedestal shall be made of die-cast	1.00	Each		

312	GM Table(Main Table+joining table+ERU+ back unit + 2 Book Case (Maestro) Supplying and placing in position main desk of the following specifications. The main desk shall be of size 1800 Width mm x 900 Depth mm x 750 Height mm.The table top shall be 25 mm thick MFC (Melamine Faced Chipboard) also there should be 30 mm MDF (Medium density fiberboard) black pad.The modesty panel shall be of 18 mm thick MFC (Melamine faced chipboard).The leg of the main desk shall be of 25 mm MFC plus 30 mm MDF right and left pad.The main table should be of duck noise profile edge in order to enhance the workspace aesthetics. The joining table RHS shall be of size 1050 Width mm x 1200 Depth mm x 750 Height mm.The top panel shall be 25 mm thick with MFC (Melamine Faced Chipboard).The leg of the joining table shall be of metal.Polyurethane Coated joining table. The return desk size shall be 1200 Width mm x 600 Depth mm x 730 Height mm.The top panel shall 25 mm thick MFC (Melamine Faced Chipboard) .The Modesty panel shall be 18 mm thick MFC coated. The leg of the return desk shall be 25 mm thick MFC (Melamine faced chipboard) plus the right and left pad should be 30 mm thick MDF (medium density fiber) coated. back unit size shall be 1400 Width mm x 470 Depth mm x 760 Height mm.The top panel size shall be 25 mm thick MFC (Melamine faced chipboard) . The door panels and all other panels should be 18 mm thick MFC (Melamine faced chipboard) .The handle shall be of metal.	10.00	Each		

313	GM Chair (Sedna VHB) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed moulded reconstituted wood & upholstered with leather and moulded polyurethane foam. Size of back shall be (W)-46.0cm, (H)-57.0cm & size of seat shall be (W)-49.0cm x (D)-49.5cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16 +/- 2 kgf as per IS: 7888 for 25% compression. The back rest should be connected to the mechanism with a drop-lift mechanism which can be adjusted in the range of 7.0 +/- 0.5cm for the comfortable back support to suitable individual need. Armrests should be pressure die casted in polished aluminium with PP arm tops. The mechanism of chair shall have following features: 360 degree revolving type, Seat/Back tilt ratio of 1:3, Synchronized tilt, Back tilt with 4 position locking and Side tilt tension adjustment knob should be operated while taking back support for better adjustment of comfort. The chair shall be provided with pneumatic height adjustment which shall have stroke of 10.0 +/- 0.3 cm. The pedestal shall be made of die-cast polished aluminium. it shall be fitted with 5 nos twin wheel castor. The size of head rest shall be (W)26.0cm x 12.0cm(L). The size of the pedestal shall be 65.0 +/- 0.5 cm pitch-centre-dia (75.0 +/- 1.0 cm with castors). The twin wheel castors shall be injection moulded in black polypropylene. Overall dimensions of Chair shall be, Width of Chair - 75.0cm, Depth of Chair - 75.0 cm as measured from pedestal below. Height from ground - min 113.5 to max 138.0 cms. Seat height - min 41.0cm to max 51.0 cm. Dimensions tolerance / variations shall be within +/- 1 cm.	10.00	Each		
314	Visitor Chair (Sedna Visitor) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2 +/- 0.1 cm thick hot pressed moulded reconstituted wood & upholstered with leather and moulded polyurethane foam. The back shall be designed with contoured lumber support for extra comfort. Size of back shall be (W)-45.0cm, (H)-49.0cm & size of seat shall be (W)-49.0cm x (D)-49.5cm. High Resilience (HR) foam should be used in making seat & back which shall be moulded with density 45 +/- 2 kg/m³ and hardness load 16 +/- 2 kgf as per IS: 7888 for 25% compression. The understructure should be welded structure made up of M.S.E.R.W. elliptical tube and the understructure should powder coated with 40-60 micron DFT (Dry film thickness) Overall dimensions of Chair shall be, Width of Chair - 51.0cm, Depth of Chair - 66.5 cm as measured from base. Height from ground - 96.0 cm. Seat height -48.0 cm. Dimensions tolerance / variations shall be within +/- 1 cm.	30.00	Each		
315	Sofa 1 Seater (Plunge 1) Supplying and placing in position 1 Seater Sofa of dimensions 900 W x 800 D x 685 H with PU Upholstery and tropical wood frame. Foam : Moulded foam at seat and back of density 45 Kg/cubic m. Wooden element of Rubber wood, Nylon webbing. Coffee Tray : Alluminium with powder coated	6.00	Each		

316	Sofa 3 Seater (Plunge 3) Supplying and placing in position 3 Seater Sofa of dimensions 1970 W x 800 D x 685 H with PU Upholstery and tropical wood frame. Foam : Moulded foam at seat and back of density 45 Kg/cubic m. Wooden element of Rubber wood, Nylon webbing. Coffee Tray : Alluminium with powder coated	6.00	Each		
317	GM & DGM Center Table (Glaze) Supplying and placing in position Center table of Dimensions 1100 x 600 x 500. 8 mm tempered glass top, 6 mm tempered bottom glass for storage, Silver powder coated. Glass understructure. Glass attached to the understructure via UV disc. Load bearing capacity :30Kg	21.00	Each		
318	GM & DGM Corner Table (Glaze) Supplying and placing in position corner table of Dimensions 600 x 600 x 450. 8 mm tempered glass top, 6 mm tempered bottom glass for storage, Silver powder coated. Glass understructure. Glass attached to the understructure via UV disc. Load bearing capacity : 20Kg	42.00	Each		
319	DGM (Main Table+ ERU+ back unit) {Orion (1950 x 750) + (1050 x 500)} Supplying and placing in position Main Desk 1950 W x 750 D size shall be 1950 Width mm x 750 Depth mm x 733 Height mm . The top worksurface shall be made from 25 mm thick PLT plus the Edge banded with matching PVC lipping . The grommet cutout shall be on primary worktop for alignment worktops connected by table connector . The Modesty panel shall be 18 mm MDF with PU painted in both sides . The Pedestal top shall be supporting wooden with soft closing drawers . There shall be a combination of 18 and 25 mm PLT also the edge shall be banded with matching PVC lipping file Hanger inside the file drawer , side central lock. Secndry (L) + Ped 1050 W x 500 D size shall be 1050 Width mm x 500 Depth mm x 733 Height mm . The top worksurface shall be made of 25 mm thick PLT . Edge banded with matching PVC lipping and Grommet cutout on primary worktop. Also for allignment worktops shall be connected by table connector . Secondary Archival Storage size shall be 900 Width mm x 1200 Depth mm x 450 Height mm . The Secondary archival storage shall be a wooden wardrobe with 3 point locking and push to open doors . The design shall be handle less . There shall also be combination of 18 mm & 25 mm PLT plus Edge shall be banded with matching PVC lipping .	6.00	Each		

320	DGM Chair (NRG HB) Supplying and placing in position chair of the following specifications. The seat shall made of injection molded plastic outer and inner in polypropylene talc filled. plastic inner is upholstered with synthetic leather cover and moulded polyurethane foam and lumbar foam. The back shall made of injection molded plastic outer in nylon material and inner in polypropylene talc filled. Seat dimensions should be 48.4cm(W) x 52 cm(D) and back as 49.0cm(W) x 73.0cm(H). High Resilience polyurethane foam shall be moulded with density 55+/-2 kg/m³ and back hardness load 11+/-2 kgf as per IS:7888 for 25% compression and seat hardness load 20+/-2 kgf as per IS:7888 for 25% compression. The lumbar support foam insert shall made from visco-elastic slow recovery memory foam, moulded with density=60+/-5kg/m³ and hardness=6.5+/-1.5 at 25% compression and recovery time 12+/-1 sec. Armrest shall have 4 range of adjustments- 1. Up-down adjustment: 8 steps(8.0+/-0.5cm range), 2. Swivel adjustment: 3 position, 9degree+/-2 swivel each side. 3. width adjustment: Any position(2.0+/-0.5cm range each armtop) 4. To-Fro adjustment: Any position(4.0+/-0.5cm range) Height adjustment shall be in armrest structure and all other adjustments should be provided in pad which is fixed to armrest structure, The mechanism of chair shall have following features:360 degree revolving type, Seat/Back tilt ratio of 1:2, Active Bio-Synchro mechanism, 5 position tilt limiter giving option of variable tilt angle to the chair. Front-Pivot for tilt with feet resting on ground and continious lumbar support should ensure more	6.00	Each		
321	Visitor Chair (NRG Visitor) Supplying and placing in position chair of the following specifications. The seat shall made of injection molded plastic outer and inner in polypropylene talc filled. Plastic inner is upholstered with synthetic leather cover and moulded polyurethane foam and lumbar foam . The back shall made of injection molded plastic outer in nylon material and inner in polypropylene talc filled. Seat dimensions should be 48.4cm(W) x 52.0cm(D) and back as 49.0cm(W) x 64.6cm(H). High Resilience polyurethane foam shall be moulded with density 55+/-2 kg/m³ and back hardness load 11+/-2 kgf as per IS:7888 for 25% compression and seat hardness load16+/-2 kgf as per IS:7888 for 25% compression. The lumbar support foam insert shall made from visco-elastic slow recovery memory foam, moulded with density=60+/-5kg/m³ and hardness=6.5+/-1.5 at 25% compression and recovery time 12+/-1 sec The tubular visitor frame shall be powder coated(DFT 40-60 microns) cantilever structure and made of dia 2.54+/-0.03cm x 0.2+/-0.016cm thick MSERW tube with a connecting M.S spine welded to it. Overall dimensions of Chair shall be, Width of Chair - 57.5cm, Depth of Chair - 63.2 cm as measured from base below. Height from ground -99.6cm. Seat height - 49.3cm. Dimensions tolerance/variatiions shall be within +/- 1 cm.	18.00	Each		

322	Sofa 2 Seater (D Alpina) Supplying and placing in position 2 Seater sofa of the following specifications. upholstrey in Synthetic Leather. Polyester fiber wadding 175 GSM (18 mm). PU foam of 32d, 28d, 23d in various position. Expanded PF sheet for load distribution in seats. Durable rubber webbings of 50 mm & 70 mm. Cotton webbing on wooden surface to prevent sharp edges. Commercial ply – 12 to 15 mm as per design requirement. Pinewood of various thickness and length, duly dried as base structure. All structures are joined with stapling. The overall dimension of the sofa shall be 1360 mm(W) x 850 mm (D) X 890mm (H). The seat height shall be of 420 mm. The sofa comes in a tropical wooden frame.	17.00	Each		
323	Sofa 3 Seater (D Alpina) Supplying and placing in position 2 Seater sofa of the following specifications. upholstrey in Synthetic Leather. Polyester fiber wadding 175 GSM (18 mm). PU foam of 32d, 28d, 23d in various position. Expanded PF sheet for load distribution in seats. Durable rubber webbings of 50 mm & 70 mm. Cotton webbing on wooden surface to prevent sharp edges. Commercial ply – 12 to 15 mm as per design requirement. Pinewood of various thickness and length, duly dried as base structure. All structures are joined with stapling. The overall dimension of the sofa shall be 1820 mm(W) x 850 mm (D) X 890mm (H). The seat height shall be of 420 mm. The sofa comes in a tropical wooden frame.	4.00	Each		
324	Chief Engineer Table (Main Table+ ERU+ back unit) Orion (1650 x 600) + (1050 x 500) Supplying and placing in position Main Desk 1650 W x 600 D size shall be 1650 Width mm x 600 Depth mm x 733 Height mm . The top worksurface shall be made from 25 mm thick PLT plus the Edge banded with matching PVC lipping . The grommet cutout shall be on primary worktop for alignment worktops connected by table connector . The Modesty panel shall be 18 mm MDF with PU painted in both sides . The Pedestal top shall be supporting wooden with soft closing drawers . There shall be a combination of 18 and 25 mm PLT also the edge shall be banded with matching PVC lipping file Hanger inside the file drawer , side central lock. Secndry (L) + Ped 1050 W x 500 D size shall be 1050 Width mm x 500 Depth mm x 733 Height mm . The top worksurface shall be made of 25 mm thick PLT . Edge banded with matching PVC lipping and Grommet cutout on primary worktop. Also for alignment worktops shall be connected by table connector . Secondary Archival Storage size shall be 900 Width mm x 1200 Depth mm x 450 Height mm . The Secondary archival storage shall be a wooden wardrobe with 3 point locking and push to open doors . The design shall be handle less . There shall also be combination of 18 mm & 25 mm PLT plus Edge shall be banded with matching PVC lipping .	11.00	Each		

325	Chief Engineer Chair (Kareena HB) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2+/-0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with fabric or synthetic leather and moulded polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood upholstered with replaceable fabric or synthetic leather upholstery covers and moulded polyurethane foam. The moulded polyurethane foam shall be of density 45+/-2kg/m³, and hardness load 16+/-2kgf as per IS:7888 for 25% compression. The dimensions of seat shall be- 51.0cm(W) x 48.0cm(D) and of back shall be 48.0cm(W) x 76.0cm(H). The armrest top shall be made of moulded polyurethane and mounted on to a drop lift height adjustable type M.S tubular armrest support chrome plated. The armrest height shall be adjustable up to 6.5+/-0.5cm in 5 steps and also has swivel adjustment of 22 degree+/-2 on both sides. The mechanism of the chair shall have following features : 360° revolving type, Knee tilt synchro mechanism, Tilt tension adjustment, Single point control, 4 position locking with anti shock feature, Seat depth adjustment of 6.0+/-0.5cm should be locked in 6 positions. The backrest shall consists of a sliding up down mechanism, Which can be adjusted in the range of 7.5+/-0.5cm and should be locked in 4 positions for correct position of lumbar support. The chair shall be provided with pneumatic height adjustment which shall have stroke of 9.0 +/- 0.3 cm. The pedestal shall be fabricated from 0.2+/-0.02cm thick HR sheet, chrome plated and assembled with injection moulded black polypropylene hub cap. The size of the pedestal shall be 66.0+/- 0.5 cm pitch-centre-dia	11.00	Each		
326	Visitor Chair (Kareena Visitor) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2+/-0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with fabric or synthetic leather and moulded polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood upholstered with replaceable fabric or synthetic leather upholstery covers and moulded polyurethane foam. The moulded polyurethane foam shall be of density 45+/-2kg/m³, and hardness load 16+/-2kgf as per IS:7888 for 25% compression. The dimensions of seat shall be- 51.0cm(W) x 48.0cm(D) and of back shall be 48.0cm(W) x 64.5cm(H). The armrest top shall be made of moulded polyurethane and mounted on to a fixed type M.S tubular armrest support chrome plated. The Arm support has static vertical adjustment of +/-1.5+/-0.05cm. The backrest shall consist of a fixed type mechanism i.e no back up/down adjustment. The leg frame welded assembly shall be chrome plated, made from 3.5+/-0.03cm x 1.5+/-0.02cm x 0.16+/-0.0128cm thick elliptical MSERW tube and provided with a base plate for seat fixing. Overall dimensions of Chair shall be, Width of Chair - 66.5cm, Depth of Chair - 58.0cm as measured from pedestal below. Height from ground - 88.5cm. Seat height - 45.0cm. Dimensions tolerance / variations shall be within +/- 1 cm.	22.00	Each		

327	Secretary Table(Main Table+ERU) Finesse Table-5026+ ERU 3616 Supplying and placing the executive table of following specifications. Main Table (1500 x 750 x 740) having top and side panel 25mm thick plain particle board(PPB) clad with 0.6 mm thick post formed laminate and 1mm thick backing laminate (BDL). Flat edge duly sealed with 2mm thick PVC beading and modesty panel of 18mm thick plain particle board(PPB) clad with 1.0mm thick decorative laminate(DL) on both sides. Edge sealed with 2mm thick PVC beading with Side Unit of size 1050 x 450 x 705 mm with 25mm thick plain particle board(PPB) clad with 0.6 mm thick post formed laminate and 1mm thick backing laminate (BDL). Flat edge duly sealed with 2mm thick PVC beading and 18mm thick plain particle board(PPB) clad with 1.0mm thick decorative laminate(DL) on both sides. Edge sealed with 2mm thick PVC beading and The mobile pedestal of same family.	8.00	Each		
328	Secretary Chair/ Conference Chair (Beat MB) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2+/-0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with leatherette , over molded High Resilience polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood. The HR polyurethane foam shall be of density 55+/-2kg/m ³ , and hardness load 16+/-2kgf as per IS:7888 for 25% compression. The dimensions of seat shall be- 49.0cm(W) x 51.4cm(D) and of back shall be 51.6cm(W) x 65.7cm(H). The armrest top is PU molded over metal insert and the height adjustable armrest structure is powder coated. The armrest height shall be adjustable up to 8.0+/-0.5cm in 8 steps. The mechanism of the chair shall have following features : 360° revolving type, Front Pivot synchro mechanism, Tilt tension adjustment, Single point control, 4 position locking with anti shock feature, Seat/back tilting ratio of 1:2. The back can be adjusted in 5 positions manually for correct position of lumbar support. Stroke of height adjustable spine is 7 cm. The chair shall be provided with pneumatic height adjustment which shall have stroke of 10.0 +/- 0.3 cm. The pedestal shall be injection molded in black 30% glass filled Nylon and fitted with 5 nos. twin wheel castors. The size of the pedestal shall be 66.0+/- 0.5 cm pitch-centre-dia (76.1 +/- 1.0 cm with castors). The twin wheel castors shall be injection molded in black nylon. The seat can be slid horizontally as per user convenience having a stroke slide of 5 cm. Overall dimensions of Chair shall be, Width of Chair - 76.1cm, Depth of Chair - 76.1cm as measured from pedestal below. Height from ground - min 102.0 to max 119.0cm.	133.00	Each		

329	Visitor Chair (Beat Visitor) Supplying and placing in position chair of the following specifications. The seat shall be made up of 1.2+/-0.1cm thick hot pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with leatherrete, over molded High Resilience polyurethane foam. The back shall be made up 1.2+/-0.1cm thick hot pressed plywood. The HR polyurethane foam shall be of density 55+/-2kg/m ³ , and hardness load 16+/-2kgf as per IS:7888 for 25% compression. The dimensions of seat shall be- 49.0cm(W) x 51.4cm(D) and of back shall be 51.6cm(W) x 65.7cm(H). Armrests shall be fixed and The tubular frame is powder coated (DFT 40-60microns) cantilever structure & made of Dia.Ø 2.54 ±0.03cm.x 0.2 ±0.016cm.thk. M.S. E.R.W Tube with a connecting M.S. Spine welded to it. Back spine is fitted to the frame assembly.	98.00	Each		
330	Cabinets (VSDU-8) Overall Dimensions of VSDU - 8 shall be 900mm(W)x450mm(D)x1830mm(H). The top shall be Metal top (1 mm add in unit height) .The Rigid Knock Down Construction , Back , Sides and Door shall be made from Glass for visibility of content . Sliding door arrangement shall have sliding door wth top hanging arrangement to prevent derailment . Each door shall be provided with 2 plastic roller having steel ball bearing for smooth movement of door & less noise .VSDU 8 shall have glass door for visibility of the content . Locking shall be 5 lever cam lock for safe locking . Handle shall be plastic flush & recessed handle . Shelving shall have Height wise adjustable shelf mounting . Uniformly Distributed Load Capacity of the shelf is 40 Kg maximum . VSDU - 8 shall have 4 no. of adjustable full shelves . Accessories optional shall be cradle with pipes for hanging instadex files . Leveler shall be screw type leveler with hex plastic base and overall finish shall be epoxy polyester coated to the thickness of 50 microns . For VSDU 8 - A4 size box file can be stored vertically on four shelves and clear space above fifth shelf is 220 mm .	44.00	Each		

331	Engineer's Manager Module cubicle (Wish 3000 x 1500) Providing and placing WISH panel & tile based modular workstation, with partition thickness as 52.4 mm thk and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles are fabric tackable & white board. Bottom tiles - Plain metal. SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tackable along with white board. INTERMEDIATE BLOCKS Intermediate blocks are given in DL finish. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. MODESTY PANELS WITH ASSEMBLY LEG - 25 MM THK PLB modesty has been given on the front of the main worktop which is attached to the partition on one end with gable end bkts and on the other end with metal powder coated frontier leg. Side panels or legs - out of 25 mm thk prelam particle board with flat pvc lipping edge banding considered only on the open end conditions or metal powder coated legs at the end and shared condition. System shall also have 120 mm high powder coated standalone panel legs to give the system an elevated look. Worksurface - Main table recta out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 1650 mm w x 800 mm d and ERU table recta of size 1050 mm w x 450 mm d. Pedestals with or without legs - Nova pedestal flat metal front, full ht free standing central locking of size 390 mm w x 435 mm d x 646 mm ht 3dr = 2box+1file. CPU trolley - with castors KBPT with/without mousetray - plastic/metal/articulated. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring.	37.00	Each		
332	Cabinets/ passage area storage {Echo HDU (1219 x 750)} Supplying and placing the all wood storage unit of size 750 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door Panels ae made from 18 mm PLB with 2 mm Edge band on all edges ad a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.	137.00	Each		

333	Assistant Table (Mayfair) Supplying and placing in position Main desk of the following specifications. Main Desk size shall be 900 Width x 600 Depth x 750 Height. The Top shall be in white cedar and black and shall be 18 mm PLB with PVC lipping.The side panels shall be 18 mm thickPLT with PVC .The Modesty panel shall be 18 mm thick PLT.The Modesty panel shall be in a combination of black & white cedar.	10.00	Each		
334	Assistant/Reading Chair (Bravo Mid Back) Supplying and placing in position chair of the following specifications. The seat and back shall be made up of 1.2 ±0.1cm. thick hot-pressed plywood measured as per QA method described in OCP-QLTA-P14-18 and upholstered with fabric upholstery covers and moulded Polyurethane foam. The back foam shall be designed with contoured lumbar support for extra comfort. The seat shall be extra thick foam on front edge to give comfort to popliteal area. The dimensions of back shall be 47.5 cm(W) x 58.0 cm(H) and of seat shall be 47.0 cm (W) x 48.0 cm (D). The HR polyurethane foam shall be moulded with density= 45±2 kg/m3 and hardness load 16 ± 2 kgf as. per IS:7888 for 25% compression. The one-piece armrests shall be injection moulded from black Co.polymer Polypropylene. The mechanism shall be designed with 360° revolving type, Upright-position locking, Tilt tension adjustment, Seat/back tilting ratio of 1:3. The pneumatic height adjustment shall has an adjustment stroke of 12.0 ±0.3cm. The bellow shall be 3 piece telescopic type and injection moulded in black Polypropylene. The pedestal shall be injection moulded in black 33% glass-filled Nylon-66 and fitted with 5 nos. twin wheel castors. The pedestal shall be 66.3 ±0.5cm. pitch-center dia. (76.3 ±1.0cm with castors). The twin wheel castors shall be injection moulded in Black Nylon. Overall Dimensions of Chair shall be Seat Height - min 42.5 to max 54.5cm, Height - min85.5 to max 97.5cm, Width & Depth of Chair as measured from pedestal - Width-76.3 cm and Depth-76.3 cm.	28.00	Each		

335	Plotting Room Workstation (Linea 3600 x 900) Providing and placing 2 LINEA DESK based modular workstation of size 1800 x 900 with System ht - 750 mm UNDERSTRUCTURE: Comprising of metal powder coated cross connectors between legs, legs made up of metal powder coated finish and the entire assembly is fixed to the worktop with the help of ABS plastic spacers 20 mm high which gives the floating look to the w/s module. . The respective finishes for the screens shall be fabric. Wire Management : Metal powder coated Cable pole of size 170mm w x 85 mm d x 705 mm ht/ is given to pull wires from the floor junction box upto the power box fixed under neath the worktop. Aluminium access flaps on worktop above power box cut out for accessing switches. Worksurface - out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 1800 mm w x 900 mm d each. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 10 mm of uneven flooring.	1.00	Each		
336	Peak Centre/ Mail Room Workstation (Wish 1800 x 600) Providing and placing WISH panel & tile based modular workstation, with partition thickness as 52.4 mm thk and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles are fabric tackable & white board. Bottom tiles - Plain metal. SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tackable along with white board. INTERMEDIATE BLOCKS Intermediate blocks are given in DL. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. END PANEL: a 52.4 mm thk end panel is fitted with the main spine of 52.4 mm in the following size 2' wide and 4'0" ht. Following finishes are given on intermediate block DL, bottom block metal and top block fabric. Worksurface - Main table recta out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 2400 mm w x 600 mm d Pedestals with or without legs - Nova pedestal flat metal front, free standing central locking of size 390 mm w x 585 mm d x 646 mm ht 3dr = 2box+1file. CPU trolley - with castors KBPT with/without mousetray - plastic/metal/articulated Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring.	10.00	Each		
337	Library Centre table (Victoria) Providing and placing Centre Table of Dimensions: 1200 x 600 x 450. Rubber wood under frame. High density plywood top with 24 mm thickness. Curved legs with ethnic design. Load bearing capacity of 50 Kg	1.00	Each		

338	Library Corner Table (Edward) Providing and placing Corner Table of Dimensions: 600 x 600 x 480. Rubber wood under frame. High density plywood top with 24 mm thickness. Curved legs with ethnic design. Load bearing capacity of 30 Kg	1.00	Each		
339	Meeting Table (CONCLVE 10 B.CONV 1500D) Conclve 10 B. Conv 1500 D size shall be 3200 Width mm x 1500 Depth mm x 750 Height mm . Top work surface shall be 12 mm thick tougher glass with back painted design on to under side and crystal edge polish finish . The construction shall be Knock down Construction . The Understructure shall have all panels made from 36 mm thick Pre-laminated board with 2 mm thick PVC edge beading . Understructure also consists of storage for CPU , projector and paper storage . Provision for glass adjustment for glass aligning . The Wire Management shall have Legrand electricals used for wire management on to centre support beam panel and CPU storage area for socket connections ,RJ11,RJ45 .	2.00	Each		
340	Conference Table (Talk Modular Membrane) Supplying and placing in position Conference table of the following specifications. The top of Conference Table shall be 25 mm thick base material shall be 25 mm MDF board plus 0.4 mm PVC membrane foil using wrap around technology . The foil is pre - coated with PU layer for better scratch and wear resistance . 0.6 mm balancing laminate on bottom surface . The Squeeze Leg Assembly shall be nickel chrome plated made from Dia 50.8 x 1.6 mm thick MS ERW tube . Leg Assembled together with a plastic glide at bottom and a powder coated leg connector made from aluminium alloy at top . Cross Member and connectors shall be powder coated cross member made from 1.5 mm thick aluminium extrusion fixed with work surface by plastic moulded table support connector . Powder coated connectors made from Aluminium alloy fixed at both ends of cross members . Squeeze Leg Assembly and connectors are assembled together to strengthen complete understructure . Laminate Modesty shall be 18 mm thick base material shall be 16 mm Plain particle board . Post - Laminated with 0.6 mm Top laminate on either side also there shall be 2 mm thick PVC edge banding of matching colour on outer edges of modesty . Work surface and Modesty are assembled together with powder coated Modesty bracket made from 2 mm thick MS sheet . Metal Perforated Modesty shall be 18 mm thick Powder coated metal perforated modesty with stiffener made from 0.8 mm thick MS sheet . Work surface and Modesty are assembled together with powder coated Modesty bracket made from 2 mm thick MS sheet . The Access Flap and Switch Mounting Tray shall be made from Matt silver anodized aluminium extrusion and plastic moulded components to facilitate	40.00	Each		

341	Cabinets-2 (Unite) Construction & Material Knockdown construction. Prime Quality CRCA 0.8mm thk for all the body panels and shelves. Door Opening Twin door with self closing hinges Door Wood (18 mm PLT) Handle • Aesthetically appealing recessed plastic handle for wooden Doors. • 3 point locking mechanism in • Height wise Adjustable Shelf Mounting • Uniformly Distributed Load capacity per each shelf is 80 Kg Maximum 2 nos. Adj. Shelves. Top Options Wooden Top (PLB) 25 mm thk. PF or Wooden Top (PLB) 25 mm thk. Plain or 14 mm thk Metal top (Add to unit height) Skirting Options 152 mm High, 125 mm High – add to unit height Leveler Screw type adjustable Leveler with plastic base (Add in unit height min. 18 mm & additional 10 mm adjustment) Finish: Epoxy polyester powder coating finish 50 +/-10 microns. Stack ability / Reversibility / Connectivity • Can be stacked with any of Unite range of storages. • Unit can be stacked such that its front Fascia is opposite to that of other units. • Can be connected with Grid Partition in select situations. • Work top anchoring option on demand. Back panel Unit has its own back; additionally GRID tiles can be mounted if required.E44	15.00	Each		
342	Canteen Table (Time out 4 Seater) Supplying and placing in position Canteen table of the following specifications. 4 Seater PU Coated size shall be 1135 Width mm x 1175 Depth mm x 750 Height mm . Top shall be 25 mm thick base material shall be 25 mm MDF board . On top PU painting of minimum 2H hardness with 75% glass as per color chart .Combination color graphics on the centre . Brown Laminate on bottom specially profiled edges for comfort . The Understructure shall be having bend pipe structure of MS powder coated . Pipe dia 38 mm , 2 mm thick and it shall be fitted with top by SS machine screws . Legs shall be of MS powder coated and 38 mm dia. pipe legs are fixed with understructure and table top . Glide shall be of Plastic fixed at the understructure to prevent the damage of table top during stacking .	6.00	Each		
343	Canteen Chair (Unwind Café) Supplying and placing in position cafe chairs of the following specifications. The seat and back shall be one piece injection moulded in high impact strength polypropylene. The dimensions of seat shall be 52.5 cm (W) X 53.2 cm (D) and of back shall be 51.6 cm (W) X 40.5 cm (H). The Tubular welded frame is made from Dia 2.22 ± 0.03 x 0.12 ± 0.0128 cm and 3.5 ± 0.03 cm x 1.5 ± 0.03 cm x 0.12 ± 0.0128 cm SS 202 grade tube. The tubes are buff polished to give shiny finish. Overall Dimensions of Chair shall be Seat Height - 45.0 cm, Height - 84.5cm, Width & Depth of Chair as measured from pedestal - Width-52.5cm and Depth-55.8 cm.	24.00	Each		

344	3 Arc Reception Table (First impression) Supplying and placing in position Reception table of the following specifications. Top shall be of Rubberwood with clean Matt PU finish 18 mm thick , inside radius - 700 mm , outside radius - 1350 mm and depth - 650 mm . Cork shall be 18 mm thick of rubber . Glass shall be Frostered 10 mm thick diamond cut finishing on edges , inside radius shall be - 1202.5 mm , outside radius - 1402.5 mm and depth - 200 mm . The Modesty Panel shall be MS Perforated sheet below worksurface : 0.8 mm (thick) x 665 mm (height) x 1345 mm (flat length) . Above Worksurface : 0.8 mm (thick) x 260 mm (height) x 1345 mm (flat length) . The legs shall be of MS tube 1.6 mm thick diameter 50.8 mm and height 604 mm	2.00	Each		
345	Reception Chairs (Gallop Mesh) Supplying and placing in position chair of the following specifications. The seat shall be made of Injection molded Plastic outer & inner. Plastic Inner shall be upholstered with fabric and moulded Polyurethane foam. The back shall be made of 1.2 ±0.1em. hot-pressed plywood measured as per QA method described in OCP-QLTA-P14-18 & upholstered with fabric and moulded Polyurethane foam and back covers. The back foam shall be designed with contoured lumbar support for extra comfort. Dimensions of Back shall be: (W)46.0 cm x (H)50.5 Cm, and of Seat : (W)46.0cm x (D) 48.0 cm. The HR polyurethane foam shall be moulded with Density= 45 ±2 kg/m³ and back hardness load 12 ± 2 kgf and seat hardness load 16 ±2 as per IS:7888 for 25% compression. spine cap shall be made up of Polypropylene which covers the back frame and spine junction. The armrests shall have only Up-Down adjustment- 8.0±0.5cm (8 positions) which shall be provided in armrest structure. Armrest Top is made up of PU with metal insert fitted on the armrest structure. The adjustable tilting mechanism shall be designed with the following features: • 360° revolving type. • Front-pivot for tilt with feet resting on ground and continuous lumbar support ensuring more comfort. • Side tilt tension adjustment can be operated in seating position. • 4-position Tilt limiter giving options of variable tilt angle to the chair (5 steps: 0° to 20° ±2° tilting). • Seat/back tilting ratio of 1:2., Seat depth adjustments shall be integrated in the seat through a sliding mechanism. The pneumatic height adjustment shall have an adjustment of 10.0 ±0.3cm. The pedestal shall be	4.00	Each		
346	Sofa 1 Seater (Jinerio) Supplying and placing in position sofa of the following specifications. Upholstery : Microfibre with Polyester Laminate Frame Material : Kiln dried wood Seat Foam : Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density : 34 kg/ cubic m. Back Foam : Slab stock foam with recron fill at back and arms. Foam Density : 34 kg/cubic m. Webbing Material : S- spring along with nylon strips. The overall dimension of the sofa shall be 1060 mm(W) x 912 mm (D) X 830mm (H). The upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.	2.00	Each		

347	Sofa 2 Seater (Jinerio) Supplying and placing in position sofa of the following specifications.Upholstery : Microfibre with Polyester Laminate Frame Material : Kiln dried wood Seat Foam : Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density : 34 kg/ cubic m. Back Foam : Slab stock foam with recron fill at back and arms. Foam Density : 34 kg/cubic m. Webbing Material : S- spring along with nylon strips. The overall dimension of the sofa shall be 1572 mm(W) x 912 mm (D) X 830mm (H). The upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.	8.00	Each		
348	Sofa 3 Seater (Jinerio) Supplying and placing in position sofa of the following specifications.Upholstery : Microfibre with Polyester Laminate Frame Material : Kiln dried wood Seat Foam : Slab stock foam with recron layer. Also bonded foam used as a supporting material beneath slab stock. Foam Density : 34 kg/ cubic m. Back Foam : Slab stock foam with recron fill at back and arms. Foam Density : 34 kg/cubic m. Webbing Material : S- spring along with nylon strips. The overall dimension of the sofa shall be 2072 mm(W) x 912 mm (D) X 830mm (H). The upholstery is made of fabric. The seat and backrest is filled with recron. The frame is made up of tropical wooden.	3.00	Each		
349	Centre table (Bloom) Supplying and placing in position Center table of following specifications. The overall size shall be : Width - 1000 mm, Depth-600, Height - 428 mm. Material : Glass of 08 mm thk tempered, Solid rubber wood legs and frame, MS sheet as bottom shelf. PU Coated rubber wood parts with a clear glass. Metal frames are powder coated in shade Black to the thickness of 40-80 microns.	4.00	Each		
350	Corner Table (Bloom) Supplying and placing in position Corner table of following specifications.Overall Size : Width - 500 mm, Depth-500, Height - 428 mm. Material : Glass of 08 mm thk tempered, Solid rubber wood legs and frame, MS sheet as bottom shelf. PU Coated rubber wood parts with clear glass. Metal frames are powder coated in shade Black to the thickness of 40-80 microns.	10.00	Each		

351	Mazine Racks (PDR) Supplying and placing in position public waiting sofa with following specifications:Overall Dimensions of Steel Body With Retractable Tray + Fittings shall be 290mm(W) x 400mm(D) x 1890mm(H). Rigid Knockdown construction. Prime quality CRCA steel shall be used panels from 0.8 mm thick . Side panels shall be 27 mm thick prelaminated particle board (PLB) with laminate on both sides .Stackability shall be having add-on units stacked width wise to form a bank of racks having common side panel .5 Level Racks per unit . Display Tray suitable for magazines,periodicals. Aesthetically appealing metal tray at an angle for easy viewing . Receding facility to access the storage behind . Sliding on plastic rollers . Behind Storage shelving shall have 5 level behind storage shelf and uniformly distributed load capacity per each shelf is 35 Kg maximum . Finish should be epoxy polyester powder coated to the thickness of 50 microns	8.00	Each		
352	Optimizer 1 (Single Static 3 Bay 15') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3. The Construction shall be rigid knock down made out of 0.8 thick CRCA steel conforming to IS : 513 . Each body shall have a main unit plus add on units (1,2,3,4,5) . Finish shall be Epoxy polyester powder coated thickness of 40 microns . Shelf construction shall be made from CRCA steel 0.8 mm thick IS :513 .Uniformly distributed load capacity of 80 Kg . Undercarriage shall have construction in welded frame made of HR sheet 3.15 mm thick conforming to IS : 10748 . Finish shall be epoxy polyester powder coat of approved color & shade with a dry film thickness of minimum 40 microns .The Movements shall be Drive Type configuration : In case of D2 & D3 movement of units is achieved mechanically through a PU Drive Wheel and Sprocket -Chain-Tensioner arrangement mounted rigidly onto body size .For D3 each movable undercarriage shall be provided with 2 rollers on the shaft for driving , 2 antifriction ball bearing for rolling and 4 antifriction ball bearing for guiding between rail . Fittings shall be centralized locking arrangement through locking stiffener mounted onto back of single last unit so that it gets locked on channels when all the units are brought together . The Recess handle lock is of Godrej make & placed at suitable height . This arrangement occupies a space of 90.0 mm . When the last unit is twin movable , hinged doors are provided for the end bodies, so in this case locking stiffener is mounted onto drive unit cover :	2.00	Each		
353	Optimizer 1 (Twin Mobile 3 bay 15) Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3	12.00	Each		

354	Optimizer 1 (Single last 3 Bay 15') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3	2.00	Each		
355	Optimizer 1 (Channels 6') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3	3.00	Each		
356	Optimizer 1 (Channels 9') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x381mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x762mm(D)x2080mm(H) for TD-3	3.00	Each		
357	Optimizer 2 (Single Static 3 Bay 18') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3. The Construction shall be rigid knock down made out of 0.8 thick CRCA steel conforming to IS : 513 . Each body shall have a main unit plus add on units (1,2,3,4,5) . Finish shall be Epoxy polyester powder coated thickness of 40 microns . Shelf construction shall be made from CRCA steel 0.8 mm thick IS :513 .Uniformly distributed load capacity of 80 Kg . Undercarriage shall have construction in welded frame made of HR sheet 3.15 mm thick conforming to IS : 10748 . Finish shall be epoxy polyester powder coat of approved color & shade with a dry film thickness of minimum 40 microns .The Movements shall be Drive Type configuration : In case of D2 & D3 movement of units is achieved mechanically through a PU Drive Wheel and Sprocket -Chain-Tensioner arrangement mounted rigidly onto body size .For D3 each movable undercarriage shall be provided with 2 rollers on the shaft for driving , 2 antifriction ball bearing for rolling and 4 antifriction ball bearing for guiding between rail . Fittings shall be centralized locking arrangement through locking stiffener mounted onto back of single last unit so that it gets locked on channels when all the units are brought together . The Recess handle lock is of Godrej make & placed at suitable height . This arrangement occupies a space of 90.0 mm . When the last unit is twin movable , hinged doors are provided for the end bodies, so in this case locking stiffener is mounted onto drive unit cover ;	1.00	Each		
358	Optimizer 2 (Twin Mobile 3 bay 18') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3	6.00	Each		

359	Optimizer 1 (Single last 3 Bay 18') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3	1.00	Each		
360	Optimizer 2 (Channels 6') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3	3.00	Each		
361	Optimizer 2 (Channels 6') Overall Dimensions of Single Static Drive Cover Unit 3 Bay(U/C + Fittings + Cover) shall be 2745mm(W)x457mm(D)x2080mm(H) for SD - 3 & LD- 3 (Height with undercarriage and rails in mm: 1980+65+35=2080) and 2745mm(W)x915mm(D)x2080mm(H) for TD-3	1.00	Each		
362	Passage Area Storages {Echo HDU (1219 x 900)} Supplying and placing the all wood storage unit of size 900 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door Panels are made from 18 mm PLB with 2 mm Edge band on all edges and a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.	15.00	Each		

363	Passage Area Storages {Echo HDU (1219 x 1050)} Supplying and placing the all wood storage unit of size 1050 x 450 x 1219 having following specifications. Body is made from 18mm PLB with all the edges sealed with 0.8 mm thick PVC Edge band. The Back panel is 9mm White PLT. The entire construction is ready to assemble unit and is assembled with suitable KD fittings. The shelves and separator panels is made from 18 mm white PLT and edges are sealed with 0.8 mm edge band. The bottom shelf is fixed and other shelves have one step adjustment for optimizing the space. . Each shelf shall have Uniformly Distributed Load capacity per each shelf is 60 Kg Maximum having 2 nos. Adjustable Shelves. Wooden Top shall be made from Pre-Laminated Board of 25 mm thick. Skirting of 125 mm High shall be provided. Leveller Screw type adjustable Leveller with plastic base. Back Panel and Sides of the storage units will be made out from 18mm thick Pre-Laminated Particle Board. Doors: Door Panels are made from 18 mm PLB with 2 mm Edge band on all edges and a flush Plastic handle is fitted vertically at the centre of the door. The hinge door has suitable hinges and HDU is fitted with an adjustable fitting for height adjustment. HDU has a three point lock. All the storages are fitted with a 6 mm leveller at bottom for levelling.	12.00	Each		
364	Managerial table (Linea Managerial Module) Supplying and placing Manager Table with Table top - Made of 25Mm Thick Prelaminate Partical Board. Main Table-1350mmW x 600mmD x 750mm H with ERU-900mmW x 450mmD x 750mm H. The Tables Will Be Lipped With Pvc Edge Band of 2.0Mm Thickness. Understructure - Work top Is Supported On Ms Sq Leg 40 X 40mm thick & Supporting beams. Wire Management - 150Ht,Cable Tray With Seperator For Power And Data Cable Management. Ms Vertical Cover For Wire Entry, All table tops to have wire manager. Pedestal size- 390mm W x 435mm D x 656mm	4.00	Each		
365	Cabinets (Gain 450 x 500) Providing and placing 1980 mm Ht (2100 mm including skirting) Storage consisting (400 x 500 x 2100) units. of in completely knocked down construction. overall dimesnions 1500 x 500 x 2100. Door Opening Twin door with self closing hinges. The add on units can be stacked width wise to form a row of storages having a common side pannel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513. Heightwise adjustable sheves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.Epoxy Polyester powder coated to the thickness of 50 microns.Doors consdtruction made up of MDF & honeycomb with backing and decorative laminates. Self Closing Hinges and Mazak Handle. 2 mm thick lipping on all edges and 3 way locking mechanism.	2.00	Each		

366	Cabinets (Gain 500 x 500) Providing and placing 1980 mm Ht (2100 mm including skirting) Storage consisting (500 x 500 x 2100) units. of in completely knocked down construction. overall dimensions 1500 x 500 x 2100. Door Opening Twin door with self closing hinges. The add on units can be stacked width wise to form a row of storages having a common side panel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513. Heightwise adjustable shelves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.Epoxy Polyester powder coated to the thickness of 50 microns.Doors construction made up of MDF & honeycomb with backing and decorative laminates. Self Closing Hinges and Mazak Handle. 2 mm thick lipping on all edges and 3 way locking mechanism.	2.00	Each		
367	Cabinets (Gain 800 x 500) Providing and placing 1980 mm Ht (2100 mm including skirting) Storage consisting (800 x 500 x 2100) units. of in completely knocked down construction. overall dimensions 1500 x 500 x 2100. Door Opening Twin door with self closing hinges. The add on units can be stacked width wise to form a row of storages having a common side panel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513. Heightwise adjustable shelves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.Epoxy Polyester powder coated to the thickness of 50 microns.Doors construction made up of MDF & honeycomb with backing and decorative laminates. Self Closing Hinges and Mazak Handle. 2 mm thick lipping on all edges and 3 way locking mechanism.	2.00	Each		
368	Cabinets (Gain 1000 x 500) Providing and placing 1980 mm Ht (2100 mm including skirting) Storage consisting (1000 x 500 x 2100) units. of in completely knocked down construction. overall dimensions 1500 x 500 x 2100. Door Opening Twin door with self closing hinges. The add on units can be stacked width wise to form a row of storages having a common side panel. legs are fitted with screw type leveller adding 45 mm to the height. Body made from 0.5 & 0.8 mm CRCA combination. CRCA- D grade as per IS513. Heightwise adjustable shelves having load carrying capacity of 40 KG, Max 4 nos. of adjustable shelves.Epoxy Polyester powder coated to the thickness of 50 microns.Doors construction made up of MDF & honeycomb with backing and decorative laminates. Self Closing Hinges and Mazak Handle. 2 mm thick lipping on all edges and 3 way locking mechanism.	2.00	Each		

369	Table (Linea 1800 x 900) Providing and placing LINEA DESK based modular workstation with System ht - 750 mm UNDERSTRUCTURE: Comprising of metal powder coated cross connectors between legs, legs made up of metal powder coated finish and the entire assembly is fixed to the worktop with the help of ABS plastic spacers 20 mm high which gives the floating look to the w/s module. The respective finishes for the screens shall be fabric. Wire Management : Metal powder coated Cable pole of size 170mm w x 85 mm d x 705 mm ht/ is given to pull wires from the floor junction box upto the power box fixed under neath the worktop. Aluminium access flaps on worktop above power box cut out for accessing switches. Worksurface - out of 25 mm thk prelam particle board with flat pvc lipping edge banding of size 1800 mm w x 900 mm d. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 10 mm of uneven flooring.	3.00	Each		
370	Full Ht Partitions (Wish Full Ht Wall) Full Height partition shall be a modular system with overall thickness of 75mm for creating rooms/spaces and enclosures of varying sizes and offer multiple elevations incorporating together functional and decorative finishes. The system also shall offers features and options of doors, shelf and worktop fixing while having provisions for mounting of accessories like motorized blinds, access control. The offering shall include both single and double glazed partition. Main Frame Structure: Main structure shall be a combination of different Aluminum Sections made from Aluminum alloy 63400-WP and shall be powder coated with Epoxy Polyester or Anodized, varying in heights and widths to make a full height cabin up to 3000 mm below the false ceiling level. The frame structure shall be made by joining Aluminium Extrusions by means of brackets made of 3 mm Thk HR (IS-2062) and screws. Overall thickness of panel assembly shall be 66 mm. In elevations, the width of tiles shall vary from 300mm to 2400mm in pitch of 150mm and heights shall vary from 600 mm to 2400 mm (actual 534 mm to 2136 mm) in pitch of 600 mm. The system shall provide to make junctions straight partition panels as per approved layout. The super structure above false ceiling level shall consist of True ceiling mounting bracket which shall hold wooden batten frame work made from Rubber wood (50x50xlength of partition). The partition panel extrusions shall be grouted to this superstructure. The system shall have provision for leveling adjustment to compensate for floor unevenness (up to 40 mm) as well as false ceiling height difference(up to 15 mm). Provision shall be provided Horizontal adjustment at wall side with adjustment up to 20 mm. Fabric Tile: Fabric Non-tack tiles	1340.00	M2		

371	Low Ht Partitions (Wish Low Ht Wall) : Providing and placing panel & tile based partition with thickness as 52.4 mm thk and ht - 1200 including powder coated aluminium trims. Tiles: Combination of top tiles are fabric tackable & white board. Bottom tiles - Plain metal. SPLIT Tiles: Combination of two finishes for the top tiles on the user side shall be split fabric tackable along with white board. INTERMEDIATE BLOCKS Intermediate blocks are given in DL finish. Wire Management - Wires shall be taken into the system through cable ducts from the junction boxes and it is carried upto the panels through concealed conduits inside the blocks. Note: All partitions and side panels have levelling screws for adjustment in case of Uneven floor to take care of +/- 40 mm of uneven flooring. Partition thickness of 52.4 mm (minimum 50mm) thick including powder coated Aluminium trims and supported on Legs for better air circulation and helps in keeping floor clean. Panels Construction - Each panel consists of 2 nos. of vertical extrusions made of aluminum. Horizontal extrusions made of aluminium at every division of tile/block. These panels are supported on legs with levellers at various locations depending on the layout requirement. Bottom fram : Fabricated bottom frame for 52.4mm (minimum thickness 50mm) panel comprises of L-channels made of 2mm thick CRCA steel (IS: 513), formed plates of 3mm thick HR steel (IS: 2062) & ERW steel tube of size 35x15x1.6mm thick in oval cross section (IS: 7138) welded together. Powder Coating with average 50 to 60 micron thickness of epoxy powder coating. GABLE END PANEL : Gable end panels are made of 25mm thick <u>Prelaminated board and brackets are made from 2.0mm</u>	100.00	M2		
372	Providing and fixing of graphics/signages (including printing of direction, entry, exit, department name etc.) with self glowing signs 12"x6" as per specification and direction of Engineer-in-Charge.	sqm	50.00		
373	Providing and fixing of graphics/signages (including printing of direction, entry, exit, department name etc.) with backlit/ SS Plate signs 12"x6" as per specification and direction of Engineer-in-Charge.	sqm	45.00		
374	Providing & fixing of flex/ film with color printing on Glass/ partition/ wall as per specifications and direction of EIC/ Architect complete.	sqft	500.00		
375	Providing & fixing of SS backlit logo on wall/ partition as per specifications and direction of EIC/ Architect complete.	sqm	10.00		
TOTAL EVALUATED COST (SUM OF TOTAL COST FROM ITEM NO. 1 TO 375)					

NOTE :

- 1.0 The above Total estimated Contract price of the services should be inclusive of all taxes and duties but excluding Service Tax.
- 2.0 Service tax component is to be indicated separately which will be borne by OIL at actual. The Service Tax liability shall be discharged by the bidder/contractor and
- 3.0 The quantity mentioned above is for evaluation purpose only and payment to
- 4.0 Payment will be made on Monthly Basis.

[illegible]