**Oil India Limited**
**(A Govt. of India Enterprise)**
**P.O. Duliajan – 786602, Assam , India**

Telephone No. (91-374) 2800491
Fax No: (91-374) 2800533
Email: materials@oilindia.in ; erp_mm@oilindia.in

**Tender No. & Date** : **SDG0189P16/08 of 08.02.2016**

Tender Fee : INR 4,500.00 OR USD 100.00

Bid Security : Applicable

**Bidding Type** : **SINGLE STAGE TWO BID SYSTEM**

**Bid Closing on** : **06.04.2016 at 11:00 hrs (IST)**
**Technical Bid Opening on** : **06.04.2016 at 14:00 hrs (IST)**
**Bid Validity** : **Bid should be valid for 180 days from bid closing date.**

**Bid Bond Validity** : **Bid Bond should be valid up to 06/04/2017.**
**(Bid bond format has been changed. Please submit bid bond as per revised format)**

Performance Guarantee : Applicable

**OIL INDIA LIMITED** invites Global Tenders for items detailed below:

| Item No. / Mat. Code | Material Description | QTY. | UOM |
|---|---|---|---|
| 1. | Supply, Installation, Commissioning and Testing of Instrumentation Test & Calibration Bench as per the details mentioned in the following Annexures:<br>a) Detailed specification- Annexure -A.<br>b) Bid Rejection Criteria (BRC) and Bid Evaluation Criteria- Annexure-B. | 01 | No. |

**Special Notes:**

1.0 The tender will be governed by "General Terms & Conditions" for e-Procurement as per Booklet No. MM/GLOBAL/E-01/2005-July'12 for E-procurement (ICB Tenders) including Amendments & Addendum to "General Terms & Conditions" for e-Procurement.

2.0 Technical Check list and Commercial Check list are furnished. Please ensure that both the check lists are properly filled up and uploaded along with Technical bid.

3.0 The item qualifies for Nil Customs Duty / Deemed Export benefits. For Deemed Export benefits, please refer Addendum to the General terms and conditions for Global tender.

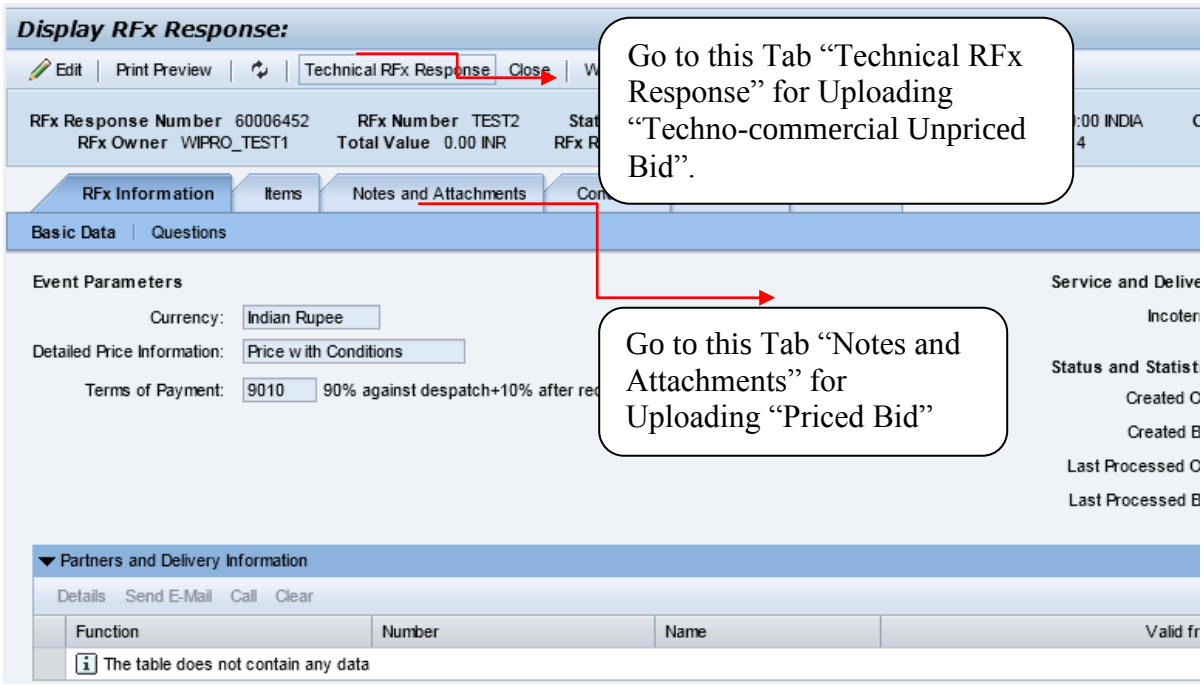
4.0 Please note that all tender forms and supporting documents are to be submitted through OIL's e-Procurement site only except following documents which are to be submitted manually in sealed envelope super scribed with tender no. and due date to The **Head- Materials, Materials Department, Oil India Limited, Duliajan- 786602, Assam** on or before 13:00 Hrs (IST) on the Bid Closing Date mentioned in the Tender.

a) **Original Bid Security.**
b) **Detailed Catalogue and any other document which have been specified to be submitted in original.**

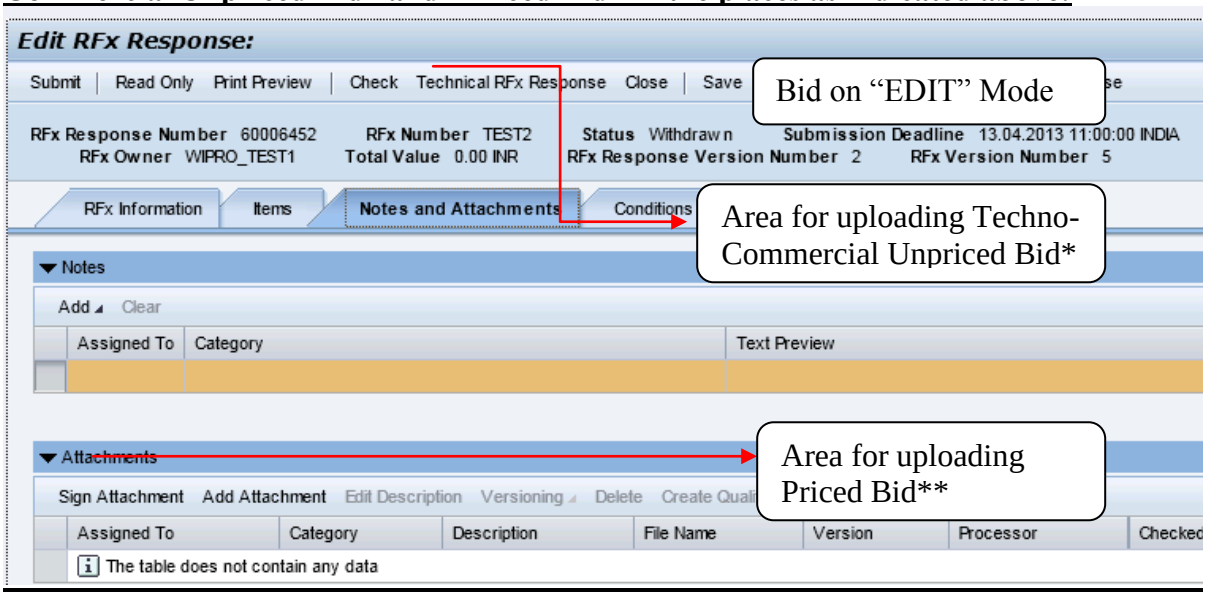
5.0 In case of SINGLE STAGE-TWO BID SYSTEM, bidders shall prepare the "Techno-commercial Unpriced Bid" and "Priced Bid" separately and shall upload through electronic form in the OIL's e-Tender portal within the Bid Closing Date and Time stipulated in the e-Tender. The "Techno-commercial Unpriced Bid" shall contain all technical and commercial details except the prices which shall be kept blank. Details of prices as per Bid format / Commercial bid to be uploaded as attachment in the Attachment Tab "Notes and Attachments".

**A screen shot in this regard is given below.**

Any offer not complying with above submission procedure will be rejected as per Bid Rejection Criteria mentioned in the tender.



**On "EDIT" Mode- The following screen will appear. Bidders are advised to Upload "Techno-Commercial Unpriced Bid" and "Priced Bid" in the places as indicated above:**




**Note :**

* The "Techno-Commercial Unpriced Bid" shall contain all techno-commercial details **except the prices**.

** 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 the Sign. On Signing a new file with extension .SSIG will be created. Close that window. Next click on Add Atachment, 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.

6.0 Bidders are requested to examine all instructions, forms, terms and specifications in the bid. Failure to furnish all information required as per the bid or submission of offers not substantially responsive to the bid in every respect will be at the bidders risk and may result in the rejection of its offer without seeking any clarifications.

7.0 The Integrity Pact is applicable against this tender. OIL shall be entering into an Integrity Pact with the bidders as per format enclosed vide Annexure VI 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. 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 any bidder refuses to sign Integrity Pact or decline to submit Integrity Pact with the offer, their bid shall be rejected straightway".**

OIL's Independent External Monitor at present are as under:

**(I) SHRI RAJIV MATHUR , IPS(Retd.)**
**e-mail:** rajivmathur23@gmail.com

## 8.0 **Pre –Bid Conference :**

(A) A Pre-Bid Conference with the Parties will be held at **Guwahati (Assam) (India) on 8th March, 2016 and 9th March,2016** to discuss on the technical specifications and other terms and conditions of the tender. All the Parties who purchase the Tender Document within the closing date of sale of the tender, will be eligible to attend the Pre-Bid Conference. The exact venue and time of the Pre-Bid conference will be intimated to the Parties at a later date.

**(B)** Clarification on the technical specifications and other terms & conditions shall be provided to the parties during the Pre-bid Conference. Parties should come fully prepared to the Pre-bid Conference and submit their queries to OIL in the Pre-bid Conference for clarification. More than two persons will not be allowed from each party and they should depute representatives who are competent enough and authorized to take spot decision. **The set of queries may also be sent to OIL latest by 04/03/2016 for study by OIL.**

(C) Any changes in the technical specifications and other terms & conditions arising out of discussion in the Pre-bid Conference shall also form part of the tender document.

(D) Parties, immediately after the purchase of the Tender documents, shall inform OIL at the following address about their participation in the Pre-Bid Conference with details of the persons to enable OIL to make arrangement for the Pre-Bid Conference.

HEAD – MATERIALS
OIL INDIA LIMITED
P.O DULIAJAN, PIN – 786 602
DIST. DIBRUGARH (ASSAM) INDIA
FAX NO. : +91 - 374 – 2800533
E-Mail: matdmmfd@oilindia.in
materials@oilindia.in

**ANNEXURE- A**
**(Tender No. SDG0189P16/08)**

# Technical Specifications

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## 1. INTRODUCTION

### 1.1 Background

1.1.1 OIL INDIA LIMITED (OIL), a Govt. of India "NAVARATNA" category Enterprise, is a premier oil Company engaged in Exploration, Production and Transportation of crude oil& natural gas with its Field Headquarter at Duliajan, Assam. Duliajan is well connected by Air with nearest Airport Dibrugarh, 45 km away. Instrumentation department of M/s OIL is an ISO 9001-2008 certified Department, provides support for procurement, installation, commissioning and maintenance of field instruments in Production and Drilling installations in OIL. Electronics and Pneumatic workshop of Instrumentation Department does calibration, repairing, testing and certification to all Electronics & pneumatic process instruments/sensors used in Production and Drilling Installations. Instrumentation workshop also extends services to laboratories in other departments like Chemical, R&D & Medical etc. for day to day operation as well as for the purpose of ISO certification.

1.1.2 Existing Test Bench of Instrumentation workshop is more than 24 years old (from the year of acquisition i.e. 1991) and has crossed its expected life. The calibration system of this Bench can support only one parameter of one instrument at a time.

1.1.3 Considering obsolesce & unreliable performance of existing system as well as present requirement of Instrumentation workshop, one latest state-of-the-art complete instrumentation test & calibration bench with calibration management system for pressure, temperature & electrical parameters is require to meet operational & ISO requirements.

1.1.4 In view of above, we intend to modernise our Instrumentation workshop with a computerised, automatic instrumentation calibration management system for smooth testing, calibration with multitasking calibration facility. Therefore, one number **Instrumentation Test & Calibration Bench**, with provision of total calibration management system, tailor made to Instrumentation workshop's requirement, is to be procured by M/s OIL covering Pressure and Temperature range up-to 30,000 psi and 650 DEG C respectively.

1.1.5 The proposed state-of-the-art instrumentation test and calibration bench, having calibration management system, multiple input handling facility, auto calibration as well as customized calibration report generation facility, shall help Instrumentation workshop to cope up all calibration jobs with existing manpower.

1.1.6 The bench should have following minimum features:

- Pressure calibration up-to 30,000 psi.
- Temperature calibration up-to 650 DEG C.
- Auto calibration facility for Pressure and Temperature.
- Calibration of HART and FF instruments
- Simulation of Voltage, Current source, Thermocouple, RTD etc.
- Generation of different types of electrical signal.
- Calibration of field testing instruments like Multi meter, Insulation Tester etc.
- Facilities for testing and repairing of electronics cards.
- Automatic generation of calibration report.
- Storage facility for calibration data.

### 1.2 Intent of the Specification

1.2.1 The intent of the specification is to enable the bidder to submit their best offer as per scope of enquiry described in **Chapter 3** of the Tender Specification, which is intended to achieve the requisite design and technological parameters as indicated in **Chapter 4**, realization of performance guarantee as mentioned in **Chapter 22** and as per special instruction to bidders as per **Chapter 25** of this specification.

1.2.2 The specification shall be read in conjunction with the Standard Bidding Document (SBD) published by M/s OIL, Notice for Invitation of Tender (NIT) and any other instructions to the bidders issued by M/s OIL enclosed with the tender documents.

## 2. SITE CONDITIONS / DESIGN DATA :

| | | |
|---|---|---|
| 2.1 Owner/ Purchaser | : | M/s OIL INDIA LIMITED |
| 2.2 Location | : | Duliajan, Assam |
| 2.3 Ambient air temperature | | |
| a) Maximum | : | 40.0 Deg. C |
| b) Minimum | : | 6.5 Deg. C |
| c) Average | : | 26.5 Deg. C |
| Reference Temperature For design of electronic Equipment/ Devices | : | 50.0 Deg. C |
| 2.4 Relative Humidity % | | |
| Maximum during monsoon | : | 100% at 21 Deg. C |
| b) Minimum | : | 70% at 41 Deg. C |
| c) Average | : | 95% at 32 Deg. C |
| 2.5 Rainfall | | |
| a) Maximum | : | 480 mm (in July) |
| b) Minimum | : | 27 mm (in November) |

It rains throughout the year.

## 3. SCOPE OF ENQUIRY

### 3.1. General

3.1.1. The above test bench is required for Instrumentation workshop of OIL INDIA LIMITED, Duliajan, Assam.

3.1.2. The scope of work for supplying and commissioning of **Instrumentation Test & Calibration Bench** in Instrumentation workshop of M/s OIL shall broadly comprises of design, engineering, manufacturing, assembly, testing, packing, supply, handling, storage at site, erection, testing, integrated commissioning and handling over of complete instrumentation test & calibration bench with integrated computerised calibration management system to M/s OIL. The scope shall also cover supply, laying, termination, testing and commissioning of all the cables power, signal, special / communication networking as necessary for installation for the system including civil work necessary for laying of trays cable inserts and also to train M/s OIL personnel on Operation & Maintenance (O&M) of the proposed Instrumentation test & calibration bench.

3.1.3. All installation work of test bench & its accessories shall be in the scope of bidder.

3.1.4. All required erection materials, accessories, earthing system commissioning spares, tools and tackles shall be in scope of bidder. Mounting stands for pressure & DP transmitters and High pressure gauge as well as for temperature transmitter shall be supplied & erected by the bidder.

3.1.5 All commissioning spares like battery, battery charger seal kit, fittings, electrical connectors etc., has to be supplied at Bidder's cost.

3.1.5. Coloured TB & different colour wire with proper ferrule shall be used for different signal, power in the test bench.

3.1.6. Necessary signal, power cable supply, cable laying etc. jobs for 230 V AC, 50 Hz from main feeder to test benches shall be considered. For this required power distribution box complete with circuit breakers, lamps, switches & TBs etc. shall be considered by bidder. 20% spare TB, circuit breakers, fuse, lamps, spare core for cables etc. shall be considered as a part of supply. All power cables inside panel shall be 3 core, 2.5 mm sq. armoured, stranded copper with Heat Resistance PVC as per relevant IS standard. Earthing cable shall be stranded 10 sq mm (for main) cable & 4 sq mm for individual shall be used. Or as per OEM's standards. At-least one spare core on all type of cables shall be considered.

3.1.7. Supply of furniture and chairs (6 nos. cushion chairs having powder coated metal framed with 5 caster legs), one table for printer and communication interface unit and any special cables, computer / printer cables will also be under bidder's scope.

3.1.8. Supply & laying of SS pipe for pneumatic supply from existing as well as new compressor/ vacuum pump to Test Bench shall be considered by bidder.

3.1.9. Necessary fittings, hoses & tubing of required rating (rated value shall be at least 150% of max. operating value) shall be supplied by bidder to hook existing accessories required for this Test Bench. Test certificate of the fittings & piping has to be produced by the bidder during installation and all test certificates should be handed over to M/s OIL. Supply of one set of spares for all type hoses, fittings etc., other than in use is under Bidder's scope.

3.1.10. Supply of necessary erection hardware, accessories, cabinets, racks etc. as required for completing installation of Test Bench.

3.1.11. Hand pumps will be used for the following applications:

- Simple pressure generation for on site, laboratories or workshops (Max pressure can be achieved within three to four nos. of pressing)
- For testing, adjusting and calibrating all types of pressure measuring instruments.
- Hydraulic (DM water)pressure generation up to 700 bar

Hand pump shall have following features: Ergonomic handling, precise setting of pressure via a fine adjustment valve, compact size, and low weight for pressure generation at site, laboratories or workshops.

3.1.12. Vacuum pumps have to be installed by the bidder for negative pressure generation and the same shall be hooked up to the Test Bench.

3.1.13. Up-to 5000 PSI quick push fit type fittings with automatic shut off valve shall be considered & those fittings are mounted directly on the front facia of the Test Bench. Above 5000 PSI, fitting with NRV (Non Return Valve) to be consider.

3.1.14. Bidder has to make separate earth pit for the Instrumentation Test & Calibration Bench. The bidder needs to carry out necessary design including laying of cables. The location will be as per OIL's advice.

3.1.15. Site for storing the materials will be allotted to the bidder within 100 metres distance from the erection site. Transportation of materials to this store and there from to the erection site shall be the exclusive responsibility of the bidder. Before transportation all materials shall be suitably and securely packed and boxed.

3.1.16. The Bidder shall provide necessary erection consumable like oxygen and acetylene gas, welding rods, solder lugs, lubricants, oil, cotton waste etc. at his own cost. The Bidder shall also mobilise himself with adequate material handling equipment in addition to other erection tools and consumable keeping in view the erection schedule.

3.1.17. Transportation and dumping of all waste on day to day basis arising out of dismantling, construction, fabrication and erection to the area during Installation and Commissioning as directed by the executing authority shall be done by the Bidder.

3.1.18. Visual inspection, cold run tests/ performance guarantee tests and commissioning of the test & calibration equipment at Instrumentation workshop as per the Specifications.

3.1.19. Conducting performance guarantee tests will be the responsibility of the Bidder. The program of tests will be drawn in advance for approval by M/s OIL.

3.1.20. Bidder shall submit test certificates for the equipment/components used for the system.

3.1.21. Bidder needs to offer complete package as per NIT. Bidder who does not have complete range of products as mentioned in BOM, may arrange that item(s)/equipment from other make(s) as mentioned in "**List of Preferred Make** " as per **Annexure:8-1** to complete their offer.

3.1.22. All the major instruments should be supplied with a suitable size of container so that same can be dispatched to third party for calibration in future.

3.1.23. The tender document includes the detailed information of the project (**Chapter 1 & 2)**, Scope of Supply & Technical Specification (**Chapter 3 and 4**), other requisite formats (**Chapter 26 & 27**) and Bid Rejection Criteria / Bid Evaluation Criteria (BEC / BRC) vide **Chapter 28.**

3.1.24. Bidders must take cognizance of all the Chapters of this document. The technical check list (**Annexure-1**) will be considered as one of the main basis for carrying out the technical evaluation. Similarly bidders must submit their price bids and Summary of Price as per the format given vide **Schedule 1**. This tender is subjected to BEC/BRC as given in **Chapter 28.**

## 4 TECHNICAL SPECIFICATION

### 4.1 Design Conditions

4.1.1 All test & calibration equipment shall be designed for continuous duty operation in industrial environment.

4.1.2 System shall be designed with inbuilt safety system for operating and maintenance personnel.

4.1.3 Test & Calibration Management System shall be of modular design for future expandability / modification.

4.1.4 All equipment connected to test bench shall have computer interface, supporting software & communication port for data storage & retrieval& can be hooked up with PC for bi-directional communication wherever possible.

4.1.5 All Master Calibration Instrument/equipment to be installed in the test bench should have Accredited NABL certified.

4.1.6 Proposed multi-function calibration test bench with integrated computerized calibration management system will be consisting of :

- Very High Pressure Section (0 to 2000 bar)
- High Pressure Section ( 0 to 1000 bar)
- Medium Pressure Section (–ve to 70 bar)
- Low Pressure/ Draft Pressure Section( +/- 50 mbar and +/- 1000 mbar)
- Temperature Section (Liquid bath & Dry block, Temperature up-to 650 DEG C)
- Electrical Section

4.1.7 The above facility shall be supplied in a console which is designed scientifically with sufficient working space and necessary mounting/installation accessories as required. The Bench shall be supplied with other necessary fittings, connecting hoses, tools and tackles as per actual requirement and specification mentioned herewith.

Following points to be noted by the bidder:

- For Pressure generation up-to 100 bar will be pneumatic type.
- Connecting Block for connecting both sides Impulse pressure to DP Transmitter/Instrument to be supplied.
- Test Bench should have inbuilt facility to Calibrate HART & Foundation Field Bus based Instruments.

4.2 **Design Concept & Description of Console Test Bench**

4.2.1 Test bench should have modular & console type design with all facilities accessible from front for easy operation & arrangement of the modules. In the same test bench there should be **four** standalone setup/sections for pressure, **two** standalone setup/sections temperature & **one** standalone setup/sections electrical calibrations. Two PC (desktop) loaded with necessary software for calibration management system, automatic generation of calibration certificates in customised format.

4.2.2 The test bench shall be of systematic and aesthetic design, with provision of sufficient testing space to check and calibrate various types of instruments.

4.2.3 The shape of the test bench should be as per Schematic given in **Annexure: 4.2.3-1**. First two sections will be exclusively for pressure (**up to 1000 bar**) and temperature application; another two sections will be for electrical /electronic and high pressure (**up to 2000 bar**), sufficient support to be provided in each section to place independently. Two PC consoles to be mounted at the corner of the test bench with key board & CPU tray provided accordingly (final position will be decided during engineering design). One more separate table to be provided exclusively for printer common for both and placed near to the PC to be used for connecting the same.

4.2.4 The Test Bench should be implemented with section with three fully automatic pressure controllers having ranges (**±50 mbar and ±1000 mbar**), **vacuum to 70 bar** and **0 to 1000 bar.** Individual setup/section shall be complete with all attachment, accessories, modules/calibrator cum indicators/multifunction calibrators, controllers, generator etc.

4.2.5 For very high pressure (i.e. from **0 to 2000 bar**) calibration a comparator with digital display shall be considered. The design shall be for semi-automatic operation only. All the instruments along with three/two numbers of dead weight testers. These dead weight testers will be master calibrator for

three pressure controllers as indicated in point **4.2.4** and to be placed together at the end of Electrical section of test bench.

4.2.6 The bidder needs evaluation of Gravity value of Instrumentation Workshop by **Survey of India (SI)** where dead weight testers will be place. The same value has be use in the dead weight testers. Price for the same to be quoted separately.

4.2.7 For temperature calibration, another setup/section with liquid bath and dry furnaces shall be provided separately. The same shall be integrated to Data Acquisition System (DAQ) as well as PC to complete calibration in all respect.

4.2.8 The instruments supplied in the Test Bench should be of pane mounted type and modular in design. Portable & battery type instruments are not to be mounted in the Test Bench.

4.2.9 For each pressure range (except very high pressure), manifold with 3 ports complete with isolation valve for calibration of transmitters/gauges etc. to be supplied for doing calibration numbers of instruments at a time.

4.2.10 All Power/signal connections of the Master instruments should be terminated in the terminal base so that the output/input terminals of Masters are free from regular wear and tear.

4.2.11 All the connections from the instruments to the terminal base should be done at the back side of the consoles and dimension of the consoles should be chosen in such a way that sufficient space should be maintained for each type of wiring.

4.2.12 Care should be taken so that sufficient space is maintained for accessible by our maintenance personnel.

4.2.13 All the starting switches and mimic panel shall be located on the front portion for ease of accessibility.

4.2.14 Each section of Test Bench (i.e. Pressure, Temperature and Electrical) shall have at least 4 drawers, having minimum size of 500 mm wide x 200 mm height.

4.2.15 All equipment as indicated above shall have computer interface, supporting software & communication port for data storage & retrieval and can be hooked up with PC for bi-directional communication wherever possible for which details of the equipment required are mentioned as under:

- Supply & fixing of one no. overhead lamps in each section of the bench.
- Four nos. AC sockets module round Type to be provided for 230V, 16A/5A outlets with individual MCBs in each section of the bench.
- Blank Module to be provided on the Bench for future expansion in both sides of the bench.
- Sufficient space to be kept at the back for easy accessible of the instrument remove or repair or for some other activities

4.2.16 The stainless steel tubes/pipes used in the Test Bench i.e. from existing compressor to the calibration point should be of tested for **one and half times** of the maximum rated pressure and for the same certificate is to be provided from the OEM.

4.2.17 The push fit connectors used in the Test Bench should be of panel type version with inbuilt automatic shutoff valve and the male plugs to be supplied along with the Test Bench and push fit connectors should be fitted in the front facia of the test bench.

4.2.18 The electrical sockets installed in the Test Bench should be of IP65 rated complete with shutter proof technology.

4.2.19 Programmable DC Power Supply with a range 0 to 32 V DC, 5 Amp and the same should be programmable through PC.

4.2.20 Temperature bath should be supplied along with 10 channels **DAQ** for calibration and data logging of multiple transmitters/sensors.

4.2.21 A laboratory environmental monitor should be supplied with Relative Humidity **(RH)** as well as temperature module and the same shall be interfaced with PC for recording in the calibration certificates.

4.2.22 A separate electrical vacuum pump with the pneumatic section to be provided.

4.2.23 HART/FF modules to be accessed/selected for configuration from the PC software during calibration of transmitters. HART should be inbuilt to each calibrator/module/multifunction calibrator. For FF communication, bidder may use modem separately or inbuilt as per their design. Necessary software for HART & FF shall be supplied with licence.

4.2.24 Software package should have facilities for storing calibration data at least for 6000 nos. instruments per year.

4.2.25 2KVA UPS (minimum 20 minutes backup) shall have to be considered for power supply to PC & Printer of the Test Bench by bidder.

4.2.26 For Temperature Bath, Temperature Dry Block, pump, compressor, Fume Extractor and Hydraulic Pressure Controllers, 230 V AC Non UPS power supply shall be used.

4.2.27 Hand pump shall have following features: Ergonomic handling, precise setting of pressure via a fine adjustment valve, compact size, and low weight for pressure generation at site, laboratories or workshops (achieving max pressure within three to four nos. pressing).For high pressure generation DM water type shall be considered.

4.2.28 Suitable transmitters stands & clamps for fixing the flanges, transmitters & gauges to be supplied and the same to be mounted in the Test Bench.

4.2.29 Test bench should cover **vacuum to 2000 bar** pressure range as per design concept explained above. Test bench should cover the temperature from ambient to **650 DEGC** and different electrical parameter. Necessary pressure generator, module, calibrator, multifunction calibrator, furnaces, multiproduct calibrator, tubing, fittings, power supply, PC, software etc. as described in design concept, scope of work & technical specification shall be considered by bidder for completeness of proposed **Instrument Test & Calibration Bench.**

4.2.30 From the above concept the bidder should submit preliminary drawings/layout along with the bid.

**4.3 Main Electrical Supply Module**

4.3.1 There shall be single phase electrical supply unit with On / Off switch and protective circuits. Bidder to provide three such modules with appropriate rating. These module shall be mounted on wall and each module shall consist of the following:

- Breaker with appropriate rating
- Residual Current Circuit Breaker (Earth Leakage Circuit Breaker) with suitable rating.
- LED Indicator
- Key "ON" switch
- Emergency Stop Push Button

4.4 Instrument having more than 5 Amp power rating shall have individual circuit breaker.

4.5 Supply of all necessary special tools and tackles for regular handling and maintenance.

4.6 Facility to have individual overload protection, overpressure protection, quick releasing facility wherever applicable.

4.7 Facility to be provided for configuring switch setting (Pressure & Temperature) either through the individual calibrating instrument or through PC.

4.8 PC hooking up with individual instruments shall be based on IEEE-488/GP-IB/RS232C communication or through MOD Bus protocol and all individual connections of the instruments to PC will be through Multi-dropping technique via USB port.

4.9 Minimum 2 nos. port for 4 to 20 mA source & measurement where ever required.

4.10 Minimum 2 nos. 24V DC socket for instrument calibration with proper protection facility.

4.11 A RH meter along with indicator of adequate display size of reputed make to be mounted at the centre of the test bench for display of humidity and room temperature inside the calibration hall. The same values to be registered in the calibration report before start of each and every calibration.

4.12 **Integrated Computerised Calibration Management System**

4.12.1 Integrated computerized calibration management system will facilitate the accurate calibration, preparation and storage of calibration records, reports and history information for each instrument and to fulfil the ISO 9001:2008 calibration documentation requirement. System shall make the calibration job more systematic, identify the instruments / control loops due for calibration in advance, reduces the time of calibration and helps to store the calibration records in electronic medium for future reference.

4.12.2 The integrated computerised calibration management system shall consist of two PC (latest model) loaded with various application software for all testing and calibration activities in the multi-function calibration bench. The laser printer shall be supplied for generating various calibration reports.

4.12.3 Latest licensed version software shall be window-based, menu driven, user friendly, having facility for 10 point calibration and printing calibration report as and when required. The software shall be able to communicate to other computers for transferring the calibration data. The software shall be able to identify the instruments / process quality loops (under ISO 9001:2008 quality system) due for calibration / test well in advance & the time period shall be defined as and when required. The software shall be capable of generating various reports to fulfil the requirements of ISO-9001:2008. The calibration software should have at least the following facilities:

- Automatic process data reading, setting and transfer to PC. The operator interactions shall be simple and menu-driven basis
- Display measured data with date, time tag no and other conventional data in the ISA format
- Temperature ramp and hold set-point control (both ways)
- Job definition and job selection
- Automatic temperature calibration set-up
- Calibration setting retrieval from history data bank
- Configurable history documentation
- Manual input to accommodate data from conventional instruments.
- Manual temperature / pressure flow / setting
- Connectivity of all above instruments and its configuration / monitoring etc.

- Monitoring and controlling the pressure and multi meter and other devices of the test & calibration bench
- Provision should be there to decide the weight requirement to generate specific pressure for dead weight tester
- Capable to give corrected result with consideration of temperature and density.
- Graphical representation of date shall be possible
- Visual and audible alarms for switch checking.
- MIS report -The data storage and report generation shall be in line with ISO 9001:2008 fulfilment e.g. 1) Calibration report 2) Instrument Calibration procedures
- Effective scheduling of calibration and documentation of instruments
- Should support communication protocol like HART and FF for smart type transmitter
- Facility should be available to incorporate any future changes in existing format.

4.12.4 Bidders shall detail out all the features available and support the same with documentary evidence.

4.12.5 All software should be provided **with lifetime licence**. Future software up-gradation/ patch up-gradation shall be free of cost. Bidders shall provide confirmation for the same along with the bid.

4.13 **Very High Pressure Calibration Section:**

High pressure calibration section shall be suitable for testing, simulation & calibration of field instruments and primary instruments in semi-automatic mode and it should be dedicated for measurement & simulation of pressure, so as to calibrate and test pneumatic, electronic and smart transmitters, pressure switches and other industrial parameters. In brief, the said section shall be comprised of the following:

- Generating and calibrating pressure from **0 to 2000 bar** through comparator with digital display.

- Provision of calibrating all types of gauges/transmitters and arrangement to be made for providing suitable hose, connector, adapter, mounting arrangement etc.

- Provision for placing all dead weight testers.

4.14 **High Pressure Calibration section**

High pressure calibration section shall be suitable for testing, simulation & calibration of field instruments and primary instruments in automatic mode and it should be dedicated for measurement & simulation of pressure, so as to calibrate and test pneumatic, electronic and smart transmitters, pressure switches and other industrial parameters. In brief, the said section shall be comprised of the following:

- Generating and calibrating pressure from **0 to 1000 bar** through pressure controller with motorized pressure generator and ten points / step and ramp calibration techniques for various type smart (both HART & FF) and ordinary transmitters, switches, gauges etc with precise control.

- Provision of calibrating all types of gauges/transmitters which also includes diaphragm type capillary gauges, diaphragm seal type capillary transmitter with 1.5" / 150 lbs, 1.5"/300 lbs, 2"/150 lbs, 2"/300 lbs, 3"/150 lbs, 3"/300 lbs and arrangement to be made for providing suitable adapter of connecting these flanges externally. All the flanges shall be suitable for ANSI B 16.5 only.

- Facility to be provided for calibration/configuration of pressure switch either through the individual calibrating instrument or through PC

4.15 **Medium Pressure Generation & Measurement**

Medium pressure calibration section shall be suitable for testing, simulation & calibration of field instruments and primary instruments in automatic mode and it should be dedicated for measurement & simulation of pressure, so as to calibrate and test pneumatic, electronic and smart transmitters, pressure switches and other industrial parameters.

- Dry Booster pump for pneumatic pressure generator of range **0 to 100 bar** with volumetric variator for fine adjustments and vacuum pump for vacuum pressure. The booster pump should have air drier in the inlet side and the dew point should be less than - 20 deg C. Push button to vent the generated pressure to be provided along with 2 output plug-in quick fit connectors. In addition to the above, manual hand pump shall be fitted in the panel for generation of vacuum & pressure -1 to + 20 bar with volumetric variator.

- Settable regulated pressure: Three point circuits fed from the external air supply, with three precision pressure regulators, independently settable at three different values within the standard range 0 to 100 bar, mechanically interlocked push button pneumatic selector, output plug-in connectors. This circuit shall allow quick standards three point calibrations.

In brief, the said test bench section shall be comprised of the following:

- Generating and calibrating pressure from **vacuum to 70 bar** through pressure controller with motorized pressure generator and ten points / step and ramp calibration techniques for various type smart and ordinary transmitters, switches, gauges etc with precise control.

- Provision of calibrating all types of gauges/transmitters which also includes diaphragm type capillary gauges, diaphragm seal type capillary transmitter with 1.5" / 150 lbs, 1.5"/300 lbs, 2"/150 lbs, 2"/300 lbs, 3"/150 lbs, 3"/300 lbs and arrangement to be made for providing suitable adapter of connecting these flanges externally. All the flanges shall be suitable for ANSI B 16.5 only.

- Facility to be provided for calibration/configuration of pressure switch either through the individual calibrating instrument or through PC

4.16 **Low Pressure/ Draft Pressure Generation & Measurement**

- Generating and calibration of pressure/vacuum ranging from **± 50 mbar and ± 1000 mbar** through pressure controller with ten points / step and ramp calibration techniques for various type smart transmitters, switches, Gauges etc.

4.17 Facility for calibration of P/I and I/P converters with the range of 0 to 15 PSI. Necessary indicators to be provided along with fine control for calibration of the set.

4.18 All the terminals of the test bench should be levelled properly for correct identification.

4.19 **Electrical Calibration section**

The electrical section should have Multiproduct calibrator, Oscilloscope, Function Generator, 6.5 digits multimeter, Decade Resistance Box, Soldering-De soldering station, AC and DC power supplies etc. The multiproduct calibrator should capable of calibrating all the instruments in the Electrical section of the test bench including 10 Channel DAQ (except Decade Resistance Box and Soldering-De soldering station). All the above equipment/ module should be penal mounted except Decade Resistance Box.

4.20 **Temperature Calibration section**

- The temperature calibration section consists of liquid type temperature baths of range ambient to 300 DEG C along with necessary power supply, controller/indicator, temperature sensor type selector and RS 232C port for communication and Data storing facility. Minimum 8 nos. slots shall be inbuilt feature for TC or RTD to be calibrated at a time.

- Temperature generation by using Dry block of temperature range up to 650 DEG C should be considered in the calibration test bench along with necessary power supply, Controller/indicator, Temperature Sensor type selector and RS 232C port for communication and Data storing. The temperature calibration facility shall be suitable for ten point / step calibration suitable various type / make smart transmitters. Minimum 4 nos. slots shall be inbuilt feature for TC or RTD to be calibrated at a time.

- Both temperature bath and dry block shall be fitted with the test bench and trolley/wheel mounted

- This section should include penal mounted DAQ & Lab Environment Monitor.

- Fume Extractor to be fitted above the Temperature Bath

- Facility for Selection of temperature element with 2, 3 & 4 wire system.

- Multiple T/C & RTD readings at DAQ

4.21 **Technical Specification of Different Equipment of Test Bench**

4.21.1 **Pressure Calibration Section:**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Pressure Calibration Section | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Test Bench Make | CRCA Sheet and Front Plates Made of Anodized Aluminium with Mimic panel for Test & Repair of Pneumatic Instruments | |
| 4.2 | Design | Modular in Design, Enabling Easy Change of Arrangement. Laminated Top with Compressed Ply for carrying heavy duty Work. | |
| 4.3 | Type | Fully Powder Coated ( RAL 7035 (Colour)) | |
| 4.4 | Test Bench Dimension | 2000mm (L) x 1500mm (H) x 900mm (D) | |
| 4.5 | CRCA Sheet Thickness | 1.5 mm | |
| 4.6 | Anodized Aluminium Panel Thickness | 6 mm | |
| 4.7 | Table Top with Laminated Thickness | 35 mm | |
| 4.8 | Illumination | Overhead Lamp for Illumination | |
| 4.9 | Wiring | Wiring with cross ferruling, connections with crimped cable legs and proper channeling. | |

**Note: Proper cut out should be provided to mount all test instruments as mentioned in the NIT**

4.21.2 **Pneumatic Pressure Controller (+/- 50 mbar and +/- 1000 mbar)**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Low Pressure Controller | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Ranges | +/- 50 mbar and +/- 1000 mbar | |
| 4.2 | Display | Multi-line graphic display | |
| 4.3 | Display Resolution | 4 digits | |
| 4.4 | Mounting | Panel Mount | |
| 5. | **Technical specification** | | |
| 5.1 | Controller Accuracy | 0.015 % FS | |
| 5.3 | Numbers Of Pressure Sensor | Two | |
| 5.4 | Pressure Sensor Accuracy | 0.015 % of FS | |
| 5.5 | Low Pressure Sensor Rang | ± 50 m Bar | |
| 5.6 | High Pressure Sensor Rang | ± 1000 m Bar | |
| 5.7 | Ingress Protection | IP 20 | |
| 5.8 | Pressure Generation | Automatic | |
| 5.9 | Interface | USB , RS-232 | |
| 5.10 | Power consumption | 30 VA | |
| 5.11 | Operating temperature | 20 to 35 °C | |
| 5.12 | Storage temperature | 50 °C | |
| 5.13 | Relative humidity | 80 % RH. (non-condensing) | |
| 6 | **Accessories** | Operation Manual | |
| | | Power Supply Cable | |
| | | Interface cable | |

4.21.3 **Pneumatic Pressure Controller (0-70 bar)**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Pressure Controller | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical Specifications** | | |
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Pressure measurement | Range: Vacuum to 70 bar | |
| 4.3 | Controller Accuracy | 0.015 % FS | |
| 4.4 | Controller Precision | 0.005% FS | |
| 4.5 | Numbers Of Pressure Sensor | Two | |
| 4.6 | Pressure Sensor Accuracy | 0.015 % of FS | |
| 4.7 | Low Pressure Sensor Rang | -990 m Bar to 20 Bar | |
| 4.8 | High Pressure Sensor Rang | 1 to 70 Bar | |
| 4.9 | Pressure Units | 15 engineering unit | |
| 4.10 | Permissible pressure media | Dry and Clean Air or Nitrogen | |
| 4.11 | Filter Element | All pressure ports have 20-micron filters | |
| 4.12 | Overpressure protection | Safety relief valve | |
| 4.13 | Display | Touch-screen | |
| 4.14 | Display Resolution | 5 digits | |
| 4.15 | Interface | IEEE, Ethernet, USB, RS-232 | |
| 4.16 | Power Supply | AC 220- 240 V, 50 Hz | |
| 4.17 | Power consumption | 100 W (maximum) | |
| 4.18 | Operating temperature | 15 to 35 °C | |
| 4.19 | Storage temperature | Up to 50 °C | |
| 4.20 | Relative humidity | 0- 95 % R.H. (non-condensing) | |
| 5 | **Accessories** | Operation Manual | |
| | | Power Supply Cable | |
| | | Interface cable | |

4.21.4 **Hydraulic Pressure Controller (0-1000 bar)**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | High Pressure Controller | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Ranges | 0 to 1000 bar | |
| 4.3 | Display Resolution | 5 digits | |
| 4.4 | Power Supply | AC 220 - 240 V, 50/ 60 Hz | |
| 5. | **Technical Specification** | | |
| 5.1 | Mounting | Panel Mount | |
| 5.2 | Controller Accuracy | 0.015 % of FS | |
| 5.3 | Numbers Of Pressure Sensor | Two | |
| 5.4 | Pressure Sensor Accuracy | 0.015 % of FS | |
| 5.5 | Low Pressure Sensor Rang | 0 – 600 Bar | |
| 5.6 | High Pressure Sensor Rang | 0 – 1000 Bar | |
| 5.7 | Pressure medium | Hydraulic oil or water | |
| 5.8 | Control stability | 0.008 % of FS | |
| 5.9 | Pressure Units | Minimum 15 | |
| 5.11 | Filter Element | All pressure ports have 20-micron filters | |
| 5.12 | Permissible pressure media | Dry clean air or nitrogen | |
| 5.13 | Overpressure protection | To be provided | |
| 5.14 | Permissible pressure (supply port) | Up to 8 bar | |
| 5.15 | Interface | IEEE-488.2 and RS-232 | |
| 5.16 | Power consumption | 150 VA | |
| 5.17 | Operating temperature | 15 to 35 °C | |
| 5.18 | Storage temperature | 50 °C | |
| 6 | **Accessories** | Operation Manual | |
| | | Power Supply Cable | |
| | | Interface cable | |

4.21.5 **Multifunction Calibrator**

| Sr. No. | Specifications | | Vendor Compliance |
|---|---|---|---|
| 1 | Item | Multifunction calibrator | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Measurement | Simultaneously measure electrical, temperature, or pressure signals from transmitter output. | |
| 4.2 | Display | To be provided | |
| 4.3 | Memory | Internal data memory | |
| 4.4 | Power supply | 24V DC Loop Power Supply | |
| 5 | **Technical Features / Specifications** | | |
| 5.1 | Pressure Module | Range:-0.9 to 20 bar | |
| | | Accuracy: 0.035 of FS (Minimum) | |
| | | Range: 0-700bar | |
| | | Accuracy:0.05 of FS (Minimum) | |
| 5.2 | Electrical/Temperature input module | | |
| 5.2.1 | DC Voltage | Range: ± 100 mV, ± 2 V, ± 70 V | |
| | | Accuracy : 0.05 % reading (Minimum) | |
| 5.2.2 | DC Current | Range: ± 100 mA | |
| | | Accuracy : 0.01 % reading (Minimum) | |
| 5.2.3 | Resistance | Range: 0 to 400 /10000 Ω | |
| | | Accuracy : 0.05 % reading (Minimum) | |
| 5.2.3 | Frequency | Range: 1 Hz to 50 KHz | |
| | | Accuracy : 50 Hz (Minimum) | |
| 5.2.3 | RTD | Range: Pt100,Pt200,Pt500,Pt1000, Ni120,Cu10 | |
| | | Max. Resolution: 0.1°C (Minimum) | |
| 5.2.4 | Thermocouple | Range: J,K,T,R,S,B,U,L,N,E,C | |
| | | Max. Resolution: 0.1°C (Minimum) | |
| 5.3 | Electrical/temperature Output Module | | |
| 5.3.1 | DC Voltage | Range: 100mV,1V,15V | |
| | | Accuracy : 0.02 % reading (Minimum) | |
| 5.3.2 | DC Current | Range: 0 to 20 mA | |
| | | Accuracy : 0.03 % reading (Minimum) | |
| 5.3.3 | Resistance | Range: up to 10000 Ω | |
| | | Accuracy : 0.02 % reading (Minimum) | |
| 5.3.4 | Frequency | Range: 1Hz to 50 KHz | |
| | | Accuracy : 5 Hz (Minimum) | |
| 5.3.5 | RTD | Range: Pt100,Pt200,Pt500,Pt1000, Ni120,Cu10 | |
| | | Max. Resolution: 0.1°C (Minimum) | |
| 5.3.6 | Thermocouple | Range: J,K,T,R,S,B,U,L,N,E,C | |
| | | Max. Resolution: 0.1°C (Minimum) | |
| 5.3.7 | HART Communication | Should able to Program HART instrumentation | |
| 6 | **Accessories** | • Test cable set<br>• Battery pack and charger<br>• Interface cable | |

| | | | |
|---|---|---|---|
| | | • User manual | |

4.21.6. **6½ Digital Multimeter**

| Sr. No. | Specifications | | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|---|
| 1 | Item | Digital Multimeter | | |
| 2 | Make | Vendor to specify | | |
| 3 | Model | Vendor to specify | | |
| 4 | **General Features** | | | |
| 4.1 | Resolution | 6½ digits | | |
| 4.2 | Accuracy | 0.0025% basic DC Volt | | |
| | | 0.06% basic AC Volt | | |
| 4.3 | AC bandwidth | 3 Hz to 300 kHz | | |
| 5. | **Technical Specification** | | | |
| 5.1 | Mounting | Panel Mount | | |
| 5.2 | Accuracy | Ranges | Accuracy (% of reading + % of range) | |
| | DC Voltage | 100 mV | 0.0030 + 0.0030 | |
| | | 1V | 0.0025 + 0.0006 | |
| | | 10 V | 0.0025 + 0.0006 | |
| | | 100 V | 0.0025 + 0.0006 | |
| | | 1000 V | 0.0025 + 0.0006 | |
| | AC Voltage | 100 mV | 1.00 + 0.03 | |
| | | 1V to 750V | 1.00 + 0.03 | |
| | Resistance | 100 Ω | 0.010 + 0.0030 | |
| | | 1 KΩ | 0.010 + 0.001 | |
| | | 10 KΩ | 0.010 + 0.001 | |
| | | 100 KΩ | 0.010 + 0.001 | |
| | | 1 MΩ | 0.010 + 0.001 | |
| | | 10 MΩ | 0.010 + 0.001 | |
| | | 100 MΩ | 0.300 + 0.010 | |
| | DC Current | 10 mA | 0.05 + 0.01 | |
| | | 100 mA | 0.05 + 0.005 | |
| | | 1 A | 0.05 + 0.006 | |
| | | 3 A | 0.100 + 0.020 | |
| | AC Current | 1 A | 1.00 + 0.06 | |
| | | 3 A | 1.00 + 0.06 | |
| 5.3 | Continuity | Function to be provided | | |
| 5.4 | Diode Test | Function to be provided | | |
| 5.5 | Frequency Accuracy | 0.10 % of reading | | |
| 6 | **Accessories** | Test Lead Set with Probe | | |
| | | Interface Cable | | |
| | | Operation Manual | | |

4.21.7 **Dry Pressure Booster**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Pressure Booster | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical Specifications** | | |
| 4.1 | Input Drive Pressure | 100 psi (shop air) | |
| 4.2 | Output Pressure | 100 Bar | |
| **5** | **Accessories** | i. Suitable membrane type dryer to remove moisture. The dew point should be less than - 20 deg C.<br>ii. Pressure dampener.<br>iii. Air receiver to ensure minimum flow 500 LPM | |

4.21.8 **Electrical Dry Vacuum Pump**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Electrical Vacuum Pump | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Type | Lubricant-free (clean and dry vacuum) | |
| 5. | **Technical Features** | | |
| 5.1 | Nominal rotational speed | 1500 rpm | |
| 5.2 | Displacement | 5 $m^3$ / Hr | |
| 5.3 | Peak pumping speed | 5 $m^3$ /Hr | |
| 5.4 | Ultimate vacuum (total pressure) | 0.020 mbar | |
| 5.5 | Maximum continuous inlet pressure | 200 mbar | |
| 5.6 | Motor power 1-ph | 260 W | |
| 5.7 | Noise level | Less than 60 dB | |
| 5.8 | Operating temperature range | Up to 40 °C | |

4.21.9 **Pneumatic Pressure-Vacuum Panel**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Pneumatic Pressure-Vacuum Panel | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Regulated pressure | Air supply from external source, finely controlled through three Precision pressure regulators. Output through Plug in Conectors. | |
| 4.3 | Pressure Generation Module | The Module should be provided built in Hand Pump for Vacuum & Pneumatic Pressure Generation<br><br>(Range: -0.9 to 20 bar) with Changeover for Pressure Vacuum Selection. | |
| 4.4 | Output | Two output plug-in connctors for Pressure and Vacuum. | |
| 4.5 | Vent Button | Pressure vent through vent button | |
| 5 | **Accessories** | Plug-in female connectors:8 nos. | |

4.21.10 **Hydraulic Hand Pump**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Hydraulic Hand Pump | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Ranges | 0 to 700 bar | |
| 5. | **Technical Features** | | |
| 5.1 | Pressure Range | 0 to 700 bar | |
| 5.2 | Operating fluid | DM water | |
| 5.3 | Reference Measuring Instruments connections | NPTF ¼ | |
| 5.4 | Test Item Connections | NPTF ½ and NPTF ¼ with 1 meter hose | |
| 5.5 | Fine Adjustment | Fine Adjustment valve/Volume Adjustment | |
| 5.6 | Fluid Reservoir | 100 cm3 (approx) | |
| 5.7 | Material | Anodized aluminium, brass, SS, ABS | |
| 5.8 | Accessories | Operating fluid in plastic bottle (2 Liters) | |
| | | Necessary BSP & NPT Adaptors (1/4, ½ and 3/8) | |
| | | Storage Case | |

4.21.11 **Pneumatic and Hydraulic Digital Test Gauge**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | **Digital Pneumatic and Hydraulic Test Gauge** | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Ranges | **0 to 100 bar (For Pneumatic Application)**<br><br>**0 to 700 bar (For Hydraulic Application)** | |
| 4.2 | Material | Stainless Steel | |
| 4.3 | Display | 5 1/2 digit | |
| 5. | **Technical specification** | | |
| 5.1 | Accuracy | 0.05% of Full Scale | |
| 5.2 | Resolution | mbar -0.1 & bar – 0.0001 | |
| 5.3 | Pressure units | psi, bar, mbar, Kg/cm², inH2O, ft H2O, cmH2O, mH2O,mmH2O, k Pa, M Pa, in Hg, mmHg | |
| 5.4 | Operating temperature | Up to 50°C | |
| 5.5 | Ingress Protection | IP 65 | |
| 5.6 | Data logger | Automatic recording facility to be provided | |
| 5.7 | Communication Interface | RS232 | |
| 6 | **Accessories** | Adapter ¼ NPTF and ½ NPTF | |
| | | Batteries | |
| | | Operation manual | |
| | | Interface cable | |
| | | Storage Case | |

4.21.12 **Nitrogen Cylinder with Trolley**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | **Nitrogen Cylinder with Trolley** | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Trolley details** | | |
| 4.1 | Type | Big Jumbo type / 7 cubic meters | |
| 4.2 | Wheels | Solid Rubber Front Wheels | |
| 4.3 | Stability | Two rear casters to provide Greater Stability | |
| 4.4 | Special Features | Greater Control over the Trolley | |
| | | Easily retractable rear wheel assembly | |
| | | Safety Chain for Securing Cylinder | |
| | | Trolleys are finished with scratch, high gloss, electrostatically applied oven baked Powder coated. | |
| 5. | **Technical Specifications** | | |
| 5.1 | Capacity | 46.7 ltrs WC / 7 cubic mtr | |
| | Dew point of Nitrogen | - 20 deg. Celsius (or lower) | |
| 5.2 | Cylinder Details | High Pressure Seamless Steel Cylinder and complete with neck ring & cap, Cylinder Regulator. | |
| 5.3 | Standard | ISO Marked. | |

4.21.13 **Programmable DC Power Supply**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Programmable DC power Supply | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Controllable Output | On/Off Switch | |
| 4.3 | Stability Resolution | 10mV/10mA | |
| 4.4 | Additional | • Low ripple and noise<br>• Excellent temperature stability | |
| 5 | **Technical Features / Specifications** | | |
| 5.1 | Input Voltage | 230V, 1 Ph. | |
| 5.2 | Output Voltage | 0-32 V DC | |
| 5.3 | Input current | (0.5-1) A | |
| 5.4 | Working Voltage | 90 to 270 V AC | |
| 5.5 | Output Current | 0-6 A | |
| 5.6 | Metering | 3 Digit DPM | |
| 5.7 | Meter Accuracy | ±3 counts. | |
| 5.8 | Line Regulation CV | <0.1% + 3 mV | |
| 5.9 | Line Regulation CC | <0.1% +2 mA | |
| 5.10 | Load Regulation CV | <0.02% + 5 mV | |
| 5.11 | Load Regulation CC | <0.1% + 3 mA | |
| 5.12 | Ripple (Voltage) | ≤ 1 mV rms/3 mV pp | |
| 5.13 | Ripple (Current) | 0.04% rms | |
| 5.14 | Short Circuit Protection | Auto Recovery type | |
| 5.15 | Over Voltage Protection | Latching type | |
| 6 | **Accessories** | • Test leads<br>• Test Report<br>• User Manual<br>• Interface cable | |

4.21.14 **Fixed DC Power Supply**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Fixed DC power supply | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical Specifications** | | |
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Input Voltage | 230V, 1 Ph. | |
| 4.3 | Output Voltage | 24V DC | |
| 4.4 | Input current | (0.5-1) A | |
| 4.5 | Working Voltage | 90 to 270 V AC | |
| 4.6 | Line frequency | 50/60 Hz | |
| 4.7 | Output current | 5A | |
| 4.8 | Line Regulation | +/- 1% | |
| 4.9 | Load Regulation | +/- 1% | |
| 4.10 | Ripple max | +/- 1% (P-P) | |
| 4.11 | Noise max | +/- 1% (P-P) | |
| 4.12 | Short Circuit Protection | Auto Recovery type | |
| 4.13 | Over Voltage Protection | Latching type | |
| 5 | **Accessories** | Test Lead<br>Operation Manual<br>Test Report | |

4.21.15 **230V 15/5A AC Sockets**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | 230V 15/5A AC Sockets | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical details** | | |
| 4.1 | Indication | ON/OFF Indication | |
| 4.2 | Sockets | Industrial Standards | |
| 4.3 | Type | Schuko | |
| 5 | **Female Socket Details:** | | |
| 5.1 | Voltage | 230V AC | |
| 5.2 | Pole | 2P+E | |
| 5.3 | Shutter | yes | |
| 5.5 | Protection | IP 54 | |
| 6 | **Male Socket Details** | | |
| 6.1 | Voltage | 230V AC | |
| 6.2 | Current | 16A | |
| 6.3 | Pole | 2P +E | |
| 6.4 | Protection | IP 54 | |
| 6.5 | Contact | Standard | |
| 7. | **Accessories** | Male Plug for each socket | |

**Note: One converter for each socket to be provided.**

4.21.16 **Mains Power Control**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Mains Power Control | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Earth Leakage Circuit Breaker(ELCB) specifications** | | |
| 4.1 | Number of Poles | 2P | |
| 4.2 | Rated Current In | 40A | |
| 4.3 | Operating current | 30 mA | |
| 4.4 | Rated Voltage | 230V AC. ± 10 %, 50 - 60 Hz | |
| 4.7 | Current Off-time | ≤ 300 ms | |
| 4.8 | Rated Residual | ≤ 0.5 mA | |
| 5 | **MCB(Miniature Circuit Breaker)** | | |
| 5.1 | Number of Poles | 1P | |
| 5.2 | Rated Current In | 40A | |
| 6 | **VAF meter** | | |
| 6.1 | Digits | 4 Digits LED Display | |
| 6.2 | Measure | Voltage, Current, Frequency | |
| 6.3 | Voltage Accuracy | ±1.0% of range | |
| 6.4 | Current Accuracy | ±1.0% of range | |
| 6.5 | Frequency | 0.5% of mid frequency | |

**Note: One no. of Main Power Control unit to be installed in Temperature, Pressure and Electrical Calibration section each.**

4.21.17 **Temperature Bath Table and Calibration Section**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Temperature Calibration Section | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Test Bench Make | CRCA Sheet and Front Plates Made of Anodized Aluminium with Mimic panel for Test & Repair of Temperature Instruments. | |
| 4.2 | Design | Modular in Design, Enabling Easy Change of Arrangement. Laminated Top with Compressed Ply for carrying heavy duty Work. | |
| 4.3 | Type | Fully Powder Coated ( RAL 7035 (Colour)) | |
| 4.4 | Test Bench Dimension | 2000mm (L) x 1500mm (H) x 900mm (D) | |
| 4.5 | CRCA Sheet Thickness | 1.5 mm | |
| 4.6 | Anodized Aluminium Panel Thickness | 6 mm | |
| 4.7 | Table Top with Laminated Thickness | 35 mm | |
| 4.8 | Illumination | Overhead Lamp for Illumination | |
| 4.9 | Wiring | Wiring with cross ferruling, connections with crimped cable legs and proper channeling. | |

**Note: Proper cut out should be provided to mount/ access Dry and Liquid Temperature Bath, DAQ & Environment Monitor as mentioned in the NIT**

4.21.18 **Temperature Calibration Bath**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Temperature Calibration Bath | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Range | 35˚C to 300 ˚C | |
| 4.2 | Features | Controller with display. | |
| | | RS-232 interface | |
| 5 | **Technical details** | | |
| 5.1 | Stability | 0.02 deg C at FS | |
| 5.2 | Display Resolution | 0.1 °C | |
| 5.3 | Bath depth | 200 mm approx | |
| 5.4 | Interface | RS-232 | |
| 5.5 | Power supply | AC 230 V,50/60Hz | |
| 5.6 | Power Consumption | max 14A | |
| 5.7 | Power Rating | 3000 W | |
| 5.8 | **Accessories** | Power cord | |
| | | Operation Manual | |
| | | Oil for bath | |
| | | Trolley/ wheel for easy movement | |
| | | Cover with mounting fixtures | |
| | | Interface cable | |
| | | 8 Slot SS Plate for holding 8 sensor of different sizes | |

4.21.19 **Dry Block Temperature Calibrator**

| Sr. No. | Specifications | | Vendor Compliance |
|---|---|---|---|
| 1 | Item | Temperature Calibration Bath | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Range | 50 °C to 650 °C | |
| | | Possibility to check temperature switches | |
| | | Low weight and compact design | |
| | | Simple operation | |
| 5 | **Technical details** | | |
| 5.1 | Temperature | 50 to 650 °C | |
| 5.2 | Accuracy | ±0.6 °C at 650 °C | |
| 5.3 | Stability | ±0.1 °C at 650 °C | |
| 5.4 | Display Resolution | 0.01 °C | |
| 5.5 | Axial Uniformity | 0.5 °C at 650 °C | |
| 5.6 | Heating time | 60 min | |
| 5.7 | Cooling time | 240 min | |
| 5.8 | Immersion depth | 150 mm (Minimum) | |
| 5.9 | Insert dimensions | Ø 25 mm x 150 mm (Minimum) | |
| 5.10 | Interface | RS-232 | |
| 5.11 | Power supply | AC 230V,50/60Hz | |
| 5.12 | Power consumption | 1200 W | |
| 5.13 | Weight | 20 Kg ( Maximum) | |
| 5.14 | **Accessories** | Two Drilled and one undrilled Inserts – As per M/s OIL Specification | |
| | | Replacement tool | |
| | | Interface cable | |
| | | Power cord with safety plug | |
| | | Storage Case | |
| | | Operation Manual | |

4.21.20 **Laboratory Environmental Monitor**

| Sr. No. | Specifications | | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|---|
| 1 | Item | Environmental Monitoring System | | |
| 2 | Make | Vendor to specify | | |
| 3 | Model | Vendor to specify | | |
| 4 | **Technical details** | | | |
| 4.1 | Function | Should able to display Temperature, Barometric Pressure, Relative Humidity and Dew point. | | |
| 4.2 | Mounting | Panel Mount | | |
| 4.3 | Pressure Range | 10 to 1100 mbar | | |
| 4.4 | Pressure Resolution | 0.1mbar | | |
| 4.5 | Pressure Accuracy | +/- 2 mbar | | |
| 4.6 | Relative Humidity | Accuracy/ Range | 10 to 90% : ±2%<br>5 to 10%, 90 to 95% : ±3%<br>0 to 5% , 95 to 100% : ±4% | |
| | | Non-linearity | ±3% | |
| | | Hysteresis | ±1% RH | |
| | | Response Time | 10 seconds | |
| | | Repeatability | ±0.1% | |
| | | Resolution | 0.1% | |
| 4.7 | Temperature Accuracy/Range | 5 to 45 °C | +/- 0.5 °C | |
| | | 45 to 70 °C | +/- 1 °C | |
| 4.8 | **Accessories** | • Communication Cable<br>• Power Cable<br>• Manual | | |

4.21.21 **Standard Platinum Resistance Thermometer**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | SPRT | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical details** | | |
| 4.1 | Temperature Range | –100 °C to 660 °C | |
| 4.2 | Calibrated Accuracy | ± 0.006 °C at –100 °C<br>± 0.03 °C at 660 °C | |
| 4.3 | Stability | ± 0.002 °C | |
| 4.4 | Nominal Resistance | 30 Ω | |
| 4.5 | Sensor connection | 4-wire connection | |
| 4.6 | Termination | Gold-plated spade lugs | |
| 4.7 | Protective Case | Protective Case To be Provided | |

**Note**: Size and length should be as per quoted dry block temperature calibrator.

4.21.22 **Bend Type Secondary PRT**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Bend Type Secondary PRT | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical details** | | |
| 4.1 | Temperature Range | –100 °C to 660 °C | |
| 4.2 | Relative Accuracy | ± 0.007 °C at –100 °C<br>± 0.08 °C at 660 °C | |
| 4.3 | Nominal Resistance at 0.01degC. | 100 ± 0.5 | |
| 4.4 | Bend | 90° | |
| 4.5 | Temperature Co-efficient | 0.003926 Ω/Ω/°C | |
| 4.6 | Sensor connection | 4-wire connection | |
| 4.7 | Protective Case | Protective Case To be Provided | |

**Note**: Size and length should be as per quoted dry block temperature calibrator.

4.21.23 **Temperature Data Acquisition System (DAQ)- 10 Channel**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Temperature data | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical Specification** | | |
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Measure | Thermocouples, PRTs, thermistors, dc voltage, dc current, and resistance | |
| 4.3 | Display | $6^1/_2$ Digit | |
| 4.4 | Accuracy | PRTs: ± 0.008 °C<br>Thermocouples: ± 0.6 °C | |
| 4.5 | Input channels | 10 Channel | |
| 4.6 | Scan speed | Up to 10 channels per second | |
| 4.7 | Modes of operation | Scan, Monitor, Measure, Digital Multimeter (DMM) | |
| 4.8 | Interface | IEEE-488.2, Ethernet, USB, RS-232 | |
| 4.9 | Operating temperature | 20 to 40 °C | |
| 4.10 | Relative humidity | 0 to 90 % R.H. (non-condensing) | |
| 5 | **Accessories** | Interface Cable | |
| | | Operation Manual | |

4.21.24 **Fume Extractor for Liquid Bath Heater**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Fume Extractor for Liquid Bath Heater | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Finish | Stainless Steel With Curved Glass | |
| 4.2 | Controls | Push Button Controls | |
| 5 | **Technical Features / Specifications** | | |
| 5.1 | Suction | 1000 $m^3/h$ (Minimum) | |
| 5.2 | Noise level | 62 dbA (Max) | |
| 5.3 | Filter | Aluminium filters | |
| 5.4 | Lamp | 2x40 watts | |
| 5.6 | Air Flow Outlet Diameter | 150 mm ( approx.) | |

**Note: Fume Extractor should be mounted above the Liquid Bath Heater and mounting of the same shall be under Supplier's scope.**

4.21.25 **Electrical Calibration Section**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Electrical Calibration Section | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical Specifications** | | |
| 4.1 | Design | • Modular in Design,<br>• Test Bench made by CRCA Sheet and Front Plates Made of Anodized Aluminium with Mimic panel for Test & Repair of Electronic Instruments. | |
| 4.2 | Lamination | Top with Compressed Ply for carrying heavy duty Work | |
| 4.3 | Type | Fully Powder Coated ( RAL 7035 (Colour)) | |
| 4.4 | Test Bench | Dimensions : 2000mm (L) x 1500mm (H) x 900mm (D) | |
| 4.5 | CRCA Sheet Thickness | 1.5mm | |
| 4.6 | Anodized Aluminum Panel Thickness | 6 mm | |
| 4.7 | Table Top with Laminated Thickness | 35 mm | |
| 4.8 | Illumination | Overhead Lamp for Illumination | |
| 4.9 | Wiring | Wiring with cross ferruling, connections with crimped cable legs and proper channeling. | |

**Note: Proper cut out should be provided to mount all test instruments as mentioned in the NIT**

4.21.26 **Multiproduct Calibrator**

| Sr. No. | Specifications | | | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|---|---|
| 1 | Item | Multiproduct calibrator for Test & calibration of various product like volt meters / ammeters / ohm meter / $6^1/_2$ digit DMM / Clamp meter / Temperature Data-loggers / Power meters(1Phase)/ Power & Harmonic Analyzers/ /RLC meter etc | | | |
| 2 | Make | Vendor to specify | | | |
| 3 | Model | Vendor to specify | | | |
| 4 | **Technical Specifications** | | | | |
| 4.1 | Mounting | Panel Mounted | | | |
| 4.2 | Voltage DC | Ranges: 0 to 1000V | | | |
| | | Accuracy: 30 ppm(minimum) | | | |
| 4.3 | Current DC | Ranges: 0 to +/- 20 A | | | |
| | | Accuracy: 1000 ppm(minimum) | | | |
| 4.4 | Voltage AC | | Range: 1 mV to 1000V | | |
| | | Accuracy: | 200-1000V | 400 ppm (minimum) | |
| | | | 45-999Hz | | |
| 4.5 | Current AC | Ranges: 50µA to 20A | | | |
| | | Accuracy | Range: 2-20 A | | |
| | | | 45Hz to 99Hz | 1500 ppm (minimum) | |
| | | | 100Hz to 1kHz | 3000 ppm (minimum) | |
| 4.6 | Oscilloscope Calibration option | Oscilloscope Calibration option to be provided | | | |
| | | Range | 5 MHz to 100 MHz | | |
| | | Waveform | Sine Wave | | |
| 4.7 | Resistance | Ranges: 0 to 1 GΩ | | | |
| | | Accuracy: 15000ppm(minimum) | | | |
| 4.8 | Capacitance | Ranges: 1 nF to 10 uF | | | |
| | | Accuracy: 2500 ppm(minimum) | | | |
| 4.9 | Frequency | Ranges: 1 Hz to 1 MHz | | | |
| | | Accuracy: 30 ppm(minimum) | | | |
| 410 | Waveforms | Sine, Square | | | |
| 4.11 | Power | 200 Watt (maximum) | | | |
| 4.12 | RTD | All Major type (from –100 deg C to 700 deg C) | | | |
| 5 | **Accessories** | • Test cable set<br>• Power Cord<br>• Interface cable<br>• Operation Manual | | | |

4.21.27 **Function Generator**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Function Generator | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical Specifications** | | |
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Channels | 2 | |
| 4.3 | Waveforms | Sine, Square, Pulse, triangle, Ramp | |
| 4.4 | Range | 30Mhz | |
| 4.5 | Sine Wave | 1 µ Hz to 30 MHz | |
| 4.6 | Square & Pulse | 1 µ Hz to 30 MHz | |
| 4.7 | Ramp & Triangle | 1 µ Hz to 200 KHz | |
| 4.9 | Amplitude | Range: 2.5 $mV_{p-p}$ to 10 $V_{p-p}$, 50 Ω load, 5 $mV_{p-p}$ to 20 $V_{p-p}$, open circuit | |
| | | Resolution: 4 digits | |
| | | Accuracy: ±1% of setting ±1 mVp-p at 1 kHz | |
| 4.10 | DC offset | Range: ±10V– Peak AC), 50 Ω load ±(10 $V_{DC}$ – Peak AC), open circuit | |
| | | Resolution: 4 digits | |
| | | Accuracy: ±1% of Offset setting | |
| 5 | **Accessories** | • Test cable set<br>• Power Cord<br>• Interface cable<br>• Operation Manual | |

4.21.28 **Digital Storage Oscilloscope**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Digital Storage Oscilloscope | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical Specifications** | | |
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Bandwidth | 30 MHz | |
| 4.3 | Channel | 2 | |
| 4.4 | Real time Sample Rate | Up to 2 G Sample/sec | . |
| 4.5 | Vertical Resolution | 8 bits | |
| 4.6 | Vertical sensitivity | 2 mV/div to 10 V/div | |
| 4.7 | DC Gain accuracy | ±3% FS | |
| 4.8 | Vertical Zoom | Vertical Expand | |
| 4.9 | Maximum input voltage | 300 VRMS | |
| 4.10 | Time base Range | 5 n sec/div to 50 sec/div | |
| 4.11 | Horizontal Zoom | Should be available | |
| 4.12 | Input impedance | 1 MΩ in parallel with 20 pF | |
| 4.13 | Time Scale Accuracy | 50 ppm | |
| 5 | **Accessories** | Test Lead Set with Probe | |
| | | Interface cable | |
| | | Operation Manual | |

4.21.29 **Decade Resistance Box**

| Sr. No. | Specifications | | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|---|
| 1 | Item | Decade Resistance Box | | |
| 2 | Make | Vendor to specify | | |
| 3 | Model | Vendor to specify | | |
| 4 | **Technical details** | | | |
| 4.1 | Resistance range | 0.1 Ω to 100 K Ω | | |
| 4.2 | Accuracy | ± 0.1 | | |
| 4.3 | No. of decades | 6 | | |
| 4.4 | Temperature Coefficient | +/- 0.00005 per °C | | |
| 4.5 | Current Rating | 0.1 Ω | 1.5 A | |
| | | 1 Ω | 550 mA | |
| | | 10 Ω | 150 mA | |
| | | 100 Ω | 50 mA | |
| | | 100 KΩ | 1.5mA | |
| 4.6 | Maximum Circuit Voltage | 250 V | | |
| 4.7 | Residual Resistance | < 30 mΩ | | |
| 4.8 | Insulation resistance | 500 M Ω at 500VDC. | | |

4.21.30 **Soldering & De soldering Station**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Soldering & De-soldering Station | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Features** | | |
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Power unit | 300 W | |
| 4.3 | Content | Self-contained vacuum and air turbine | |
| 4.4 | Keypad | Programmable temperature memory key | |
| 4.5 | Safe condition | ESD Safe | |
| 5 | **Technical Specifications** | | |
| 5.1 | Pump | Minimum vacuum 0.5 bar | |
| 5.2 | Minimum delivery rate | 15 ltr/min. | |
| 5.3 | Hot air Minimum | 5 ltr/min. | |
| 5.4 | Soldering iron | 50 °C – 450 °C | |
| 5.5 | De-soldering iron | 50 °C – 450 °C | |
| 6 | **Accessories** | • Soldering Iron<br>• De-soldering Iron<br>• Standard Tips<br>• User and Service Manual | |

4.21.31 **Variable AC power Supply (0-260V, 10A)**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Variable AC power supply(0-260 V,10 A) | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical Specifications** | | |

| | | | |
|---|---|---|---|
| 4.1 | Mounting | Panel Mount | |
| 4.2 | Input power | 230V AC, 50 Hz, 1 Ph. | |
| 4.3 | Output | (0- 260) V AC | |
| 4.4 | Output current | 10A | |
| 4.5 | Operation | Manually operated | |
| 4.6 | Scale | White lettering on Back | |
| 4.7 | Indication | Digital volt and ammeter | |
| 4.8 | Control | Individual MCB | |
| 4.9 | Socket | Industrial Standard | |
| 5 | **Accessories** | Male Socket – 1 No | |

4.21.32 **Very High Pressure Calibration Section:**

| **Sr. No.** | **Specifications** | | **Vendor Compliance Technical Literature / Brochure (Reference Page No.)** |
|---|---|---|---|
| 1 | Item | Very High Pressure Calibration Section | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Test Bench Make | CRCA Sheet and Front Plates Made of Anodized Aluminium with Mimic panel for Test & Repair of Pneumatic Instruments | |
| 4.2 | Design | Modular in Design, Enabling Easy Change of Arrangement. Laminated Top with Compressed Ply for carrying heavy duty Work. | |
| 4.3 | Type | Fully Powder Coated ( RAL 7035 (Colour)) | |
| 4.4 | Test Bench Dimension | 2000mm (L) x 850 mm (H) x 900mm (D) | |
| 4.5 | CRCA Sheet Thickness | 1.5 mm | |
| 4.6 | Anodized Aluminium Panel Thickness | 6 mm | |
| 4.7 | Table Top with Laminated Thickness | 35 mm | |

**Note: Three/Two no. of Dead Weight Tester along with High Pressure comparator will be place in this section**

4.21.33 **Digital Pressure Comparator**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Digital Pressure Comparator | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.2 | Pressure Units | Minimum 10 standard units | |
| 4.3 | Display | Colour screen | |
| 4.4 | Display Resolution | 6 digits | |
| 4.5 | Ingress Protection | IP 54 | |
| 4.6 | Power Supply | Internal Lithium-Ion rechargeable battery | |
| 4.7 | Battery Backup time | Minimum 10 hours | |
| 5 | **Technical Specifications** | | |
| 5.1 | Pressure Generation and Measurement Range | 0-2000bar | |
| 5.2 | Pressure Generator | Hand operated, high precision, high pressure pump capable of developing pressure up to 2000 bar also provision for fine pressure adjustment. | |
| 5.3 | Accuracy | 0.1% FS | |
| 5.4 | Interface | RS 232 and USB | |
| 6 | **Acessories** | Adaptors (Pressure rating 3000 bar)<br>¼ "NPTM X ¼ "NPTM -2 no.<br>½ "NPTM X ¼ "NPTM – 2 no.<br>3/8" NPTM X ¼ "NPTM – 2 no.<br>2" pipe male X 1/4"NPTM – 2 no. | |
| | | One meter ¼ " hose of 3000 bar rated along with NRV(Non Return Valve)- 2 set | |
| | | Test Cable – 1 set | |
| | | Suitable connect of 3000 bar rated in Comparator side to connect the hose- 2 no. | |

4.21.34 **Dead Weight Tester (DWT)-Hydraulic**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Dead weight Tester-Hydraulic | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Elastic deformation Uncertainty | 0.006 % of reading or better | |
| 4.2 | Priming Pump | To be provided | |
| 4.3 | Spindle Pump/Screw Pump | To be provided | |
| 4.4 | Stability | High long-term stability with recommended recalibration cycle every five years | |
| 4.5 | Dimensions | Compact dimensions | |
| 5 | **Technical Features / Specifications** | | |
| 5.1 | Pressure Range | 1 to 1200 bar | |
| 5.2 | Accuracy | 0.008 % of reading | |
| 6 | **Accessories** | Standard weight masses are to be non-magnetic austenitic stainless steel. Each mass should be marked with the serial number of the instruments and the nominal pressure value relative to the high and low pressure piston. Fractional mass set also should be supplied. Minimum mass resolution should be 0.2 bar. | |
| | | A set of BSP & NPT female adaptor (1/8, 1/4.3/8 and 1/2) should be supplied. | |
| | | Separate low and high Piston to cover the full range. | |
| | | Quick connector for test items. | |
| | | Instrument should be supplied with detachable lid for easy transportation. | |
| | | Levelling screw at base along with spirit level for levelling of base with Horizontal. | |
| | | Built in drain plug to remove old fluid | |
| | | High quality carrying case for DWT and weights should be supplied. | |
| | | Accredited calibration certificate also should be provided with overall uncertainty, effective area and uncertainty of individual mass set. | |
| | | Software to allow necessary corrections. | |

4.21.35 **Dead Weight Tester (DWT)- Pneumatic**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Dead weight Tester-Pneumatic | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Elastic deformation Uncertainty | 0.008 % of reading or better | |
| 4.2 | Priming Pump | To be provided | |
| 4.3 | Spindle Pump/Screw Pump | To be provided | |
| 4.4 | Stability | High long-term stability with recommended recalibration cycle every five years | |
| 4.5 | Dimensions | Compact dimensions | |
| 5 | **Technical Features / Specifications** | | |
| 5.1 | Pressure Range | 15 to 1000 mbar | |
| 5.2 | Vacuum Range | 30 to 990 mbar | |
| 5.3 | Accuracy | 0.008% reading | |
| 6 | **Accessories** | Standard weight masses are to be non-magnetic austenitic stainless steel. Each mass should be marked with the serial number of the instruments and the nominal pressure value relative to the high and low pressure piston. Fractional mass set also should be supplied. Minimum mass resolution should be 5 mbar and for vacuum 10 mbar. | |
| | | A set of BSP & NPT female adaptor (1/8, 1/4.3/8 and 1/2) should be supplied. | |
| | | Quick connector for test items. | |
| | | Instrument should be supplied with detachable lid for easy transportation. | |
| | | Levelling screw at base along with spirit level for levelling of base with Horizontal. | |
| | | High quality carrying case for DWT and weights should be supplied. | |
| | | Accredited calibration certificate also should be provided with overall uncertainty, effective area and uncertainty of individual mass set. | |
| | | Software to allow necessary corrections. | |

4.21.36 **Dead Weight Tester (DWT)- Pneumatic**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Dead weight Tester-Pneumatic | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | Elastic deformation Uncertainty | 0.008 % of reading or better | |
| 4.2 | Priming Pump | To be provided | |
| 4.3 | Spindle Pump/Screw Pump | To be provided | |
| 4.4 | Stability | High long-term stability with recommended recalibration cycle every five years | |
| 4.5 | Dimensions | Compact dimensions | |
| 5 | **Technical Features / Specifications** | | |
| 5.1 | Pressure Range | 1 to 100 bar | |
| 5.2 | Accuracy | 0.008% reading | |
| 6 | **Accessories** | Standard weight masses are to be non-magnetic austenitic stainless steel. Each mass should be marked with the serial number of the instruments and the nominal pressure value relative to the high and low pressure piston. Fractional mass set also should be supplied. Minimum mass resolution should be 0.1 bar. | |
| | | A set of BSP & NPT female adaptor (1/8, 1/4.3/8 and 1/2) should be supplied. | |
| | | Separate low and high Piston to cover the full range. | |
| | | Quick connector for test items. | |
| | | Instrument should be supplied with detachable lid for easy transportation. | |
| | | Levelling screw at base along with spirit level for levelling of base with Horizontal. | |
| | | High quality carrying case for DWT and weights should be supplied. | |
| | | Accredited calibration certificate also should be provided with overall uncertainty, effective area and uncertainty of individual mass set. | |
| | | Software to allow necessary corrections. | |

4.21.37 **Industrial Computer**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Industrial Computer | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical details** | | |
| 4.1 | Mounting | Panel Mounted Display | |
| 4.2 | Display | 19 inch SXGA TFT LCD LED Backlight with touch screen | |
| 4.3 | Contrast Ratio | 1000:1 | |
| 4.4 | Storage | Supports 2x 2.5" SATA 2.0 or SATA 3.0 HDD | |
| 4.5 | Resolution | 1280 x 1024 | |
| 4.6 | Ingress Protection | IP65 | |
| 4.7 | Operating Temperature | Up to 50degC | |
| 4.8 | Storage Temperature | Up to 60degC. | |
| 4.9 | I/O | 4 (3 x RS-232, 1 x 485 ) | |
| | | 1 x GPIO | |
| | | 2 x Extra ports | |
| | | 5 x USB Host( USB 2.0 front, 4 USB 3.0) , 2 x LAN | |
| | | VGA x1; DVI x1; DP x1 | |
| | | 2 (1 x keyboard and 1 x mouse) | |
| | | 2 (Mic-in, Line-out) | |
| 4.10 | Optical Driver | 1 x Slim Type DVD-RW | |
| 4.11 | Power Input | 100-240 VAC @ 50/60 HZ | |
| 4.12 | Processors | Intel Core i7 with Q87 chipset (up to 3.1GHZ) | |
| 4.13 | Memory | 16 GB DDR3 | |
| 4.14 | Hard Disk Capacity | 1 TB | |
| 4.15 | Operating System | Latest window version | |
| 5 | **Accessories** | • Wireless Keyboard<br>• Wireless Mouse<br>• Licence Operating System<br>• Licence MS Office.<br>• Driver CD<br>• Manuals<br>• Power and Signal Cables | |

4.21.38 **Laser B/W Printer**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | Printer | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **Technical details** | | |
| 4.1 | Print Technology | Laser | |
| 4.2 | Print quality | Black, 600x600 dpi | |
| 4.4 | Paper handling | Input tray : 100 Sheets | |
| | | Output tray : 50 Sheets | |
| 4.10 | Print speed | Up to 20 pages per minute | |
| 4.11 | Warm Up Time | 10 sec | |
| 4.12 | Power Consumption | 500 Watt | |
| 4.13 | Types of Paper | Paper (Plain, envelopes, labels, cardstock, transparencies) | |
| 4.14 | Power Requirements | 230, 50 Hz | |
| 4.15 | **Accessories** | • Laser Toner Cartridge – Two No.<br>• Connecting Cable<br>• Power Cable<br>• Driver Software<br>• Manual | |

4.21.39 **Calibration software for Pressure, Temperature and Electrical parameter**

| Sr. No. | Specifications | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|
| 1 | Item | **Calibration software-Licensed Version** | |
| 2 | Make | Vendor to specify | |
| 3 | Model | Vendor to specify | |
| 4 | **General Features** | | |
| 4.1 | System | The Calibration System Software communicated with the Supplied Multifunction Calibrator, Pressure Controllers, Digital Test Gauges, Dry Block and Liquid Bath Temperature Calibrators and Multiproduct Calibrator. The software should able to communicate with HART and FF device. | |
| 4.2 | Mode of Calibration | The Software can be set for no. of points that the transmitter to be calibrated along with the duration of the next points for Automatic Calibration on single or multiple units under test (UUTs), including leak testing. It should able to calculate coefficients for each temperature sensor tested. | |
| 4.3 | Storage | The recorded Points are stored as left and same is maintained in the data base, can be retrieved with Tag No, Sl. No., Model No. or Date of Calibration in the future. | |
| 4.4 | Data Logging | The Data's can be exported in Excel Format, where we can create many number formats with Logos as needed and get customized. | |
| 4.5 | Report Generation | The supplied software should have provision for online report generation as per user format | |

* **Bidder having three different versions of software for Pressure, Temperature and Electrical parameter needs specify three model numbers.**

4.21.40 **Standard tool Kit**

| Sr. No. | Specifications | | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|---|
| 1 | Item | Standard Tool Kit | | |
| 2 | Make | Vendor to specify | | |
| 3 | Model | Vendor to specify | | |
| 4 | **General Contents/Package** | | | |
| | **Item** | | **Quantity** | |
| 4.1 | Crimping tool up-to 6 Sq mm | | 1 No | |
| 4.2 | Stripping Tool up-to 10 Sq mm | | 1 No | |
| 4.3 | Insulation removal Tool up-to 40 mm | | 1 No | |
| 4.4 | Wire cutter up-to 50 Sq mm | | 1 No | |
| 4.5 | Normal screw driver set with large bearing surface head of thickness of 0.6 mm, length 3.5 mm & 180 mm as overall length of screwdriver. | | 1Set | |
| 4.6 | Insulated Screwdriver set with large bearing surface head of thickness of 0.4 mm, length 2.5 mm & 150 mm as overall length of screwdriver. | | 1Set | |
| 4.7 | 1000 VAC & 1500 V DC protection-insulated screw fox type insulated pozidriv screwdriver with bearing surface head of size PZ 1 & 150 mm as overall length. | | 1Set | |
| 4.8 | Universal Panel Key suitable for four different types of panel locks of size 6 mm square, 7-8 mm square, 7-8 mm triangle & 3-5 mm double. | | 1Set | |
| 4.9 | Electrician Plier -8"suitable for 1000 V AC & 1500 V DC | | 1 No | |
| 4.10 | Long Nose Plier – 6" | | 1 No | |
| 4.11 | Adjustable Wrench - 8" | | 1 No | |
| 4.12 | Test Pen 100-500V AC | | 1 No | |
| 4.13 | Knife – 8mm | | 1 No | |
| 4.14 | Mini-hacksaw – 8 ¾" | | 1 No | |
| 4.15 | Allen Key Set – 10 Pcs | | 1 Set | |
| 4.16 | Wood handle Nail Hammer | | 1 No | |
| 4.17 | Measuring Tape – 8 m | | 1 No | |
| 4.18 | Scissor | | 1 No | |
| 4.19 | Torch Light | | 1 No | |
| 4.20 | Kit bag for Tools | | 1 No | |

4.21.41 **UPS-2KVA**

| Sr. No. | Specifications | | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|---|
| 1 | Item | UPS | | |
| 2 | Make | Vendor to specify | | |
| 3 | Model | Vendor to specify | | |
| 4 | **Technical details** | | | |
| 4.1 | Type | 2 KVA Double conversion On-Line UPS System with IGBT & DSP based technology | | |
| 4.2 | UPS rated power | 2 KVA/1.8 KW | | |
| 4.3 | Input Power | Voltage Range | 160 - 276 V AC, 1Phase | |
| | | Input Power Factor | 0.8 | |
| | | Input Frequency range | 50 ± 5 Hz(45 - 55 Hz) | |
| 4.4 | Output Power | Output Voltage | 230 ± 1% of rated output voltage, AC, 1 phase | |
| | | Static Regulation | +/- 3% of nominal regulation | |
| | | Output Frequency | 50 Hz ± 1% | |
| | | Output waveform | Sinusoidal with relative harmonic not exceeding 4% for linear and 5% for non-linear load | |
| | | Output Power Factor | 0.8 or better | |
| 4.5 | Load Crest Factor | 3:1 | | |
| 4.6 | Efficiency | > 90% in high efficiency mode;<br>> 85% in normal mode. | | |
| 4.7 | Battery | Type | Inbuilt, Sealed Maintenance Free (SMF) Lead Acid battery | |
| | | Backup time | The UPS should capable to provide 15 minutes battery | |

| | | | | |
|---|---|---|---|---|
| | | | backup time at full load. | |
| | | Battery Rating & Configuration | Total number of batteries required for 15 min backup at full load, Voltage of each battery, Ampere-Hour rating of each battery should be clearly mention in the offer. | |
| 4.8 | Bypass Facility | Static & Manual Bypass | | |

| Sr. No. | Specifications | | | Vendor Compliance Technical Literature / Brochure (Reference Page No.) |
|---|---|---|---|---|
| 4.9 | Indication | LCD Panel: The UPS should have a LCD panel with keypad and backlight. It should provide useful information about the UPS itself, operating status &diagnostic indication, load status, events measurements, and settings. The Event Log and alarms should display on the LCD Panel. | | |
| 4.10 | Operation mode | | | |
| | Cold Start Feature | Should allow UPS to start on Batteries without utility input | | |
| | Auto Re-Start Feature | The UPS should automatically restart if utility returns after the output was shut off due to exhausted batteries | | |
| | Automatic Bypass | UPS should have automatic Transfer to Bypass When Overload condition occurs | | |
| 4.11 | Environment | Ambient Operating Temperature | Up to 40 deg C | |
| | | Relative Humidity | Should not exceed 95% non condensing | |
| | | Audible Noise | <70dBA at any load between 0& rated output | |

**5. Safety**

All related safety norms related to this work as per industrial safety rules & regulation guided by Govt. Of India/or State Govt. shall be fulfilled by Bidder.

**6. Bill of Materials**

Scope of supply for the test & calibration bench shall be as per BOM as indicated in **Annexure No 6-1**. If anything that has not been envisaged in BOM, but required for commissioning/ completeness of this project, bidder shall supply it.

**7. Scope of Services**

The scope of services to be provided has been indicated in **Annexure No 7-1.** If anything that has not been envisaged in the scope of services, but required for commissioning/ completeness of this project, bidder shall supply it.

**8. List of Preferred Makes**

All the equipment/ components required for test & calibration bench shall be procured from the list of preferred makes given at **Annexure- 8-1**.

**9. Battery Limit:**

Single phase AC power supply will be provided from nearest available source at Instrumentation workshop. The Bidder shall have to provide necessary switch/cables of adequate capacity and protection at his own cost. The power will be supplied from M/s OIL's source to the Bidder's switch. Necessary extension cables for further distribution shall be supplied, laid and maintained by the successful Bidder.

**10. Recommended Spare Parts for 02 Year Maintenance / Operation :**

The bidder shall submit a list of recommended spares/consumables and separately quote item wise prices for spares/consumables required for 2 (two) years operation/maintenance of the system. The bidder shall furnish particulars of list of two years recommended spares/consumables in the attached **Schedule 10-1.** The price for the same shall remain same for two years from the date of supply. OIL may procure the same through separate Purchase Order within two years. However price will be not considered for bid evaluation.

**11. Spares, Tools & Tackles etc**

**11.1 Commissioning Spares**

The Bidder shall include in his scope supply all necessary commissioning spares, consumables, special tools and tackles etc. The quantity of commissioning spares shall be sufficient to meet the requirement during trial run, commissioning. The bidder shall furnish particulars of commissioning spares in the **Schedule 11.1-1**

**11.2 Special Tools & Tackles**

The Bidder shall also supply a toolbox containing all necessary tools and special tools in particular required for maintenance of the system. List of special tools & tackles to be supplied in the tool box shall furnish particulars in the attached **Schedule 11.2-1.**

**12. Imported Items**

The items covered by this NIT will be eligible for NIL Customs Duty against imported items. Indigenous bidders shall be eligible for Deemed Export Benefit against this purchase. Items which are to be imported for the test bench shall be furnished with the offer as per **Schedule- 12-1** and should be quoted in foreign currency.

**13. Brief Technical Information/ Specification of the Proposed System**

The Bidder shall submit their offer with a brief technical information/ specification of the proposed system.

All the items of the test bench shall be complete in all respects and any item or accessory not covered in this specification but essential for completeness of the system which includes proper design, smooth & efficient operation and maintenance of the system shall be considered within the bidder's scope and no extra claims shall be admissible on such account.

**14. M/s OIL's Obligation**

M/s OIL will provide necessary AC room for installation of Test Bench. For mounting & installation of Test Bench & its accessories, necessary civil work is to be done by bidder. In this connection if any small renovation required in the room, bidder shall take care the same.

**15. Project Execution Schedule**

Time frame for project completion is **Twelve months (12) from issue of Letter of Intent (LOI) to project completion**. Bidder needs to provide a tentative project schedule along with bid. Successful bidder required to submit their project execution plan (Details of each tasks pertaining to parts procurement, assembly, testing and function test at works, delivery and shipment schedule) immediately after awarding of **LOI.** This should also include submission of drawings/design calculations for M/s OIL's approval and deputation of engineer / technicians for installation, commissioning, testing and final acceptance test at site including training.

**16. Exclusions & Deviations**

Exclusions as well as deviations from the Tender Specification, if any, shall be clearly stated under separate heads marked as "Exclusions" as per **Schedule 16-1** and "Deviations" as per **Schedule 16-2** respectively quoting the index and serial reference of Tender Specification.

**17. Drawing/ Documents/ Data to be Furnished**

The offer shall be accompanied with various layout drawing, showing the major equipment and auxiliaries, details of services & facilities.

**17.1** The Bidder shall submit along with the bid, the drawings / documents / catalogues/ related data as per the following details:

- General arrangement drawings of all units, equipment and systems with overall and relevant dimensions.
- All schedules duly filled in as mentioned in this Tender Specification and enclosed herewith
- Manufacturers' catalogues/ brief technical descriptions of offered equipment and bought-out items.
- Schedule of quantity of equipment
- Project schedule-(Bar chart/PERT Network).
- List of exclusions, deviations and reference list
- Weight and mounting arrangement of each critical item/ equipment
- Details of technical capability of Bidder.
- List of two years operational and maintenance spares
- List of commissioning spares.
- Brief technical write up for the proposed test & calibration bench.
- Drawings /data listed at various clauses at Chapter 4.0 and elsewhere mentioned in this Tender Specification.
- Any other details which may be felt necessary.
- The Bidder shall note that above drawings & documents listed are minimum requirement only. The Bidder shall ensure that all other necessary write-ups, curves and information, required to fully describe the equipment and system offered, are submitted with this offer.

**17.2** The minimum but not limited to the below documents/ as built drawings (Hard Copy along with softcopy in CD/DVD) to be supplied by successful bidder along with the test bench (The language of these documents should be English).

- Overview drawings.
- Test Bench GA drawings & Fabrication drawings
- System Configuration Drawings
- Power supply scheme drawings for Test bench, Compressor, Furnaces, PCs.
- Specification / Data sheets for each item
- O & M manuals
- Wiring diagram.
- Loop schematic drawings
- OEM's Traceable Calibration Certificates for each item(as **Annexure-21-1**)
- Accredited Calibration Certificates for each item(as **Annexure-21-2**)
- Temperature calibration table & Calculation of the characteristic constant
- Part lists
- All QA documents/test documents related to manufacturing.
- Function test at shop.
- Safety and Risk analysis of the test bench including the accessories.
- License copy in original of all software's loaded in PC, including OS to be supplied.

**17.3** During design stage successful bidder need to submit all the drawings/ document for M/s OIL's approval. The drawings/ document submitted by the successful bidder shall be reviewed & commented (or approved) by M/s OIL within 14 days of receipt of such drawings/ document. Successful bidder shall incorporate all the comments and resubmit in 3 copies to M/s OIL within 15 days time from the date of M/s OIL's comments.

**17.4** Approval of drawings, design/data sheets by M/s OIL will not relieve the successful bidder of his responsibilities for correctness, adequacy of the system and completeness of his work as per the contract.

**17.5** Drawings/Document submitted by the successful bidder shall be thoroughly checked and signed by him before submission. All reference drawing numbers must be mentioned in each drawing submitted for approval. The drawings shall be complete with Bill of Material.

**18. Inspection and Testing(FAT):**

**18.1** The successful bidder shall ensure that the material to be supplied against this order shall be individually inspected, tested and analysed in terms of the specifications attached to the order and the relevant codes and practices specified therein by expression or implication.

**18.2** The successful bidder shall make available to M/s OIL or any other individual/agency authorised by M/s OIL for the purpose of inspection, all its records and results in respect of inspection, tests and analyses conducted by it as part of their manufacturing and testing operations under the applicable codes and practices specified by expression or implication in the order.

**18.3** For false calls for inspection and for the cases where material is rejected on inspection, the successful bidder will bear the actual cost of inspection incurred/suffered by the M/s OIL.

**18.4** The selected vendor shall give at least 60 days advance notice to M/s OIL for inspection in case of outside India and 15 days in case of within India. M/s OIL shall depute two Engineers for the same. M/s OIL will bear the expenses of transportation, accommodation, boarding / lodging etc. for its personnel.

**18.5** The inspection by M/s OIL or by M/s OIL's representative in any manner does not absolve the successful bidder of any liability and/or responsibility under this purchase order

**18.6** **Factory Acceptance Test (FAT)**: Bidders shall submit their layout plan along with the technical Bid. Successful bidder will have to submit final GA drawing including all the technical details including the Factory acceptance test procedure and inspection plan to M/s OIL for approval. M/s OIL will depute two(2) engineers to witness the complete functions and operation of the all the items of the Test Bench including accuracy at one workplace . The acceptance of the test bench will be signed by M/s OIL representative at that work place after final successful functional test and demonstration.

**18.7** Successful bidder shall offer for Inspection as well as FAT either in India or in aboard based on their work place.

**18.8** Unless otherwise specifically authorised by M/s OIL in writing, the successful bidder shall not ship or despatch for any material under the purchase order before Inspection/FAT.

**19. Onsite Training**

**19.1** After successful installation and commissioning the vendor needs provide detail onsite training to M/s OIL personnel consist of 6 (Six) persons for minimum one week duration (5 Days).

The training is to be supplemented by manual in hard bound copy as well as soft copy (Minimum 2 sets).

**20. Certification of Standard/Master instruments from approved laboratory:**

All the instruments as per **Annexure-21-1** installed in the test bench should supply along with the necessary manufacturer's traceable calibration certificate. The standard/Master instruments provide in the **Annexure-21-2** shall be supplied along with accredited calibration certification. Same should be confirmed by bidder during bid.

**21. INSTALLATION, COMMISSIONING AND TESTING ( SAT):**

**21.1** The charges of Installation, commissioning, Site Acceptance Test (SAT), putting it into operation and training at M/s OIL's premises are included in the rate for Installation and commissioning. The transportation including local transportation, accommodation, boarding / lodging for successful bidder's supervisor / technicians are included in the price.

**21.2** Successful bidder will have to follow the M/s OIL's safety standards and specifications/guidelines during installation and commissioning works. Successful bidder will have to identify the supervisor/technicians in advance and furnish all the details proving their proper identity (Identity issued by Govt authorities) including police verification of all the individuals, medical fitness certificate etc. After satisfactory receipt of all the documents, these persons prior to take up any work shall have to undergo safety induction training.

**21.3** Please note that the initial consumables shall be scope of the bidder. Bidder to clearly indicate the details of initial consumables offered along with supply of this test bench.

**21.4** The system will be deemed to be commissioned after 5 days (8 hours daily) complete test & calibration of equipment bench in Instrumentation Workshop, Duliajan.

**21.5** Site Acceptance Test (SAT), will be as per sample format given in **Schedule 21.5-1.**

**22. WARRANTY / GUARANTEE :**

**22.1** The successful bidder warrants that the equipment are new and of high quality and that the goods will be free of defects in design, materials as well as workmanship for a period of TWELVE (12) months from the date of successful commissioning / initial operation or 18 months from the date of supply whichever is earlier.

**22.2** If within the expiry of the above stipulated warranty period, the subject equipment or any parts thereof are found defective because of design, workmanship or materials deficiency, the successful bidder shall repair or replace the equipment to the satisfaction of M/s OIL at his own expense.

**22.3** The successful bidder shall obtain similar guarantees from each of the brought out items used in Test Bench. However, the overall responsibility shall lie with the successful bidder.

**23. ANNUAL MAINTENANCE / SERVICE CONTRACT:**

Bidder needs to quote for call basis AMC charges including travelling, boarding and lodging expenses per man-day basis (at site)for three years after expiry of warranty period. Total twelve man-day charges shall be considered for bid evaluation (Six visit of two man-days duration in three years). M/s OIL reserves the right to issue a separate purchase order for AMC after expiry of warranty

**24. PROVEN TRACK RECORD :**

Bidder shall submit all relevant documents accomplishing the proven track record of the similar test benches supplied within last three years of Bid Closing Date. Supplier shall also clearly submit the documents along with the bid for justifying their experience as follows:

- The Customer / Client list including details of such test benches supplied and year of supply.
- Vendor to attach proof of their similar supply by way of un-priced purchase order / work order copy.

**25. SPECIAL INSTRUCTIONS TO BIDDER**

**25.1** Bidder needs to comply all the points mentioned in the **Technical checklist** attached as per **Annexure-1** and same to be submitted along with offer.

**25.2** All equipment/materials used in the subject package shall be according to the specification given herein and any deviation should be clearly brought-out in the offer. No mention of deviation will mean that the bidder has accepted the specification given herein.

**25.3** Specification of all the equipment in the test bench should be supported by technical catalogue/ literature/manuals. The bidder should provide all the supporting documents along with the bid. **Specification without supporting document will not be considered for evaluation**.

**25.4** The Bidder shall include in his supply a complete new and unused set of all special tools & tackles required for operation and maintenance of the plant/ equipment offered.

**25.5** The plant and equipment supplied shall be new and best of its kind and of latest technology. All materials and equipment shall comply with latest codes and standards, applicable nationally / internationally. A consolidated list of all codes and standards followed or adopted for design, manufacture and testing shall be submitted. Preferably, all equipment and accessories shall confirm to the latest Indian Standards wherever applicable. All electrical equipment supplied shall be designed, manufactured, tested & erected as per the latest revision of CEA Regulations, Statutory requirements of the Govt. of India, Govt. of Assam. In the event of requirement of TS exceeding the requirement of corresponding standards, regulations & safety codes, the specification provided in the TS shall govern. In the event of conflict between standard regulation & TS, the most stringent shall be applied.

**25.6** All equipment as may be necessary shall conform to the provision of Statutory and other Regulations in force such as Indian explosives Act 1884, Mines Act 1952, Oil Mines regulation1984, Indian Factories Act 1948, Indian Boiler Regulation 1950, State Factories Act 1948, Central Pollution Control Board, Indian Weights & Measures Act, etc. The Successful Bidder shall take necessary steps to get all the installations within his scope of supply approved by the concerned legal authorities.

**25.7** The Bidder shall use new, good and tested quality materials. The workmanship shall be of high quality.

**25.8** Layout of test bench and equipment shall have provision for easy and safe movement of operation / maintenance personnel for operation / inspection. Adequate space for dismantling / removal of equipment / parts for repair shall also be built in the layout. All working parts of the equipment shall be easily accessible and maintainable. There should be a proper arrangement for convenience of operation, inspection, maintenance, replacement & repair. Fast wearing parts shall be accessible for replacement/maintenance without necessitating removal of other parts. All like parts of the equipment supplied shall be inter-changeable.

**25.9** After erection, all equipment, pipes, structures, etc., shall be thoroughly cleaned and painted with one coat of primer and two coats of approved colour paints. Paints shall be of good quality and shall be strictly as per instructions and recommendations of the paint manufacturer and to the approval of M/s OIL.

**25.10** Execution of entire work shall be carried out in such a manner that normal working of the workshop is not interrupted.

**25.11** The Successful Bidder shall obtain written approval/clearance from the M/s OIL at each stage or before start of the next stage of site work. The Successful Bidder with the approval of the M/s OIL shall decide the stages.

**25.12** The Successful Bidder shall ensure deputation of well experienced engineers and technical staff from various disciplines as per requirement for erection, testing and commissioning of the test bench.

**25.13** All the manufacturing / fabrication works shall be carried out only on the basis of approved drawings and schemes or as directed by M/s OIL. It is solely the responsibility of the Successful Bidder to ensure that all working drawings prepared by him bear the stamp of approval of M/s OIL's prior to start of work.

**25.14** The successful Bidder shall stand guarantee against obsolescence of equipment under their scope of supply for a minimum period of 10 (ten) years after expiry of warranty period. The bidder shall also guarantee that discontinuity of production of any item offered, as a part of the system shall not affect the maintainability of the system for a minimum period of 10 (ten) years.

**25.15** Bidder shall provide the OEM or authorised dealer's authorization/ support letter for all critical bought out items as per **Annexure: 26.14-1** for a period of ten years and same to be provided along with the bid.

**25.16** The successful Bidder shall also stand guarantee against all the offered software licensed for lifelong use and will update all the software with latest patch time to time free of cost.

**25.17** The Bidder must guarantee supply of spares and availability of support service for at least 10 years with effect from date of commissioning of the Test Bench supplied under the Tender /

Order, if order is awarded to them by M/s OIL. Bidder needs to provide written compliance along with bid.

**Annexure: 1**

**TECHNICAL CHECK LIST FOR THE BIDDER**

Important: Please tick relevant box and specify remarks, if any. Use additional sheets for remarks if required.

| NIT item No | Agree | Not Agree | Remarks | Technical Literature / Brochure(Reference Page No.) where applicable |
|---|---|---|---|---|
| 3.1.1 | | | | |
| 3.1.2 | | | | |
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| 3.1.22 | | | | |
| 3.1.23 | | | | |
| **NIT item No** | **Agree** | **Not Agree** | **Remarks** | **Technical Literature / Brochure(Reference Page No.) where applicable** |
| 3.1.24 | | | | |
| 3.1.25 | | | | |
| 4.1.1 | | | | |
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| 4.2.15 | | | | |
| 4.2.16 | | | | |
| 4.2.17 | | | | |
| NIT item No | Agree | Not Agree | Remarks | Technical Literature / Brochure(Reference Page No.) where applicable |
| 4.2.18 | | | | |
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| 4.2.21 | | | | |
| 4.2.22 | | | | |
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| 4.12.1 | | | | |
| 4.12.2 | | | | |
| 4.12.3 | | | | |
| 4.12.4 | | | | |
| NIT item No | Agree | Not Agree | Remarks | Technical Literature / Brochure(Reference Page No.) where applicable |
| 4.12.5 | | | | |
| 4.13 | | | | |
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| 4.19 | | | | |
| 4.20 | | | | |
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| **10** | | | | |
| **11.1** | | | | |
| **11.2** | | | | |
| **12** | | | | |
| **13** | | | | |
| **14** | | | | |
| **15** | | | | |
| **16** | | | | |
| **17.1** | | | | |
| **17.2** | | | | |
| **17.3** | | | | |
| **17.4** | | | | |
| **NIT item No** | **Agree** | **Not Agree** | **Remarks** | **Technical Literature / Brochure(Reference Page No.) where applicable** |
| **17.5** | | | | |
| **18.1** | | | | |
| **18.2** | | | | |
| **18.3** | | | | |
| **18.4** | | | | |
| **18.5** | | | | |
| **18.6** | | | | |
| **18.7** | | | | |
| **18.8** | | | | |
| **19.1** | | | | |
| **20** | | | | |
| **21.1** | | | | |
| **21.2** | | | | |
| **21.3** | | | | |
| **21.4** | | | | |
| **22.1** | | | | |
| **22.2** | | | | |
| **22.3** | | | | |
| **23** | | | | |
| **24** | | | | |
| **25.1** | | | | |
| **25.2** | | | | |
| **25.3** | | | | |

| NIT item No | Agree | Not Agree | Remarks | Technical Literature / Brochure(Reference Page No.) where applicable |
|---|---|---|---|---|
| **25.4** | | | | |
| **25.5** | | | | |
| **25.6** | | | | |
| **25.7** | | | | |
| **25.8** | | | | |
| **25.9** | | | | |
| **25.10** | | | | |
| **25.11** | | | | |
| **25.12** | | | | |
| **25.13** | | | | |
| **25.14** | | | | |

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| **25.15** | | | | |
| **25.16** | | | | |

Signature of the Bidder

Designation:

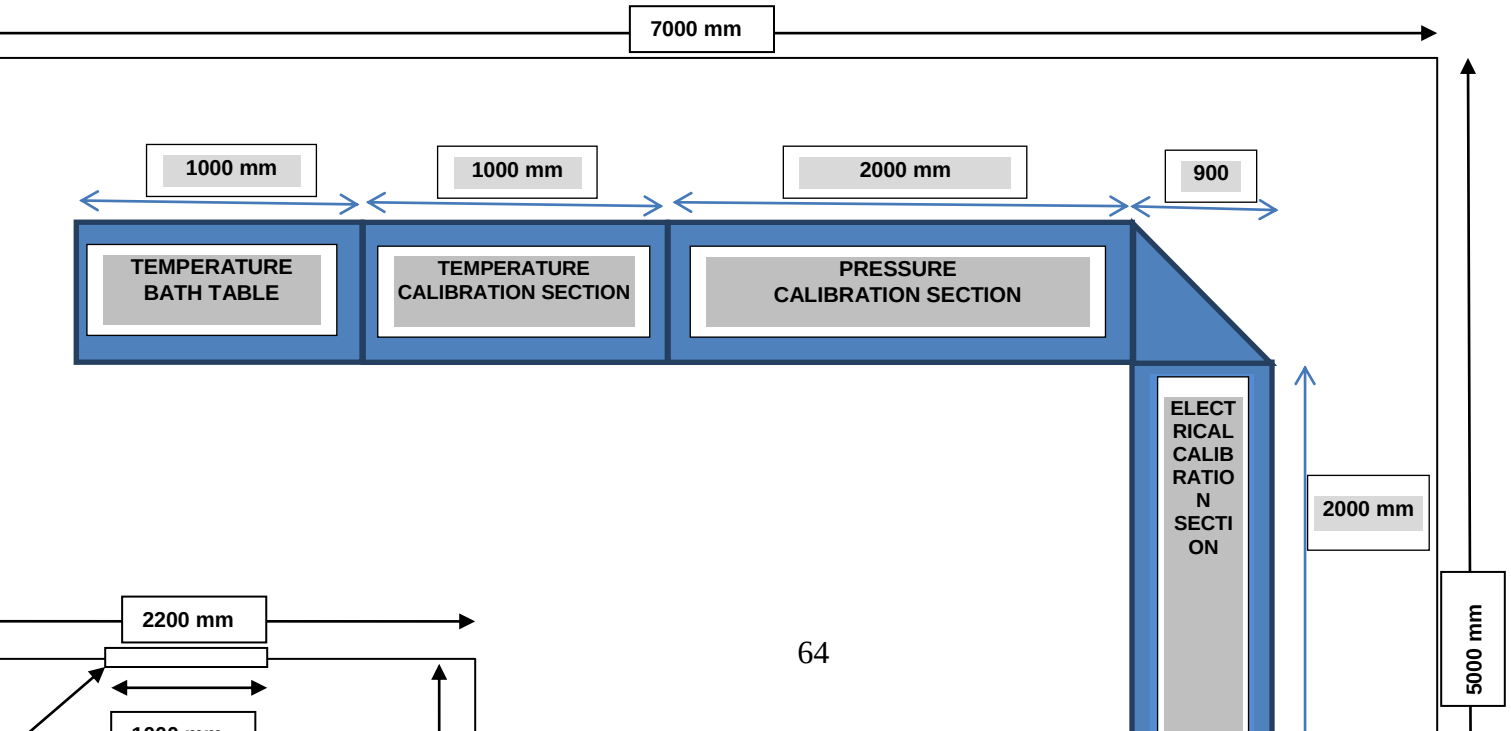
Company Name:

Seal of Company

Date:

**Annexure: 4.2.3-1**

**Tentative Schematic of the Test Bench with Room Size**



**Annexure: 6-1**

## BILL OF MATERIAL

**Pressure Calibration Section**

| Sl. No. | Description | Qty |
|---|---|---|
| 1 | Design, Manufacturing & Supply of Console type Calibration set-up of Size 2000 mm (L) x 1500 mm (H) x 900 mm (D) with proper finishing & furniture as per TS. Dimension will be finalised during detail engineering. | 1 Set |
| 2 | Panel mounted type Pneumatic Pressure Controller Range ( ± 50 mbar and ± 1000 mbar) & necessary pressure generating system as per TS | 1 Set |
| 3 | Panel mounted type Pneumatic Pressure Controller Range ( vacuum to 20 bar & 0 to 70 bar ) & necessary pressure generating system as per TS | 1 Set |
| 4 | Panel mounted type Hydraulic Pressure Controller Range ( 0 to 1000 bar ) & necessary pressure generating system as per TS | 1 Set |
| 5 | Panel mounted type Multifunction Calibrator with Pressure Sensors (Pressure range: vacuum to 1 bar, 0-20 bar, 0-700 bar) & HART as per TS | 1 lot |
| 6 | Panel mounted type 6.5 Digital Multimeter | 1 No |
| 7 | Dry Pressure Booster as per TS | 1 Set |
| 8 | Electrical Dry Vacuum Pump as per TS | 1 Set |
| 9 | Pneumatic/Vacuum Panel with 3 Settable Regulators, Built In Hand Pump as per TS | 1 Set |
| 10 | Hydraulic Hand Pump as per TS | 1 No |
| 11 | Digital Pneumatic Test Gauge : Range ( 0 to 100 bar) as per TS | 1 No |
| 12 | Digital Hydraulic Test Gauge : Range ( 0 to 700 bar) as per TS | 1 No |
| 13 | Nitrogen Cylinder with trolley as per TS | 1 Set |
| 14 | Programmable DC Power Supply 0 to 32 VDC, 5A | 1 No |
| 15 | Fixed DC Power Supply 24 VDC, 5A | 1 No |
| 16 | 230V, 15/5A AC Sockets (Schuko) with suitable plug and converter as per TS | 4 Sets |
| 17 | Mains Power Control – MCB,ELCB, LED Indicator and Emergency Stop Push Button as per TS | 1 Set |

**Temperature Bath Table & Calibration Section**

| Sl. No. | Description | Qty |
|---|---|---|
| 1 | Design, Manufacturing & Supply of Console type Calibration set-up of Size 2000 mm (L) x 1500 mm (H) x 900 mm (D) with proper finishing & furniture as per TS. Dimension will be finalised during detail engineering. | **1 No** |
| 2 | Bench Mounted Temperature Calibration Bath (Ambient to 300°C) with trolley | 1 Set |
| 3 | Bench Mounted Dry Block Temperature Calibrator ( up to 650°C) | 1 Set |
| 4 | Panel mounted type Lab Environment Monitor | |
| 5 | Standard Platinum Resistance Thermometer | 1 No |
| 6 | Bend Type Secondary PRT | 1 No |
| 7 | Panel mounted type Temperature 10 channel Data Acquisition System(DAQ) for RTD & T/C's | 1 No |
| 8 | Fume extractor for Liquid Bath Heater | 1 Set |
| 9 | 230V, 15/5A AC Sockets (DIN Type) with suitable plug and converter as per TS | 4 No's |
| 10 | Mains Power Control – MCB,ELCB, LED Indicator and Emergency Stop Push Button as per TS | 1 Set |

**Electrical Calibration Section**

| Sl. No. | Description | Qty |
|---|---|---|
| 1 | Design, Manufacturing & Supply of Console type Calibration set-up of Size 2000 mm (L) x 1500 mm (H) x 900 mm (D) with proper finishing & furniture as per TS. Dimension will be finalised during detail engineering. | **1 No** |
| 2 | Panel mounted type Multiproduct Calibrator | 1 No |
| 3 | Panel mounted type 6.5 Digital Multimeter | 1 No |
| 4 | Panel mounted type Programmable DC Power Supply 0-32V, 5A | 1 No |
| 5 | Panel mounted type Fixed DC Power Supply 24V,5A DC | 1 No |
| 6 | Panel mounted type Function Generator 30 MHz, 2 Channel | 1 No |
| 7 | Panel mounted type Digital Storage Oscilloscope – 30 MHz, 2 Channel | 1 No |
| 8 | Decade Resistance Box | 1 No |
| 9 | Panel mounted type Soldering/De-Soldering Station | 1 No |
| 10 | Panel mounted type 0-250V,5A Variable AC Power Supply | 1 No |
| 11 | 230V, 15/5A AC Sockets (DIN Type) with suitable plug and converter as per TS | 4 No's |
| 12 | Mains Power Control – MCB,ELCB, LED Indicator and Emergency Stop Push Button as per TS | 1 No |

**Very High Pressure Calibration Section**

| Sl. No. | Description | Qty |
|---|---|---|
| 1 | Design, Manufacturing & Supply of Console type Calibration set-up of Size 2000 mm (L) x 850 mm (H) x 900 mm (D) with proper finishing & furniture as per TS. Dimension will be finalised during detail engineering. | **1 No** |
| 2 | Comparator with Digital Display ( Range : 0 to 2000 bar) & necessary pressure generating system as per TS | 1 Set |
| 3 | Hydraulic Dead Weight Tester (Range : 1 to 1100 bar) | 1 No |
| 4 | Pneumatic Dead Weight Tester (Range : -1 to 1 bar) | 1 No |
| 5 | Pneumatic Dead Weight Tester (Range : 1 to 100 bar) | 1 No |
| 6 | Pneumatic Dead Weight Tester Automatic Dual Range with Range (-1 to 1 bar) and (1 to 100 bar). **This item can be considered as alternative against Sl No: 4 & 5.** | 1 No |

**Other Materials**

| Sl. No. | Description | Qty |
|---|---|---|
| 1 | Industrial Computer with 19" TFT Monitor (panel mounted) & Accessories | 2 No |
| 2 | Laser B/W Printer with table | 1 Set |
| 3 | Pressure Calibration Software licensed Version **(Note-2)** | 1 Set |
| 4 | Temperature Calibration Software licensed Version (**Note-2)** | 1 Set |
| 5 | Electrical Calibration Software licensed Version **(Note-2)** | 1 Set |
| 6 | All driver, Antivirus , Utility Software & OS with license | 2 Set |
| 7 | Necessary communication bus/module for FF & HART as required along with all required communication cables & connectors | 1 Set |
| 8 | Armoured Stranded Copper cable for Power supply of proper sizes (depending on current & voltage rating) feeder to Booster Compressor, Vacuum pump etc. as per IS standard | 1 lot |
| 9 | Necessary hardware for laying & terminations of all type of cable gland | 1 lot |
| 10 | All necessary mounting Hardware, cabinets and Racks for Test bench & its' accessories. | 1 lot |
| 11 | All necessary Fittings, reducers, connectors, probes, BSP & NPT adaptors ($^1/_8$ inch, ¼ inch, ½ inch & $^3/_8$ inch) & other accessories as required excluding very high pressure section (2000bar) | 4 lot |
| 12 | Necessary Hose & SS fittings for very high pressure application (2000 bar) | 2 Set |
| 13 | Flanges for Calibrating Capillary type Gauges & Transmitters (Remote Seal) | 1 lot |
| 14 | Necessary Hose & SS fittings having 150% rating calibration Certificates from OEM | 1 lot |
| 15 | All required tables (hard copy) for Temperature calibration (Calculation of the characteristic constant and table degree by degree) | 1 lot |
| 16 | Standard Tool Kit | 1 No |
| 17 | Anti-static mat with Wrist band | 4 No |
| 18 | Heavy Duty Mat | 4 No |
| 19 | Chairs | 6 No |
| 20 | List of Spares | 1 No |
| 21 | UPS – 2KVA | 1 No |
| 22 | Construction of earth pit | 1 No |

**Note-1: Scope of supply shall be as per BOM. If anything that has not been envisaged in BOM but required for commissioning/ completion of this project, bidder shall supply it.**

**Note-2: Bidder may quote for integrated software for Pressure, Temperature & Electrical. However, two separate licenses to be provided for two PCs.**

**Annexure: 7-1**

**Scope of Services**

| | | |
|---|---|---|
| 1 | Design, Engineering, Drawing Preparation , Application S/W Development for Test Benches satisfying all safety rules & regulations | 1 Job |
| 2 | Testing & Inspection prior to despatch | 1 Job |
| 3 | Packaging prior to despatch. | 1 Job |
| 4 | Handling & Storage at site maintaining all safety rules | 1 Job |
| 5 | Supply of necessary Erection Hardware, Accessories, Cabinets, Racks etc. as required to complete installation of Test Bench | 1 Job |
| 6 | Erection & commissioning of Supplied Materials maintaining all safety rules | 1 Job |
| 7 | Laying & Termination of Signal, Power & Communication Cables maintaining all safety rules | 1 Job |
| 8 | Installation Works for Erection of Supplied Materials, laying of Cable trays etc. maintaining all safety rules | 1 Job |

| | | |
|---|---|---|
| 9 | Integrated Commissioning maintaining safety rules | 1 Job |
| 10 | Handing over of Total System as per mutually agreed upon format (SAT) | 1 Job |
| 11 | Training as per the specifications | 1 Job |
| 12 | Drawings & Documents including "As Built Drawings", Valid calibration certificates | 1 Job |
| 13 | Evaluation of **Gravity value (g)** of Instrumentation Workshop by Survey of India (SI). | 1 Job |

**Annexure: 8-1**

**List of Preferred Makes**

| Sl. No. | Item | Make |
|---|---|---|
| 1 | Test Bench | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 2 | Panel mounted type Pneumatic Pressure Controller Range ( ± 50 mbar and ± 1000 mbar) | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 3 | Panel mounted type Pneumatic Pressure Controller Range ( vacuum to 20 bar & 0 to 70 bar ) | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 4 | Panel mounted type Hydraulic Pressure Controller Range ( 0 to 1000 bar ) | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 5 | Panel mounted type Multifunction Calibrator with Pressure Sensors & HART | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics, AOIP SAS, Meriam Process echnologies |
| 6 | Panel mounted type 6.5 Digital Multimeter | Beamex, Fluke, GE(Druck), keysight, Wika/Scandura, YIL, Time Electronics, Extech Instruments Corporation |
| 7 | Dry Pressure Booster as per TS | Wika/Scandura, SMC ,Fluke, Time Electronics,GE,YIL |
| 8 | Electrical Dry Vacuum Pump as per TS | Edwards, Toshniwal, GNM Tech Inc. |
| 9 | Pneumatic/Vacuum Panel with 3 Settable Regulators, Built In Hand Pump as per TS | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 10 | Hydraulic Hand Pump as per TS | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 11 | Digital Pneumatic Test Gauge : Range ( 0 to 100 bar) as per TS | Wika,Scandura GE(Druck), Crystal |
| 12 | Digital Hydraulic Test Gauge : Range ( 0 to 700 bar) as per TS | Wika,Scandura GE(Druck), Crystal |
| 13 | Programmable DC Power Supply 0 to 32 VDC, 5A | Aplab, Scheneider, Siemens, Phoenix, Tektronix, B&K Precision |
| 14 | Fixed DC Power Supply 24 VDC, 5A | Aplab, Scheneider, Siemens, Phoenix, Tektronix |
| 15 | Bench Mounted Temperature Calibration Bath (Ambient to 300°C) with trolley | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |

| | | |
|---|---|---|
| 16 | Bench Mounted Dry Block Temperature Calibrator ( Upto to 650°C) | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 17 | Panel mounted type Lab Environment Monitor | Omega, Ruska,Avtech, Extech Instruments Corporation, GEO Instruments |
| 18 | Reference SPRT | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics, Practical Instrument Electronics Inc, Advanced Sensing Products, TMS Europe Ltd |
| 19 | Bend Type Secondary PRT | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics, Practical Instrument Electronics Inc, Advanced Sensing Products, TMS Europe Ltd |
| 20 | Panel mounted type Temperature 10 channel Data logger for RTD & T/C's | Fluke, Omega, YIL |

| **Sl. No.** | **Item** | **Make** |
|---|---|---|
| 21 | Panel mounted type Multiproduct Calibrator | Beamex, Fluke, GE(Druck), Transmille, Wika/Scandura, YIL , Time Electronics |
| 22 | Panel mounted type Function Generator 30 MHz, 2 Channel | Keysight, Tetronix ,Mouser, Agilent Technologies |
| | | |
| 23 | Panel mounted type Digital Storage Oscilloscope – 30 MHz, 2 Channel | Keysight, Tetronix, Mouser, Agilent Technologies |
| 24 | Decade Resistance Box | Toshniwal,Sparkfun,YIL, Mouser,Time Electronics,Precision Measuring Instruments |
| 25 | Panel mounted type Soldering/De-Soldering Station | Hakko ,Weller,Digikey |
| 26 | Panel mounted type 0-250V,5A Variable AC Power Supply | Aplab, Scheneider, Siemens, Phoenix, Tektronix, B&K, Precision,AE, Agronic,Regole |
| 27 | Comparator with Digital Display ( Range : 0 to 2000 bar) & necessary pressure generating system as per TS | Beamex, Fluke, GE (Druck), Wika/Scandura, YIL, Time Electronics,Novaswiss |
| 28 | Hydraulic Dead Weight Tester (Range : 1 to 1100 bar) | Beamex, Fluke, GE(Druck), Wika/ DH-Budenberg , YIL, Time Electronics |
| 29 | Pneumatic Dead Weight Tester (Range : -1 to 1 bar) | Beamex, Fluke, GE(Druck), Wika/ DH-Budenberg , YIL, Time Electronics |
| 30 | Pneumatic Dead Weight Tester (Range : 1 to 100 bar) | Beamex, Fluke, GE(Druck), Wika/ DH-Budenberg , YIL, Time Electronics |
| 31 | Industrial Computer with 19" TFT Monitor (panel mounted) & Accessories | Dell, HP/Compaqe, IBM, Toshiba, Advantech |
| 32 | Laser B/W Printer | Dell, HP/Compaqe, IBM, Toshiba |
| 33 | Pressure Calibration Software licensed Version | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 34 | Temperature Calibration Software licensed Version | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 35 | Electrical Calibration Software licensed Version | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Time Electronics |
| 36 | All necessary Fittings, reducers, connectors, probes, BSP & NPT adaptors (1/8 inch, ¼ inch, ½ inch & 3/8 inch) & other accessories as required | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Swagelok,Parker |

| | | |
|---|---|---|
| | excluding very high pressure section (2000bar) | |
| 37 | Necessary Hose & SS fittings for very high pressure application (2000 bar) | Beamex, Fluke, GE(Druck), Wika/Scandura, YIL, Swagelok, Parker |
| 38 | Standard Tool Kit | Phoenix, Stanley, Taparia |
| 39 | UPS – 2KVA | APC/Schneider, Emerson, Microteck, Aplab,Eton |

**Annexure: 22-1**

**List of Instruments to be supplied along with OEM Traceable Calibration Certification:**

| Sl. No. | Item | Certificate Validity (In Years) |
|---|---|---|
| 1 | Temperature Calibration Bath (Ambient to 300°C) | 1 |
| 2 | Dry Block Temperature Calibrator (Up to 650°C) | 1 |
| 3 | Lab Environment Monitor | 1 |
| 4 | Function Generator 30 MHz, 2 Channel | 1 |
| 5 | Digital Storage Oscilloscope – 30 MHz, 2 Channel | 1 |
| 6 | Decade Resistance Box | 1 |
| 7 | Digital Pneumatic Test Gauge : Range ( 0 to 100 bar) | 1 |
| 8 | Digital Hydraulic Test Gauge : Range ( 0 to 700 bar) | 1 |

**Annexure: 22-2**

**List of Instruments to be supplied along with Accredited Calibration Certification:**

| Sl. No. | Item | Certificate Validity (In Years) |
|---|---|---|
| 1 | Pneumatic Dead Weight Tester (Range : -1 to 1 bar) | 5 |
| 2 | Pneumatic Dead Weight Tester (Range : 1 to 100 bar) | 5 |
| 3 | Hydraulic Dead Weight Tester (Range : 1 to 1100 bar) | 5 |
| 4 | Pneumatic Pressure Controller Range( ± 50 mbar and ± 1000 mbar) | 1 |
| 5 | Pneumatic Pressure Controller Range ( vacuum to 20 bar & 0 to 70 bar ) | 1 |
| 6 | Hydraulic Pressure Controller Range ( 0 to 1000 bar ) | 1 |
| 7 | Multiproduct Calibrator | 1 |
| 8 | Multifunction Calibrator with Pressure Sensors & HART | 1 |
| 9 | 6.5 Digital Multimeter | 1 |
| 10 | Reference SPRT | 1 |
| 11 | Bend Type Secondary PRT | 1 |

| | | |
|---|---|---|
| 12 | 10 channel DAQ for RTD & T/C's | 1 |
| 13 | Digital Display for Comparator ( Range : 0 to 2000 bar) | 1 |

**Annexure: 26.14-1**

**In case of bought out, OEM or authorised dealer authorization/ support letter for following critical items:**

| Sl. No. | Description |
|---|---|
| 1 | Panel mounted type Pneumatic Pressure Controller Range ( ± 50 mbar and ± 1000 mbar) |
| 2 | Panel mounted type Pneumatic Pressure Controller Range ( vacuum to 20 bar & 0 to 70 bar ) |
| 3 | Panel mounted type Hydraulic Pressure Controller Range ( 0 to 1000 bar ) |
| 4 | Panel mounted type Multifunction Calibrator with Pressure Sensors (Pressure range: vacuum to 1 bar, 0-20 bar, 0-700 bar) & HART |
| 5 | Panel mounted type Multiproduct Calibrator |
| 6 | Bench Mounted Temperature Calibration Bath (Ambient to 300°C) |
| 7 | Bench Mounted Dry Block Temperature Calibrator (Up to 650°C) |
| 8 | Panel mounted type Temperature 10 channel Data logger for RTD & T/C's |
| 9 | Panel mounted type 6.5 Digital Multimeter |
| 10 | Dry Booster Pump |
| 11 | Electrical Dry Vacuum Pump |
| 12 | Programmable DC Power Supply 0 to 32 VDC, 5A |
| 13 | Comparator with Digital Display ( Range : 0 to 2000 bar) |
| 14 | Hydraulic Dead Weight Tester (Range : 1 to 1100 bar) |
| 15 | Pneumatic Dead Weight Tester (Range : -1 to 1 bar) |
| 16 | Pneumatic Dead Weight Tester (Range : 1 to 100 bar) |
| 17 | Pneumatic Dead Weight Tester Automatic Dual Range with Range (-1 to 1 bar) and (1 to 100 bar). **This item can be considered as alternative against Sl No: 15 & 16.** |
| 18 | Pressure Calibration Software licensed Version |
| 19 | Temperature Calibration Software licensed Version |
| 20 | Electrical Calibration Software licensed Version |

**Schedule- 1**

**SCHEDULE OF PRICES**

All the quoted prices shall be firm till the completion of said works.

**Pressure Calibration Section**

| Sl. No. | Particulars | Qty | * Unit Rate | * Extended Rate |
|---|---|---|---|---|
| 1 | Design, Manufacturing & Supply of Console type Calibration set-up of Size 2000 mm (L) x 1500 mm (H) x 900 mm (D) with proper finishing & furniture as per TS. Dimension will be finalised during detail engineering. | 1 Set | | |
| 2 | Panel mounted type Pneumatic Pressure Controller Range ( ± 50 mbar and ± 1000 mbar) & necessary pressure generating system as per TS | 1 Set | | |
| 3 | Panel mounted type Pneumatic Pressure Controller Range ( vacuum to 20 bar & 0 to 70 bar ) & necessary pressure generating system as per TS | 1 Set | | |
| 4 | Panel mounted type Hydraulic Pressure Controller Range ( 0 to 1000 bar ) & necessary pressure generating system as per TS | 1 Set | | |
| 5 | Panel mounted type Multifunction Calibrator with Pressure Sensors (Pressure range: vacuum to 20 bar, 0-700 bar) & HART as per TS | 1 lot | | |
| 6 | Panel mounted type 6.5 Digital Multimeter | 1 No | | |
| 7 | Dry Pressure Booster as per TS | 1 Set | | |
| 8 | Electrical Dry Vacuum Pump as per TS | 1 Set | | |
| 9 | Pneumatic/Vacuum Panel with 3 Settable Regulators, Built In Hand Pump as per TS | 1 Set | | |
| 10 | Hydraulic Hand Pump as per TS | 1 No | | |
| 11 | Digital Pneumatic Test Gauge : Range ( 0 to 100 bar) as per TS | 1 No | | |
| 12 | Digital Hydraulic Test Gauge : Range ( 0 to 700 bar) as per TS | 1 No | | |
| 13 | Nitrogen Cylinder with trolley as per TS | 1 Set | | |
| 14 | Programmable DC Power Supply 0 to 32 VDC, 5A | 1 No | | |
| 15 | Fixed DC Power Supply 24 VDC, 5A | 1 No | | |
| 16 | 230V, 15/5A AC Sockets (DIN Type) with suitable plug and converter as per TS | 4 Sets | | |
| 17 | Mains Power Control – MCB,ELCB, LED Indicator and Emergency Stop Push Button as per TS | 1 Set | | |

**Temperature Bath and Calibration Section**

| Sl. No. | Particulars | Qty | * Unit Rate | * Extended Rate |
|---|---|---|---|---|
| | Design, Manufacturing & Supply of Console type Calibration set-up of Size 2000 mm (L) x 1500 mm (H) x 900 mm (D) with proper finishing & furniture as per TS. Dimension will be finalised during detail engineering. | **1 No** | | |
| 1 | Bench Mounted Temperature Calibration Bath (Ambient to 300°C) with trolley | 1 Set | | |
| 2 | Bench Mounted Dry Block Temperature Calibrator (up to 650°C) | 1 Set | | |
| 3 | Panel mounted type Lab Environment Monitor | | | |
| 4 | Reference RTD | 1 No | | |
| 5 | Bend Type Secondary PRT | 1 No | | |
| 6 | Panel mounted type Temperature 10 channel DAQ for RTD & T/C's | 1 No | | |

| | | | | |
|---|---|---|---|---|
| 7 | Fume extractor | 1 Set | | |
| 8 | 230V, 15/5A AC Sockets (DIN Type) with suitable plug and converter as per TS | 4 No's | | |
| 9 | Mains Power Control – MCB,ELCB, LED Indicator and Emergency Stop Push Button as per TS | 1 Set | | |

**Electrical & Electronics Calibration Section**

| Sl. No. | Particulars | Qty | * Unit Rate | * Extended Rate |
|---|---|---|---|---|
| 1 | Design, Manufacturing & Supply of Console type Calibration set-up of Size 2000 mm (L) x 1500 mm (H) x 900 mm (D) with proper finishing & furniture as per TS. Dimension will be finalised during detail engineering. | **1 No** | | |
| 2 | Panel mounted type Multiproduct Calibrator | 1 No | | |
| 3 | Panel mounted type 6.5 Digital Multimeter | 1 No | | |
| 4 | Panel mounted type Programmable DC Power Supply 0-32V, 5A | 1 No | | |
| 5 | Panel mounted type Fixed DC Power Supply 24V,5A DC | 1 No | | |
| 6 | Panel mounted type Function Generator 30 MHz, 2 Channel | 1 No | | |
| 7 | Panel mounted type Digital Storage Oscilloscope – 30 MHz, 2 Channel | 1 No | | |
| 8 | Decade Resistance Box | | | |
| 9 | Panel mounted type Soldering/De-Soldering Station | 1 No | | |
| 10 | Panel mounted type 0-250V,5A Variable AC Power Supply | 1 No | | |
| 11 | 230V, 15/5A AC Sockets (DIN Type) with suitable plug and converter as per TS | 4 No's | | |
| 12 | Mains Power Control – MCB,ELCB, LED Indicator and Emergency Stop Push Button as per TS | 1 No | | |

**Very High Pressure Calibration Section**

| Sl. No. | Particulars | Qty | * Unit Rate | * Extended Rate |
|---|---|---|---|---|
| 1 | Design, Manufacturing & Supply of Console type Calibration set-up of Size 2000 mm (L) x 850 mm (H) x 900 mm (D) with proper finishing & furniture as per TS. Dimension will be finalised during detail engineering. | **1 No** | | |
| 2 | Comparator with Digital Display ( Range : 0 to 2000 bar) & necessary pressure generating system as per TS | 1 Set | | |
| 3 | Hydraulic Dead Weight Tester (Range : 1 to 1100 bar) | 1 No | | |
| 4 | Pneumatic Dead Weight Tester (Range : -1 to 1 bar) | 1 No | | |
| 5 | Pneumatic Dead Weight Tester (Range : 1 to 100 bar) | 1 No | | |
| 6 | Pneumatic Dead Weight Tester Automatic Dual Range with Range (-1 to 1 bar) and (1 to 100 bar). This item can be considered as alternative | 1 No | | |

| | | | | |
|---|---|---|---|---|
| | against Sl No: 4 & 5. | | | |

**Other Items**

| Sl. No. | Particulars | Qty | * Unit Rate | * Extended Rate |
|---|---|---|---|---|
| 1 | Industrial Computer with 19" LED Monitor (panel mounted) & Accessories | 2 No | | |
| 2 | Laser B/W Printer with table | 1 Set | | |
| 3 | Pressure Calibration Software licensed Version | 1 Set | | |
| 4 | Temperature Calibration Software licensed Version | 1 Set | | |
| 5 | Electrical Calibration Software licensed Version | 1 Set | | |
| 6 | Necessary communication bus/module for FF & HART as required along with all required communication cables & connectors | 1 Set | | |
| 7 | Armoured Stranded Copper cable for Power supply of proper sizes (depending on current & voltage rating) feeder to Booster Compressor, Vacuum pump etc. as per IS standard | 1 lot | | |
| 8 | Necessary hardware for laying & terminations of all type of cable gland | 1 lot | | |

| Sl. No. | Particulars | Qty | * Unit Rate | * Extended Rate |
|---|---|---|---|---|
| 9 | All necessary Fittings, reducers, connectors, probes, BSP & NPT adaptors ($^1/_8$ inch, ¼ inch, ½ inch & $^3/_8$ inch) & other accessories as required excluding very high pressure section (2000bar) | 4 lot | | |
| 10 | Flanges for Calibrating Capillary type Gauges & Transmitters (Remote Seal) | 1 lot | | |
| 11 | Standard Tool Kit | 1 No | | |
| 12 | Anti-static mat with Wrist band | 4 No | | |
| 13 | Heavy Duty Mat | 4 No | | |
| 14 | Chairs | 6 No | | |
| 15 | UPS – 2KVA | 1 No | | |
| 16 | Installation, Testing, Commissioning | 1 lot | | |
| 17 | Evaluation of Gravity value of Instrumentation Workshop by Survey of India (SI). | 1 No | | |
| 18 | Any other item/service | As required | | |
| 19 | AMC price (Per man-day) | 12 No | | |

*** To mention the currency in the heading.**

**Schedule 10-1**

**List of Recommended / Mandatory Spare Parts for 02 Year Maintenance and Operation**

**(To be filled up by Bidder)**

| Sl No | Parts | Description Of Spare | Recommended Quantity | Unit Price | Remarks |
|---|---|---|---|---|---|
| 1 | MCB | | | | |
| 2 | ELCB | | | | |
| 3 | Switches | | | | |
| 4 | Oil | | | | |
| 5 | Set of Quick Connecters | | | | |
| 6 | Socket & Plug | | | | |
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Signature of the Bidder

Designation:

Company Name:

Seal of Company

Date:

**Schedule 11.1-1**

**List of Commissioning Spares**

**(To be filled up by Bidder)**

| Sl No | Description Of Spare | Quantity |
|---|---|---|
| 1 | Set of NPT & BSP Adaptors | |
| 2 | Set of Suitable Fuses for the Supplied Instruments | |
| 3 | Set of Tubes, Ferrules & Adaptors | |

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|---|---|---|
| 4 | Oil for Dead Weight Tester | |
| 5 | Oil for Liquid Temperature Bath | |
| 6 | Oil for High Pressure Comparator | |
| 7 | Set of Wrenches | |
| 8 | Set of Seals & O Rings | |
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Signature of the Bidder

Designation:

Company Name:

Seal of Company

Date:

**Schedule 11.2-1**

**List of Special Tools & Tackles**
**(To be filled up by Bidder)**

| Sl No | Name Of Tools & Tackles | Quantity |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
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Signature of the Bidder

Designation:

Company Name:

Seal of Company Date:

**Schedule 12-1**

**List of Imported Items**
**(To be filled up by Bidder)**

| Sl No | Name Of Equipment | Quantity |
|---|---|---|
| 1 | | |
| 2 | | |
| 3 | | |
| 4 | | |
| 5 | | |
| 6 | | |
| 7 | | |
| 8 | | |
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Signature of the Bidder

Designation:

Company Name:

Seal of Company Date:

**Schedule 16-1**

**List of Exclusions**
**(To be filled up by Bidder)**

| Sl No | Reference Clause of TS | Details of Exclusions | Reasons |
|---|---|---|---|
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Signature of the Bidder

Designation:

Company Name:

Seal of Company

Date:

**Schedule 16-2**

**List of Deviations**
**(To be filled up by Bidder)**

| Sl No | Reference Clause of TS | Details of Deviations | Reasons |
|---|---|---|---|
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Signature of the Bidder

Designation:

Company Name:

Seal of Company

Date:

**Schedule 21.5-1**

| Site Acceptance Test(SAT) | | | | | |
|---|---|---|---|---|---|
| Manufacturer's Name & Address | Item: Design and Supply of Pressure, Temperature, and Electrical Test benches | | Project: | | |
| | | | FAT NO.<br>Revision<br>Date<br>Page 1 of 1 | Client:<br>Customer<br>PO No. | |
| Sl. No. | Inspection Activities | Documents Require | Reference Documents | Acceptance | Remarks |
| 1.0 | Physical Verification | Packing List & FAT Report | As per the Packing List | | |
| 2.0 | Erection & Commissioning<br>- Visual<br>- Conformance to Specs.<br>- Functional Checks | Calibration Certificates | | | |
| 3.0 | Testing & Demonstration | 1. Training / Demonstration Report<br>2. Completion Report/MOM | | | |
| Prepared By | | Checked By | | Approved by | |

25. SPECIAL INSTRUCTIONS TO BIDDER:

25.1 Bidder needs to comply all the points mentioned in the Technical checklist attached as per Annexure-1 and same to be submitted along with offer.

25.2 All equipment/materials used in the subject package shall be according to the specification given herein and any deviation should be clearly brought-out in the offer. No mention of deviation will mean that the bidder has accepted the specification given herein.

25.3 Specification of all the equipment in the test bench should be supported by technical catalogue/ literature/manuals. The bidder should provide all the supporting documents along with the bid. Specification without supporting document will not be considered for evaluation.

25.4 The Bidder shall include in his supply a complete new and unused set of all special tools & tackles required for operation and maintenance of the plant/ equipment offered.

25.5 The plant and equipment supplied shall be new and best of its kind and of latest technology. All materials and equipment shall comply with latest codes and standards, applicable nationally / internationally. A consolidated list of all codes and standards followed or adopted for design, manufacture and testing shall be submitted. Preferably, all equipment and accessories shall confirm to the latest Indian Standards wherever applicable. All electrical equipment supplied shall be designed, manufactured, tested & erected as per the latest revision of CEA Regulations, Statutory requirements of the Govt. of India, Govt. of Assam. In the event of requirement of TS exceeding the requirement of corresponding standards, regulations & safety codes, the specification provided in the TS shall govern. In the event of conflict between standard regulation & TS, the most stringent shall be applied.

25.6 All equipment as may be necessary shall conform to the provision of Statutory and other Regulations in force such as Indian explosives Act 1884, Mines Act 1952, Oil Mines regulation1984, Indian Factories Act 1948, Indian Boiler Regulation 1950, State Factories Act 1948, Central Pollution Control Board, Indian Weights & Measures Act, etc. The Successful Bidder shall take necessary steps to get all the installations within his scope of supply approved by the concerned legal authorities.

25.7 The Bidder shall use new, good and tested quality materials. The workmanship shall be of high quality.

25.8 Layout of test bench and equipment shall have provision for easy and safe movement of operation / maintenance personnel for operation / inspection. Adequate space for dismantling / removal of equipment / parts for repair shall also be built in the layout. All working parts of

the equipment shall be easily accessible and maintainable. There should be a proper arrangement for convenience of operation, inspection, maintenance, replacement & repair. Fast wearing parts shall be accessible for replacement/maintenance without necessitating removal of other parts. All like parts of the equipment supplied shall be inter-changeable.

25.9 After erection, all equipment, pipes, structures, etc., shall be thoroughly cleaned and painted with one coat of primer and two coats of approved colour paints. Paints shall be of good quality and shall be strictly as per instructions and recommendations of the paint manufacturer and to the approval of M/s OIL.

25.10 Execution of entire work shall be carried out in such a manner that normal working of the workshop is not interrupted.

25.11 The Successful Bidder shall obtain written approval/clearance from the M/s OIL at each stage or before start of the next stage of site work. The Successful Bidder with the approval of the M/s OIL shall decide the stages.

25.12 The Successful Bidder shall ensure deputation of well experienced engineers and technical staff from various disciplines as per requirement for erection, testing and commissioning of the test bench.

25.13 All the manufacturing / fabrication works shall be carried out only on the basis of approved drawings and schemes or as directed by M/s OIL. It is solely the responsibility of the Successful Bidder to ensure that all working drawings prepared by him bear the stamp of approval of M/s OIL's prior to start of work.

25.14 The successful Bidder shall stand guarantee against obsolescence of equipment under their scope of supply for a minimum period of 10 (ten) years after expiry of warranty period. The bidder shall also guarantee that discontinuity of production of any item offered, as a part of the system shall not affect the maintainability of the system for a minimum period of 10 (ten) years.

25.15 Bidder shall provide the OEM or authorised dealer's authorization/ support letter for all critical bought out items as per Annexure: 26.14-1 for a period of ten years and same to be provided along with the bid.

25.16 The successful Bidder shall also stand guarantee against all the offered software licensed for lifelong use and will update all the software with latest patch time to time free of cost.

25.17 The Bidder must guarantee supply of spares and availability of support service for at least 10 years with effect from date of commissioning of the Test Bench supplied under the Tender / Order, if

order is awarded to them by M/s OIL. Bidder needs to provide written compliance along with bid.

## General Note:

**1.0 Payment clause:**

Payment shall be released as follows:

i) 80 % value shall be released on supply against proof of despatch/shipment of the goods.

ii) Remaining 20% along with installation & commissioning charges shall be paid after successful commissioning and acceptance by OIL at site.

OIL may consider making 100 % payment towards supply of the items against proof of dispatch/shipment provided bidders agree to pay interest @ 1% above prevailing Bank Rate (CC rate) of State Bank of India for 20 % of the items value and also submit Bank Guarantee for the equivalent amount plus interest valid till successful commissioning of at site. This is in addition to the 10 % of the order value towards Performance Security as per the tender requirement.

Payment towards Installation & Commissioning shall be released only after successful commissioning and acceptance by OIL at site.

Payment towards training shall be released only after successful completion of training.

**ANNEXURE- B**
**(Tender No. SDG0189P16/08)**

## BID REJECTION CRITERIA(BRC)/BID EVALUATION CRITERIA(BEC)

BID REJECTION CRITERIA:

The bids shall in general conform to the specifications and terms and conditions given in the tender. Bids shall be rejected in case the Item offered do not conform to the required technical specifications and to the respective international / national standards wherever stipulated. Notwithstanding the general conformity of the bids to the stipulated specifications and terms and conditions, the following requirements will have to be particularly met by the bids, without which the same will be considered as non-responsive and will be rejected.

A. BRC TECHNICAL:

1. Bidder should have experience of design, engineering, supply and commissioning of minimum one number of similar test bench during last 5(Five) years as on the Bid Closing Date. Similar implies Electrical Test Bench (having minimum Multiproduct Calibrator) or Temperature Test Bench (having minimum Dry Block/ Liquid Bath) or Pressure Test Bench ( having minimum Pressure Controller ) used for measurement and calibration purpose in Laboratory environment.

1.1 Documentary evidence to substantiate the above experience should be submitted in the form of copy of relevant Purchase Order along with Installation and commissioning certificate in respect of satisfactory execution of the Purchase Order.

1.2 Documentary evidence from customer/user certifying that the above supplied test bench is in operation for minimum one year from date of commissioning.

BID EVALUATION CRITERIA (BEC)

1.0 The bids conforming to the technical specifications, 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 given below.

2.0 If there is any discrepancy between the unit price and the total price, the unit price will prevail and the total price shall be

corrected. Similarly, if there is any discrepancy between words and figure, the amounts in words shall prevail and will be adopted for evaluation.

3.0 For conversion of foreign currency into Indian currency for evaluation of Bids, B.C. selling (Market) rate declared by State Bank of India, one day prior to the date of priced bid opening shall be considered. However, if the time lag between the opening of the bids and final decision exceeds 3(three) months, then B.C. Selling(Market) rate of exchange declared by SBI on the date prior to the date of final decision shall be adopted for conversion and evaluation.

**COMMERCIAL:**

1.0 Bids are invited under Single Stage Two Bid System. Bidders shall quote accordingly under Single Stage Two Bid System. Bidder to note that no price details should be furnished in the Technical (i.e. Unpriced) bid. The "Unpriced Bid" shall contain all techno-commercial details except the prices which shall be kept blank. The "Priced Bid" must contain the price schedule and the bidder's commercial terms and conditions. Bidder not complying with above submission procedure will be rejected.

2.0 **Bid security of US $ 6,320.00 or Rs. 4,33,920.00 shall be furnished as a part of the TECHNICAL BID**. Any bid not accompanied by a proper bid security in ORIGINAL will be rejected without any further consideration. For exemption for submission of Bid Security, please refer Clause No. 9.8 (Section A) of General Terms and Conditions for Global Tender. **The Bid Security shall be valid up to 06/04/2017. Bid shall be rejected straightway if Original Bid Security is not received within the Bid Closing Date & time mentioned in the Tender and/or Bid Security validity is shorter than the validity indicated in Tender and/or Bid Security amount is lesser than the amount indicated in the Tender.**

3.0 Bidders must confirm that Goods, materials or plant(s) to be supplied shall be new of recent make and of the best quality and workmanship and shall be guaranteed for a period of twelve months from the date of commissioning of the complete package at site against any defects arising from faulty materials, workmanship or design. Defective goods/materials or parts rejected by OIL shall be replaced immediately by the supplier at the supplier's expenses at no extra cost to OIL.

4.0 Successful bidder will be required to furnish a Performance Bank Guarantee @10% of the order value. The Performance Bank Guarantee must be valid for one year from the date of successful commissioning of the complete package at site. Bidder must confirm the same in their Technical Bid. Offers not complying with this clause will be rejected.

5.0 The prices offered will have to be firm through delivery and not subject to variation on any account. A bid submitted with an adjustable price will be treated as non-responsive and rejected.

6.0 **Validity of the bid shall be minimum 180 days from the Bid Closing date. Bids with lesser validity will be rejected.**

7.0 Bids received after the bid closing date and time will be rejected. Similarly, modifications to bids received after the bid closing date & time will not be considered.

8.0 Bidders shall quote directly and not through Agents in India. Offers made by Indian Agents on behalf of their foreign principals will be rejected. Similarly offers from unsolicited bidders will be rejected.

9.0 Bids containing incorrect statement will be rejected.

10.0 Offers should be submitted with Integrity Pact duly signed by the authorized signatory of the bidder. If any bidder refuses to sign Integrity Pact or declined to submit Integrity Pact with the offer, their bid shall be rejected straightway.

11.0 No offers should be sent by Telex, Cable, E-mail or Fax. Such offers will not be accepted.

12.0 Bidders are required to submit the summary of the prices in their commercial bids as per bid format (Summary), given below:

(i) **Commercial Bid Format ( Summary ) for Foreign Bidders** :

(A) Total material cost for all items including commissioning spares
(B) Total Packing & FOB Charges for (A) above
(C) Total FOB Port of Shipment value, (A+B) above
(D) Ocean Freight Charges up to Kolkata, India
(E) Insurance Charges for all the items above
(F) Total CIF Kolkata value, ( C+D+E )
(G) Installation & Commissioning charges including Service Tax
(H) Pre-shipment Inspection charges, if any, including Service Tax, if any
(I) Training to OIL Personnel charges, if any, including Service Tax
(J) AMC Charges including Service Tax
(K) Total Value, ( F+G+H+I +J) above
(L) Total value in words :
(M) Gross Weight :
(N) Gross Volume :

(iii) **Commercial Bid Format (SUMMARY) for Indigenous Bidders**:

(A) Total material cost for all items including commissioning spares
(B) Total Packing & FOB Charges for (A) above
(C) Total Ex-works value, ( A+B ) above
(D) Excise Duty, (Please indicate applicable rate of Duty)
(E) Sales Tax, (Please indicate applicable rate of Tax)
(F) Total FOR Despatching station price, ( C+D+E ) above
(G) Road Transportation charges to Duliajan

(H) Insurance Charges
(I) Total FOR Duliajan value, (F+G+H) above
(J) Installation & Commissioning charges including Service Tax
(K) Pre-shipment Inspection charges, if any, including Service Tax, if any
(L) Training to OIL Personnel charges, if any, including Service Tax
(M) AMC Charges including Service Tax
(N) Total Value, ( I+J+K+L+M ) above
(O) Total value in words :
(P) Gross Weight :
(Q) Gross Volume :

**SPECIAL NOTES**:

1. The items covered under this tender will be used by OIL in the PEL/ML areas issued/renewed after 01/04/99, applicable Customs Duty for import of goods shall be ZERO. Indigenous bidders shall be eligible for Deemed Export and should quote Deemed Export prices. Excise Duty under Deemed Export exempted. Necessary Project Authority Certificate (PAC) shall be issued by OIL towards this.

2. Successful bidder shall offer the items for Pre-despatch/shipment Inspection by OIL's executives. Pre-despatch/Shipment Inspection charges, if any, must be quoted separately on lumpsum basis which shall be considered for evaluation of the offers. The to and fro fares, boarding/lodging and other enroute expenses of OIL's personnel shall be borne by OIL. Pre-despatch Inspection charges shall include Service Tax, if any.

3. Installation/Commissioning charges must be quoted separately on lumpsum basis which shall be considered for evaluation of the offers. These charges should include amongst others to and fro fares, boarding/lodging, local transport at Duliajan and other expenses of supplier's commissioning personnel during their stay at Duliajan, Assam(India). All Income, Service, Corporate Taxes etc. towards the services provided under installation / commissioning shall be borne by the supplier and will be deducted at source at the time of releasing the payment. Bidder should also confirm about providing all these services in the Technical Bid.

4. Bidders must categorically indicate the Installation / Commissioning, Pre-despatch /Shipment Inspection, Training and AMC charges in their offers and must confirm about providing the same in their Technical bids.

13.0 **LIQUIDATED DAMAGE**: Supplier's competent personnel must arrive at Duliajan within 15 days from the date of intimation by OIL and complete the installation & commissioning job thereafter within the time mentioned in the tender. OIL, on the other hand, shall inform the party immediately on receipt of the goods at Duliajan. Liquidated Damage will be levied for any failure on the part of the supplier in completing the installation and commissioning of the Units @ 0.5% per full week or part thereof to a maximum of 10% of the total installation/commissioning charges.

**(II) Bid Evaluation Criteria**:

The bids conforming to the specifications, terms and conditions stipulated in the enquiry and considered to be responsive after subjecting to the Bid Rejection Criteria will be considered for further evaluation as per the Bid Evaluation Criteria given below:

**COMMERCIAL**:

1.0 The evaluation of bids will be done as per the Commercial Bid Format (SUMMARY) detailed vide Para 12.0 of BRC.

2.0 If there is any discrepancy between the unit price and the total price, the unit price will prevail and the total price shall be corrected. Similarly, if there is any discrepancy between words and figure, the amounts in words shall prevail and will be adopted for evaluation.

3.0 For conversion of foreign currency into Indian currency, B.C. selling (Market) rate declared by State Bank of India, one day prior to the date of price bid opening shall be considered. However, if the time lag between the opening of the bids and final decision exceed 3(three) months, then B.C. Selling(Market) rate of exchange declared by SBI on the date prior to the date of final decision shall be adopted for conversion and evaluation.

4.0 Offers not complying with the payment terms indicated in the enquiry shall be loaded with one percent above the prevailing Bank rate (CC rate) of State Bank of India for duration of commissioning time indicated in the tender plus transit time (3 months) for evaluation purpose.

5.0 To ascertain the inter-se-ranking, the comparison of the responsive bids will be made as under, subject to corrections / adjustments given herein.

5.1 **When only foreign bidders are involved**:

Comparison of bids will be done on the basis of "GRAND TOTAL VALUE" which is estimated as under:

(A) Total material cost for all items including commissioning spares
(B) Total Packing & FOB Charges of (A) above
(C) Total FOB Port of Shipment value, ( A+B ) above
(D) Ocean Freight Charges upto Kolkata, India
(E) Insurance Charges @ 1% of Total FOB Value vide (C) above
(F) Banking Charges @ 0.5% of Total FOB Value vide (C) above in case of payment through Letter of Credit ( If confirmed L/C at buyer's account is required, 1.5% of Total FOB Value will be loaded )
(G) Total CIF Kolkata Value, ( C+D+E+F ) above
(H) Installation & Commissioning charges
(I) Pre-shipment Inspection charges, if any, including Service Tax, if any.
(J) Training to OIL Personnel charges, if any, including Service Tax.
(K) AMC Charges including Service Tax
(L) Grand Total Value, ( G+H+I+J+K ) above

**Banking charge in the country of the foreign bidder shall be borne by the bidder.**

5.2 When only domestic bidders are involved or when more than one domestic bidders are in contention in case of mixed response:

Comparison of bids will be done on the basis of "GRAND TOTAL VALUE" which is estimated as under:

(A) Total material cost for all items including commissioning spares
(B) Packing and Forwarding Charges
(C) Total Ex-works value, (A+B) above
(D) Excise Duty
(E) Sales Tax
(F) Total FOR Despatching station price, ( C+D+E )
(G) Road Transportation charges to Duliajan
(H) Insurance Charges @0.5% of Total FOR Despatching Station Value (F) above
(I) Total FOR Duliajan value, (F+G+H)
(J) Assam Entry tax
(K) Installation & Commissioning charges including Service Tax
(L) Pre-shipment Inspection charges, if any, including Service Tax, if any.
(M) Training to OIL Personnel charges, if any, including Service Tax
(N) AMC Charges including Service Tax
(O) Grand Total Value, ( I+J+K+L+M+N ) above

Excise Duty in case of the indigenous bidder is EXEMPTED.

5.3 **When both foreign and domestic bidders are involved**:
The Grand Total Value of domestic bidder (inclusive of customs duty on imported raw material and components etc, and applicable terminal excise duty on the finished products and Sales Tax) excluding inland transportation to destination, Assam Entry Tax and Insurance charges worked out as per Para 5.2 above and Grand Total Value of the foreign bidder worked out as per Para 5.1 above will be compared. No price preference will be allowed to indigenous bidders except that for capital goods, the domestic manufacturers would be accorded a price preference to offset CST to the extent of 4% or actuals, whichever is less subject to 30% local content norms as stipulated for World Bank Funded project to the satisfaction of OIL. When more than one domestic bidders fall within price preference range, inter-se-ranking will be done on Total value basis.

Note: If the Government of India revises these evaluation criteria the same as applicable on the bid closing date will be adopted for evaluation of the offers.

6.0 Other terms and conditions of the enquiry shall be as per General Terms and Conditions for Global Tender. However, if any of the Clauses of the Bid Rejection Criteria / Bid Evaluation Criteria (BEC / BRC) mentioned here contradict the Clauses in the General Terms & Conditions of Global Tender of the tender and/or elsewhere, those mentioned in this BEC / BRC shall prevail.

7.0 “Bidders to note that 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. A new Clause on applicability of Public Procurement Policy for procurement of goods from Micro and Small Enterprises(MSE) in the tender is furnished vide Amendment to General Terms and Conditions for Global Tender (MM/GLOBAL/E-01/2005). Bidders are requested to take note of the same and to submit their offers accordingly.”

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## COMMERCIAL CHECK LIST

THE CHECK LIST MUST BE COMPLETED AND SUBMITED WITH YOUR OFFER. PLEASE ENSURE THAT ALL THESE POINTS ARE COVERED IN YOUR OFFER. THESE WILL ENSURE THAT YOUR OFFER IS PROPERLY EVALUATED. PLEASE SELECT "Yes" OR "No" TO THE FOLLOWING QUESTIONS, IN THE RIGHT HAND COLUMN.

| Sl No. | REQUIREMENT | COMPLIANCE |
|---|---|---|
| 1 | Whether bid submitted under Single Stage Two Bid System? | Yes / No |
| 2 | Whether quoted as manufacturer? | Yes / No |
| 3 | Whether ORIGINAL Bid Bond (not copy of Bid Bond) Sent separately? If Yes, provide details | |
| | (a) Amount : | |
| | (b) Name of issuing Bank : | |
| | (c) Validity of Bid Bond : | |
| 4 | Whether offered firm prices? | Yes / No |
| 5 | Whether quoted offer validity of 180 days from the date of closing of tender? | Yes / No |
| 6 | Whether quoted a firm delivery period? | Yes / No |
| 7 | Whether agreed to the NIT Warranty clause? | Yes / No |
| 8 | Whether confirmed acceptance of tender Payment Terms? | Yes / No |
| 9 | Whether confirmed to submit PBG as asked for in NIT? | Yes / No |
| 10 | Whether agreed to submit PBG within 30 days of placement of order? | Yes / No |
| 11 | Whether Price submitted as per Price Schedule (refer Para 12.0 of BRC)? | Yes / No |
| 12 | Whether quoted as per tender (without any deviations)? | Yes / No |
| 13 | Whether quoted any deviation? | Yes / No |
| 14 | Whether deviation separately highlighted? | Yes / No |
| 15 | Whether indicated the country of origin for the items quoted? | Yes / No |
| 16 | Whether technical literature / catalogue enclosed? | Yes / No |
| 17 | Whether weight & volume of items offered indicated? | Yes / No |
| 18 | For Foreign Bidders - Whether offered FOB / FCA port of despatch including sea / air worthy packing & forwarding? | Yes / No |
| 19 | For Foreign Bidders – Whether port of shipment indicated. To specify: | Yes / No |
| 20 | For Foreign Bidders only - Whether indicated ocean freight up to Kolkata port (Excluding marine insurance) ? | Yes / No |
| 21 | Whether Indian Agent applicable? | Yes / No |
| 22 | If YES, whether following details of Indian Agent provided? | |
| 23 | (a) Name & address of the agent in India – To indicate | Yes / No |

| | | |
|---|---|---|
| | (b) Amount of agency commission – To indicate | Yes / No |
| | (c) Whether agency commission included in quoted material value? | Yes / No |
| 24 | For Indian Bidders – Whether indicated the place from where the items will be dispatched. To specify : | Yes / No |
| 25 | For Indian Bidders – Whether road transportation charges up to Duliajan quoted? | Yes / No |
| 26 | For Indian Bidders only - Whether offered Ex-works price including packing/forwarding charges? | Yes / No |
| 27 | For Indian Bidders only - Whether indicated import content in the offer? | Yes / No |
| 28 | For Indian Bidders only - Whether offered Deemed Export prices? | Yes / No |
| 29 | For Indian Bidders only – Whether all applicable Taxes & Duties have been quoted? | Yes / No |
| 30 | Whether all BRC/BEC clauses accepted? | Yes / No |
| 31 | Whether confirmed to offer the items for Pre-despatch/shipment Inspection? | Yes / No |
| 32 | Whether Pre-despatch/shipment inspection charges applicable? | Yes / No |
| 33 | If Pre-despatch/shipment inspection charges applicable, whether quoted separately on lumpsum basis? | Yes / No |
| 34 | Whether confirmed to carry out Installation & Commissioning of the equipment at Duliajan (Assam)? | Yes / No |
| 35 | Whether Installation & Commissioning charge applicable? | Yes / No |
| 36 | If Installation/ Commissioning charges applicable, whether separately quoted on lumpsum basis? | Yes / No |
| 37 | Whether to & fro air fares, boarding/lodging of the commissioning personnel at Duliajan, Assam (India) included in the quoted charges? | Yes / No |
| 38 | Whether confirmed that all Service, Income, Corporate tax etc. applicable under Installation/ Commissioning are included in the prices quoted? | Yes / No |
| 39 | Whether Integrity Pact with digital signature uploaded? | Yes / No |
| 40 | Whether confirmed to carry out Training to OIL personnel as per NIT? | Yes / No |
| 41 | Whether Training charge applicable? | Yes / No |
| 42 | If Training charges applicable, whether separately quoted on lumpsum basis? | Yes / No |
| 43 | Whether to & fro air fares, boarding/lodging of the Training personnel for providing training at Duliajan, Assam (India) included in the quoted charges? | Yes / No |
| 44 | Whether confirmed that all Service, Income, Corporate tax etc. applicable towards services to be provided under Training are included in the prices quoted? | Yes/No |
| 45 | Whether confirmed acceptance of tender Payment Terms. | Yes/No |

| | |
|---|---|
| Offer reference | |
| Name of the Bidder | |

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