Bid Number: GEM/2021/B/996399
Dated: 03-02-2021

Bid Document

Bid Details	
Bid End Date/Time	26-02-2021 14:00:00
Bid Opening Date/Time	26-02-2021 14:30:00
Bid Life Cycle (From Publish Date)	90 (Days)
Bid Offer Validity (From End Date)	65 (Days)
Ministry/State Name	Ministry Of Petroleum And Natural Gas
Department Name	Oil India Limited
Organisation Name	Oil India Limited
Office Name	Oil India Limited
Total Quantity	10
Item Category	1. LP Booster Compressor Capacity (NM3/Hr) : 2700 , 2. Gas Lift Compressor, Capacity (NM3/Hr) : 3200
Bidder Turnover (Last 3 Years)	3356 Lakh (s)
MSE Exemption for Years of Experience and Turnover	No
Startup Exemption for Years of Experience and Turnover	No
Document required from seller	Experience Criteria,Bidder Turnover,Certificate (Requested in ATC),Additional Doc 1 (Requested in ATC),Additional Doc 2 (Requested in ATC),Additional Doc 3 (Requested in ATC),Additional Doc 4 (Requested in ATC) *In case any bidder is seeking exemption from Experience / Turnover Criteria, the supporting documents to prove his eligibility for exemption must be uploaded for evaluation by the buyer
Bid to RA enabled	No
Primary product category	2. Gas Lift Compressor, Capacity (NM3/Hr) : 3200
Time allowed for Technical Clarifications during technical evaluation	7 Days
Inspection Required	No
Estimated Bid Value	1273200000
Evaluation Method	Item wise evaluation

EMD Detail

Required	No

ePBG Detail

Advisory Bank	State Bank of India
ePBG Percentage(%)	3.00
Duration of ePBG required (Months).	18

(a). The EMD % will be applicable for each schedule/group selected during Bid creation.

(b). EMD & Performance security should be in favour of Beneficiary, wherever it is applicable.

Beneficiary:
CHIEF MANAGER MATERIALS(FP)
MATERIALS DEPARTMENT, Oil India Limited, PO DULIAJAN, DISTRICT : DIBRUGARH, ASSM PIN NO. 786602,
(Tuhin Roy)

Splitting

Bid splitting not applied.

MII Purchase Preference

MII Purchase Preference	Yes

MSE Purchase Preference

MSE Purchase Preference	Yes

1. Preference to Make In India products (For bids < 200 Crore):Preference shall be given to Class 1 local supplier as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. The minimum local content to qualify as a Class 1 local supplier is denoted in the bid document. If the bidder wants to avail the Purchase preference, the bidder must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which no purchase preference shall be granted. In case the bid value is more than Rs 10 Crore, the declaration relating to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or a chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in -India) order 2017 dated 04.06.2020. Only Class-I and Class-II Local suppliers as per MII order dated 4.6.2020 will be eligible to bid. Non - Local suppliers as per MII order dated 04.06.2020 are not eligible to participate. However, eligible micro and small enterprises will be allowed to participate .In case Buyer has selected Purchase preference to Micro and Small Enterprises clause in the bid, the same will get precedence over this clause.
2. Purchase preference to Micro and Small Enterprises (MSEs): Purchase preference will be given to MSEs as defined in Public Procurement Policy for Micro and Small Enterprises (MSEs) Order, 2012 dated 23.03.2012 issued by Ministry of Micro, Small and Medium Enterprises and its subsequent Orders/Notifications issued by concerned Ministry. If the bidder wants to avail the Purchase preference, the bidder must be the manufacturer of the offered product in case of bid for supply of goods. Traders are excluded from the purview of Public Procurement Policy for Micro and Small Enterprises. In respect of bid for Services, the bidder must be the Service provider of the offered Service. Relevant documentary evidence in this regard shall be uploaded along with the bid in respect of the offered product or service. If L-1 is not an MSE and MSE Seller (s) has/have quoted price within L-1+ 15% (Selected by Buyer)of margin of purchase preference /price band defined in relevant policy, such Seller shall be given opportunity to match L-1 price and contract will be awarded for 25%(selected by Buyer) percentage of total QUANTITY.

Evaluation Method (Item Wise Evaluation Method)

Contract will be awarded schedulewise and the determination of L1 will be done separately for each schedule. The details of item-consignee combination covered under each schedule are as under:

Evaluation Schedules	Estimated Value	Item/Category	Quantity
Schedule 1	499200000	1. Lp Booster Compressor Capacity (nm3/hr) : 2700	4

Schedule 2	774000000	2. Gas Lift Compressor, Capacity (nm3/hr) : 3200	6

1. LP Booster Compressor Capacity (NM3/Hr) : 2700 (4 the number pi)

(Minimum 50% Local content required for MII compliance)

Technical Specifications

Buyer Specification Document	Download

Consignees/Reporting Officer and Quantity

S.No.	Consignee/Reporting Officer	Address	Quantity	Delivery Days
1	DIPANKAR PATHAK	786602,Oil India Limited, Duliajan, Assam	4	365

2. Gas Lift Compressor, Capacity (NM3/Hr) : 3200 (6 the number pi)

(Minimum 50% Local content required for MII compliance)

Technical Specifications

Buyer Specification Document	Download

Consignees/Reporting Officer and Quantity

S.No.	Consignee/Reporting Officer	Address	Quantity	Delivery Days
1	DIPANKAR PATHAK	786602,Oil India Limited, Duliajan, Assam	6	365

Buyer added Bid Specific Additional Scope of Work

S.No.	Document Title	Description	Applicable i.r.o. Items
1	technical specification(1 of 2) View	to be quoted as per technical specification document	1. LP Booster Compressor Capacity (NM3/Hr) : 2700(4),2. Gas Lift Compressor, Capacity (NM3/Hr) : 3200(6)
2	technical specification(2 of 2) View	to be quoted as per technical specification document	1. LP Booster Compressor Capacity (NM3/Hr) : 2700(4),2. Gas Lift Compressor, Capacity (NM3/Hr) : 3200(6)
3	bid rejection criteria View	bidder to meet brc	1. LP Booster Compressor Capacity (NM3/Hr) : 2700(4),2. Gas Lift Compressor, Capacity (NM3/Hr) : 3200(6)
4	vendor format View	to be filled up by bidder	1. LP Booster Compressor Capacity (NM3/Hr) : 2700(4),2. Gas Lift Compressor, Capacity (NM3/Hr) : 3200(6)
5	quality Assurance Plan	to be complied by the bidder	1. LP Booster Compressor Capacity (NM3/Hr) : 2700(4),2. Gas Lift Compressor, Capacity

	View		(NM3/Hr) : 3200(6)

The uploaded document only contains Buyer specific Additional Scope of Work and / or Drawings for the bid items added with due approval of Buyer's competent authority. Buyer has certified that these additional scope and drawings are generalized and would not lead to any restrictive bidding.

Bid Specific Additional Terms and Conditions

1. While generating invoice in GeM portal, the seller must upload scanned copy of GST invoice and the screenshot of GST portal confirming payment of GST.
2. Whereever Essentiality Certificate is applicable (PEL/ML), successful bidder should provide Proforma Invoice for processeing for EC application and material should be dispatche after receiving of EC rom DGH. In view of the same, an ATC may be incorporated in GeM, viz, "BIDDER/OEM must provide Proforma Invoice for processeing for EC application within 30 days from date of issue of GeM Contract and material should be dispatche after receiving of EC rom DGH."
3. Bidder Turn Over Criteria: The minimum average annual financial turnover of the bidder during the last three years, ending on 31st March of the previous financial year, should be as indicated in the bid document. Documentary evidence in the form of certified Audited Balance Sheets of relevant periods or a certificate from the Chartered Accountant / Cost Accountant indicating the turnover details for the relevant period shall be uploaded with the bid. In case the date of constitution / incorporation of the bidder is less than 3 year old, the average turnover in respect of the completed financial years after the date of constitution shall be taken into account for this criteria.

4. Purchase Preference linked with Local Content (PP-LC) Policy:

   The bid clause regarding "Preference to Make In India products" stands modified in this bid and shall be governed by the PPLC Policy No. FP-20013/2/2017-FP-PNG dated 17.09.2020 issued by MoP&NG as amended up to date. Accordingly, bidders with Local Content less than or equal to 20% will be treated as "Non Local Supplier". The prescribed LC shall be applicable on the date of Bid opening. Sanctions on the bidders for false / wrong declaration or not fulfilling the Local Content requirement shall be as per the PPLC policy. Further following additional provisions are added in the certification and verification of local content provision of the Preference to Make in India clause:

   (i) In case of foreign bidder, certificate from the statutory auditor or cost auditor of their own office or subsidiary in India giving the percentage of local content is also acceptable. In case office or subsidiary in India does not exist or Indian office/subsidiary is not required to appoint statutory auditor or cost auditor, certificate from practicing cost accountant or practicing chartered accountant giving the percentage of local content is also acceptable.

   (ii) Along with Each Invoice: The local content certificate (issued by statutory auditor on behalf of procuring company) shall be submitted along with each invoice raised. However, the % of local content may vary with each invoice while maintaining the overall % of local content for the total work/purchase of the pro-rata local content requirement. In case, it is not satisfied cumulatively in the invoices raised up to that stage, the supplier shall indicate how the local content requirement would be met in the subsequent stages.

   (iii) The bidder shall submit an undertaking from the authorized signatory of bidder having the Power of Attorney along with the bid stating the bidder meets the mandatory minimum LC requirement and such undertaking shall become a part of the contract.

5. **NET WORTH:** Net Worth of the OEM should be positive as per the last audited financial statement.

This Bid is also governed by the General Terms and Conditions

In terms of GeM GTC clause 26 regarding Restrictions on procurement from a bidder of a country which shares a land border with India, any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. While participating in bid, Bidder has to undertake compliance of this and any false declaration and non-compliance of this would be a ground for immediate termination of the contract and further legal action in accordance with the laws.

---Thank You---

SL. NO.	MATERIAL DESCRIPTION	QUANTITY	UNIT
10	**LP Booster Compressor** **a. Capacity (NM^3/Hr) : 2700** **b. Design Pressure (Gauge) (Kg/cm^2)** **(i) Suction : 1.50** **(ii) Discharge : 25.00** **c. Design Temp. (Deg C)** **(i) Suction : 50** The details specification as per the technical specification to be attached in the bid document. Supply will involve Installation & Commissioning at site.	4 Estimated Unit Cost Rs. 124800000	NO.

SL. NO.	MATERIAL DESCRIPTION	QUANTITY	UNIT
20	**Gas Lift Compressor** **a. Capacity (NM^3/Hr) : 3200** **b. Design Pressure (Gauge) (Kg/cm^2)** **(i) Suction : 14.00** **(ii) Discharge : 105.00** **c. Design Temp. (Deg C)** **(i) Suction : 50** The details specification as per the technical specification to be attached in the bid document. Supply will involve Installation & Commissioning at site	6 Estimated Unit Price Rs. 12,90,00,000	NO

OIL INDIA LIMITED
DULIAJAN
DIST: DIBRUGARH
ASSAM
786602

DOCUMENT 1 OF 2

Subject : PROCUREMENT OF 10 (Ten) NOS. OF GAS COMPRESSOR PACKAGES. 4 NOS. GAS LP BOOSTER. AND 6 NOS. GL UNITS INCLUDING INSTLLATION AND COMMISSIONING.

THE DETAIL SPECIFICATION IS as under

SL. NO.	MATERIAL DESCRIPTION	QUANTITY	UNIT
10	**LP Booster Compressor** **a. Capacity (NM^3/Hr) : 2700** **b. Design Pressure (Gauge) (Kg/cm^2)** **(i) Suction : 1.50** **(ii) Discharge : 25.00** **c. Design Temp. (Deg C)** **(i) Suction : 50** The details specification as per the technical specification to be attached in the bid document. Supply will involve Installation & Commissioning at site along with installation equipment/spares. The above Gas Compressor Packages shall be placed/installed on existing RCC foundation of old vintage compressor package due to space constraints. The compressor packages shall be mounted on concrete filled skids instead of normal structural skids. These concrete filled skids shall be placed on the existing RCC foundation with the help of Anti Vibration Pads without anchor bolts. Some of these units may be placed on gravel packed pad without anchor bolts. However, the vendor shall consider Anti Vibration Pads for all the units. The vendor will have to design taking into above	4	NO.

	considerations and shall carryout all the necessary engineering studies to supply suitable package		
20	**Gas Lift Compressor** **d. Capacity (NM^3/Hr) : 3200** **e. Design Pressure (Gauge) (Kg/cm^2)** **(iii)Suction : 14.00** **(iv)Discharge : 105.00** **f. Design Temp. (Deg C)** **(ii) Suction : 50** The details specification as per the technical specification to be attached in the bid document. Supply will involve Installation & Commissioning at site along with installation equipment/spares. The above Gas Compressor Packages shall be placed/installed on existing RCC foundation of old vintage compressor package due to space constraints. The compressor packages shall be mounted on concrete filled skids instead of normal structural skids. These concrete filled skids shall be placed on the existing RCC foundation with the help of Anti Vibration Pads without anchor bolts. Some of these units may be placed on gravel packed pad without anchor bolts. However, the vendor shall consider Anti Vibration Pads for all the units. The vendor will have to design taking into above considerations and shall carryout all the necessary engineering studies to supply suitable package	6	NO

BIDDER TO QUOTE ALL INCLUSIVE COST AS FOR/DDP DULIAJAN (MRP) INCLUDING ALL COST TOWARDS LOADING, FREIGHT UPTO DESTINATION, INSURANCE, GST . TRAINING , COST OF INSTALLATION SPARES ETC. HOWEVER, UNLOADING AT SITE WILL BE DONE BY OIL AT ITS OWN COST. BOTH THE ITEMS WILL BE EVALAUTED INDIVIDUALLY AND SHALL BE AWARDED TO TECHNO-COMMERCIALLY ACCEOTABLE L1 BIDDER.

ANNEXURE -AT

TECHNICAL SPECIFICATION FOR GAS ENGINE DRIVEN GAS COMPRESSOR PACKAGES

1.0 GENERAL

OIL INDIA LIMITED invites tender for Turnkey implementation of Design, Manufacture, Fabrication, Package, Test, Supply, Erection and Commissioning of Gas Engine driven Separable Reciprocating Gas Compressor Packages as under to be installed in different Gas Compressor Stations (GCSs) of OIL INDIA LIMITED, Duliajan in Upper Assam region of India.

Item No.	Unit	Qty	Duty of Compressors	Capacity (NM^3/Hr)	Design Pressure (Gauge) (Kg/cm^2)		Design Temp. (Deg C)
					Suction	Discharge	Suction
10	No.	4	LP Booster Compressor	2700	1.50	25.00	50
20	No.	6	Gas Lift Compressor	3200	14.00	105.00	50

The above Gas Compressor Packages shall be placed/installed on existing RCC foundation of old vintage compressor package due to space constraints. The compressor packages shall be mounted on concrete filled skids instead of normal structural skids. These concrete filled skids shall be placed on the existing RCC foundation with the help of Anti Vibration Pads without anchor bolts.

Some of these units may be placed on gravel packed pad without anchor bolts. However, the vendor shall consider Anti Vibration Pads for all the units.

The vendor will have to design taking into above considerations and shall carryout all the necessary engineering studies to supply suitable package.

2.0 SCOPE

Compliance with the requirements of this specification does not relieve the vendor of furnishing gas engine driven reciprocating compressors along with its accessories of proper design, meeting all the specified rated operating and service conditions.

The intent of this specification is to describe the minimum acceptable parameters for the design, manufacture and packaging of the Reciprocating gas compressors packages. It is not the intent of Company to deviate from good engineering practice. The absence of any specifications shall imply that the best engineering practices shall prevail, utilizing the best quality workmanship and new materials. Where different standards are specified, the most stringent shall apply.

3.0 DEFINITIONS

OWNER/ OIL: OIL INDIA LIMITED

Vendor / Supplier: Party (ies), who manufactures and/or supplies material, equipment and services to perform the duties as specified in the scope of supply.

Shall: Indicates a mandatory requirement.

Should: Indicates a strong recommendation to comply with the requirements of this document.

4.0 CODES AND STANDARDS

4.1 General

- All specifications and publications shall be the current issue on the date of Tender and it shall be the Vendor's responsibility to comply with the same.
- The Reciprocating Gas Compressor Package shall be designed and manufactured in conformity with the codes, specification listed below and with the equipment data sheets.

4.2 International Codes and Standards:

- ISO 13631, Latest edition Specification for Packaged Reciprocating Compressors for (Formerly API 11P) Oil and Gas Production Services
- API 618, 5th edition Reciprocating Compressors for Petroleum, Chemical, and Gas Industry Services
- API 661, 6th edition Air-Cooled Heat Exchangers for General Refinery Services - Adoption of ISO 13706-1:2005
- API 520 (7th Ed.) Sizing, Selection, and Installation of Pressure – Relieving Devices in Refineries
- API 526 (5th Ed.) Flanged Steel Pressure Relief Valves
- API 670 (4th Ed.) Vibration, Axial Position, and Bearing-temperature Monitoring System.
- API 671 Special Purpose Coupling for Petroleum, Chemical & Gas Industry
- API 676 Positive Displacement Pumps – Rotary
- ISO 15664 Acoustic – Noise Control Design Procedure for Open Plant
- ISO 1217 Displacement Compressor Acceptance Test
- ISO 10441 Flexible couplings for mechanical power transmission, Special purpose applications
- ISO 3046 Reciprocating Internal Combustion engines
- ISO 10474 Steel and steel products – Inspection documents
- ISO 9001:2000 Quality Management System Requirements
- ASME Sec. VIII Div. I Pressure Vessels
- ASME Sec. II Materials
- ASME Sec. V Non Destructive Examination
- ASME Sec. IX Qualification Standard for Welding Procedures
- ASME B31.3 Chemical Plant & Petroleum Refinery Piping
- ASME B16.5 Steel Pipe Flanges and Flanged Fittings
- ASTM American Society of Testing Materials
- ANSI/AWS D1.1 Structural Welding Code

4.3 Order of Precedence:

In case of any conflict among the various documents of this specification the following preferential order shall govern:

- Government of India Legislation/Regulation
- Purchase Order Data Sheets
- Purchase Order Specification
- Approved Design Drawings
- International Codes & Standards

Compliance with these specifications shall not relieve the bidder the responsibility of supplying equipment and accessories of proper design, material and workmanship to meet the specified operating conditions.
In the event of any conflict of data or requirements in any of the above documents (excluding Govt. Legislation/Regulation), the most stringent requirement shall prevail.
However, OIL's interpretation shall be the final.

4.4 Language and Units of Measurement:

The governing language of the Contract shall be English language. All notices, correspondence, information, literature, data, manuals and other documents required under the Contract shall be in the English language.

Technical units, quantities, etc. shall be expressed, used and abbreviated according to the SI system except for the pipe sizes, which shall be imperial units. Preferred units of measure are as follows:

- Liquid Density: API and kg/m^3
- Flow Rate: m^3 / hr, MMSCFD (gas), m^3 / hr ,BPD (condensate), m^3 / hr, BWPD (Water)
- Power, Duty: kW/HP
- Heat Transfer Coefficient: $W / m^2 K$
- Thermal Conductivity: W / m.K
- Heat Capacity: kJ
- Viscosity: cP
- Kinematic Viscosity :centistokes (cSt)
- Area : m^2
- Length : Meter (m), km, mm
- Pressure: Kg/cm^2(g), psi(g), psi(a)
- Temperature: °C/ Deg F
- Volume: m^3
- Pipe Diameter: Inch, mm
- Stress: MPa, Kg/cm^2, Pa
- Weight: Kg / Ton

4.5 Environmental Conditions

The climatic conditions (indicative) are as stated below:

- Maximum Ambient Temperature 42 DegC
- Minimum Ambient Temperature 7 DegC
- Relative Humidity
  - At 21 Deg C : 100 %
  - At 32 Deg C : 95%

- At 41 Deg C: 70%
- Elevation Above Mean Sea Level : 121 metres
- Seismic Zone: V
- Yearly Average Rainfall : 300 cm

5.0 SCOPE OF WORKS

5.1 General:

Vendor's scope of work includes engineering, design, manufacture, packaging, inspection, testing & supply and erection & commissioning at sites within an aerial distance of 100 Km from Duliajan, Assam, India in Gas Compressor Stations (GCSs).

For scope of the Reciprocating Gas Compressor package reference is made to the design data sheets (**Annexure AA, AB & AC** enclosed) giving the operating conditions and design requirements.

The Vendor's scope of works shall include, but not be limited to the supply of the following items and services:

- Engineering, design manufacturing and packaging.
- Procurement of raw materials etc., from sub-vendors. Preparation of documentation for design, approval by Purchaser.
- Inspection and testing including bough out items.
- Surface preparation, protective coating and painting.
- NLMRT, String Test as per Tender
- Packaging for transportation to site and supply.
- Erection & commissioning
- Field trial run and performance test at site

A. SCOPE OF SUPPLY FOR EACH COMPRESSOR PACKAGE

a) **Reciprocating compressors** designed and manufactured as per ISO 13631: 2003 edition (Formerly API 11P). The compressors shall be horizontal, balanced opposed two stage compressors suitable to perform the process duties as defined in the attached data sheets (Annexure AA, AB & AC).

b) **Driver**: Gas Engine Driver utilizing the same process gas as fuel gas.

c) **Coolers:** Common unitized aerial cooler of fin fan design shall be provided to cater to cooling requirements of the lube oil, compressor cylinder jacket water (if any), gas engine jacket water, process gas (both inter-stage and discharge cooling).

d) **Coupling with Inertia Ring:** A standard dry shim pack coupling bolted to compressor and driver fitted with a non-sparking coupling guard. An Inertia Ring may be provided (if required) as per requirement of Torsional Analysis.

e) **Flywheel**: A flywheel between compressor and gas engine attached to the compressor crankshaft, if required.

a) **Scrubbers**: Gas scrubbers with their supporting structure at suction of each compressor stage, complete with necessary isolation / dumping valves and instrumentation.

f) **Pulsation Dampeners**: Suction and Discharge dampeners at each cylinder. The pulsation Dampeners shall be fabricated as per the recommendations of the acoustic pulsation studies. Care shall be taken to design the pulsation bottles in such a way that the diameter of the pulsation bottles (specially the discharge bottles of both the stages) do not unnecessarily increase the overall height of the compressor package.

g) **Barring Device**: A manual barring device for the engine to be provided

h) **Valves and Safety Valves**: One each of automatic recycle valve with manual by pass valve, blow down valve, suction shutoff valve, discharge shutoff valve, discharge check valve and one each of safety relief valve on suction & discharge vessels, final discharge line, fuel line. Safety Relief valves shall be designed, manufactured, inspected and tested in accordance with API 520 and API 526.

i) **Suction Strainer**: A suction strainer in the process gas inlet of the compressor and fuel inlet line of the engine.

j) **Control Panel & Instrumentation**: Electronic Control Panel complete with Instrumentation required for safe operation and control of the complete compressor package. Instrumentation shall be complete with junction boxes installed, wired and tested on the associated skid. The control panel skid will be separable from the main compressor skid. Supply shall be complete with cable trays, cable ties, instruments, installation materials etc. required within the skid.

k) **Concrete Filled Base Frame**: Heavy-duty concrete filled base frame for the compressor, gas engine, process equipment, and other auxiliary equipment.

l) **Lubrication System**: Lubrication system as detailed under;

The major components of the Compressor main lubrication system shall be as follows:

- Main oil pump.
  - Driven from crankshaft.
  - shall be manufacturer's standard
- Pre-lube Pump driven by Air Motor
- Lube Oil Cooler
  - Shell and tube exchanger with jacket cooling water /air cooled
- Lube Oil Filter
  - Dual filters, each 100 % capacity (full flow), non-bypassing with isolation valves arranged so that switching can occur without causing a low-pressure shutdown of minimum particle size 10 micron.
  - Size shall be determined by Vendor in lieu of other information as per API 618 requirements.
- Cooler Surge Tank : It shall be mounted outside the skid limits on rugged structure along with necessary monkey ladder and platform with handrails for accessibility during maintenance.
- Piping lube oil system:
  - All lube oil piping down stream of filter shall be series 300 Stainless Steel.
  - All high-pressure double ferrule fitting and 2/3 way valves shall be from SWAGELOC/ Hy-Loc/ PARKER makes & shall be S.S. material only. Material of tube shall also be SS316 as per ASTM A269 Sandvik make.
  - 200 mesh screen before lube oil pump
  - Frame lubrication system for frame bearings, connecting rod bearing, cross head shoes.

- Compressor bearing temperature thermocouples

m) **Cylinder and Packing Lubrication System**: A high-pressure lubrication system for cylinder and packing lubrication, using divider block technology along with requisite nos. of gauges, filtration and safety systems for ease of troubleshooting. The system shall be complete with digital display of lube oil consumption and with data transfer facilities to monitor lube oil consumption, pump failure, divider block failure etc. along with requisite hardware, software for data transfer. The packing shall provide a dynamic seal between cylinder and piston rod.

n) **Compressor cooling system** if any.

o) **Compressor Main Components**: Frame, cylinder, distance piece, cross head, crank shaft, piston, bearings, packing, compressor valves, and capacity control devices etc.

p) **Auxiliary Pipe work**: All necessary auxiliary / ancillary pipe-work including fittings, valves and pipe supports, terminating at the package skid edge for both compressor, accessories, gas engine and accessories. Interconnected Piping between different components of the package.

All on skid termination points shall be flanged as per ASME B 16.5, Weld neck, RF/RTJ, Smooth finish. The termination flanges should be in sizes of ½", 1", 2" , 4" ,6" NB etc. sizes.The terminal points shall be as shown in the P&ID. The terminal points include suction / discharge flanges, drains with valve, vents, etc.

q) Electrical:

Cable termination kits for termination of LV cables shall be provided by Vendor. Cable glands, boots and lugs for all LV cable connections are in Vendor's scope.
Two earthing bosses on the equipment skid.

r) **Special Tools and Tackles**: These shall include all non-standard equipment needed to remove the compressor cover, bearings, valves and piston rod packings or perform maintenance. All special tools shall be supplied in sectionalized purpose built cases with hinged lids.

s) **Spares**: Supply of Spares for start up , Supply of Commissioning spares and List of Recommended Spares for two years of normal operation (Insurance Spares).

t) **Name Plate**: All major components of the compressor package shall be fitted with identification plate.

u) **Earthing Lugs**: Minimum two earthing lugs shall be provided on the skid along with separate earthing lug for Control Panel skid diagonally opposite sides

v) **Vibration**: The standard vibration limit shall be included in the bid. Vendor shall specify vibration effect of compressor to piping battery limit.

B. Surface Preparation and Painting:

The equipment and skids are to be externally painted for environmental protection after thorough cleaning. As a minimum, zinc rich primer (1 coat) and epoxy based final covering is to be provided. Cleaning shall be done through sand blasting as per SSPC #

SP6 before painting with spray except compressor and engine block. Vendor to provide the detailed specification of painting.

C. Inspection and Testing

The package will be inspected and Tested as per the QAP included in this specification. OIL reserves the right to inspect, visit the vendor's factory during the manufacturing, packaging and Testing activities of the packages. Inspection and Testing includes string testing of the complete assembled package shall be witnessed and approved by OIL's representative prior to shipping at vendor's works.

OIL reserves the right to reject if any part / parts found to be defective after delivery at site. Vendor shall be no way claim by the reason that the unit/ item was previously inspected and passed by OIL as per the inspection clause detailed anywhere in the enquiry.

D. Vendor Documentation

a) Six hard copies along with soft copy each of

- Approved Drawings
- Torsional analysis,
- Cross head load (rod load) reversal diagrams for each load step of every specified condition

b) Final Compressor Modelling File with updated info regarding attenuation devices, Piping , Cooler and final pressure drops

c) Six copies of installation, commissioning, operation and maintenance manual with illustrated parts list for each item covering all accessories/bought out items of each of the packaged units should be furnished before shipment of unit along with soft copy.

d) Six copies of Compressor Part list to be provided along with part nos. and Bill of materials with the supply of the items along with softcopy.

e) The Complete Bill of Materials (BOM) for each duty of compressor in soft copy format (Searchable)

f) Safe Startup Maps

g) Rod Load and Pin Reversal Maps

h) Highest Expected Discharge Temperature and Discharge Pressure Maps

i) Performance Curves
    a. Suction Pressure vs. Load
    b. Suction Pressure vs. Flow
    c. Discharge Pressure vs. Load
    d. Discharge Pressure vs. Flow
    e. Suction Pressure vs. Discharge Pressure, per load step.
    f. Sets of above curves from maximum speed to minimum speed in decrements of no more than 50 RPM

j) Flow Maps from minimum to maximum desired flows, in 100 NM3/Hr increments

k) Unit Isentropic Efficiency Map at Rated Speed across all pressure combinations

l) Provide Compression Ratio Maps across all pressure combinations per stage. Report should generate maximum compression ratios

m) Acoustic Report. Detailed acoustics reports of performance at design and guarantee points, review of thousands of potential operating points with identification of areas in the operating map where vibration and acoustic issues may still be present even with attenuation devices in place. Provide data in a useable format for tuning load, flow and pressure drops across entire operating map.

E. Packaging:

The packaging of the package should be in such a way that the unit could be placed at site with necessary ancillaries, auxiliaries, pining etc., within a short span of time during erection and commissioning. Proper tagging of the auxiliaries/ ancillaries/ dismantled item shall be done according to their unit and bill of materials to make them easily identifiable at site. Packaging should be such that HOT (welding/gas cutting/grinding) job requirement at site is nil.

The packaging shall take into account the total height of the package from the skid level. The height of the Engine and Compressor should be low to achieve low centre of gravity for the package and the cooler shall be designed in such a way that it can be placed on a concrete foundation of maximum 500 mm height from the ground level. Additionally the top most part of the package should have height of less than 4 mtrs from the ground level. All efforts shall be put to design the package so that the overall centre of gravity is low. The pulsation bottles shall be designed taking into account the pulsation study recommendations and also to see that the overall height of the package can be kept low.

F**. Site assembly, Erection and Commissioning**

a) The bidder shall submit footprint drawings and other design details with weight, CG etc. at least 3 (Three) months after the placement of order and shall obtain final approval from OIL within 5 (Five) months after placement of order.

b) The vendor shall provide services of their commissioning team for assembly, erection and commissioning at site.

(i) All the packages will be delivered to Duliajan Central Location.

(ii) OIL will provide crane services for offloading of the items at the central location.

(iii) Vendor to engage their representative for verification and checking of the supplied packages as per invoice, packing list etc. All the Boxes will only be opened in presence of Vendor's representative. Any item found missing, damaged will be replaced by the vendor at no extra cost.

(iv) OIL will then provide trailer services to transfer the items to the site and crane services for placing the major equipment of the compressor package along with skid at site. Lifting facility for any other component of the package shall be arranged by the vendor. OIL will hook up process and service piping with the compressors at the battery limit. All other arrangement for installation and commissioning the compressor shall be done by the vendor.

c) Vendor shall supervise the placement of compressor packages at location. After placement of the units, the vendor shall commence erection of the packages within **(1) week** and complete the erection/commissioning jobs within **(8) Eight weeks** of placement of the skid at site.

d) The package shall be considered fully commissioned only after the supply and acceptance of all related items of the package, commissioning spares, consumables, documentation, Site Testing, Commissioning Run, Condition Monitoring and Training.

e) During site preparation vendor to provide site supervision to ensure preparation of surface for installation of anti-vibration pads/ gravel packed pad as per design requirement. After installation /commissioning the vendor shall run (continuous run) each compressor

for 72 (Seventy Two) hours at site load conditions satisfactorily prior to handing over to OIL for regular operation.

f) Installation and commissioning price including accommodation, local transport, work force etc. for the same shall be borne by the vendor and to be quoted separately in commercial bid.

Condition Monitoring :

1. During the commissioning test run, the vendor shall carryout snapshot condition monitoring with the help of a P-V Analyzer (Similar to Windrock 6400 unit). Vendor shall bring all the necessary transducers like pressure sensor, accelerometer, velocity meter, vibration meter for valve movement, temperature sensor along with the analyser required for data collection and analysis.

2. Following parameters/plots along with trend shall be analysed and report based on the same shall be submitted.-
   a) Main bearing high and low frequency plots.
   b) Cylider indicated pressure: The indicated pressure has to be submitted as PV diagram. One pressure measurement at each degree of revolution is the minimum requirement.
   c) Volume: Volume associated with the pressure measurement is to be captured using the crankshaft angular position in relation to TDC or any other reference point.
   d) Vibrations: Vibration impulse signals with crankshaft phase reference is required. Also valve cover vibration is required.
   e) Rod drop: Rod drop to be measured and in its reference piston ring, rider ring and crosshead shoe wear information to be submitted in the report.
   f) Cylinder PV plot & log PV plots
   g) Cylinder rod load plots
   h) Crank angle correlation
   i) Valve temperature

3. Following parameters are to be calculated and to be submitted by the party in the report.
   a) **Power:** power required for completing the gas compression cycle to determine the compressor overload.
   b) **Capacity:** Capacity should be calculated as the average of suction and discharge conditions, or at standard conditions.
   c) **Flow balance:** To be calculated.
   d) **Percent clearance:** Percent clearance calculations to be submitted in report for indicating presence of liquids in the cylinder.
   e) **Volumetric efficiency:** Volumetric efficiency is to be calculated from PV diagram.
   f) **Valve losses:** To be calculated and expressed as percentage of total energy.
   g) **Theoretical Discharge Temperature:** To be calculated, assuming isentropic compression of the gas.

h) **Valve & Piston Ring leak Diagnosis:** Comments to be submitted regarding the suction and discharge valve leaks as well as piston ring leak situation as indicated by PV diagram.
i) **Rod load & Rod load reversal:** The duration of rod load reversal to be given with an accuracy of one degree.
j) These parameters are to be shown in the report as graphs between load and crank-angle.

4. The report has to be submitted as soft copy (in CD) as well hardcopy for each of the individual units.

G. Training to Operations staff of OIL at site:

Vendor will provide 2 (two) days classroom training at OIL field office, Duliajan to the operating staff and Maintenance Crew.

Moreover 5 (Five) days training shall be provided at **each site each unit** to the operating staff to enable them to operate the units in safe and efficient manner.

OIL will provide the classroom including projector, laptop etc. free of cost for the classroom training at Duliajan.

H. Design & Engineering Services:

a) Complete design, engineering of the compressor package including all accessories, gas engine, coolers etc.
b) Conducting digital acoustical simulation and mechanical response studies and solution as per API 618 design approach 3 (DA3) and carrying out the pulsation design studies as per Appendix M of API 618 5th Edition. Vendor to submit all the reports to OIL.
c) Carrying out static skid design i.e. Lifting Analysis, Transportation, Wind, and Seismic. Adequate mechanical structure shall be considered while design study
d) Carrying out Dynamic Skid Design i.e. Assess Dynamic Forces, MNF, Resonance, Stiffness
e) Carrying out Mechanical Vibration Analysis including frequency response studies using ANSYS software
f) Carrying out full torsional and lateral analysis and rotor response studies including stress calculations of the complete rotating assembly. This analysis shall indicate the vibration levels expected for each case of operation including start-up, shutdown, and upset cases.
g) Forced Response analysis of compressor manifold system and piping
h) Carrying out the Valve Dynamic Response Study
i) Design of Concrete filled skid taking into consideration of worst case operating parameters with special significance to vibration.
j) To Provide stress analysis and recommendation to mitigate vibration.
k) Providing all documentation for tie-in provisions and as required by the purchase order, the specifications and the standards referred to herein.
l) Furnishing monthly progress reports and ensuring timely execution of the job.
m) Point Performance Runs with All Guarantee and Design Points
n) Process and Mechanical guarantee.

I. The requirements set out in this document shall not be construed to eliminate consideration of the manufacturer's standard design. The manufacturers standard design may be accepted, if found to be equivalent or superior to the requirements of these

specifications. The Vendor shall provide any material, equipment, instrumentation and any other accessory, over and above that specified herein, which is required to provide a safe and efficient unit. The Vendor is to provide a Process performance and Mechanical guarantee.

J. **OIL Scope of Utility Services**

OIL shall provide the following:

a) **Electrical Power Supply:** For Control Panel: Rated voltage: 240 V-AC (± 10%), single (1) phase, Rated frequency : 50 Hz (± 3%). Work site illumination and any other utility power requirement shall be provided.
b) **Fuel Gas:** The composition of the fuel gas is stated in the Annexure-AC.
c) **Instrument Air:** Operating Pressure : 6 - 8 $kg/cm^2(g)$ Temperature : 50°C Maximum
d) **Area:** Main unit will be placed in a bay having a shed area of 10 m Long x 6 m Wide and 4.0 m High.
e) Sun shelter with overhead standard lifting facilities (Max 3 MT) above the compressor skid.
f) Process piping up to and from Package Inlet and Outlet.
g) Connecting pipe-work from Package skid end connections of the scrubber and other drains to the station drain system.
h) Connecting pipe-work from the Package skid edge connections of the relief valve discharge pipe to the station flare / Vent system.
i) Piping connection to the control panel and starting air piping end from the air supply mains.
j) Unloading and placement of compressor package at site.

6.0 DESIGN REQUIREMENTS

6.1 General

The reciprocating gas compressor package shall be designed, constructed, inspected and tested in accordance with API 11P/ISO13631 Latest Edition, equipment data sheets and this specification. The most stringent requirement shall apply. The equipment (including auxiliaries) shall be designed for a minimum service life of Twenty (20) years. The Reciprocating gas compressor package shall be complete with all accessories such as interconnecting piping, instruments, etc. all mounted on a common base frame.
Design, construction, inspection and testing requirements are for two types of gas engine driven compressor packages namely Low Pressure Booster (LPB) Compressor and Gas Lift (GL) Compressor.

6.1.1 Package Layout

The vendor shall provide 3D layout diagram showing all accessories, piping etc. Isometric views with hard copies shall be provided for each of Low Pressure Booster and Gas lift Compressors. A Soft copy of the drawing shall be provided in Autocad format.

The equipment layout shall be such that it enables safe and easy access to each item for operation and maintenance. Location of platforms /walkways and ladders for operation and maintenance activities shall be shown. In particular, ease of maintenance shall be borne in mind during the design stage of the ancillary equipment such as coolers, lube oil system etc. Optimization of package battery limit interfaces with other facilities shall be considered.

The normal limiting dimensions and weight for each skid journey to upper Assam are as under;

Length (Max)	9.0 metres.
Width (Max)	2.54 metres.
Height at Centre	2.44 metres.
Height at Maximum Width	2.21 metres.
Top Width at Maximum Height	0.61 metres.
Weight	40 *Tonnes (Max)*

The above dimensions are the maximum dimensions for each skid for transportation purposes only, the vendor to design the package to reduce the dimensions as much as possible taking into consideration of space required for maintenance. The centre of gravity of the package should be designed as low as possible for reduced vibrations.

The main skid containing Gas Engine, Compressor and other auxiliaries including Control Panel but excluding aerial cooler shall be limited to a length of maximum 7 (Seven) Meters.

6.1.2 Required Turndown

The compressor train shall be capable of operating from 100 to 50% minimum of the design throughput at the design operating suction and discharge pressures. This turndown shall be achieved as far as possible by speed variation of the compressor train. Or by bypass circulation.

7.0 Mechanical:

7.1 Reciprocating Compressor Package Design

The compressor and auxiliaries shall be designed, manufactured, tested and supplied strictly in accordance with the requirements of API 11P/ISO13631 latest edition.

The compressor shall be separable, reciprocating, 2 (two) stage; two throw, double acting, horizontally balanced opposed design. The operating parameters are provided in the data sheets. All operating conditions mentioned in the data sheets are at the battery limit.

The compressor may be water cooled or non-cooled cylinder type. All gas compressor cylinders shall be mounted with suitable Kiene type valves for connection of P-V Analyzers.

Piston rods shall be forged with rolling threads. The Vendor shall carry out lateral and torsional analysis. Torsional analysis shall be carried out for the complete compressor/driver system and shall cover all the possible resonance conditions that may occur during run-up, run-down, and within the complete operating speed range.

The suction and discharge pulsation dampeners shall be designed and manufactured as per ASME section VIII Div 1 with code stamping. Intercooler and after cooler shall not be used as pulsation suppression devices.

During the detailed design stage, acoustical simulation shall be carried out as per design approach 3 specified in API 618 in order to verify its satisfactory performance in all respects but especially mechanical/fluid stability over the entire relevant operational flow rates, temperatures and gas compositions. The conduct of this study and the implementation of necessary recommendations emanating from it are included in the scope of supply of the Vendor.

In addition to this, the Vendor shall carry out valve dynamic response study.

Noise levels of compressor assembly together with drive unit will not exceed **90 dB**(A) at 1 meter distance from the equipment.

Compressor bearing temperature monitoring shall be carried out in accordance with API 670.

The package shall be designed for, continuous unattended operation in a fail-safe manner.

The compressor package shall be suitable for starting & stopping as part of an automatic control sequence to be executed from the compressor control system.

Compressor Suction and discharge flange rating is as per data sheet. Allowable forces and moments on the compressor suction and discharge nozzles shall be as per API 618 fifth edition.

7.2 Lubrication

The lubrication of the compressor cylinders and packing lubrication System shall be as per API 618 with divider block technology. Vendor is to provide detail lube oil requirement calculations.

7.3 Cooling Water System (for Prime Mover / Engine/ Compressor (if required))

Closed loop engine jacket water-cooling shall be provided along with coolant expansion tank. The expansion tank shall be designed as per Engine manufacture's recommendation of coolant expansion factor with necessary pressure cap, level glass etc. taking into consideration the total volume of coolant in the system including the aerial cooler sections. The coolant make up/ expansion tank shall be mounted outside the skid limits on rugged structure along with necessary monkey ladder and platform with handrails to access the tank for necessary maintenance activities.

7.4 Compressor Capacity Control

To operate the compressor at variable throughput a suction pressure controlled (pressure controller) by-pass control valve from delivery to suction side shall be provided for LPB compressors only. The sizing of the control valve shall be done considering 0-60% bypass of compressor throughput. The control valve shall be provided with a by-pass valve and isolation valves (2 Nos.). By-pass and isolation valves shall be gate valves as per API Spec, 6D. The recycle control valve shall be designed in such a way that the maximum operating noise will be less than 75 dBA from 1 mtrs of the control valve at any operating condition, also the max gas velocity in the piping shall not exceed 20 m/sec.
For the Gas Lift units high delivery Pressure controlled (pressure controller) by pass control valve from delivery to suction along with manual and bypass valves shall be provided.

7.5 Coolers

Common unitized cooler of fin fan design shall be provided to cater to cooling requirements of the lube oil, packing oil, compressor jacket cylinder water cooling (if any), gas engine jacket water, process gas inter-stage and discharge after coolers.

The cooler shall be forced draft, air-cooled heat exchangers designed, manufactured, tested and supplied in accordance with ISO 13706 / API 661. Vendor to state the exceptions to the API 661 for approval of OIL (if any).The cooling fans shall be forced draught type with airflow upward.

The cooling fan shall be capable of cooling up to 125 % of the duty requirements of the worst-case scenario.

The tube bundle shall be provided with valves for vent and drain connections. Central, accessible greasing facilities shall be provided for fan bearings, if not greased for life.

Vendor shall submit fan performance curves along with the bid.

The air-cooled heat exchangers shall comply with the following requirements:

- Finned type tubes shall be provided and the tubes shall be tested hydrostatically as per standard
- A corrosion allowance of 3 mm shall be provided on all wetted carbon steel surfaces except for tubes.
- Thermal rating of the air cooled heat exchangers shall be based on a maximum flow at 125% of rated mass throughput for the worst design case .
- Discharge cooler shall be sized for full flow recycle operation at maximum power.
- For cooling of engine coolant, the cooler shall be designed for 125% of the engine heat rejection of the engine service power at site conditions with the absolute maximum ambient temperature.
- Fans shall be driven by V belt and pulleys.
- Fan tip speed shall not exceed 60 m/sec. However, it may be further reduced, if noise levels exceed the specified levels of 90 dbA at 1 m distance from the unit.
- It shall be possible to manually adjust the pitch of the blades to increase the fan capacity.
- Tube bundles shall have finned tubes, with full accessibility for inspection, cleaning and replacing.
- Each tube bundle shall be provided with valve drain and vent connections.
- Vibration probes shall be provided for each cooler fan/section for high vibration alarm / trip.
- Ladders with railing shall be provided for safe working. Location of the ladder shall be marked on the detailed drawing.
- A 50 mm square mesh arrangement (for hail guard) above the tube bundle shall be provided for all air coolers designed to take a load of maximum 100 kg at a point.
- Fan hub bearing lubrication is by grease at the grade level.
- Loadings for pipe supports shall be considered in the structural design load.
- The design of the cooler should be such that the cooler shaft diameter do not exceed 2-9/16” and limited length. This requirement is for ease of maintenance during cooler shaft replacement job.

7.6 Scrubbers Vessels

The compressor package shall be complete with compressor suction and inter stage scrubbers. The scrubbers are to be designed to remove any condensed hydrocarbons, water and any entrained lube oil in the gas stream.

• Scrubbers shall be vertical type with demister mat on the gas outlet. The scrubber vessel and the scrubber internals shall be designed as per design data sheet provided. The vessel internals shall be complete with Vortex breaker and Mist Eliminator (Demister) among others.

- The mechanical design, fabrication and testing of the scrubbers shall be carried out in accordance with ASME Sec VIII Div I with ASME "U"Code stamping.
- A corrosion allowance of 3.0 mm shall be provided.
- Desired Nos. of Nozzles of proper size as per design requirement shall be provided.
- One No. Inspection / Access hole of not less than 6 inch size shall be provided.
- Vessel internals shall be firmly attached and it must be possible to clean the internals, through the manholes.
- All scrubber nozzles shall have valve or blind flanged connections to enable flushing with water or purging with nitrogen.
- The scrubber shall have suitable rugged supporting structures to prevent vibration.
- All vessel connections shall be flanged as per ASME B 16.5. The flanges shall be weld neck, RF/ RTJ type with smooth finish of 125 – 250 micron.
- Each scrubber shall be fitted with the accessories as under;
  - One no. Safety Relief valve designed for overpressure below the mesh pad
  - One No. Manual drain valve
  - One No. Level gauge to check liquid level inside the vessel, the level gauge shall be designed in such a way so that the protruding length from the separator surface is minimal to avoid vibration.
  - One No. liquid dump valve to be operated by main control panel

- The following minimum instrumentation to be fitted in the vessel:
  - High level Switches
  - Automatic high liquid level controller to operate liquid dump valve. The high liquid level controller cum dump valve shall be operated through the control panel.

7.7 Vibration Levels

The Vendor shall be responsible for achieving vibration acceptance levels at site for all items of equipment in his supply. Structural vibration of base plate shall also be considered and checked in the field.

7.8 Dry Flexible Couplings

Dry Flexible Couplings shall be Rexnord Make CMR type with Stainless Steel shim packs.
All coupling guards shall be totally enclosed, spark proof. The guard shall be rigidly supported and manufactured from non-sparking material.

7.9 Gas Engine

H.P. Requirement: The gas engines power must satisfy the following requirements;

BHP (Continuous rating Under site condition)	=	120% of the total BHP required to drive the compressor at full design load along with the auxiliaries

The Gas engine shall be **Naturally Aspirated** or **Turbocharged** type. The composition of the fuel gas is stated in the compressor data sheets. Engine shall be suitably derated for the fuel gas composition and as per the local environmental conditions (altitude and temperature).

The gas engine shall be designed as per ISO 3046.

Among others the gas engine shall be complete with the following;

- **Intake air filter**: The air filter shall be dry type. It shall remove 98% of all particles greater than 10 μm. Air filters shall be sheltered from rain ingress. The filter shall be fitted with a differential pressure indicator to show when the filter requires attention.
- Air engine starter- The Engine starter shall be TDI twin turbine type to be able to operate at low pressure air (max 6 Kg/cm2)
- Lube oil system
- **Engine cooling system**: Closed circuit coolant water system to be used for engine cooling. The engine coolant plus DM water shall be cooled in the air cooler as stated in Aerial Cooler section.
- **Exhaust System Silencer with spark arrestor:** The exhaust silencer shall be Reactive type Hospital Grade with integral spark arrester capable of sound attenuation in the range of **45 to 60 dB (A).** An expansion bellow with flue gas duct is to be provided at the engine exhaust termination. All external connections from the engine shall terminate in flanges to ASME B16.5. Suitable supports are to be provided to avoid vibration. The Engine Exhaust Silencer will not be mounted on the aerial cooler and will be directed away to the outside of the shed through suitable supports mounted on floor. The exhaust silencer should have the option of mounting suitable catalytic converters module in future.
- **Engine Management system** with troubleshooting tools with necessary software/hardware/cables/license/passwords and other special tools for maintenance and troubleshooting purposes.
- **Engine Ignition System** shall be Shielded ignition system.
- **Fuel Filtration:** Dual filters, each 100 % capacity (full flow), non-bypassing with isolation valves arranged so that switching can occur without causing a low-pressure shutdown of minimum particle as per OEM recommendation.
- **Turbocharger (if required)**
- Auxiliary water pump (if required)
- Air Fuel Ratio Controller (if required)
- **Electrical Panel** with UPS and Battery for at least 4 (Four) Hours Back up. This Electrical Panel will be installed in the Safe Area of the Gas Compressor Station. OIL will supply the 230 VAC up to the Panel. Vendor to supply required 24 V DC from the Control Panel up to the Gas Engine (Approximate length of Cable required 90 mtrs for each package). The battery supplied should be Maintenance Free.

7.10 Piping

Piping and appurtenances shall be designed, fabricated, installed, inspected and tested in accordance with ASME B31.3 & ASME B16.5.

Among others, the following piping shall be included in the supply:

- All piping within the compressor skid and auxiliaries such as scrubbers etc.
- Process gas piping between scrubbers (suction / discharge) and main compressor skid
- Interconnected process gas piping between coolers skid and main compressor skid
- Interconnected piping between lube oil skid and the main compressor skid
- Thermal insulation required for all surface greater than 60°C.
- Piping vibration analysis and recommendations for piping outside compressor skid shall be provided by Vendor.

- Care shall be exercised in pipe sizing to minimize acoustical pulsations and mechanical vibrations.
- All piping wetted by the process gas shall be manufactured from carbon steel SA 106 Gr B seamless with suitable corrosion allowance
- The flanges shall be of SA 106 as per ANSI B 16.5
- All piping shall be butt welded and designed with flanged joints to allow complete removal.
- All termination points shall be WNRF flanged and conform to ASME B16.5. All flanges up to ANSI 300 class shall have weld neck, raised face, smooth finish. The flanges above ANSI 300 class shall be weld neck, RTJ jointed. Both types of joints shall be complete with either jointing sheet or RTJ ring.
- Compressor casing drains and vents shall be valved and routed to edge of the base plate and shall allow for complete drainage of compressor assembly. Each casing drain shall have individual valves.
- The end connection shall be flanged as per ASME B16.5.
- All relief valves and depressurizing valves shall be positioned above the relief header and the equipment being protected. The piping should be routed to eliminate liquid pockets both upstream and downstream of these valves.
- All isolation valves provided on the compressor skid drain shall be ball valves.
- The compressor vent, blowdown line shall have valve and routed to edge of base plate. The end connection shall be flanged as per ASME B 16.5.
- Suitable piping supports for all piping shall be provided. The piping support shall be extended from the main skid and after that from the cooler skid up to supplier's battery limit.
- A detailed stress analysis for the package piping shall be done. The analysis reports shall be attached with the final documentation. Vendor shall provide the requirement of acoustical insulation (if any) for the piping in his scope as well as for suction and discharge piping.
- All isolation valves shall be as per the valve specification. All check valves shall be of non-slam type.
- All process valves in natural gas service should be API 6D Monogrammed and through conduit design. Valves up to 300 # rating maybe Ball/ Gate type but above 300 # rating should be preferably through conduit gate valve.
- All piping/ valve/ fitting sizes above 2" NB shall be multiples of 2" NB as per design requirement. OIL's Non - standard sizes like 1 ½" , 3" etc. should not be used for the package.
- All Valves shall be flanged end type (including NRV)
- The package shall be complete from the suction skid edge connection to the discharge connection. Suction and discharge lines shall be sized for a maximum actual velocity of 9 m/sec to 12.8 m/sec. The Vendor shall carry out the pulsation study of suction and discharge piping complying with the scrubber nozzle forces and moments.
- The guideline for suction and discharge piping design and preparation for an acoustical simulation analysis shall be as per API 618. The Vendor shall provide the details of special supports (if any).
- To minimize pipe vibrations Vendor shall design pipe runs so that the acoustic length of the pipe run shall not create standing wave that amplifies the pressure pulsation system.
- Typical pipe run with respect to acoustic length to be considered are:
  - Pipe length from suction pipe line to suction scrubber.
  - Pipe length from scrubber to suction dampeners.
  - Pipe length from discharge scrubber to pipeline.
  - Pipe length from discharge pulsation dampeners to cooler.
  - Pipe length from cooler to scrubber.

7.11 Instrumentation and Controls

7.11.1 The control philosophy is to operate, control and shutdown the unit in a failsafe manner. The control Panel shall initiate machine trip in case of all mechanical upsets (e.g. temperature rise, vibrations, low coolant flow, low suction pressure etc.), which might result in a major mechanical breakdown. A Process Shutdown (PSD) or an Emergency Shutdown (ESD) shall stop the gas compressor package.
The Vendor shall supply a local control panel (PLC based) mounted on-skid and designed for operation, control and safeguarding of the compressor system. All operating parameters for the compressor shall be available from the control panel. The control logic shall be done in the local control panel.
Vendor will size and select all instrumentation located within the scope of the skid package, as per the attached P&ID. Sizing calculations shall be provided for approval and verification.
Datasheets in ISA / PTS formats shall be provided by the Vendor for review and approval. Instrumentation and control panel shall be supplied from the recommended instrumentation Vendors approved by OIL.
All equipment, instrumentation, valves etc. shall be tagged in accordance with the approved P&ID. Instruments shall be labelled and cross-referenced in an instrument list which will also indicate the manufacturer, size, model number, calibration range, span limit and set point. Vendor shall also provide other engineering documents such as wiring diagrams, layout drawings, etc., for review and approval. Operating and control philosophy shall be submitted as a part of the offer.
All Instruments shall be intrinsically safe wherever required and approved for use as per electrical area classification. Refer to details of instrumentation and control panel specification **as per Annexure-AD, AE.**

7.12 Speed Control: Speed control of the compressor unit will be carried out from the local control panel.

7.13 Vibration: Vibration sensors shall be provided for compressor frame, each cylinder and cooler and shall be connected to Control Panel for continuous monitoring, alarm and shutdown.

8.0 General
The package (Compressor + Engine + Vessels & Ancillaries) shall be set on a single structural steel skid / base frame with **concrete filling** suitable for installing on gravel packed pad/ anti – vibration pad mounted on pre-finished RCC surface. Vendor is to provide details about design, concrete grade, and structural design. Vendor to note that existing **conventional concrete foundation** would be available for placement of the compressor package. Vendor to select suitable **anti vibration pad** on the basis of pulsation/skid design analysis report/ recommendations.

8.1 Structural Steel Skid:

The structural design of the skid(s) shall include the following minimum general requirements:

- Steel design shall be in accordance with BS 5950 or AISC.
- The main runners shall be I Beams of appropriate thickness, strength and grade.
- Bi-directional moment resistant frames shall be avoided.
- The thickness of any structural steel plate shall be 8 mm minimum.
- The thickness of gusset and stiffener plates shall be 10 mm minimum.
- The skid shall be designed to minimize field assembly and installation. All shop connections to be designed as fully welded. Field welds shall be avoided, and field connections shall be designed as bolted connections.

- The lifting lugs shall be located on the outside of the longitudinal perimeter beams in order to minimize deflections. A transverse beam must be provided at lifting lug locations.
- The skid shall be designed for a 4 point lift only. Exception for this requirement must be authorized by OIL.
- Tie down lugs or brackets shall be welded to structural members of the skid(s) to allow tie down during transportation.
- Spreader bar, for lifting / handling of skid / Unit shall be supplied by Vendor. 1 no. each for each duty of Compressor i.e. 2 nos. (1 for LPB and 1 for GL)
- Vendor shall supply all chocks / packing pieces, shims and the anchor bolts.
- For the purpose of levelling, jacking bolts with locknuts shall be supplied by the Vendor.
- The base frame shall incorporate fixtures, rails, space, etc., as required to expedite maintenance. The base frame shall incorporate a sloping drip pan (for oil collection) collecting area covering whole skid, compressor, engine, coupling, piping etc. including a drain point and valve at the lowest point.
- The single structural skid design should take account of load of Engine, Compressor and other accessories without any bending during lifting.
- Necessary lifting analysis for the complete skid along with the mounted equipment will be carried out and necessary recommendations will be followed to reduce any possibilities of permanent deflection during loading/unloading operations.
- The concrete used for the skid shall be non-shrinking epoxy type with rebar supports

8.2 Access Platforms

Vendor shall provide suitable platforms for the following items to the extent indicated below unless the equipment or the facilities described are accessible from grade or from any other permanent platforms.

- Compressor and main driver
- Coolers to attend the inlet/return headers with vent and drain valves, driver and fan assemblies
- All such platforms and ladders shall be provided with hand railing to prevent fall.

9.0 INSPECTION AND TESTING

9.1 Quality Assurance

Vendor and his major Sub-Vendors shall demonstrate that they operate a quality system in accordance with an internationally recognized standard such as ISO 9001:2000 or agreed equivalent standard, commensurate with the goods and services provided.

The Vendor shall submit a quality control program for OIL's review at the time of proposal in line with the Tender QAP. The Vendor shall provide facilities for and cooperate with OIL and its designated authorized inspectors during manufacturing, assembly and testing.

9.2 Pre-Inspection Meeting

OIL will initiate this meeting as required. The specification, inspection, testing and packaging procedure will be reviewed with Vendor's manufacturing and quality control personnel.

The Vendor shall provide a Quality Plan/ Inspection and Testing Plan for manufacturing, Testing and packaging as per the Tender Quality Assurance Plan. The plan shall cover all quality related aspects of each piece of equipment in the specification and shall indicate inspection points, review points and milestones where OIL shall examine the equipment. At no time will inspection by OIL relieve the Vendor of his quality control responsibilities.

9.3 Inspection and Testing

Inspection & testing of all the components of this package shall be performed by vendor as per the QAP.

In order to enable a proper scheduling of the inspection visits, Vendor is requested to notify OIL at least six (6) weeks prior to the date of inspection if the inspection is to be held is at foreign countries. If the inspection is to be held at India then the minimum notice period is 3 (three) weeks prior to the date of inspection. When components or services are obtained from Sub-Vendor's OIL reserves the right to inspect these items at the point of manufacture. It is the Vendor's responsibility to include OIL's inspection and notification requirements to all sub-orders.

Vendor shall provide free access to his works and that of Sub-Vendor's for the authorized representative of OIL. All certification on the materials, shop test data, etc., shall be made available to verify that the requirements of the purchase order are being met.

The Vendor shall provide test certificates for all tests carried out on component equipment, as detailed in the QAP and the tender.

Test certificates shall be approved by OIL's Representative prior to dispatch and official certificates shall be forwarded within one week of test completion. A witnessed full functional test, including a noise test, shall be carried out on complete package.

For Major components supplied loose, where applicable and for skid mounted, fabricated packages, as minimum, the OIL's Inspector reserves the right to:

- Review Vendor's schedule
- Review Vendor's quality control procedures.
- Review welding procedures and welder's qualifications before fabrication commences.
- Check code material specifications, mill certificates (when applicable), thickness and pressure ratings.
- Check welding procedures are being followed.
- Witness air receiver / piping hydro test.
- Check equipment layout and that interconnecting piping, wiring and tubing matches layout drawings, material lists, and P&ID's; and is suitable for operation and maintenance.
- Check surface preparation for painting and coating.
- Check painting and coating for number of layers and thickness.
- Function testing of the control and shutdown logic.
- Confirm that all loose components are shipped.
- Other test as stated on the data sheets.

Vendor may use any method of inspection necessary to establish quality control and ensure adherence to specifications. Any weld which does not meet the specifications or the applicable code requirements or is unacceptable for the service for which it is intended shall be cut out or repaired at no expense.

9.4 Material Testing Requirement

The final non-destructive examination of welds for acceptance purposes shall be carried out after completion of PWHT, if any. Radiography shall be performed before PWHT, in which case an ultrasonic examination shall be performed after PWHT for acceptance purposes.

All weld joints of shell, heads, nozzles and attachments shall be 100% MPI tested and 100% ultrasonic tested (from remote surface) after PWHT.

Full traceability of all welds is required. The Vendor shall provide a weld map with full traceability to individual weld numbers. The traceable data shall include NDT reports, welding procedure and welder number.

Certification requirements shall be as follows:

- Pressure containing parts in accordance with ISO 10474 3.1
- Non pressure containing parts in accordance with ISO 10474 2.2

Certificate shall be provided in accordance with material requisition covering each item. All certificates should be fully traceable to the item covered and shall be marked with the purchaser order number, item number and tag/part number. They shall be clearly legible, in the English language.

9.5 Gas Engine Performance Test:
Performance testing of the engine shall have to be carried out in accordance with ISO 3046 or equivalent test procedure at manufacturer's works. All relevant certificates to be submitted to OIL for scrutiny and record.

9.6 Factory Acceptance Test / No Load Mechanical Run Test of Compressor
OIL reserves the right to visit the Vendor's premises to witness an acceptance test of the equipment and shall be given tentative dates at least 2 (Two) months in working days notice, in case of Foreign Country and 1 (one) month in case of India, in writing of readiness for this Testing. The equipment will be thoroughly tested by the Vendor prior to the acceptance test. Prior to the start of the Vendor's testing, a detailed schedule of the tests shall be supplied to OIL. The acceptance test will check compliance with the specification and the vendor is to make available all necessary equipment and services for this test. Notwithstanding the above notice periods the Vendor shall, following receipt of the purchase order submit a schedule identifying details of timing of design, construction and testing activities.

Factory Acceptance Test procedures shall be submitted by Vendor for OIL's review and approval. The compressor package shall be tested at Vendor's work.

Testing shall include as a minimum for the following:

a) Material inspection
b) A witnessed hydrostatic test.
c) A witnessed No Load Mechanical Run Test for at least 4 (Four) hours. This will include operation of the compressor at design rpm.
d) All pressure vessels and equipment subjected to pressure shall be tested in accordance with ASME section VIII Division I. This includes scrubbers, gas coolers etc.
e) Cooler fans shall be subjected to mechanical run test, vibration and noise test system at the sub Vendor's works.
f) Testing of auxiliaries such as lube oil system, coolers etc. shall be carried out as specified in respective codes at the respective sub Vendor's shops.

9.7 String test:

Vendor has to specify the infrastructure available to carry out the string test of the compressor package. The location of the site where the string test will be carried is to be mentioned in the bid.

One no. complete package of each duty i.e. Low Pressure Booster (LPB) compressor unit and one no. Gas Lift (GL) unit shall be taken up for string test at vendor's works.
The Vendor shall submit test procedures for the FAT of the entire compressor machinery train including gas engine, Dry flexible coupling, auxiliary skids such as scrubbers, air cooled heat exchangers etc.

A witnessed running string test of the complete unit comprising compressor, seal system, dry flexible coupling, base plate, gas engine, lube oil system, auxiliary skids, instrumentation and all ancillaries.

a) A witnessed compressor performance test with all auxiliaries and process equipment interconnected and assembled.
b) A witnessed sound level test.
c) Vibration measurements of all elements including base plate vibrations and natural frequencies.
d) Pressure measurements of all test berth fitted pressure transmitters.

During the string / performance test all original components supplied under the Purchase Order shall be used, with slave / test berth monitoring equipment hooked up to the contact temperature probes.
The compressor and ancillaries shall not leave the factory before all factory acceptances tests (FAT) have been satisfied.

9.8 Site Acceptance Test / Final Acceptance Criteria

After installation and commissioning at OIL's site, the SAT shall be executed in accordance with ISO 1217 for at least 72 hours without any interruptions. Every interruption during the SAT will result in restarting the SAT by resetting the elapsed time of the test to zero (0) hours. However shutdown or trip due to process conditions will not result in zero reset.
The Snapshot Monitoring of the Package will be accrued out during the Commissioning Run Test of the Package through suitable P-V Analyzer.
The vendor shall carryout onsite vibration analysis on all the major parts of the package i.e. Compressor Frame, Cylinders, Vessels, Nozzles, Cooler Fan Bearings, if any of the vibration is found outside industry levels , vendor shall take all necessary action to rectify the same. The vibration reading will be taken at 0% load, 50% load and full load conditions for all the units.
Vendor's representative will collect all the operating parameter readings of the compressor package during the SAT as below:

a) at 15 minutes interval for first 4 hours,
b) at 30 minutes interval for the next 4 hours
c) at 1 hours interval for the next period

The completed log book will be handed over to OIL after certifying the same by OIL's Engineer.
After satisfactory completion of the SAT the Vendor or authorized representative shall sign the 'System Acceptance Note' that shall mean acceptance of the system for operation and the subsequent sustained performance test.

Vendor's representative must be available at site during the SAT period to carry out the test. The final acceptance criteria for the package shall be in accordance with scope of supply and data sheets, applicable codes, standards and regulations together with additional requirements noted on the functional Operation and Maintenance Philosophy.

The package shall be considered fully commissioned only after the supply and acceptance of all related items of the package, documentations, inspection reports, Testing Reports etc. including Hazardous area approval/ certification for all electronic/ electrical field instruments, manuals, Inspection Reports, SAT reports, PV analysis report, Vibration reports.

9.9 Technical Integrity

The Vendor shall be responsible for the technical integrity of the Compressor package, including: mechanical design, supply of material, manufacture, quality assurance, assembly, testing, performance and specified engineering services. All of these activities shall be in accordance with the scope of supply, this functional specification and data/interface information supplied by the Purchaser. The Vendor shall have single point responsibility for all aspects of the works, inclusive of all components subcontracted or purchased from other parties.

9.10 General Requirement

All costs related to OIL's representatives to & fro journey, accommodation, food for the purpose of inspection, technical meeting will be borne by OIL. However all costs related to carrying out the inspection, run test etc shall be borne by the vendor.
The Vendor shall provide OIL with reasonable access to his and his sub-Vendor's plant facilities in order to verify that equipment is manufactured and tested as specified.
The Vendor shall provide calibration certificates of testing instrumentation for review by the inspector prior to each test.
The Vendor shall provide weekly reports during procurement and fabrication phases indicating progress status.

10.0 PREPARATION FOR SHIPMENT AND PACKING

All items shall be suitably protected against damage during shipment and storage. On completion of inspection and tests, equipment shall be thoroughly cleaned and dried internally and externally and prepared for shipment. The package shall be adequately protected against corrosion and mechanical damage during shipment to plant site and outdoor storage for period up to one year. Contractor shall consider transit route to site and pack accordingly.

If dispatched in pieces, Vendor shall submit the procedure of assembling for Purchaser's information. Vendor shall provide recommended procedures and checklists for commissioning, start-up.

All special tools and calibration tools required for assembly and commissioning shall be in Vendor's scope of supply.

All flanges shall be covered with metal covers, soft rubber gaskets and held by at least four (4) bolts. Other openings shall be taped closed. Threaded connections shall be capped or plugged for thread protection. Any external components, which may be subject to damage during transit and are not easily protected, shall be removed and packaged separately, to the equipment, for shipment with all openings plugged. Extent of loose supplied items to be marked on equipment drawings.

All internal parts of carbon steel shall be sand blasted and then brushed to remove particles. The equipment shall be sealed closed and contain bags of desiccant to prevent rust. Silica gel or other drying agents must, where installed, be clearly labelled and separately listed on a removal checklist. This list is to be attached to the equipment. All insurance spares shall be packaged in suitable storage without opening to prevent insect manifestation.

Exposed shafts and shaft couplings shall be coated with a preservative and wrapped with waterproof moldable cloth, then sealed entirely with waterproofed, cloth-backed duct tape.

Oil lubricated pump bearing housings, equipment cases, stuffing boxes and gearboxes shall be fogged and filled 10 to 50 percent of the internal volume with VSI circulating Oil and then all openings shall be tightly sealed.

Internals of equipment that can be made airtight by use of flanges or plugs shall have openings sealed.

Equipment shall be tagged to indicate the type of internal preservative used. Tags shall be waterproof and tear-resistant and shall be attached with stainless steel wire.

Auxiliary piping connections shall be tagged or marked for identification in the field. Each package shall contain lists of contents; one list inside and one list outside of the package. The package shall have external identification corresponding to the order number. All loose items shipped with the equipment shall be tagged with the order number and item identification. Start up / Commissioning spare parts shall be identified separately. The equipment shall be delivered with one copy of the Installation, operation and maintenance manuals.

11.0 SITE SUPERVISION AND COMMISSIONING REQUIREMENTS

The Vendor shall include the services of competent and experienced field engineer(s) /Supervisor(s) for the erection, installation / modifications, testing and commissioning of the equipment covered by this specification. This shall cover competent engineer(s)/ Supervisor(s) of sub-vendors also.
The package shall be considered fully commissioned only after the supply and acceptance of all related items of the package, documentation including Hazardous Area approval for electronic/ electrical field instruments and control Panel.

Vendor shall provide a separate break-down quote for Start-Up and Commissioning Services and Operator Training as per payment schedule.

11.1 Engineer's / Operator Training

The supplier shall have to provide training to OIL personnel as below during Commissioning Test Run and after successful commissioning:

Vendor shall provide training at site i.e. Duliajan during the period of commissioning run. The vendor shall provide 2 (Two) days classroom training at Duliajan and 5 (five) days hands on training at site to the engineers & operators for each of the gas compressor package.

Training shall cover Safety, basic theory of the equipment, operating procedures, maintenance procedures and control system training as a minimum.

Training Room plus related ancillaries like LCD Projector etc will be provided by OIL at Duliajan. However to & fro charges, accommodation, local conveyance, food etc. for the trainer will be at the vendor's account.

12.0 GUARANTEE

Vendor shall be fully responsible for all equipment supplied by him including bought out items. All the equipment shall be fully guaranteed for a period of twelve months after commissioning and satisfactory site acceptance test by OIL. Vendor shall guarantee all materials against defect, damage or non-conformity / workmanship. If any defect or non-performance occurs during the guarantee period, Vendor shall make all necessary alteration, repair and replacement at no cost to OIL. Vendor shall also provide a performance guarantee for the Compressor packages.

The Vendor shall provide all Certification for the equipment and shall ensure that, dimensional compatibility, shaft system critical speeds, vibration, noise levels and acceptability of pipe loads are within the relevant specification limits.

Vendor shall have the final and total responsibility for the design and performance of all equipment's supplied under this specification.

13.0 DOCUMENTATION

13.1 Documents Required With Bid

Vendor shall provide the following along with the bid:

a) A preliminary production schedule of the complete package including design, engineering, fabrication, factory testing, installation, commissioning, start up and site activities with bar chart showing major milestones and hold points.
b) Comments / Deviations / Exceptions taken by the Vendor with respect to Codes, Standards and Regulations shall be explained with technical justification for evaluation.
c) Functional description.
d) Detailed scope of supply
e) Completed ISO 13631 datasheet.
f) Point Performance Runs for all Guarantee points and all Design Points
g) Major Bought out items details as per Vendor List
h) A machinery train general arrangement drawing for the complete package including weights, space required for maintenance.
i) Completed data sheets for the compressor, Engine, Cooler etc.
j) OEM Compressor Modelling File
k) Compressor Sizing Software with proposed compressor frame /cylinders modelling
l) Completed auxiliary equipment data sheets (Gas engine, heat exchangers etc.)
m) Completed table of compliance (Exception / Deviation)
n) Vendor's P&ID for the complete package including all auxiliaries.
o) Functional description of the compressor package including start up, IPF and emergency shutdown procedures, capacity control, normal operation, etc.
p) Performance curves at different operating parameters and speeds for the proposed compressor with the guaranteed parameters clearly marked.
q) Schedule of material of construction
r) Full details of the proposed bearings and the lubrication oil system.
s) Performance Curves - Sets must include varying speed, when appropriate o Suction vs. Load, and Suction vs. Flow Curves: o Discharge vs. Load, and Discharge vs. Flow Curves
t) Panhandle diagram (Capacity versus suction pressure characteristics).
u) Full details of all the electrical items, electrical block diagrams showing all interfacing and interconnections.
v) Electrical load list including all 24V DC loads.
w) Full description and specification of all piping and instrumentation incorporated with the package.
x) Spares (commissioning, insurance) list
y) Project specific Quality plan.
z) Typical Inspection and test plan
aa) Reference list of compressors of similar capacity and design.
bb) Recommended 2 years operating spares / Insurance spares.
cc) Recommended start-up and Commissioning spare list.
dd) List of proposed major sub-Vendors.
ee) Utility requirement and Consumption (if any).
ff) Infrastructure available for carrying out factory acceptance test and String test.
gg) Vendor assistance, support facilities in India.
hh) Filled out Checklists

13.2 Drawings and Documents

The Vendor drawings shall be reviewed and approved by OIL, against the Purchase Order. The approval by OIL does not signify compliance with the purchase order. It should be noted that review by the OIL is for quality assurance purpose only, assuming that Vendor is technically responsible for all technical aspects of design checking. The Vendor is responsible for checking of compliance with the relevant documents like this specification, applicable codes and OIL standards.

Drawing detailing package envelope including installation and maintenance requirement and interface connections shall be supplied by Vendor.

14 .0 TIME SCHEDULE:

Vendor must complete the entire job within 18 (Eighteen) months from receipt of formal order. The schedule of completion of compressors shall be as under:-

Activity	15^{th} Month	17^{th} Month	18^{th} Month
Installation & commissioning of LP Booster Compressor unit complete in all respect (including 72 hrs. commissioning run	1	1	2
Installation & commissioning of Gas Lift Compressor unit complete in all respect (including 72 hrs. commissioning run)	1	2	3

Activity wise break up of milestone chart showing start of activities & completion of activities from zero date (i.e. date of LOA) & commissioning schedule shall be submitted along with the offer.

15.0 Cost of recommended Spare parts for two years operation shall not be considered for bid evaluation. However, the bidder to furnish detailed list of the spare parts and their price for stock provisioning.

16.0 Supplier to stand guarantee for the availability of all spares at least for 15 years after commissioning of the equipment supplied.

17.0 All electronic/electrical instruments, Junction box used in hazardous area should fulfil the following. The bidder shall confirm the compliance at the time of submission of bid.

a. Item shall be of a type and specification conforming to the relevant standards as specified in the Regulation 107(2) of Oil Mines Regulation-2017 and complying the provisions therein.
b. Bidder should supply documents specifying the type, details of specification, reference of the particular standard, test criteria as per the standards and status of testing, place of testing, copies of test reports from Indian Government Laboratory or NABL accredited laboratory or IECEx accredited laboratory or ATEX notified body which is not a part of manufacture's facilities.
c. In this regard, Bidder may refer OMR-2017, Notification dated 18th October 2017, published in the Gazette of India, under Ministry of Labour and Employment, Directorate General of Mines Safety, published on 2nd November 2017.

Annexure-AA

Design Data Sheet
Details of the Compressor Packages

Table : A

Item No.	Unit	Qty	Duty of Compressors	Capacity (NM^3/Hr)	Design Pressure (Gauge) (Kg/cm^2)		Design Temp. (Deg C)
					Suction	Discharge	Suction
1.	No.	4	LP Booster Compressor	2700	1.50	25.00	50
2.	No.	6	Gas Lift Compressor	3200	14.00	105.00	50

Note:

The above duty conditions (capacities) are at normal operating speed of 900 rpm (75% of the maximum rated speed recommended by manufacture) and after considering other conditions/factors such as altitude, maximum gas temperature, ambient temperature etc.

The gas pressures (both suction and discharge) for the units are likely to fluctuate by 20% of the figures given in Annexure-AA above and the compressor package shall be designed taking the extreme operating conditions. Bidders are required to furnish Capacity availability and other details like HP requirement of the packages at different combinations.

The requirement against each duty of compressor may be increased/ decreased at the time of order placement.

Annexure-AB

Design Data Sheet (Range)

The gas pressures (both suction and discharge) for the units are likely to fluctuate as shown in the table- B below. Bidders are required to furnish Capacity availability and other details like HP requirement of the packages at different combinations and the compressor package shall be designed taking the extreme operating conditions.

Table:B

Item No.	Unit	Qty	Equipment Description	Cont. Operating Pressure (gauge) (KG / CM^2)					
				Suction Range			Discharge Range		
				MIN	NOR	MAX	MIN	NOR	MAX
1.	No.	4	LP Booster Compressor	1.00	1.50	2.50	14.00	20.00	25.00
2.	No	6	GL Compressor	11.00	14.00	15.00	80.00	90.00	105.00

MIN : Minimum, NOR: Normal operating , MAX: Maximum

(i) The gas pressures (both suction and discharge) for the units are likely to fluctuate as shown in the table above. Bidders are required to furnish Capacity availability and

other details like HP requirement of the packages at different combinations including extreme operation conditions of suction and discharge pressures.

Annexure-AC

COMPOSITION OF FUEL GAS & GAS TO BE COMPRESSED

The composition of gas to be compressed in each case is shown in the following schedule (typical composition). The gas may be fully saturated with water vapour in the suction, at the suction pressure and temperature condition and hence while computing compressor BHP, it is to be taken in to account. Fuel gas is tapped from GL gas system.

Component	GL Compressor % Volume (approx)	Low Pressure Booster Compressor % Volume (approx)
Methane	80.0 – 88.0	75.0 – 85.0
Ethane	7.5 – 5.0	9.0 – 6.3
Propane	6.5 – 3.0	8.0-4.5
Butane	3.5 – 2.0	2.4 – 1.2
Pentane +	1.5 – 1.0	2.0 – 1.2
Co_2, N_2 Water Vapor etc.	1.0 – 1.0	2.0 – 1.0

Annexure-AD

Instrumentation & Control Philosophy:

The instrumentation & control of the unit shall be designed to provide automatic safety shutdown devices and annunciation system with fuel cut-off/ grounding of ignition for safe starting and shutdown of the engine and compressor. The control Panel shall be the Master Controller for the complete package including any electronic controller of the gas engine. There should be complete communication amongst all the electronic control function of individual equipment and the main control panel should be able to communicate between them.

2.0 Control Panel:

The control panel shall be designed based on Microprocessor based programmable Logic controller suitable for hazardous environment for failsafe operation ,control and shutdown of the unit. The fault functions shall be both visually and audibly indicated on the unit's control panel HMI and shall remain 'ON' until manual reset. It will have sequence starting system to ensure that all functions associated with starting operation are performed in correct sequence. The initiation shall be by means of a switch of push type, on the unit control panel. Provision shall also be incorporated for emergency shutdown of the compressor unit. In addition to the indication on the panel, analog indicators for critical parameters (list given in point no. 3.2) are to be provided at one place in the form of a gauge panel. The gauge panel shall be designed to be located adjacent to the control panel.

Note: The successful bidder should supply a ***''well proven control system for Natural Gas Compressor and Engine Control''.*** The bidder shall provide evidence that this particular control system technology are in use worldwide for Natural Gas Compressor Control at least for the last five years from bid closing date.

3.0 Shutdown & Indicating devices:

3.1 The following minimum shutdown devices should be offered for Compressor, Engine & Cooler:

3.1.1 Compressor Shutdown devices:

a) High liquid level in suction scrubbers
b) High liquid level in inter stage scrubbers
c) Low lube oil pressure
d) Compressor Lube Oil No flow
e) Low lube oil level
f) High discharge gas pressure for each stage
g) High discharge gas temperature for each stage
h) Low suction gas pressure
i) High cylinder jacket water temperature
j) High vibration (Crankcase)
k) High temperature of Compressor Bearings.

3.1.2 Engine Shutdown devices:

a) Low lube oil pressure
b) High coolant temperature (outlet from engine)
c) Low lube oil level
d) Engine Cooling system low flow
e) Engine over speed
f) Engine overload(manifold Air Pressure(MAP) sensors)
g) High exhaust temperature
h) Engine high vibration
i) Low coolant tank level
j) High temperature in each cylinder

Note: The vendor shall ensure that there is no conflict of engine shutdown system with compressor control system. The vendor will be responsible for ensuring proper safe operation of the package. The engine control and shutdown system should be packaged in control panel. Vendor's/manufacturer's works are to ensure proper operation, maintenance and safety of the package and to avoid duplicity of instrumentation devices.

3.1.3 Cooler – Shutdown Devices:

a) High vibration (near drive end)

3.2 Analog gauge panel is to be provided to monitor process parameters of compressor and Engine as given below:

Sl No	Parameter	Quantity
1.	1st stage suction Pressure	1 No.
2.	Interstage Pressure	1 No.
3.	2nd stage discharge Pressure	1 No.
4.	Engine oil Pressure	1 No.

5.	Compressor oil Pressure	1 No.
6.	Crank air Pressure	1 No.
7.	Engine oil Temperature	1 No.
8.	Compressor oil Temperature	1 No.
9.	Engine Exhaust Temperature	1 No.

3.3 The analog gauge board to be placed on the side of the skid nearer to the control panel.

4.0 Programmable Controller:

4.1 Each unit (Engine and Compressor) shall have a sequence starting system to ensure that all functions associated with the starting operation are performed in the correct failsafe sequence. Initiation shall be by means of a switch on the unit control panel.

4.2 The control panel shall include a programmable controller with the following features to cater the operational need of the compressor.

a) Expandable digital & analog inputs/outputs.
b) Program memory held in EPROM.
c) Communication port for connection to PC or laptop computer.
d) Provision for RS-232/RS485 and Ethernet connectivity (IP enabled) for remote monitoring and configuration purpose.
e) Battery operated program loader/Laptop computer(IS) (Four Nos. for the entire lot)
f) Designed to work in engine and compressor environment
g) Arrangement for retaining memory in case of power failure
h) The controller should have capability to calculate flow as per latest AGA standard.
i) The controller should be capable of controlling PID Loops.
j) Redundant 24 V DC Power supply.

4.3 The control panel shall have an entry for easy access and shall be suitable for use in hazardous area. The panel shall employ the sequence start system and alarm/monitoring functions together with the start switch and shutdown button. Provision shall also be incorporated for remote emergency shutdown of the compressor unit.

4.4 An UPS (Uninterrupted Power Supply) of minimum 2 (Hour) hour battery back-up is to be provided for each gas compressor-engine control panel. The said UPS with battery should be of portable type & should be placed in an FLP/ Explosion proof enclosure beside the control panel. The UPS should handle unwanted extra high voltage surge for about few seconds & have protection facility to cut-off power to the panel.

4.5 The control panel is to be placed on a separate skid on the same level of the compressor-engine skid. The Control Panel skid and the main skid will be connected to each other through rubber gasketed bolting. The supplier shall provide drawing /sketch showing position of the control panel for O.I.L's approval. Mounting of the control panel shall be designed using anti-vibration pads so that no vibration is transferred to the panel.

5.0 STATUTORY APPROVAL REQUIREMENT:

All electronic/electrical instruments and equipment, including control panel & JB use in hazardous area should fulfill the following:

5.1 Item shall be of a type and specification confirming to the relevant standards as specified in the Regulation 107(2) of **Oil Mines Regulation-2017** and complying the provisions therein.

5.2 Bidder should supply documents specifying the type, details of specification, reference of the particular standard, test criteria as per the standards and status of testing, place of testing, copies of test reports from Indian Government Laboratory or NABL accredited laboratory or IECEx accredited laboratory or ATEX notified body which is not a part of manufacture's facilities.

5.3 In this regard, Bidder may refer OMR-2017, Notification dated 18th October 2017, published in the Gazette of India, under Ministry of Labour and Employment, Directorate General of Mines Safety, published on 2nd November 2017.

Note: Bidders must categorically confirm in their bids that they would submit the above approvals along with the goods, failing which the offer will be summarily rejected. This is required as per Oil India's regulatory standards and specifications for Oil & Gas field services.

6.0 Additional Points:

6.1 All sensors for the various parameters should be designed to be compatible with the I/O card of the programmable controller to have their exact value of the parameters in the control system.

- Pneumatic instruments shall operate on air supply of 20 PSI and shall have transmission and output signal of 3 to 15 PSI.
- Electronic field instruments shall operate on 24 volts DC.
- All receivers shall be suitable for current input of 4-20mA DC OR voltage input of 1 to 5 V DC or its suitable multiple.
- All electronic instruments shall be immune to Radio frequency interference.
- The field transmitters shall be electronic type.
- All temperature gauges and pressure gauges shall be SS cage.
- For remote temperature indication / recording / control etc., preferably 3 wire RTD or thermocouple shall be used depending on the requirement.
- Separate junction Boxes shall be provided for different type of signals like analog signals, alarm, shut down, thermocouples etc., for interfacing Field Instruments, local control panels wherever applicable.
- All instruments & junction boxes etc., shall be supplied with S.S. Tag plates with cable tie.
- Instrument power circuits especially all digital inputs and outputs shall be individually protected from fault with the help of fuses. Power supply to the individual instrument shall be disconnectable from switch and protected with the help of fuse.
- The complete instrument system shall be designed for fail safe operation, by using normally closed contacts, which shall open on fault conditions.
- Indicating fuses shall be used in the power distribution to all instrumentation in accordance with the instrument manufacturer's recommendations and good practice.
- There shall be overall 20 % spare capacity available for any future addition of I/O against installed capacity. Vendor must design the field panels in such a manner that

– there shall be spare space available in the installed chassis/rack to enable OIL to enhance the capacity at-least by another 20% through installation of additional modules / hardware. Panel shall be supplied with complete internal wiring of 20% spare for future use.

6.2 Engine RPM shall be preferably measured using a proximity sensor. Engine speed indicator with Frequency to current Converter (F/I) for Programmable Controller input and auto-manual selection switch with both auto-manual speed control in the panel to be provided. Engine RPM/speed display should be available in the Control panel.

6.3 All equipment supplied shall be from reputed manufacturers and field proven, both with respect to design and materials. Uniformity in selection should be maintained for makes of similar Instrument and their accessories for operational convenience ease of maintenance and spare parts inventory point of view. If there is any conflict in respect of related standards, code etc., bidder shall refer the matter to OIL for clarification and only after obtaining the same they should proceed further.

6.4 Pre-Alarm System: The panel will have an additional feature to indicate a audio-visual alarm in the panel in the event of certain parameters deviating from its operating value. The setting of such pre alarm will be slightly below or above the setting value of shutdown alarm such that initiation of these pre alarms will not bring about the shutdown of the unit. Audible alarm shall be loud enough (Min. 80 dB) to draw attention of the shift operator.

6.5 Automatic trip circuits shall meet the following requirements:

- All trips shall have a pre-warning alarm and an alarm to indicate the trip condition especially in cases where operator can intervene to avoid tripping of machine.
- For any start up purpose, automatic trip bypass facilities shall be provided with separate indication that the corresponding trip signal has been by passed.
- All the solenoids and relays shall be energized in normal state of process operation.
- There shall be provision for generating software alarms – both “Low” and “High” type against each of the analog inputs apart from alarms generated due to any hardware device in field. These alarms shall be user configurable for setting as well as for Logging applications.

6.6 The control system shall be designed in such a way that failure of any portion of the system shall bring the machine to a fail-safe shutdown state

6.7 The control Panel should have online monitoring of rod load for each cylinder through in built programming.

6.8 Capacity control of the compressor shall be incorporated in the Programmable controller. The control loop shall be complete with pneumatic control valve with positioner and I/P converter.

Capacity control philosophy for Low Pressure Booster:

i) The Low Pressure Booster Compressor should be able to maintain the required suction pressure by taking gas from the discharge line through the control valve. The control valve shall be Normally Closed type.

ii) The Gas Lift Compressor discharge pressure shall be maintained by the control valve below the maximum discharge pressure and the gas shall be by passed to the suction side. The control valve shall be Normally Closed type.

6.9 Flow Measurements to be incorporated in the control system:

a) The engine shall be provided with on-line flow meter for fuel gas volume. This flow measurement should be conforming to latest AGA standard. On-line Flow

Meter to be hooked up with the Programmable Controller and Totalizer indication should be available in the Control Panel Display.

b) The Gas Compressor Package shall be provided with on-line flow meter for gas volume at discharge. The flow meter shall be installed taking into consideration of straight piping required. If required flow strainer may be designed for the same. This flow measurement should be conforming to latest AGA standard. On-line Flow Meter to be hooked up with the Programmable Controller and Totalizer indication should be available in the Control Panel Display.

6.10 **Panel Wiring:**

a) Open terminals shall generally be avoided. Terminal strips shall be mounted inside the enclosure.

b) 1sq. mm multi stranded PVC insulated copper conductor (LAP CABLE) shall be used in general with printed ferruling (ferruling is to be done is cross way like DEST/SOURCE).

6.11 Wire carrying measurement signals associated with pressure transmitters, RTD/TC and other low level signals shall be routed in separate wire trays and not along-with power cables (colour identification of signal cables may also be followed up as far as possible).

6.12The complete installation & Commissioning of the control system shall be in the scope of supplier.

6.13All wires required for Panel internal wiring shall be of minimum 1.0 mm2, standard copper conductor, with 600 volt rated PVC insulation shall be tagged at both ends with full ring type label. Tagging shall correspond to that used on control panel schematic drawing.

6.14 A system of flame retarding type plastic wire ducts shall be provided for routing wiring. All wiring run outside of ducts shall be in bundles, neatly routed in a vertical or horizontal plane only, and secured with plastic wire ties or cable lacing. Power circuits, instrument signal circuits and alarm circuits shall be segregated in separate wire ways. At least 20% additional space for future wiring shall be provided in wire ways. The panel shall be designed for field wiring entry from the bottom exclusively.

6.15 Instrument piping & tubing as per P&ID:

- Panel tubing from manifold or the bulk head to the panel instruments shall be of SS tubing.
- The tubing shall be laid in metal slotted ducts.
- All the fittings shall be SS316 and double compression fittings and the tubing shall be fully annealed seamless type.
- All the field devices shall be mounted on stanchions at locations near to the process tap off point. Bidder / vendor has to provide new impulse tube connection made of ½“ or ¼ “ SS-316 stainless steel tubes. All these impulse tubing network shall be leak tested and hydro-tested during pre-commissioning checks.

6.16 Earthing Requirement:

a) Each cabinet, console and other equipment supplied, as a part ofthe control system, shall be provided with an earthing lug. All these lugs shall be properly secured to the AC mains earthing bus.

b) All circuit grounds, shields and drain wires of control cables shall be connected to the system ground bus which shall be electrically isolated from AC mains earthing bus. This bus shall be typically of 25 mm wide and 6 mm thick of copper.

c) A minimum 1” x ¼” copper ground bus bar, isolated from the panel structure shall run the entire length of the Panel near floor level in Control Panel, compression type terminals suitable for 4/0 AWG copper ground cable shall be provided at each end of the bar for connection to the main ground. All signal circuits shall be grounded as per the instrument manufacturer’s recommendations and good practices. All circuits must be grounded at one point only. All shields shall be grounded at the same point as the signal circuit. Where multiple grounds in a loop are unavoidable, signal

isolators shall be provided to prevent potential ground loops. Ground wiring shall be directly connected to the ground bus bar by means of suitable wire lugs, no intermediate terminals are allowed.

d) All instrument cases and housing capable of carrying current shall be grounded to the panel structure. The panel structure will in turn be grounded to the ground bus bar for eventual connection to main ground. Compression type terminals suitable to the ground for 4/0 AWG copper ground cable shall be provided in each Desk section for the purpose.

7.0 Documentation & Approvals:

7.1 During detailed engineering & design stage, the approvals of the following are to be obtained from O.I.L. Minimum 3 (three) sets of hard copy and soft copy for each of the following documents are required.

a) P& I Diagram
b) General Layout diagram
c) All drawings and instrument datasheets
d) Panel Details & Panel wiring diagram
e) Loop Diagram & Loop details
f) Programmable Controller Hardware & Software
g) Programming Terminal(Laptop) specification
h) Logic details of start-up, sequence, interlock, safety shutdown, alarm, control & monitoring.
i) Programs development for start-up, sequence, interlock, safety shutdown, alarm, control & monitoring.
j) Emergency & Shutdown logic.
k) All field & Panel Instruments.
l) Tag data base for the entire unit

Note: The supplier must submit drawing/data sheets etc within 01(One) month from the date of placement of order on them, for OIL's scrutiny and approval.

7.2 Three sets of all electrical drawings are to be supplied in A3 size, laminated along with supply. Three sets of operation and maintenance manuals of field instruments are to be supplied for every compressor along with goods.

7.3 A permanent block/flow diagram of the operating process and list of start-up and shutdown procedure is to be riveted in a suitable place on the control panel.

7.4 Detailed technical specifications, approved vendors list and check List for Control and Instrumentation system as per Annexure-F, G & H respectively.

Annexure-AE

1.0 **Specification of Control Panel**:

a)	Type	: Enclosed self-supporting, lockable type
b)	Material	: Heavy gauge CRCA sheet stainless steel, reinforced to provide self standing and rigid assembly
c)	Enclosure class	: IP-54 or better
d)	Certification	: For use in Gas groups IIA,IIB and Zone 2 hazardous areas of Oil Mines in India.(Test certificates complying OMR-2017)
e)	Ambient Temperature	: Maximum 50 deg C
f)	Cable connection	: Double compression FLP Cable gland
g)	Cable entry	: Bottom
h)	Terminal type	: 1.5 mm^2 spring loaded (Double-decker terminals are not acceptable)
i)	I/O Card mounting rack	: As per manufacturer's standard
j)	Input connections	: All analog & digital inputs are to be routed through suitable I.S. barriers
k)	Wiring Insulation grade	: 1100 V or above
l)	Spare Terminals	: 20% after complete wiring
m)	Panel Illumination	: Internal lighting shall be installed in the control panel using fluorescent lighting fixtures to provide

		adequate lighting for maintenance of equipment. The location of lighting fixture must not interfere with doors or other equipment which must be accessible and space shall be maintained for bulb replacement.
n)	Audio-Visual Alarm	: Suitable audio-visual alarm system should be provided in the control panel.
o)	DC Power supply	: Panel shall accompanied with 230 VAC to 24VDC redundant power supply.
p)	UPS with battery	: min. 4 (Four) hour backup)

2.0 **Microprocessor based Programmable Controller**:

The specification given below is the minimum requirement but not restricted to the following:

Model : Latest model of Programmable Logic Controller

Hardware & Software:

a) Processor: Processor should be capable of handling all the parameters and all control loops, indications, annunciations etc. It should have sufficient memory capacity with minimum of 20% extra memory as spare. Also its memory should have the facility for future up-gradation.

b) Rack: As per MFR's standard.

c) I/O Card : Should have following Input-Output cards

i. Analog Input
ii. Analog Output
iii. Digital Input
iv. Digital Output
v. Power supply card

d) Incoming Power supply at site: 230 V AC +/- 10%, 50 Hz, single phase

e) Software: Latest Windows based application software for developing logic diagram etc & Graphics building on Windows operating system

f) Communication Port: RS-232/RS485 and Ethernet connectivity (IP enabled) for remote monitoring and configuration purpose.

3.0 **Programmable Controller Inputs/Outputs (Tentative):**

Bidders shall be required to consider minimum Input and output as mentioned as under for configuration of the Controller and hardware to be provided to meet control requirements. In case, any extra input or output devices are felt necessary to be included and configured within the system, the same shall be indicated during detailed engineering. Even during system pre-commissioning or testing if OIL feels necessary to have trending or real time data logging or monitoring of some other additional process data in the operating system, bidder shall be ready to carry out requisite engineering and configure the same within the system without any extra cost to OIL so long as no additional hardware is necessary for the controller or field devices.

Analog Inputs:

SL No	Parameters	Quantity
1	Engine Fuel Gas Inlet Pressure	**1 No.**
2	1st Stage Suction Pressure	**1 No.**
3	1st Stage Discharge Pressure	**1 No.**
4	2ndStage Suction Pressure	**1 No.**
5	2ndStage Discharge Pressure	**1 No.**

6	Compressor Oil Pressure	**1 No.**
7	Engine Oil Pressure	**1 No.**
8	Instrument Air Pressure	**1 No.**
9	Cranking Air Pressure	**1 No.**
10	Differential Pressure Compressor Oil Filter	**1 No.**
11	Differential pressure engine oil filter	**1 No.**
12	Engine intake manifold pressure right bank	**1 No.**
13	Engine intake manifold pressure left bank	**1 No.**
14	Flow-engine fuel gas	**1 No.**
15	Compressor vibration(frame& throws)	**As per requirement**
16	Engine vibration	**As per requirement**
17	Cooler vibration	**As per requirement**
18	Flow-Compressor Discharge	**As per requirement**

THERMOCOUPLE INPUT(TYPE-K)

SL No.	**Parameter**	**Quantity**
1	ENGINE FUEL GAS INLET TEMPERATURE	**1 No.**
2	1^{ST} STAGE SUCTION TEMPERATURE	**1 No.**
3	1^{ST} STAGE DISCHARGE TEMPERATURE	**1 No.**
4	2^{ND} STAGE SUCTION TEMPERATURE	**1 No.**
5	COMPRESSOR OIL TEMPERATURE	**1 No.**
6	ENGINE OIL TEMPERATURE	**1 No.**
7	COMPRESSOR/AUXILLARY JACKET WATER TEMPERATURE	**1 No.**
8	ENGINE JACKET WATER TEMPERATURE	**1 No.**
9	ENGINE INTAKE MANIFOLD RIGHT BANK TEMPERATURE	**1 No.**

10	ENGINE INTAKE MANIFOLD LEFT BANK TEMPERATURE	**1 No.**
11	EXH. TEMPERATURE (for all cylinders)	**As per number of cylinders**
12	EXCESSIVE EXH. TEMPERATURE RIGHT BANK	**1 No.**
13	EXCESSIVE EXH. TEMPERATURE LEFT BANK	**1 No.**

ANALOG OUTPUTS:

SL No	**Parameters**	**Quantity**
1	RECYCLE CONTROL (I/P)	**1 No.**
2	SPEED CONTROL (I/P)	**1 No.**

DIGITAL INPUT:

SL No.	**Parameters**	**Quantity**
1	EMERGENCY STOP	**1 No.**
2	1^{ST} STAGE SUCTION SCRUBBER LIQUID LEVEL HH	**1 No.**
3	2^{ND} STAGE SUCTION SCRUBBER LIQUID LEVEL HH	**1 No.**
4	COMPRESSOR LUBE OIL NO FLOW	**1 No.**
5	COMPRESSOR LUBE OIL LEVEL LL	**1 No.**
6	ENGINE LUBE OIL LEVEL LL	**1 No.**
7	COMPRESSOR/AUXILLARY JACKET WATER LEVEL LL	**1 No.**
8	ENGINE JACKET WATER LEVEL LL	**1 No.**
9	FLOW SWITCH ENGINE COOLING WATER NO FLOW	**1 No.**
10	IGNITION FAULT SIGNAL	**1 No.**

DIGITAL OUTPUT:

SL No.	**Parameters**	**Quantity**
1	COMPRESSOR PRELUBE	**1 No.**
2	ENGINE PRELUBE	**1 No.**
3	CRANK	**1 No.**
4	IGNITION	**1 No.**
5	FUEL	**1 No.**

6	ALARM LIGHT	**1 No.**
7	FAULT LIGHT	**1 No.**
8	ALARM HORN	**1 No.**
9	UNIT RUN STATUS RELAY	**1 No.**
10	1ST STAGE SUCTION SCRUBBER LEVEL DUMP	**1 No.**
11	2ND STAGE SUCTION SCRUBBER LEVEL DUMP	**1 No.**

FREQUENCY INPUT:

SL No.	**Parameter**	**Quantity**
1	**ENGINE RPM**	**1 No.**

4.0 Specification for Laptop Computer for PLC configuration/ Programming:

4 (Four) nos. laptop Computer with the following specification shall be supplied by the vendor.

a) Operating System: Windows® 10(64 bit) and preloaded with necessary software drivers for seamless performance of the laptop, (Licensed software CD's are to be provided)
b) Software along with License for Control Panel Programming, Gas engine ignition system Programming, Compressor Lubrication system Programming along with required Cables for ports
c) Minimum configurations:
- Processor : Latest Intel® Core i7 processor
- Memory: Minimum 8GB 2.133GHz DDR4 SSD RAM
- Data Storage: SATA HD 1TB
- Display: Min 13 inch with FHD Direct view
- Connectivity: 10/100/1000 gigabit Ethernet and triple RF# pass through (GPS, Mobile Broadband and WLAN)
- Wireless LAN: Intel® Dual Band Wireless #AC 7260 (802.11ac, dual band,2x2,upto 867 Mbps) with Bluetooth®4.0
- Power: 65W or 90W AC adapters for 230VAC supply at 50 Hz frequency adapter
- Battery: mAh to be strong enough to provide backup of at least 4 hours.
- Ports: All necessary ports and cables for communicating with the system components (Controller, HMI etc.)
- Safety feature:
  a)To be usable in Hazardous Location: ANSI/ISA 12.12.01 certified (Class 1 Div.2, Group A,B,C,D)
  b) Electromagnetic Interference: MIL-STD-461F/810G certified
  c) Ingress Protection: IP65 certified
  d) Operating Thermal Range: -29 degC to 60degC
  e) Non-operating thermal range: -51degC to 71degC
  f) Humidity: 95% RH
- Accessories: Laptop carry case
- Minimum 3 years warranty certificate for the laptop

d) The specification mentioned above is minimum for the Laptop. Supplier should include all features & accessories as necessary for programming and configuration application.

e) Amongst others, laptop should be virus protected with latest antivirus software; licensed Antivirus CD is to be supplied separately.
f) Application Software: Preloaded with Programmable Controller software, Flow Meter configuration software (Licensed software CD's are to be provided), Gas Engine Control Panel Software, Gas Engine Ignition System Software, Gas compressor cylinder Lubrication software, Gas compressor OEM's Compressor Sizing software with license, (Licensed software CD's are to be provided), Any specified Cable/ Connectors required for interface with laptop is to be provided.

Annexure-AF

Commissioning Spares

Minimum spares as perceived by OIL are shown as Annexure – AFF (Alongwith Price Bid Format) should be included in the offer. However, if bidder feels necessary of any more spares or increase in quantity or items, they should include the same for successful commissioning of the units. Rates quoted for commissioning spares shall be considered for evaluation of offers.

Annexure-AG

VENDORS LIST

Sr No	Item / equipment	Name of Vendor
a)	Gas Engine	Caterpillar INNIO Waukesha
b)	Aerial Cooler	Harsco Air-X-Limited, USA/UK AXH air-coolers, Tulsa, Oklahoma,USA Air Cooled Exchangers, Tulsa,USA Alfa Laval Chart Industries
c)	Coupling	Rexnord CMR type

Sr No	Item / equipment	Name of Vendor
d)	Divider Block Lubrication	CPI,Stafford, Texas, USA CC technology , Midland, Texas, USA Lincoln
e)	Control Panel	Altronic, LLC,Girard, Ohio, USA FWMurphy, UK AMOT Controls, UK
f)	Pressure/Temperature gauges	ODIN WIKA Murphy McDaniel
g)	Pressure/Temperature Switches	Switzer Danfoss Indfoss
h)	Level Switches	Norriseal Murphy Fisher Rosemount Invalco Magnetrol Kimray
i)	Level gauges	Levcon Chemtrols Norriseal
j)	RTD/Thermocouple	Nagman GIC ALTOP Waaree
k)	Solenoid Valve	ASCO Rotex
l)	Control valves & Valve Positioners	Emerson MIL Samson
m)	Junction Box & cable Gland	Baliga, Chennai Flexpro Sterling
n)	I.S. Zener Barrier	MTL P&F Electronics
o)	Vibration Sensors	FW Murphy AMOT Controls Metrix (USA)
p)	Flow Meters	Emerson Rockwin Cameron
q)	Pressure regulators	Emerson ShavoNorgren ABB Fisher Kimray

Sr No	Item / equipment	Name of Vendor
r)	PLC	Altronics Murphy Amot Allen Bradley Siemens
s)	Pressure/DP Transmitter/Temp. Transmitter	Emerson ABB Honeywell Yokogawa Altronic Controls
t)	I/P Converter	Fisher ABB Honeywell Yokogawa
u)	SS Tubing	Sandvik, Sweden
v)	SS Tubing fittings	Swagelok , Parker
w)	Anti Vibration Pad	Bilz Vibration Technology AG, Germany
x)	Accoustic Pulsation Study Static & Dynamic Skid Design MNF Study	Wood group, Beta machinery Services SVT SWRI

Note:
The vendor list is for reference purpose. The supplier/ packager to mention the make, model of item alongwith the Technical bid. After placement of Purchase order, vendor shall take approval against each item with detailed datasheet.

Annexure-AH

Format of Authorization & Backup Warranty
(To be typed on the letter head of the Manufacturers)

Ref. No Date

Sub: Authorization & Backup Warranty

Ref: Your tender No. Dated

To,

The HOD-Materials
Materials Deptt,
OIL, Duliajan

Sir,

We, M/s……. (Name & address of the Manufacturer) hereby authorize M/s……..... (Name & address of the Bidder) to submit their Bid against Tender No……... floated by OIL INDIA LIMITED (OIL) for supply tendered goods, which will be manufactured by us. As we do not participate directly against such tendering process, we authorize M/s. ……. (name of the Bidder) to participate as our only Sole Selling Agent/Dealer/Distributer/Supply House (strike out whichever is not applicable) against the tender.

We hereby guarantee the supply through M/s……..... (name of the Bidder) in the event of placement of purchase order by OIL and shall provide all back-up supports as may be necessary including for the quality & workmanship of supplied materials.

This authorization and back-up warrantee/guaranty shall remain valid throughout the execution by M/s. ……..…… (Name of the Bidder) including the defect liability period, in the event of an order by OIL on them.

Yours faithfully,
For (Name of the manufacture)

Name & Signature of Authorized signatory: Designation :
Phone No. Place : Date :
Seal of the Manufacturer:

Annexure-AI & AJ

The QAP and Vendors format as attached have to be submitted by the bidders.

Annexure-AK

Technical Check List

Packaged Compressor Information Sheet

Sl. No.	Description	Vendor's Comments

Sl. No.	Description	Vendor's Comments
A	Frame/ Model	
1	Maximum BHP per throw and number of throws	
2	Rated Maximum speed (rpm)	
3	Maximum gas rod-load (mode of Calculation)	
B	Max. Inertia load	
1	Max. (Gas + Inertia) load	
2	Piston speed	
3	Main journal bearing size (dia x length)	
4	Crank pin journal bearing size (dia x length)	
5	Con rod bushing (X-head end) size (dia x length)	
6	Cross-head type	
7	Cross head size (dia)	
8	Cross-head pin size (dia x length)	
9	Cross head pin bushing size (dia x length)	
10	Cross head shoe size (width x length)	
11	Piston-rod dia	
12	Con rod bolt dia	
13	Type of threads on piston-rod on (Requirement is for rolled-threads)	
14	Type of threads on con-rod bolts	
15	Frame lubrication pump capacity	
16	Crank-case oil sump capacity	
17	Difference in reciprocating weights on opposite crank	
18	Type of Valve offered	
19	Material of construction of the following:	
a	Crank-shaft	
b	Con-rod	
c	Piston rod	
d	Con-rod bolts	
e	Cross-head	
f	Cross-head pin	
g	Main bearing	
h	Crank-pin bearing	
i	Thrust bearing	
j	Pistons	
k	Piston rings	
l	Packing rings	
m	Oil Scrapper rings	
n	Valves plates/springs	
B	General Information (Compressor)	
1	Whether the design of LP Booster has taken into consideration the expected fluctuations of suction/discharge pressure.	
2	Whether the cylinders are linered	
3	Whether the compressors are provided with explosion relief devices	
4	Whether ½" indicator taps are provided at the end, of the cylinders	
5	Whether reinforced conical type suction start-up screens are provided	

Sl. No.	Description	Vendor's Comments
6	Make and type of coupling	
7	Whether pre/post lube oil pumps (for gas engine driven units) are driven by pneumatic motors and both the systems are automatic and controlled by Control Panel	
8	The type of suction scrubber provided .Whether the mist extractor provided with the suction/inter stages scrubbers is adequate to remover 99% of all droplets of 10 microns or larger. Is there any arrangement in the suction scrubbers to handle light slugging	
9	Grades of lube oil for compressor and its Indian equivalent	
10	Make of the forced-feed lubrication system, Divider Block	
11	Type of rod packing cooling	
12	Power required driving auxiliaries (cooler and compressor auxiliary water pumps).	
13	Whether safety valve is provided after each stage of compression and at first stage suction.	
14	Whether compressor valves are of plate-type or ring type	
15	Whether compressor valves are non-metallic	
16	Whether air bleed valve is provided at both stage cylinders. (In case of water cooled compressors)	
17	Whether the bidder has quoted with concrete filled skid along with details and credentials thereof	
18	Whether after cooler by-pass valve/ system has been provided for Gas Lift compressors	
19	Whether approx. dimensions and weight of each skidded units are included.	
20	Whether commissioning spares and other consumable spares provided	
C	PRIME MOVER (ENGINE):	
1	Whether continuous ratings (HP) of the engine indicated are after appropriate deductions for altitude, temperature and fuel-gas composition mentioned in specifications	
2	Whether pyrometer is provided to indicate individual cylinder temperature of the engine.	
3	What is the continuous rating (HP) of the engine at operating speed at site condition?	
4	Whether bhp developed by the prime mover at design speed meets the 20% margin required over (total BHP required to drive compressor when fully loaded + total BHP required to drive the auxiliaries).	
5	Whether engine crank-case is provided with explosion proof devices	
6	Starting air pressure requirement	
7	Whether the fuel filter is provided with pressure gauges, drain block valve and piping to the edge of skid.	
8	Details of the fuel filter provided	
9	Whether engine governor is Wood-ward hydraulic type/Electronic Type	
10	Whether the air cleaner is dry-type with pre-filter.	
11	Whether the silencer is hospital type with spark & flame	

Sl. No.	Description	Vendor's Comments
	arrestor	
12	Whether suitable provision has been made to check the performance of individual spark plug by spark detector without opening the spark plug or the cable.	
D	COOLER	
1	Whether the engine jacket water cooler has been designed for 20% excess reserve cooling capacity over maximum possible lHP of the engine (i.e. HP developed at maximum rated speed of the engine).	
2	Whether the auxiliary cooler section for gas and compressor jacket water has been designed for an excess 15% & 20% capacity respectively over the design requirement.	
3	Whether the heat transfer calculation have been provided with respect to adequacy of the engine jacket water cooler.	
E.	Mesh size of the bug-screen and hail Guard	
1	Inter-stage and after cooler gas temperature.	
2	Whether the cooling water circuits for the engine and compressors are separate with separate cooling sections in the cooler	
3	Whether cooler fin guard (folding type) provided on top of cooler section.	
4	Whether air bleed valve is provided for water section(s) at the topmost position.	
5	Coolant Capacity	
6	Coolant Make, Specification	
F	GENERAL	
1	Whether the string test will be carried out as per the specifications	
2	What is the maximum expected noise level in decibels of the packaged unit from a distance of 1m from the unit	
3	Whether spare parts list for 2 years operations indicating price of the individual item is provided.	
4	It is to be confirmed that spares for the engines, compressors and other accessories shall be available at least for a period of 15 years after the date of commissioning of the units at site as mentioned in OIL's specifications	
5	Whether the delivery schedule is as per the specifications	

Annexure AL

TECHNICAL CHECK LIST FOR INSTRUMENTATION & CONTROL SYSTEM

A. Programmable Control Panel:

Sl.	Description	Remarks

No.		YES	NO
1	Latest Model of Programmable Controller is provided		
2	Certification of the control panel for use in Gas Groups IIA,IIB and Zone 2 Hazardous areas of Oil Mines in India is provided(test certificates complying OMR-2017)		
3	Communication for remote monitoring provided		
4	Audio-Visual Alarm facility with safety shutdown devices provided		
5	The suitable position of the panel is provided as per the layout diagram		
6	Suitable engine speed indicator and auto-manual selection with both auto-manual speed control is provided		
7	All panel parameters are displayed through HMI in Control panel		
8	Redundant DC Power supply unit Provided		
9	Isolators are provided for all inputs		
10	Starting sequence, Interlock, Start-up & Safety shutdown is executed using Programmable Controller		
11	Confirm to supply control 3 sets of panel engineering details, technical documents of control panel instrumentation system along with the material		
12	Scrubber level control is achieved using control valve and level control action from Programmable Controller		
13	Compressor capacity control is provided		
14	UPS(Uninterrupted Power Supply) back up is of Four hours duration		
15	Provision for interface to OIL's SCADA system is available in the panel		
16	Gauge panel is placed as per the layout diagram		

Field Instruments

Sl. No.	Description	Remarks	
		YES	NO
1	All field instruments i.e. transmitters, switches, solenoid valves, I/P & P/I converters etc. test certificates as per OMR-2017		
2	All field instruments are compatible to 24 V DC power supply		
3	Technical literature/catalogue for all field instruments provided		
4	Field Instruments considered as per Commissioning Spares		

Annexure AM

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" OR INDICATE TO THE FOLLOWING QUESTIONS, IN THE RIGHT HAND COLUMN.

Sl No.	REQUIREMENT	COMPLIANCE
1.0	Whether bid submitted under Single Stage Two Bid System?	Yes / No
2.0	Whether quoted as OEM / Authorized Packager of OEM ?	
2.1	**Whether all documents have been submitted as required for fulfilling Experience criteria clause of BRC-Technical.**	Yes / No
2.2	**Name and details of the E&P company, or Service Provider to an E&P Company or Natural Gas Transportation Company to whom the bidder has successfully executed orders / contracts as per Experience criteria clause of BRC-Technical.**	Yes / No
2.3	**Whether submitted the profile and other documents of the E&P company, or Service Provider to an E&P Company or Natural Gas Transportation Company for verification (viz. Annual reports, Memorandum of Association, Article of Association etc.)**	Yes / No
2.4	**Whether technical Bid Evaluation & Bid Rejection Criteria (BEC/BRC) documents have been submitted after verification and certification by Independent Third-Party Inspection Agencies as per ANNEXURE – C.**	Yes / No
2.5	**Whether Undertaking of Local content percentage and other documents has been submitted as per APPENDIX-A3 "PURCHASE PREFERENCE POLICY LINKED WITH LOCAL CONTENT (PP-LC)".**	Yes / No
2.6	Whether Integrity Pact with digital signature uploaded and all clauses have been accepted as per the format?	Yes / No
3.0	Whether "Bid Securing Declaration" submitted ?	Yes / No
3.1	Whether offered firm prices?	Yes / No
3.2	Whether quoted offer validity of 120 days from the date of closing of tender?	Yes / No

3.3	Whether quoted a firm delivery period?	Yes / No
3.4	Whether agreed to the tender Warranty clause?	Yes / No
3.5	Whether confirmed acceptance of tender Payment Terms ?	Yes / No
3.6	Whether confirmed to submit PBG as asked for in tender?	Yes / No
3.61	Whether agreed to submit PBG within 30 days of placement of order?	Yes / No
3.70	Whether Prices submitted as per Price format ?	Yes / No
3.71	Whether confirmed that all spares will be supplied for a minimum period of 15 years after supply ?	Yes / No
3.72	Whether cost of two years recommended / Operating Spares quoted?	Yes / No
3.8	Whether quoted as per tender (without any deviations)?	Yes / No
3.81	Whether quoted any deviation?	Yes / No
3.82	Whether deviation separately highlighted?	Yes / No
3.9	Whether indicated the country of origin for the items quoted?	Yes / No
3.91	Whether technical literature / catalogue enclosed?	Yes / No
4.0	Whether weight & volume of items offered indicated?	Yes / No
5.0	For Indian Bidders – Whether indicated the place from where the goods will be dispatched. To specify :	Yes / No
5.1	For Indian Bidders – Whether road transportation charges up to Duliajan quoted?	Yes / No
5.2	For Indian Bidders only - Whether offered Ex-works price including packing/forwarding charges?	Yes / No
5.3	For Indian Bidders only - Whether indicated Local content in the offer?	Yes / No
5.4	For Indian Bidders only – Whether all applicable Taxes & Duties have been quoted?	Yes / No
6.0	Whether all BRC/BEC clauses accepted ?	Yes / No
7.0	Whether confirmed to offer the equipment for Pre-despatch/shipment Inspection & testing?	Yes / No
7.1	Whether Pre-despatch/shipment inspection & testing charges applicable?	Yes / No

7.2	If Pre-despatch/shipment inspection & testing charges applicable, whether quoted separately on lumpsum basis?	Yes / No
7.3.	Whether confirmed to carry out Installation & Commissioning of the equipment at Duliajan (Assam) ?	Yes / No
7.4	Whether Installation & Commissioning charge applicable?	Yes / No
7.5	If Installation/ Commissioning and Training charges applicable, whether separately quoted on lumpsum basis?	Yes / No
7.6	Whether to & fro air fares, boarding/lodging of the commissioning personnel at Duliajan , Assam(India) included in the quoted charges ?	Yes / No
7.7	Whether confirmed that all Service, Income, Corporate tax etc. applicable under Installation/ Commissioning are included in the prices quoted ?	Yes / No

Offer reference	
Name of the Bidder	

**********End of ANNEXURE -A **********

10.0 PREPARATION FOR SHIPMENT AND PACKING

All items shall be suitably protected against damage during shipment and storage. On completion of inspection and tests, equipment shall be thoroughly cleaned and dried internally and externally and prepared for shipment. The package shall be adequately protected against corrosion and mechanical damage during shipment to plant site and outdoor storage for period up to one year. Contractor shall consider transit route to site and pack accordingly.

If dispatched in pieces, Vendor shall submit the procedure of assembling for Purchaser's information. Vendor shall provide recommended procedures and checklists for commissioning, start-up.

All special tools and calibration tools required for assembly and commissioning shall be in Vendor's scope of supply.

All flanges shall be covered with metal covers, soft rubber gaskets and held by at least four (4) bolts. Other openings shall be taped closed. Threaded connections shall be capped or plugged for thread protection. Any external components, which may be subject to damage during transit and are not easily protected, shall be removed and packaged separately, to the equipment, for shipment with all openings plugged. Extent of loose supplied items to be marked on equipment drawings.

All internal parts of carbon steel shall be sand blasted and then brushed to remove particles. The equipment shall be sealed closed and contain bags of desiccant to prevent rust. Silica gel or other drying agents must, where installed, be clearly labelled and separately listed on a removal checklist. This list is to be attached to the equipment. All insurance spares shall be packaged in suitable storage without opening to prevent insect manifestation.

Exposed shafts and shaft couplings shall be coated with a preservative and wrapped with waterproof moldable cloth, then sealed entirely with waterproofed, cloth-backed duct tape.

Oil lubricated pump bearing housings, equipment cases, stuffing boxes and gearboxes shall be fogged and filled 10 to 50 percent of the internal volume with VSI circulating Oil and then all openings shall be tightly sealed.

Internals of equipment that can be made airtight by use of flanges or plugs shall have openings sealed.

Equipment shall be tagged to indicate the type of internal preservative used. Tags shall be waterproof and tear-resistant and shall be attached with stainless steel wire.

Auxiliary piping connections shall be tagged or marked for identification in the field. Each package shall contain lists of contents; one list inside and one list outside of the package. The package shall have external identification corresponding to the order number. All loose items shipped with the equipment shall be tagged with the order number and item identification. Start up / Commissioning spare parts shall be identified separately. The equipment shall be delivered with one copy of the Installation, operation and maintenance manuals.

11.0 SITE SUPERVISION AND COMMISSIONING REQUIREMENTS

The Vendor shall include the services of competent and experienced field engineer(s) /Supervisor(s) for the erection, installation / modifications, testing and commissioning of the equipment covered by this specification. This shall cover competent engineer(s)/ Supervisor(s) of sub-vendors also.
The package shall be considered fully commissioned only after the supply and acceptance of all related items of the package, documentation including Hazardous Area approval for electronic/ electrical field instruments and control Panel.

Vendor shall provide a separate break-down quote for Start-Up and Commissioning Services and Operator Training as per payment schedule.

11.1 Engineer's / Operator Training

The supplier shall have to provide training to OIL personnel as below during Commissioning Test Run and after successful commissioning:

Vendor shall provide training at site i.e. Duliajan during the period of commissioning run. The vendor shall provide 2 (Two) days classroom training at Duliajan and 5 (five) days hands on training at site to the engineers & operators for each of the gas compressor package.

Training shall cover Safety, basic theory of the equipment, operating procedures, maintenance procedures and control system training as a minimum.

Training Room plus related ancillaries like LCD Projector etc will be provided by OIL at Duliajan. However to & fro charges, accommodation, local conveyance, food etc. for the trainer will be at the vendor's account.

12.0 GUARANTEE

Vendor shall be fully responsible for all equipment supplied by him including bought out items. All the equipment shall be fully guaranteed for a period of twelve months after commissioning and satisfactory site acceptance test by OIL. Vendor shall guarantee all materials against defect, damage or non-conformity / workmanship. If any defect or non-performance occurs during the guarantee period, Vendor shall make all necessary alteration, repair and replacement at no cost to OIL. Vendor shall also provide a performance guarantee for the Compressor packages.

The Vendor shall provide all Certification for the equipment and shall ensure that, dimensional compatibility, shaft system critical speeds, vibration, noise levels and acceptability of pipe loads are within the relevant specification limits.

Vendor shall have the final and total responsibility for the design and performance of all equipment's supplied under this specification.

13.0 DOCUMENTATION

13.1 Documents Required With Bid

Vendor shall provide the following along with the bid:

a) A preliminary production schedule of the complete package including design, engineering, fabrication, factory testing, installation, commissioning, start up and site activities with bar chart showing major milestones and hold points.
b) Comments / Deviations / Exceptions taken by the Vendor with respect to Codes, Standards and Regulations shall be explained with technical justification for evaluation.
c) Functional description.
d) Detailed scope of supply
e) Completed ISO 13631 datasheet.
f) Point Performance Runs for all Guarantee points and all Design Points
g) Major Bought out items details as per Vendor List
h) A machinery train general arrangement drawing for the complete package including weights, space required for maintenance.
i) Completed data sheets for the compressor, Engine, Cooler etc.
j) OEM Compressor Modelling File
k) Compressor Sizing Software with proposed compressor frame /cylinders modelling
l) Completed auxiliary equipment data sheets (Gas engine, heat exchangers etc.)
m) Completed table of compliance (Exception / Deviation)
n) Vendor's P&ID for the complete package including all auxiliaries.
o) Functional description of the compressor package including start up, IPF and emergency shutdown procedures, capacity control, normal operation, etc.
p) Performance curves at different operating parameters and speeds for the proposed compressor with the guaranteed parameters clearly marked.
q) Schedule of material of construction
r) Full details of the proposed bearings and the lubrication oil system.
s) Performance Curves - Sets must include varying speed, when appropriate o Suction vs. Load, and Suction vs. Flow Curves: o Discharge vs. Load, and Discharge vs. Flow Curves
t) Panhandle diagram (Capacity versus suction pressure characteristics).
u) Full details of all the electrical items, electrical block diagrams showing all interfacing and interconnections.
v) Electrical load list including all 24V DC loads.
w) Full description and specification of all piping and instrumentation incorporated with the package.
x) Spares (commissioning, insurance) list
y) Project specific Quality plan.
z) Typical Inspection and test plan
aa) Reference list of compressors of similar capacity and design.
bb) Recommended 2 years operating spares / Insurance spares.
cc) Recommended start-up and Commissioning spare list.
dd) List of proposed major sub-Vendors.
ee) Utility requirement and Consumption (if any).
ff) Infrastructure available for carrying out factory acceptance test and String test.
gg) Vendor assistance, support facilities in India.
hh) Filled out Checklists

13.2 Drawings and Documents

The Vendor drawings shall be reviewed and approved by OIL, against the Purchase Order. The approval by OIL does not signify compliance with the purchase order. It should be noted that review by the OIL is for quality assurance purpose only, assuming that Vendor is technically responsible for all technical aspects of design checking. The Vendor is responsible for checking of compliance with the relevant documents like this specification, applicable codes and OIL standards.
Drawing detailing package envelope including installation and maintenance requirement and interface connections shall be supplied by Vendor.

14 .0 TIME SCHEDULE:

Vendor must complete the entire job within 18 (Eighteen) months from receipt of formal order. The schedule of completion of compressors shall be as under:-

Activity	15^{th} Month	17^{th} Month	18^{th} Month
Installation & commissioning of LP Booster Compressor unit complete in all respect (including 72 hrs. commissioning run	1	1	2
Installation & commissioning of Gas Lift Compressor unit complete in all respect (including 72 hrs. commissioning run)	1	2	3

Activity wise break up of milestone chart showing start of activities & completion of activities from zero date (i.e. date of LOA) & commissioning schedule shall be submitted along with the offer.

15.0 Cost of recommended Spare parts for two years operation shall not be considered for bid evaluation. However, the bidder to furnish detailed list of the spare parts and their price for stock provisioning.

16.0 Supplier to stand guarantee for the availability of all spares at least for 15 years after commissioning of the equipment supplied.

17.0 All electronic/electrical instruments, Junction box used in hazardous area should fulfil the following. The bidder shall confirm the compliance at the time of submission of bid.

a. Item shall be of a type and specification conforming to the relevant standards as specified in the Regulation 107(2) of Oil Mines Regulation-2017 and complying the provisions therein.
b. Bidder should supply documents specifying the type, details of specification, reference of the particular standard, test criteria as per the standards and status of testing, place of testing, copies of test reports from Indian Government Laboratory or NABL accredited laboratory or IECEx accredited laboratory or ATEX notified body which is not a part of manufacture's facilities.
c. In this regard, Bidder may refer OMR-2017, Notification dated 18th October 2017, published in the Gazette of India, under Ministry of Labour and

Employment, Directorate General of Mines Safety, published on 2nd November 2017.

Annexure-AA

Design Data Sheet
Details of the Compressor Packages

Table : A

Item No.	Unit	Qty	Duty of Compressors	Capacity (NM^3/Hr)	Design Pressure (Gauge) (Kg/cm^2)		Design Temp. (Deg C)
					Suction	Discharge	Suction
1.	No.	4	LP Booster Compressor	2700	1.50	25.00	50

2.	No.	6	Gas Lift Compressor	3200	14.00	105.00	50

Note:

The above duty conditions (capacities) are at normal operating speed of 900 rpm (75% of the maximum rated speed recommended by manufacture) and after considering other conditions/factors such as altitude, maximum gas temperature, ambient temperature etc.

The gas pressures (both suction and discharge) for the units are likely to fluctuate by 20% of the figures given in Annexure-AA above and the compressor package shall be designed taking the extreme operating conditions. Bidders are required to furnish Capacity availability and other details like HP requirement of the packages at different combinations.

The requirement against each duty of compressor may be increased/ decreased at the time of order placement.

Annexure-AB

Design Data Sheet (Range)

The gas pressures (both suction and discharge) for the units are likely to fluctuate as shown in the table- B below. Bidders are required to furnish Capacity availability and other details like HP requirement of the packages at different combinations and the compressor package shall be designed taking the extreme operating conditions.

Table:B

Item No.	Unit	Qty	Equipment Description	Cont. Operating Pressure (gauge) (KG / CM^2)					
				Suction Range			Discharge Range		
				MIN	NOR	MAX	MIN	NOR	MAX

1.	No.	4	LP Booster Compressor	1.00	1.50	2.50	14.00	20.00	25.00
2.	No	6	GL Compressor	11.00	14.00	15.00	80.00	90.00	105.00

MIN : Minimum, NOR: Normal operating , MAX: Maximum

(i) The gas pressures (both suction and discharge) for the units are likely to fluctuate as shown in the table above. Bidders are required to furnish Capacity availability and other details like HP requirement of the packages at different combinations including extreme operation conditions of suction and discharge pressures.

Annexure-AC

COMPOSITION OF FUEL GAS & GAS TO BE COMPRESSED

The composition of gas to be compressed in each case is shown in the following schedule (typical composition). The gas may be fully saturated with water vapour in the suction, at the suction pressure and temperature condition and hence while computing compressor BHP, it is to be taken in to account. Fuel gas is tapped from GL gas system.

Component	GL Compressor % Volume (approx)	Low Pressure Booster Compressor % Volume (approx)
Methane	80.0 – 88.0	75.0 – 85.0

Ethane	7.5 – 5.0	9.0 – 6.3
Propane	6.5 – 3.0	8.0-4.5
Butane	3.5 – 2.0	2.4 – 1.2
Pentane +	1.5 – 1.0	2.0 – 1.2
Co_2, N_2 Water Vapor etc.	1.0 – 1.0	2.0 – 1.0

Annexure-AD

Instrumentation & Control Philosophy:

The instrumentation & control of the unit shall be designed to provide automatic safety shutdown devices and annunciation system with fuel cut-off/ grounding of ignition for safe starting and shutdown of the engine and compressor. The control Panel shall be the Master Controller for the complete package including any electronic controller of the gas engine. There should be complete communication amongst all the electronic control function of individual equipment and the main control panel should be able to communicate between them.

2.0 Control Panel:

The control panel shall be designed based on Microprocessor based programmable Logic controller suitable for hazardous environment for failsafe operation ,control and shutdown of

the unit. The fault functions shall be both visually and audibly indicated on the unit's control panel HMI and shall remain 'ON' until manual reset. It will have sequence starting system to ensure that all functions associated with starting operation are performed in correct sequence. The initiation shall be by means of a switch of push type, on the unit control panel. Provision shall also be incorporated for emergency shutdown of the compressor unit. In addition to the indication on the panel, analog indicators for critical parameters (list given in point no. 3.2) are to be provided at one place in the form of a gauge panel. The gauge panel shall be designed to be located adjacent to the control panel.

Note: The successful bidder should supply a ***''well proven control system for Natural Gas Compressor and Engine Control''.*** The bidder shall provide evidence that this particular control system technology are in use worldwide for Natural Gas Compressor Control at least for the last five years from bid closing date.

3.0 Shutdown & Indicating devices:

3.1 The following minimum shutdown devices should be offered for Compressor, Engine & Cooler:

3.1.1 Compressor Shutdown devices:

a) High liquid level in suction scrubbers
b) High liquid level in inter stage scrubbers
c) Low lube oil pressure
d) Compressor Lube Oil No flow
e) Low lube oil level
f) High discharge gas pressure for each stage
g) High discharge gas temperature for each stage
h) Low suction gas pressure
i) High cylinder jacket water temperature
j) High vibration (Crankcase)
k) High temperature of Compressor Bearings.

3.1.2 Engine Shutdown devices:

a) Low lube oil pressure
b) High coolant temperature (outlet from engine)
c) Low lube oil level
d) Engine Cooling system low flow
e) Engine over speed
f) Engine overload(manifold Air Pressure(MAP) sensors)
g) High exhaust temperature
h) Engine high vibration
i) Low coolant tank level
j) High temperature in each cylinder

Note: The vendor shall ensure that there is no conflict of engine shutdown system with compressor control system. The vendor will be responsible for ensuring proper safe operation of the package. The engine control and shutdown system should be packaged in control panel. Vendor's/manufacturer's works are to ensure proper operation, maintenance and safety of the package and to avoid duplicity of instrumentation devices.

3.1.3 Cooler – Shutdown Devices:

a) High vibration (near drive end)

3.2 Analog gauge panel is to be provided to monitor process parameters of compressor and Engine as given below:

Sl No	Parameter	Quantity
1.	1st stage suction Pressure	1 No.
2.	Interstage Pressure	1 No.
3.	2nd stage discharge Pressure	1 No.
4.	Engine oil Pressure	1 No.
5.	Compressor oil Pressure	1 No.
6.	Crank air Pressure	1 No.
7.	Engine oil Temperature	1 No.
8.	Compressor oil Temperature	1 No.
9.	Engine Exhaust Temperature	1 No.

3.3 The analog gauge board to be placed on the side of the skid nearer to the control panel.

4.0 Programmable Controller:

4.1 Each unit (Engine and Compressor) shall have a sequence starting system to ensure that all functions associated with the starting operation are performed in the correct failsafe sequence. Initiation shall be by means of a switch on the unit control panel.

4.2 The control panel shall include a programmable controller with the following features to cater the operational need of the compressor.

a) Expandable digital & analog inputs/outputs.
b) Program memory held in EPROM.
c) Communication port for connection to PC or laptop computer.
d) Provision for RS-232/RS485 and Ethernet connectivity (IP enabled) for remote monitoring and configuration purpose.
e) Battery operated program loader/Laptop computer(IS) (Four Nos. for the entire lot)
f) Designed to work in engine and compressor environment
g) Arrangement for retaining memory in case of power failure
h) The controller should have capability to calculate flow as per latest AGA standard.
i) The controller should be capable of controlling PID Loops.
j) Redundant 24 V DC Power supply.

4.3 The control panel shall have an entry for easy access and shall be suitable for use in hazardous area. The panel shall employ the sequence start system and alarm/monitoring functions together with the start switch and shutdown button. Provision shall also be incorporated for remote emergency shutdown of the compressor unit.

4.4 An UPS (Uninterrupted Power Supply) of minimum 2 (Hour) hour battery back-up is to be provided for each gas compressor-engine control panel. The said UPS with battery should be of portable type & should be placed in an FLP/ Explosion proof enclosure

beside the control panel. The UPS should handle unwanted extra high voltage surge for about few seconds & have protection facility to cut-off power to the panel.

4.5 The control panel is to be placed on a separate skid on the same level of the compressor-engine skid. The Control Panel skid and the main skid will be connected to each other through rubber gasketed bolting. The supplier shall provide drawing /sketch showing position of the control panel for O.I.L's approval. Mounting of the control panel shall be designed using anti-vibration pads so that no vibration is transferred to the panel.

5.0 STATUTORY APPROVAL REQUIREMENT:

All electronic/electrical instruments and equipment, including control panel & JB use in hazardous area should fulfill the following:

5.1 Item shall be of a type and specification confirming to the relevant standards as specified in the Regulation 107(2) of **Oil Mines Regulation-2017** and complying the provisions therein.

5.2 Bidder should supply documents specifying the type, details of specification, reference of the particular standard, test criteria as per the standards and status of testing, place of testing, copies of test reports from Indian Government Laboratory or NABL accredited laboratory or IECEx accredited laboratory or ATEX notified body which is not a part of manufacture's facilities.

5.3 In this regard, Bidder may refer OMR-2017, Notification dated 18th October 2017, published in the Gazette of India, under Ministry of Labour and Employment, Directorate General of Mines Safety, published on 2nd November 2017.

Note: Bidders must categorically confirm in their bids that they would submit the above approvals along with the goods, failing which the offer will be summarily rejected. This is required as per Oil India's regulatory standards and specifications for Oil & Gas field services.

6.0 Additional Points:

6.1 All sensors for the various parameters should be designed to be compatible with the I/O card of the programmable controller to have their exact value of the parameters in the control system.

- Pneumatic instruments shall operate on air supply of 20 PSI and shall have transmission and output signal of 3 to 15 PSI.
- Electronic field instruments shall operate on 24 volts DC.
- All receivers shall be suitable for current input of 4-20mA DC OR voltage input of 1 to 5 V DC or its suitable multiple.
- All electronic instruments shall be immune to Radio frequency interference.
- The field transmitters shall be electronic type.
- All temperature gauges and pressure gauges shall be SS cage.
- For remote temperature indication / recording / control etc., preferably 3 wire RTD or thermocouple shall be used depending on the requirement.
- Separate junction Boxes shall be provided for different type of signals like analog signals, alarm, shut down, thermocouples etc., for interfacing Field Instruments, local control panels wherever applicable.
- All instruments & junction boxes etc., shall be supplied with S.S. Tag plates with cable tie.

- Instrument power circuits especially all digital inputs and outputs shall be individually protected from fault with the help of fuses. Power supply to the individual instrument shall be disconnectable from switch and protected with the help of fuse.
- The complete instrument system shall be designed for fail safe operation, by using normally closed contacts, which shall open on fault conditions.
- Indicating fuses shall be used in the power distribution to all instrumentation in accordance with the instrument manufacturer's recommendations and good practice.
- There shall be overall 20 % spare capacity available for any future addition of I/O against installed capacity. Vendor must design the field panels in such a manner that – there shall be spare space available in the installed chassis/rack to enable OIL to enhance the capacity at-least by another 20% through installation of additional modules / hardware. Panel shall be supplied with complete internal wiring of 20% spare for future use.

6.2 Engine RPM shall be preferably measured using a proximity sensor. Engine speed indicator with Frequency to current Converter (F/I) for Programmable Controller input and auto-manual selection switch with both auto-manual speed control in the panel to be provided. Engine RPM/speed display should be available in the Control panel.

6.3 All equipment supplied shall be from reputed manufacturers and field proven, both with respect to design and materials. Uniformity in selection should be maintained for makes of similar Instrument and their accessories for operational convenience ease of maintenance and spare parts inventory point of view. If there is any conflict in respect of related standards, code etc., bidder shall refer the matter to OIL for clarification and only after obtaining the same they should proceed further.

6.4 Pre-Alarm System: The panel will have an additional feature to indicate a audio-visual alarm in the panel in the event of certain parameters deviating from its operating value. The setting of such pre alarm will be slightly below or above the setting value of shutdown alarm such that initiation of these pre alarms will not bring about the shutdown of the unit. Audible alarm shall be loud enough (Min. 80 dB) to draw attention of the shift operator.

6.5 Automatic trip circuits shall meet the following requirements:

- All trips shall have a pre-warning alarm and an alarm to indicate the trip condition especially in cases where operator can intervene to avoid tripping of machine.
- For any start up purpose, automatic trip bypass facilities shall be provided with separate indication that the corresponding trip signal has been by passed.
- All the solenoids and relays shall be energized in normal state of process operation.
- There shall be provision for generating software alarms – both "Low" and "High" type against each of the analog inputs apart from alarms generated due to any hardware device in field. These alarms shall be user configurable for setting as well as for Logging applications.

6.6 The control system shall be designed in such a way that failure of any portion of the system shall bring the machine to a fail-safe shutdown state

6.7 The control Panel should have online monitoring of rod load for each cylinder through in built programming.

6.8 Capacity control of the compressor shall be incorporated in the Programmable controller. The control loop shall be complete with pneumatic control valve with positioner and I/P converter.

Capacity control philosophy for Low Pressure Booster:

i) The Low Pressure Booster Compressor should be able to maintain the required suction pressure by taking gas from the discharge line through the control valve. The control valve shall be Normally Closed type.

ii) The Gas Lift Compressor discharge pressure shall be maintained by the control valve below the maximum discharge pressure and the gas shall be by passed to the suction side. The control valve shall be Normally Closed type.

6.9 Flow Measurements to be incorporated in the control system:

a) The engine shall be provided with on-line flow meter for fuel gas volume. This flow measurement should be conforming to latest AGA standard. On-line Flow Meter to be hooked up with the Programmable Controller and Totalizer indication should be available in the Control Panel Display.

b) The Gas Compressor Package shall be provided with on-line flow meter for gas volume at discharge. The flow meter shall be installed taking into consideration of straight piping required. If required flow strainer may be designed for the same. This flow measurement should be conforming to latest AGA standard. On-line Flow Meter to be hooked up with the Programmable Controller and Totalizer indication should be available in the Control Panel Display.

6.10 **Panel Wiring:**

a) Open terminals shall generally be avoided. Terminal strips shall be mounted inside the enclosure.

b) 1sq. mm multi stranded PVC insulated copper conductor (LAP CABLE) shall be used in general with printed ferruling (ferruling is to be done is cross way like DEST/SOURCE).

6.11 Wire carrying measurement signals associated with pressure transmitters, RTD/TC and other low level signals shall be routed in separate wire trays and not along-with power cables (colour identification of signal cables may also be followed up as far as possible).

6.12The complete installation & Commissioning of the control system shall be in the scope of supplier.

6.13All wires required for Panel internal wiring shall be of minimum 1.0 mm2, standard copper conductor, with 600 volt rated PVC insulation shall be tagged at both ends with full ring type label. Tagging shall correspond to that used on control panel schematic drawing.

6.14 A system of flame retarding type plastic wire ducts shall be provided for routing wiring. All wiring run outside of ducts shall be in bundles, neatly routed in a vertical or horizontal plane only, and secured with plastic wire ties or cable lacing. Power circuits, instrument signal circuits and alarm circuits shall be segregated in separate wire ways. At least 20% additional space for future wiring shall be provided in wire ways. The panel shall be designed for field wiring entry from the bottom exclusively.

6.15 Instrument piping & tubing as per P&ID:

- Panel tubing from manifold or the bulk head to the panel instruments shall be of SS tubing.
- The tubing shall be laid in metal slotted ducts.
- All the fittings shall be SS316 and double compression fittings and the tubing shall be fully annealed seamless type.
- All the field devices shall be mounted on stanchions at locations near to the process tap off point. Bidder / vendor has to provide new impulse tube connection made of ½“ or ¼ “ SS-316 stainless steel tubes. All these impulse tubing network shall be leak tested and hydro-tested during pre-commissioning checks.

6.16 Earthing Requirement:

a) Each cabinet, console and other equipment supplied, as a part ofthe control system, shall be provided with an earthing lug. All these lugs shall be properly secured to the AC mains earthing bus.

b) All circuit grounds, shields and drain wires of control cables shall be connected to the system ground bus which shall be electrically isolated from AC mains earthing bus. This bus shall be typically of 25 mm wide and 6 mm thick of copper.

c) A minimum 1" x ¼" copper ground bus bar, isolated from the panel structure shall run the entire length of the Panel near floor level in Control Panel, compression type terminals suitable for 4/0 AWG copper ground cable shall be provided at each end of the bar for connection to the main ground. All signal circuits shall be grounded as per the instrument manufacturer's recommendations and good practices. All circuits must be grounded at one point only. All shields shall be grounded at the same point as the signal circuit. Where multiple grounds in a loop are unavoidable, signal isolators shall be provided to prevent potential ground loops. Ground wiring shall be directly connected to the ground bus bar by means of suitable wire lugs, no intermediate terminals are allowed.

d) All instrument cases and housing capable of carrying current shall be grounded to the panel structure. The panel structure will in turn be grounded to the ground bus bar for eventual connection to main ground. Compression type terminals suitable to the ground for 4/0 AWG copper ground cable shall be provided in each Desk section for the purpose.

7.0 Documentation & Approvals:

7.1 During detailed engineering & design stage, the approvals of the following are to be obtained from O.I.L. Minimum 3 (three) sets of hard copy and soft copy for each of the following documents are required.

a) P& I Diagram
b) General Layout diagram
c) All drawings and instrument datasheets
d) Panel Details & Panel wiring diagram
e) Loop Diagram & Loop details
f) Programmable Controller Hardware & Software
g) Programming Terminal(Laptop) specification
h) Logic details of start-up, sequence, interlock, safety shutdown, alarm, control & monitoring.
i) Programs development for start-up, sequence, interlock, safety shutdown, alarm, control & monitoring.
j) Emergency & Shutdown logic.
k) All field & Panel Instruments.
l) Tag data base for the entire unit

Note: The supplier must submit drawing/data sheets etc within 01(One) month from the date of placement of order on them, for OIL's scrutiny and approval.

7.2 Three sets of all electrical drawings are to be supplied in A3 size, laminated along with supply. Three sets of operation and maintenance manuals of field instruments are to be supplied for every compressor along with goods.

7.3 A permanent block/flow diagram of the operating process and list of start-up and shutdown procedure is to be riveted in a suitable place on the control panel.

7.4 Detailed technical specifications, approved vendors list and check List for Control and Instrumentation system as per Annexure-F, G & H respectively.

Annexure-AE

1.0 **Specification of Control Panel**:

a)	Type	: Enclosed self-supporting, lockable type
b)	Material	: Heavy gauge CRCA sheet stainless steel, reinforced to provide self standing and rigid assembly
c)	Enclosure class	: IP-54 or better
d)	Certification	: For use in Gas groups IIA,IIB and Zone 2 hazardous areas of Oil Mines in India.(Test certificates complying OMR-2017)
e)	Ambient Temperature	: Maximum 50 deg C

f)	Cable connection	: Double compression FLP Cable gland
g)	Cable entry	: Bottom
h)	Terminal type	: 1.5 mm^2 spring loaded (Double-decker terminals are not acceptable)
i)	I/O Card mounting rack	: As per manufacturer's standard
j)	Input connections	: All analog & digital inputs are to be routed through suitable I.S. barriers
k)	Wiring Insulation grade	: 1100 V or above
l)	Spare Terminals	: 20% after complete wiring
m)	Panel Illumination	: Internal lighting shall be installed in the control panel using fluorescent lighting fixtures to provide adequate lighting for maintenance of equipment. The location of lighting fixture must not interfere with doors or other equipment which must be accessible and space shall be maintained for bulb replacement.
n)	Audio-Visual Alarm	: Suitable audio-visual alarm system should be provided in the control panel.
o)	DC Power supply	: Panel shall accompanied with 230 VAC to 24VDC redundant power supply.
p)	UPS with battery	: min. 4 (Four) hour backup)

2.0 **<u>Microprocessor based Programmable Controller</u>**:

The specification given below is the minimum requirement but not restricted to the following:

Model : Latest model of Programmable Logic Controller

Hardware & Software:

a) Processor: Processor should be capable of handling all the parameters and all control loops, indications, annunciations etc. It should have sufficient memory capacity with minimum of 20% extra memory as spare. Also its memory should have the facility for future up-gradation.

b) Rack: As per MFR's standard.

c) I/O Card : Should have following Input-Output cards
   i. Analog Input
   ii. Analog Output
   iii. Digital Input
   iv. Digital Output
   v. Power supply card

d) Incoming Power supply at site: 230 V AC +/- 10%, 50 Hz, single phase

e) Software: Latest Windows based application software for developing logic diagram etc & Graphics building on Windows operating system

f) Communication Port: RS-232/RS485 and Ethernet connectivity (IP enabled) for remote monitoring and configuration purpose.

3.0 **<u>Programmable Controller Inputs/Outputs (Tentative):</u>**

Bidders shall be required to consider minimum Input and output as mentioned as under for configuration of the Controller and hardware to be provided to meet control requirements. In case, any extra input or output devices are felt necessary to be included and configured within the system, the same shall be indicated during detailed engineering. Even during system pre-commissioning or testing if OIL feels necessary to have trending or real time data logging or monitoring of some other additional process data in the operating system, bidder shall be ready

to carry out requisite engineering and configure the same within the system without any extra cost to OIL so long as no additional hardware is necessary for the controller or field devices.

Analog Inputs:

SL No	Parameters	Quantity
1	Engine Fuel Gas Inlet Pressure	**1 No.**
2	1st Stage Suction Pressure	**1 No.**
3	1st Stage Discharge Pressure	**1 No.**
4	2ndStage Suction Pressure	**1 No.**
5	2ndStage Discharge Pressure	**1 No.**
6	Compressor Oil Pressure	**1 No.**
7	Engine Oil Pressure	**1 No.**
8	Instrument Air Pressure	**1 No.**
9	Cranking Air Pressure	**1 No.**
10	Differential Pressure Compressor Oil Filter	**1 No.**
11	Differential pressure engine oil filter	**1 No.**
12	Engine intake manifold pressure right bank	**1 No.**
13	Engine intake manifold pressure left bank	**1 No.**
14	Flow-engine fuel gas	**1 No.**
15	Compressor vibration(frame& throws)	**As per requirement**
16	Engine vibration	**As per requirement**
17	Cooler vibration	**As per requirement**
18	Flow-Compressor Discharge	**As per requirement**

THERMOCOUPLE INPUT(TYPE-K)

SL No.	Parameter	Quantity
1	ENGINE FUEL GAS INLET TEMPERATURE	**1 No.**
2	1ST STAGE SUCTION TEMPERATURE	**1 No.**
3	1ST STAGE DISCHARGE TEMPERATURE	**1 No.**

4	2^{ND} STAGE SUCTION TEMPERATURE	**1 No.**
5	COMPRESSOR OIL TEMPERATURE	**1 No.**
6	ENGINE OIL TEMPERATURE	**1 No.**
7	COMPRESSOR/AUXILLARY JACKET WATER TEMPERATURE	**1 No.**
8	ENGINE JACKET WATER TEMPERATURE	**1 No.**
9	ENGINE INTAKE MANIFOLD RIGHT BANK TEMPERATURE	**1 No.**
10	ENGINE INTAKE MANIFOLD LEFT BANK TEMPERATURE	**1 No.**
11	EXH. TEMPERATURE (for all cylinders)	**As per number of cylinders**
12	EXCESSIVE EXH. TEMPERATURE RIGHT BANK	**1 No.**
13	EXCESSIVE EXH. TEMPERATURE LEFT BANK	**1 No.**

ANALOG OUTPUTS:

SL No	**Parameters**	**Quantity**
1	RECYCLE CONTROL (I/P)	**1 No.**
2	SPEED CONTROL (I/P)	**1 No.**

DIGITAL INPUT:

SL No.	**Parameters**	**Quantity**
1	EMERGENCY STOP	**1 No.**
2	1^{ST} STAGE SUCTION SCRUBBER LIQUID LEVEL HH	**1 No.**
3	2^{ND} STAGE SUCTION SCRUBBER LIQUID LEVEL HH	**1 No.**
4	COMPRESSOR LUBE OIL NO FLOW	**1 No.**
5	COMPRESSOR LUBE OIL LEVEL LL	**1 No.**
6	ENGINE LUBE OIL LEVEL LL	**1 No.**
7	COMPRESSOR/AUXILLARY JACKET WATER LEVEL LL	**1 No.**
8	ENGINE JACKET WATER LEVEL LL	**1 No.**
9	FLOW SWITCH ENGINE COOLING WATER NO FLOW	**1 No.**

10	IGNITION FAULT SIGNAL	**1 No.**

DIGITAL OUTPUT:

SL No.	Parameters	Quantity
1	COMPRESSOR PRELUBE	**1 No.**
2	ENGINE PRELUBE	**1 No.**
3	CRANK	**1 No.**
4	IGNITION	**1 No.**
5	FUEL	**1 No.**
6	ALARM LIGHT	**1 No.**
7	FAULT LIGHT	**1 No.**
8	ALARM HORN	**1 No.**
9	UNIT RUN STATUS RELAY	**1 No.**
10	1ST STAGE SUCTION SCRUBBER LEVEL DUMP	**1 No.**
11	2ND STAGE SUCTION SCRUBBER LEVEL DUMP	**1 No.**

FREQUENCY INPUT:

SL No.	Parameter	Quantity
1	**ENGINE RPM**	**1 No.**

4.0 Specification for Laptop Computer for PLC configuration/ Programming:

4 (Four) nos. laptop Computer with the following specification shall be supplied by the vendor.

a) Operating System: Windows® 10(64 bit) and preloaded with necessary software drivers for seamless performance of the laptop, (Licensed software CD's are to be provided)
b) Software along with License for Control Panel Programming, Gas engine ignition system Programming, Compressor Lubrication system Programming along with required Cables for ports
c) Minimum configurations:
   - Processor : Latest Intel® Core i7 processor
   - Memory: Minimum 8GB 2.133GHz DDR4 SSD RAM
   - Data Storage: SATA HD 1TB
   - Display: Min 13 inch with FHD Direct view
   - Connectivity: 10/100/1000 gigabit Ethernet and triple RF# pass through (GPS, Mobile Broadband and WLAN)
   - Wireless LAN: Intel® Dual Band Wireless #AC 7260 (802.11ac, dual band,2x2,upto 867 Mbps) with Bluetooth®4.0
   - Power: 65W or 90W AC adapters for 230VAC supply at 50 Hz frequency adapter
   - Battery: mAh to be strong enough to provide backup of at least 4 hours.

- Ports: All necessary ports and cables for communicating with the system components (Controller, HMI etc.)
- Safety feature:
  a)To be usable in Hazardous Location: ANSI/ISA 12.12.01 certified (Class 1 Div.2, Group A,B,C,D)
  b) Electromagnetic Interference: MIL-STD-461F/810G certified
  c) Ingress Protection: IP65 certified
  d) Operating Thermal Range: -29 degC to 60degC
  e) Non-operating thermal range: -51degC to 71degC
  f) Humidity: 95% RH
- Accessories: Laptop carry case
- Minimum 3 years warranty certificate for the laptop

d) The specification mentioned above is minimum for the Laptop. Supplier should include all features & accessories as necessary for programming and configuration application.

e) Amongst others, laptop should be virus protected with latest antivirus software; licensed Antivirus CD is to be supplied separately.

f) Application Software: Preloaded with Programmable Controller software, Flow Meter configuration software (Licensed software CD's are to be provided), Gas Engine Control Panel Software, Gas Engine Ignition System Software, Gas compressor cylinder Lubrication software, Gas compressor OEM's Compressor Sizing software with license, (Licensed software CD's are to be provided), Any specified Cable/ Connectors required for interface with laptop is to be provided.

Annexure-AF

Commissioning Spares

Minimum spares as perceived by OIL are shown as Annexure – AFF (Alongwith Price Bid Format) should be included in the offer. However, if bidder feels necessary of any more spares or increase in quantity or items, they should include the same for successful commissioning of the units. Rates quoted for commissioning spares shall be considered for evaluation of offers.

Annexure-AG

VENDORS LIST

Sr No	Item / equipment	Name of Vendor
a)	Gas Engine	Caterpillar INNIO Waukesha
b)	Aerial Cooler	Harsco Air-X-Limited, USA/UK AXH air-coolers, Tulsa, Oklahoma,USA Air Cooled Exchangers, Tulsa,USA Alfa Laval Chart Industries
c)	Coupling	Rexnord CMR type
d)	Divider Block Lubrication	CPI,Stafford, Texas, USA CC technology , Midland, Texas, USA Lincoln
e)	Control Panel	Altronic, LLC,Girard, Ohio, USA FWMurphy, UK AMOT Controls, UK
f)	Pressure/Temperature gauges	ODIN WIKA Murphy McDaniel
g)	Pressure/Temperature Switches	Switzer Danfoss Indfoss
h)	Level Switches	Norriseal Murphy Fisher Rosemount Invalco Magnetrol Kimray
i)	Level gauges	Levcon Chemtrols Norriseal
j)	RTD/Thermocouple	Nagman GIC ALTOP Waaree
k)	Solenoid Valve	ASCO Rotex
l)	Control valves & Valve Positioners	Emerson MIL Samson
m)	Junction Box & cable Gland	Baliga, Chennai Flexpro Sterling
n)	I.S. Zener Barrier	MTL P&F Electronics
o)	Vibration Sensors	FW Murphy AMOT Controls

Sr No	Item / equipment	Name of Vendor
		Metrix (USA)
p)	Flow Meters	Emerson Rockwin Cameron
q)	Pressure regulators	Emerson ShavoNorgren ABB Fisher Kimray
r)	PLC	Altronics Murphy Amot Allen Bradley Siemens
s)	Pressure/DP Transmitter/Temp. Transmitter	Emerson ABB Honeywell Yokogawa Altronic Controls
t)	I/P Converter	Fisher ABB Honeywell Yokogawa
u)	SS Tubing	Sandvik, Sweden
v)	SS Tubing fittings	Swagelok , Parker
w)	Anti Vibration Pad	Bilz Vibration Technology AG, Germany
x)	Accoustic Pulsation Study Static & Dynamic Skid Design MNF Study	Wood group, Beta machinery Services SVT SWRI

Note:
The vendor list is for reference purpose. The supplier/ packager to mention the make, model of item alongwith the Technical bid. After placement of Purchase order, vendor shall take approval against each item with detailed datasheet.

Annexure-AH

Format of Authorization & Backup Warranty
(To be typed on the letter head of the Manufacturers)

Ref. No Date

Sub: Authorization & Backup Warranty

Ref: Your tender No. Dated

To,

The HOD-Materials
Materials Deptt,
OIL, Duliajan

Sir,

We, M/s……. (Name & address of the Manufacturer) hereby authorize M/s……..... (Name & address of the Bidder) to submit their Bid against Tender No……... floated by OIL INDIA LIMITED (OIL) for supply tendered goods, which will be manufactured by us. As we do not participate directly against such tendering process, we authorize M/s. ……. (name of the Bidder) to participate as our only Sole Selling Agent/Dealer/Distributer/Supply House (strike out whichever is not applicable) against the tender.

We hereby guarantee the supply through M/s……..... (name of the Bidder) in the event of placement of purchase order by OIL and shall provide all back-up supports as may be necessary including for the quality & workmanship of supplied materials.

This authorization and back-up warrantee/guaranty shall remain valid throughout the execution by M/s. ……..…… (Name of the Bidder) including the defect liability period, in the event of an order by OIL on them.

Yours faithfully,
For (Name of the manufacture)

Name & Signature of Authorized signatory: Designation :
Phone No. Place : Date :
Seal of the Manufacturer:

Annexure-AI & AJ

The QAP and Vendors format as attached have to be submitted by the bidders.

Annexure-AK

Technical Check List

Packaged Compressor Information Sheet

Sl. No.	Description	Vendor's Comments
A	Frame/ Model	
1	Maximum BHP per throw and number of throws	
2	Rated Maximum speed (rpm)	
3	Maximum gas rod-load (mode of Calculation)	
B	Max. Inertia load	
1	Max. (Gas + Inertia) load	
2	Piston speed	
3	Main journal bearing size (dia x length)	
4	Crank pin journal bearing size (dia x length)	
5	Con rod bushing (X-head end) size (dia x length)	
6	Cross-head type	
7	Cross head size (dia)	
8	Cross-head pin size (dia x length)	
9	Cross head pin bushing size (dia x length)	
10	Cross head shoe size (width x length)	
11	Piston-rod dia	
12	Con rod bolt dia	
13	Type of threads on piston-rod on (Requirement is for rolled-threads)	
14	Type of threads on con-rod bolts	
15	Frame lubrication pump capacity	
16	Crank-case oil sump capacity	
17	Difference in reciprocating weights on opposite crank	
18	Type of Valve offered	
19	Material of construction of the following:	
a	Crank-shaft	
b	Con-rod	
c	Piston rod	
d	Con-rod bolts	
e	Cross-head	
f	Cross-head pin	
g	Main bearing	
h	Crank-pin bearing	
i	Thrust bearing	
j	Pistons	
k	Piston rings	
l	Packing rings	
m	Oil Scrapper rings	
n	Valves plates/springs	
B	General Information (Compressor)	
1	Whether the design of LP Booster has taken into consideration the expected fluctuations of suction/discharge pressure.	

Sl. No.	Description	Vendor's Comments
2	Whether the cylinders are linered	
3	Whether the compressors are provided with explosion relief devices	
4	Whether ½" indicator taps are provided at the end, of the cylinders	
5	Whether reinforced conical type suction start-up screens are provided	
6	Make and type of coupling	
7	Whether pre/post lube oil pumps (for gas engine driven units) are driven by pneumatic motors and both the systems are automatic and controlled by Control Panel	
8	The type of suction scrubber provided .Whether the mist extractor provided with the suction/inter stages scrubbers is adequate to remover 99% of all droplets of 10 microns or larger. Is there any arrangement in the suction scrubbers to handle light slugging	
9	Grades of lube oil for compressor and its Indian equivalent	
10	Make of the forced-feed lubrication system, Divider Block	
11	Type of rod packing cooling	
12	Power required driving auxiliaries (cooler and compressor auxiliary water pumps).	
13	Whether safety valve is provided after each stage of compression and at first stage suction.	
14	Whether compressor valves are of plate-type or ring type	
15	Whether compressor valves are non-metallic	
16	Whether air bleed valve is provided at both stage cylinders. (In case of water cooled compressors)	
17	Whether the bidder has quoted with concrete filled skid along with details and credentials thereof	
18	Whether after cooler by-pass valve/ system has been provided for Gas Lift compressors	
19	Whether approx. dimensions and weight of each skidded units are included.	
20	Whether commissioning spares and other consumable spares provided	
C	PRIME MOVER (ENGINE):	
1	Whether continuous ratings (HP) of the engine indicated are after appropriate deductions for altitude, temperature and fuel-gas composition mentioned in specifications	
2	Whether pyrometer is provided to indicate individual cylinder temperature of the engine.	
3	What is the continuous rating (HP) of the engine at operating speed at site condition?	
4	Whether bhp developed by the prime mover at design speed meets the 20% margin required over (total BHP required to drive compressor when fully loaded + total BHP required to drive the auxiliaries).	
5	Whether engine crank-case is provided with explosion proof devices	
6	Starting air pressure requirement	

Sl. No.	Description	Vendor's Comments
7	Whether the fuel filter is provided with pressure gauges, drain block valve and piping to the edge of skid.	
8	Details of the fuel filter provided	
9	Whether engine governor is Wood-ward hydraulic type/Electronic Type	
10	Whether the air cleaner is dry-type with pre-filter.	
11	Whether the silencer is hospital type with spark & flame arrestor	
12	Whether suitable provision has been made to check the performance of individual spark plug by spark detector without opening the spark plug or the cable.	
D	COOLER	
1	Whether the engine jacket water cooler has been designed for 20% excess reserve cooling capacity over maximum possible lHP of the engine (i.e. HP developed at maximum rated speed of the engine).	
2	Whether the auxiliary cooler section for gas and compressor jacket water has been designed for an excess 15% & 20% capacity respectively over the design requirement.	
3	Whether the heat transfer calculation have been provided with respect to adequacy of the engine jacket water cooler.	
E.	Mesh size of the bug-screen and hail Guard	
1	Inter-stage and after cooler gas temperature.	
2	Whether the cooling water circuits for the engine and compressors are separate with separate cooling sections in the cooler	
3	Whether cooler fin guard (folding type) provided on top of cooler section.	
4	Whether air bleed valve is provided for water section(s) at the topmost position.	
5	Coolant Capacity	
6	Coolant Make, Specification	
F	GENERAL	
1	Whether the string test will be carried out as per the specifications	
2	What is the maximum expected noise level in decibels of the packaged unit from a distance of 1m from the unit	
3	Whether spare parts list for 2 years operations indicating price of the individual item is provided.	
4	It is to be confirmed that spares for the engines, compressors and other accessories shall be available at least for a period of 15 years after the date of commissioning of the units at site as mentioned in OIL's specifications	
5	Whether the delivery schedule is as per the specifications	

Annexure AL

TECHNICAL CHECK LIST FOR INSTRUMENTATION & CONTROL SYSTEM

A. Programmable Control Panel:

Sl. No.	Description	Remarks	
		YES	NO
1	Latest Model of Programmable Controller is provided		
2	Certification of the control panel for use in Gas Groups IIA,IIB and Zone 2 Hazardous areas of Oil Mines in India is provided(test certificates complying OMR-2017)		
3	Communication for remote monitoring provided		
4	Audio-Visual Alarm facility with safety shutdown devices provided		
5	The suitable position of the panel is provided as per the layout diagram		
6	Suitable engine speed indicator and auto-manual selection with both auto-manual speed control is provided		
7	All panel parameters are displayed through HMI in Control panel		
8	Redundant DC Power supply unit Provided		
9	Isolators are provided for all inputs		
10	Starting sequence, Interlock, Start-up & Safety shutdown is executed using Programmable Controller		
11	Confirm to supply control 3 sets of panel engineering details, technical documents of control panel instrumentation system along with the material		
12	Scrubber level control is achieved using control valve and level control action from Programmable Controller		
13	Compressor capacity control is provided		
14	UPS(Uninterrupted Power Supply) back up is of Four hours duration		
15	Provision for interface to OIL's SCADA system is available in the panel		
16	Gauge panel is placed as per the layout diagram		

Field Instruments

Sl. No.	Description	Remarks	
		YES	NO
1	All field instruments i.e. transmitters, switches, solenoid valves, I/P & P/I converters etc. test certificates as per OMR-2017		
2	All field instruments are compatible to 24 V DC power supply		
3	Technical literature/catalogue for all field instruments provided		

4	Field Instruments considered as per Commissioning Spares		

Annexure AM

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" OR INDICATE TO THE FOLLOWING QUESTIONS, IN THE RIGHT HAND COLUMN.

Sl No.	REQUIREMENT	COMPLIANCE
1.0	Whether bid submitted under Single Stage Two Bid System?	Yes / No
2.0	Whether quoted as OEM / Authorized Packager of OEM ?	
2.1	**Whether all documents have been submitted as required for fulfilling Experience criteria clause of BRC-Technical.**	Yes / No
2.2	**Name and details of the E&P company, or Service Provider to an E&P Company or Natural Gas Transportation Company to whom the bidder has successfully executed orders / contracts as per Experience criteria clause of BRC-Technical.**	Yes / No
2.3	**Whether submitted the profile and other documents of the E&P company, or Service Provider to an E&P Company or Natural Gas Transportation Company for verification (viz. Annual reports, Memorandum of Association, Article of Association etc.)**	Yes / No
2.4	**Whether technical Bid Evaluation & Bid Rejection Criteria (BEC/BRC) documents have been submitted after verification and certification by Independent Third-Party Inspection Agencies as per ANNEXURE – C.**	Yes / No
2.5	**Whether Undertaking of Local content percentage and other documents has been submitted as per APPENDIX-A3 "PURCHASE PREFERENCE POLICY LINKED WITH LOCAL CONTENT (PP-LC)".**	Yes / No
2.6	Whether Integrity Pact with digital signature uploaded and all	Yes / No

	clauses have been accepted as per the format?	
3.0	Whether "Bid Securing Declaration" submitted ?	Yes / No
3.1	Whether offered firm prices?	Yes / No
3.2	Whether quoted offer validity of 120 days from the date of closing of tender?	Yes / No
3.3	Whether quoted a firm delivery period?	Yes / No
3.4	Whether agreed to the tender Warranty clause?	Yes / No
3.5	Whether confirmed acceptance of tender Payment Terms ?	Yes / No
3.6	Whether confirmed to submit PBG as asked for in tender?	Yes / No
3.61	Whether agreed to submit PBG within 30 days of placement of order?	Yes / No
3.70	Whether Prices submitted as per Price format ?	Yes / No
3.71	Whether confirmed that all spares will be supplied for a minimum period of 15 years after supply ?	Yes / No
3.72	Whether cost of two years recommended / Operating Spares quoted?	Yes / No
3.8	Whether quoted as per tender (without any deviations)?	Yes / No
3.81	Whether quoted any deviation?	Yes / No
3.82	Whether deviation separately highlighted?	Yes / No
3.9	Whether indicated the country of origin for the items quoted?	Yes / No
3.91	Whether technical literature / catalogue enclosed?	Yes / No
4.0	Whether weight & volume of items offered indicated?	Yes / No
5.0	For Indian Bidders – Whether indicated the place from where the goods will be dispatched. To specify :	Yes / No
5.1	For Indian Bidders – Whether road transportation charges up to Duliajan quoted?	Yes / No
5.2	For Indian Bidders only - Whether offered Ex-works price including packing/forwarding charges?	Yes / No
5.3	For Indian Bidders only - Whether indicated Local content in the offer?	Yes / No
5.4	For Indian Bidders only – Whether all applicable Taxes &	Yes / No

	Duties have been quoted?	
6.0	Whether all BRC/BEC clauses accepted ?	Yes / No
7.0	Whether confirmed to offer the equipment for Pre-despatch/shipment Inspection & testing?	Yes / No
7.1	Whether Pre-despatch/shipment inspection & testing charges applicable?	Yes / No
7.2	If Pre-despatch/shipment inspection & testing charges applicable, whether quoted separately on lumpsum basis?	Yes / No
7.3.	Whether confirmed to carry out Installation & Commissioning of the equipment at Duliajan (Assam) ?	Yes / No
7.4	Whether Installation & Commissioning charge applicable?	Yes / No
7.5	If Installation/ Commissioning and Training charges applicable, whether separately quoted on lumpsum basis?	Yes / No
7.6	Whether to & fro air fares, boarding/lodging of the commissioning personnel at Duliajan , Assam(India) included in the quoted charges ?	Yes / No
7.7	Whether confirmed that all Service, Income, Corporate tax etc. applicable under Installation/ Commissioning are included in the prices quoted ?	Yes / No

Offer reference	
Name of the Bidder	

**********End of ANNEXURE -A **********

Annexure-BB

BID REJECTION CRITERIA (BRC) / BID EVALUTION CRITERIA (BEC)

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

The bids shall conform to the specifications and terms & conditions given in the Tender. Bids shall be rejected in case the items offered do not conform to the required parameters stipulated in the technical specifications and to the relevant international/national standards wherever stipulated. Notwithstanding the general conformity of the bids to the stipulated specifications and terms & conditions, the following requirements must be particularly met by the bidders, without which the offer shall be considered as non-responsive and rejected:

BID REJECTION CRITERIA (BRC):

BRC- TECHNICAL:

A 1.0 The Compressor Unit shall conform to API 11 P of 1989/ISO 13631. The bidder shall furnish the technical information in API packaged data sheet of API Standard 11 P/ISO13631.

A 2.0 The gas compressor package skid shall be concrete filled type suitable for installation on relatively soft gravel packed area without concrete foundation.

A 3.0 Bidders must quote for full quantity of same make and model of Compressors and other ancillaries/accessories against each duty of compressors i.e. LPB (Low Pressure Booster) & GL (Gas Lift).

A 4.0 The bidder shall offer only the compressor frame/model which are proven for applications of Field Gas Gathering / pipelines compression. At least 2 (two) such compressors of each duty (i.e. LPB & GL) should have operated 8000 hours individually and satisfactorily.

Documentary evidence in support of the above shall be submitted along with the bid in the form of valid purchase order copies, invoice/ performance report/ inspection report / bill of lading.

B. BIDDER'S QUALIFICATION CRITERIA:

B 1.1 The bidder shall be an Original Equipment Manufacturer (OEM) of reciprocating Gas Compressors as per API 11P /ISO 13631.

OR

B 1.2 The bidder shall be an authorized packager of the OEM of the Gas Compressor Manufacturer.

Note:

a) Bidders other than OEMs must submit a valid Authorization letter and back-up warranty from the compressor manufacturer.
b) The Authorization letter must be duly sealed & signed by the Manufacturer on their official letter head
c) The packager shall categorically confirm in their technical bid that there will be no change of the proposed OEM after submission of the bid.

C. BIDDERS' EXPERIENCE:

C 1.1 In case the Bidder is an **Original Equipment Manufacturer (OEM)** of Reciprocating Gas Compressors, the bidder shall have the experience of successful Engineering, Manufacturing, Packaging, Supply, Installation and commissioning for 2 (Two) nos. similar items of tender item sl. No. 10 (i.e. Low Pressure Booster Compressor) and / or 3 (Three) nos. of similar items of tender item sl. No. 20 (i.e. Gas Lift Compressor) in last Ten (10) years preceding the Original bid closing date of this tender to any E&P company, or service provider to an E&P company or Natural Gas Transportation Company. Documentary evidences in this regard must be submitted along with the Technical Bid as per Para A.5.

If the bidder quotes for both the items sl. No. 10 & 20, then bidder to submit documents against Bidder's experience for 2 (Two) nos. similar items of tender item sl. No 10 and experience for 3 (Three) nos. similar items of tender item sl. No 20 i.e. Total 2 + 3 = 5 Nos.

If the bidder quotes only for items sl. No. 10 then bidder to submit documents against Bidder's experience for 2 (Two) nos. similar items of tender item sl. No 10 only.

If the bidder quotes only for items sl. No. 20 then bidder to submit documents against Bidder's experience for 3 (Three) nos. similar items of tender item sl. No 20 only.

C 1.2 In case the Bidder is an authorized **Packager of the Original Equipment Manufacturer (OEM)** of Gas Compressor, the following criteria shall be met by the Bidder and the OEM:

i) The Bidder as a **Packager** shall have the experience of Engineering, Manufacturing, Packaging, Supply, Installation and commissioning for 2 (Two) nos) of similar items to tender item sl. No. 10 (i.e. Low Pressure Booster Compressor) and / or 3 (Three) nos. of similar to tender item sl. No. 20 (i.e. Gas Lift Compressor) (manufactured by either the proposed OEM in the last Ten (10) years preceding the Original bid closing date of this tender to any E&P company or service provider to an E&P company or Natural Gas Transportation Company. Documentary evidences in this regard must be submitted along with the Technical Bid as per Para A.5.

Similar item to Tender items is defined as below:

a) The Tender Item sl. No. 10 (Low Pressure Booster) means Gas Engine Driven Separable High Speed (As per API 11P /ISO 13631) Reciprocating Gas Compressor Units of minimum duty of 400 HP with ***concrete filled skids without anchor bolts.*** At

least 2 (two) such units should have operated 8000 hours individually in last 10 years from the date of Original Bid Closing Date (B.C.D.).

b) The Tender Item sl. No. 20 (Gas Lift Compressor) means Gas Engine driven Separable High Speed (As per API 11P/ISO 13631) Reciprocating Gas Compressor Units of minimum duty of 400 HP with ***concrete filled skids without anchor bolts .*** At least 3 (three) such units should have operated 8000 hours individually in last 10 years from the date of Original Bid Closing Date (B.C.D.).

D. In case the Bidder has relevant experience in engineering, packaging, supply, installation & commissioning of Reciprocating Gas Compressor Units (As per API 11P/ISO 13631) **but not having the experience** of ***concrete filled skids without anchor bolts.*** Then

D 1.1 The bidder having relevant experience in engineering, packaging, supply, installation & commissioning of Reciprocating Gas Compressor Units (As per API 11P/ISO 13631) but **not having the experience** of ***concrete filled skids without anchor bolts*** may take support from a party who is having the proven capability of design of concrete filled skids for reciprocating gas compressor packages of minimum duty of 400 HP.

In this case bidder to provide documentary evidence regarding the experience of engineering, packaging, supply, installation and commissioning of at least 2 (two) nos. of similar gas compressor units for line item 10 and at least 3 (three) nos. of similar gas compressor units for line item 20 of the tender of minimum 400 HP which have operated 8000 hours individually in last 10 years from the date of original bid closing. Documentary evidences in this regard must be submitted along with the Technical Bid as per Para A.5

Similar Items is defined as:

a) The Tender Item sl. No. 10 (Low Pressure Booster) means Gas Engine Driven Separable High Speed (As per API 11P /ISO 13631) Reciprocating Gas Compressor Units of minimum duty of 400 HP**.** At least 2 (two) such units should have operated 8000 hours individually in last 10 years from the date of Original Bid Closing Date (B.C.D.)

b) The Tender Item sl. No. 20 (Low Pressure Booster) means Gas Engine Driven Separable High Speed (As per API 11P /ISO 13631) Reciprocating Gas Compressor Units of minimum duty of 400 HP**.** At least 3 (Three) such units should have operated 8000 hours individually in last 10 years from the date of Original Bid Closing Date (B.C.D.).

D 1.2 The bidder shall have to provide undertaking to carryout design, analysis, and technical supervision during fabrication, installation and commissioning of the Concrete filled skid without anchor bolts through outsourcing to experienced sub-vendor.

The bidder to provide documentary evidence towards the experience of the sub-vendor in regards to successful design and analysis of concrete filled skids without anchor bolts for minimum 5 (Five) nos. High speed reciprocating gas compressor packages (As per API 11P/ ISO 13631) of minimum duty of 400 HP in last 10 (Ten) years.

The documentary evidence shall be valid purchase order with technical details showing that the Gas Compressor Concrete filled skid design was without anchor bolts and was successfully carried out by the sub-vendor along with performance certificate from the operator/owner that the units have operated at least 8000 Running hours successfully as on Original Bid closing date and as proof of execution of order, copy of invoice or Final inspection report from client is to be submitted.

D 1.3 Offers of those Bidders who themselves do not meet the technical experience criteria as stipulated in the **clause no. C** above shall also be eligible provided the Bidder is a subsidiary company of the parent company in which the parent company has 100% stake or parent company can also be considered on the strength of its 100% subsidiary. However, the parent/ subsidiary company of the Bidder should on its own meet the technical experience as stipulated in the **clause no. C** above and must not rely for meeting the technical experience criteria on its sister subsidiary/ co-subsidiary company or through any other arrangement like Technical Collaboration agreement. In that case as the subsidiary company is dependent upon the technical experience of the parent company or vice-versa with a view to ensure commitment and involvement of the parent/ subsidiary company for successful execution of the contract, the participating bidder should enclose an Agreement (as per format enclosed at Attachment – I) between the parent and the subsidiary company or vice-versa and Parent/ Subsidiary Guarantee (as per format enclosed at Attachment – II) from the parent/ subsidiary company to OIL for fulfilling the obligation under the Agreement, along with the techno-commercial bid.

A.5 NOTES TO BIDDER REGARDING EXPERIENCE CRITERIA

A.5.1 The following documentary evidences to substantiate above Bidders experience records (C & D as applicable) of the Bidder must be submitted along with the technical bid, failing which the Bid shall be treated as incomplete and rejected:

(a) Copy of Purchase order(s)/contract(s) awarded by Client(s) along with True copies of Original Completion report/performance certificate from the clients mentioning the Operating Running Hours (on Client's/User's official letter head with signature & stamp) duly notarized by Government Notary.

(b) The detailed scope of works with technical specification mentioning the concrete filled skids without anchor bolts. The Bidder has the onus of submitting required documents to fulfil the experience criteria.

And

(c) Any one or combination of the following documents that confirms the successful execution of each of the purchase order(s) / contract(s) -

Copy of Bill of Lading
OR
Copy of Consignee delivery receipts/challans
OR
Copy of Tax Invoice/Excise Gate Pass issued under relevant Act/rules
OR
Copy of Commercial Invoice/Payment Certificate

A.5.2 The date of purchase order(s)/contract(s) need not be within Ten (10) years preceding the original bid closing date of the Tender, but execution/ supply of required quantity must be within Ten (10) years preceding the original bid closing date of this tender.

A.5.3 The service provider to an E&P company shall mean company who has bought the tender item (Gas Compressor package) and has provided service to an E&P company utilizing the tender item (Gas Compressor Package).

A.5.4 In case experience credentials is submitted for past supply to a service provider, the submitted documents should clearly indicate name of the E&P Company for which the tender item has been utilized. On the contrary, a declaration from the service provider (on their official letter head with signature & stamp) is also acceptable as experience credential.

A.6 Bidders shall categorically confirm that installation and commissioning of the compressor packages with all accessories shall be carried out by their competent personnel at OIL's installations in and around Duliajan, Assam (India) and its adjoining fields/ out step locations. The units will be installed as replacement in the existing stations as well as in new installations.

A.7 The bidder shall warrant that in the event of an order, all product(s) supplied shall be new and free from all defects and fault in material, workmanship, & manufacture and shall be in full conformity with the applicable API specification. The clause shall be valid for 12 months from the date of successfully commissioning of the units.

A.8 The bidder shall have single point responsibility for designing, engineering, packaging, supply, installation and commissioning of the complete package.

A.9 The bidder shall have to provide process guarantee that the Gas Compressor Package will meet the tender technical requirements.

A.10 The bidder must complete the entire job of Supply, Installation & commissioning within 18 (Eighteen) months from receipt of formal order.

BRC -FINANCIAL:

1.0 **Annual Turnover -** The bidder shall have annual financial turnover of minimum **INR 33.56 Crores** during any of the preceding 3 (Three) financial/accounting years reckoned from the original bid closing date of the tender.

2.0 "Net Worth" of the bidder must be positive for the financial/accounting year just proceeding to the original Bid Closing Date of the Tender **(i.e., Year 2019-20).**

3.0 Considering the time required for preparation of Financial Statements, if the last date of preceding financial/accounting year falls within the preceding six months reckoned from the original bid closing date and the Financial Statements of the preceding financial/accounting year are not available with the bidder, then the financial turnover of the previous three financial/accounting years excluding the preceding financial/ accounting year will be considered. In such cases, the Net worth of the previous financial/accounting year excluding the preceding financial/ accounting year will be considered. However, the bidder has to submit an affidavit/ undertaking **(ref. Proforma-6)** certifying that 'the balance sheet/Financial Statements for the financial year **2019-20** has actually not been audited so far'.

Note:

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

i) A certificate issued by a practicing Chartered / Cost Accountant (with Membership Number and Firm Registration Number), certifying the Annual Turnover & Net worth as per format prescribed in **Proforma-7**.
OR

ii) Audited Balance Sheet along with Profit & Loss account.

b) In case the bidder is a Central Govt. Organization/PSU/State Govt. Organization/Semi-State Govt. Organization or any other Central/ State Govt. Undertaking, where the auditor is appointed only after the approval of Comptroller and Auditor General of India and the Central Government, their certificates may be accepted even though FRN is not available. However, bidder to provide documentary evidence for the same.

4.0 In case the Audited Balance Sheet and Profit & Loss Account submitted along with the bid are in currencies other than INR or US$, then the bidder shall have to convert the figures in equivalent INR or US$ considering the prevailing conversion rate on the date of Balance Sheet and Profit & Loss Account. A CA certificate is to be submitted by the bidder regarding converted figures in equivalent INR or US$.

5.0 In case the Bidder is subsidiary company (should be 100% owned subsidiary of the parent/ultimate parent/holding company) who does not meet financial criteria by itself and submits its bid based on the strength of parent/ ultimate parent/ holding company, then following documents need to be submitted:

i) Turnover of the parent/ ultimate parent/ holding company should be in line with Para 1.0 above.

ii) Net Worth of the parent/ultimate parent/ holding company should be positive in line with Para 2.0 above.

iii) Corporate Guarantee (as per Attachment XX) on parent / ultimate parent/ holding company's company letter head signed by an authorised official undertaking that they

would financially support their wholly owned subsidiary company for executing the project/ job in case the same is awarded to them.

iv) Document of subsidiary company being 100% owned subsidiary of the parent/ ultimate parent/ holding company.

BRC -COMMERCIAL:

Commercial Bid Rejection Criteria will be as per Section D of General Terms & Conditions of Indigenous Tender (MM/LOCAL/E-01/2005) with following Special Bid Rejection Criteria.

1.0 Bids are invited online under **Single Stage Two Bid System**. Bidders must prepare the Techno-Commercial Bid (Unpriced) as well as the Priced Bid separately and upload both these bids in OIL's e-procurement portal at the designated fields separately assigned. **Please 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/costs. The rate and amount columns in the unpriced technical bid must be kept blank. The "Price 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 The prices/rates offered against the tender must remain firm through delivery and not subject to variation on any account. A bid submitted with an adjustable price condition shall be treated as non-responsive and rejected. No discount whatsoever should be quoted separately. Rates/prices quoted must be net of all discount.

3.0 Bids received in physical form against online invitation shall be rejected (except the documents specifically called for in hard copies, if any). Also, modifications to bids received after the bid closing date & time shall not be entertained.

4.0 Bids containing incorrect/false/misleading statement(s) shall be rejected.

5.0 **Validity of the bid shall be as mentioned in GeM portal. Bids with lesser validity shall be straightway rejected.**

6.0 No Bid Security /Earnest Money Deposit (EMD) shall be applicable. Instead of EMD /Bid Security, all the bidders shall be required to sign a "Bid securing declaration" accepting that if they withdraw or modify their Bids during the period of validity, or if they are awarded the contract and they fail to sign the contract, or to submit a performance security before the deadline defined in the NIT/ Purchase order, they shall be suspended for the period of two (2) years. This suspension of two years shall be automatic without conducting any enquiry.

7.0 **GUARANTEE**

Vendor shall be fully responsible for all equipment supplied by him including bought out items. All the equipment shall be fully guaranteed for a period of twelve months after commissioning and satisfactory site acceptance test by OIL. Vendor shall guarantee all materials against defect, damage or non-conformity / workmanship. If

any defect or non-performance occurs during the guarantee period, Vendor shall make all necessary alteration, repair and replacement at no cost to OIL. Defective goods/materials rejected by OIL, whether the entire lot or part thereof, shall be replaced immediately by the supplier (on DDP Duliajan terms) at the supplier's expenses at no extra cost to OIL.

8.0 Successful bidder shall be required to furnish a Performance Security equivalent to Three percent (3 %) of total evaluated value of Order within 30 days of receipt of LOA/notification of award. The Performance Bank Guaranty must remain valid throughout the period of execution, including extension if any. Non-submission of Performance Security as above by the successful Bidder shall lead to cancellation/termination of award including forfeiture of their Bid Security, besides other penal actions as per OIL's Banning Policy. **Bidders should undertake in their bids to submit Performance Security as stated above.**

9.0 **Online Bid must be uploaded together with the Integrity Pact and the same must be duly signed digitally. If any bidder refuses to sign Integrity Pact or declined to submit Integrity Pact with the offer, their bid shall be rejected straightway.**

10.0 Bidders must submit prices as indicated in the price bid format provided hereunder. In case, various charges (except basic material value) are not indicated item wise specifically, the charges quoted would be pro-rata calculated and the same will be binding on the bidder. Hence, bidders are requested to quote accordingly.

11.0 Bidders are required to submit their price bids strictly as per the formats provided alongwith the bid.

12.0 Bidders shall accept and comply with the following clauses as given in the Bid Document, failing which bid shall be liable for rejection:

i) Liquidated Damages
ii) Warranty/Guarantee of material
iii) Arbitration / Resolution of Dispute
iv) Force Majeure
v) Applicable Laws

13.0 A bid shall be rejected straightway if it does not conform to the following clause:

a) Validity of bid shorter than the validity indicated in the Tender.

<u>BID EVALUATION CRITERIA</u>:

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 General Terms and Conditions for Global Tender and the Bid Evaluation Criteria given below:

1.0 The evaluation of bids shall be done as per the Price Bid Format (SUMMARY) provided in the Tender and detailed 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, 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 Bids will be evaluated item-wise. i.e. Item No 10 & 20 shall be evaluated independently.

5.0 To ascertain the inter-se-ranking, bid prices shall be converted into Indian Rupees and the comparison of responsive bids shall be made as under, subject to corrections / adjustments, if any.

Note:

1) All Bidders must quote inland freight/transportation charges upto Duliajan, Assam. In case bidder fails to quote inland freight charges, highest freight quoted by any domestic bidder (considering pro-rata distance) against this tender or OIL's estimated freight, whichever is higher, shall be loaded to their offer for ascertaining inter-se-ranking of the Bidders.

2) The items covered under this enquiry shall be used by OIL in the PEL/ML areas and hence, IGST @5% shall be applicable for Indigenous bidders under Integrated Goods and Services Act, 2017(13 of 2017), Notification No. 3/2017-Integrated Tax (Rate) dated 28/06/2017.

5.1 Comparison of bids will be done on the basis of " Grand Total FOR Duliajan value including Pre-shipment Inspection + Training + Installation & Commissioning charges " for Item No 10 & 20 independently which is estimated as under for each item as below :

	Item No 10 LP Booster Compressor	Item No 20 Gas Lift Compressor
(A) Total cost of 1 (One) No. Compressor Package (In INR) (excluding Sl. No B below)		
(B) Cost of Commissioning spares for 1 (One) No. Compressor Package (In INR)		
(C) Quantity (In Nos)	4 Nos	6 Nos
(D) Grand Total Material Cost (In INR) { (A + B) X C }		
(E) Total Packing and Forwarding Charges (In INR)		

(F) Total Ex-works value (In INR), (D + E)		
(G) Total IGST against Essentiality Certificate @ 5% on (F) above (In INR)		
(H) Total FOR Despatching station price, (F + G) (In INR)		
(I) Total Freight and Transit Insurance charges upto Destination including GST (In INR)		
(J) Total FOR Duliajan value, (H + I) (In INR)		
(K) Total Pre-shipment Inspection charges (In INR)		
(L) Total Training charges (In INR)		
(M) Total Installation & Commissioning charges (In INR)		
(N) Grand Total FOR Duliajan value including Pre-shipment Inspection + Training + Installation & Commissioning charges (J + K + L + M) (In INR) above		

BIDDER TO CONSIDER ALL THE ABOVE COMPONENTS WHILE QUOTING THE MRP PRICE AGAINST EACH ITEM. OIL MAY ASK THE DETAILS BREAK OF THE MRP PRICE OF EACH ITEM AFTER OPENING OF PRICED BID. NO PRICE SHOULD BE DISCLOSED IN TECHNICAL BID. QUOTING PRICE IN THE TECHNICAL BID WILL BE REJECTED.

5.2 The Commissioning Spares should be quoted separately indicating the unit price and quantity quoted. Rates quoted for commissioning spares shall be considered for evaluation of offers.

5.3 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, GST etc. towards the services provided under installation / commissioning/training 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.

5.4 Successful bidder shall offer the compressors for Pre-despatch/ shipment Inspection by OIL's team of technical/commercial executives. Pre-despatch/ Shipment Inspection and Training 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.

5.5 Bidders must categorically indicate the Installation / Commissioning, Predespatch/ Shipment Inspection and Training charges in their offers and must confirm about providing the same in their Technical bids.

6.0 Offers not complying with the payment terms indicated in the tender 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.

7.0 Purchase Preferences:

a) As per Gazette notification no. CG-DL-E-26062020-220191 dated 26.06.2020 issued by Ministry of Micro, Small and Medium Enterprises, MSE bidders whose quoted price is within price band of L1+15%, such MSE bidders shall be considered for award of contract by bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE. In case of more than one such MSE qualifying for 15% purchase preference, the order shall be awarded to lowest eligible MSE bidders amongst the MSE's qualifying for 15% purchase preference. Offer evaluation and award of order shall be based on the provisions of aforesaid policy or amendment to the policy (if any).

Or

b) As per Purchase Preference Policy (linked with local content) as issued by Ministry of Petroleum & Natural Gas, Government of India vide notification no. FP-20013/2/2017-FP-PNG dated 17.11.2020, Class-I local bidder with local content equal to or more than 50% shall be eligible for purchase preference of 20%. Offer evaluation and award of order shall be based on the provisions of aforesaid policy or amendment to the policy (if any).

Note : Bidder to categorically confirm under which policy i.e. PP-LC or MSME or DPIIT-MII, they want to avail the benefit and to submit requisite document/certificate in support to avail this benefit. The bids will be evaluated based on their declaration. No benefit will be given if the bid is submitted without any above declaration along with supporting document as per the respective policies. In case of tendered for Iron & Steel products as per DMI & SP policy, only the eligible bidders meeting the requisite criteria as per the DMI & SP policy shall be considered for further technical evaluation. Availing the benefit of Purchase Preference and awarding of eligible tendered quantity after price matching shall be considered based on Bidder' declaration of availing of PP-LC or MSME policy only.

8.0 Other terms and conditions of the enquiry shall be as per General Terms and Conditions for Indigenous 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 Indigenous Tender of the tender and/or elsewhere, those mentioned in this BEC / BRC shall prevail.

********** **END OF ANNEXURE – BB** **********

Attachment – I

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

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

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

WHEREAS

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

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

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

1. M/s._____(Bidder) will submit an offer to OIL for the full scope of work as envisaged in the tender document as a main bidder and liaise with OIL directly for any clarifications etc. in this context.

2. M/s. _____ (Parent Company/ Subsidiary Company (Delete whichever not applicable) undertakes to provide technical support and expertise, expert manpower and procurement assistance and project management to support the bidder to discharge its obligations as per the Scope of work of the tender / Contract for which offer has been made by the Parent Company/Subsidiary Company (Delete whichever not applicable) and accepted by the bidder.

3. This agreement will remain valid till validity of bidder's offer to OIL including extension if any and till satisfactory performance of the contract in the event the contract is awarded by OIL to the bidder.

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

5. However, the bidder shall have the overall responsibility of satisfactory execution of the contract awarded by OIL.

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

For and on behalf of	For and on behalf of
(Bidder)	(Parent Company/Subsidiary Company (Delete whichever not applicable)
M/s.	M/s.
Witness:	Witness:
1)	1)
2)	2)

&&&&&&&&&&&&

Attachment – II

PARENT COMPANY/ SUBSIDIARY COMPANYGUARANTEE *(Delete whichever not applicable)*

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

DEED OF GUARANTEE

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

WHEREAS

M/s Oil India Limited, a company duly registered under the Companies Act 1956, having its Registered Office at Duliajan in the State of Assam, India, hereinafter called "OIL" which expression shall unless excluded by or repugnant to the context thereof, be deemed to include its successor and assigns, invited tender number …… for …….. on ……..

M/s …….. (mention complete name), a company duly organized and existing under the laws of ……. (insert jurisdiction/country), having its Registered Office at …….. (give complete address) hereinafter called "the Company" which expression shall, unless excluded by or repugnant to the subject or context thereof, be deemed to include its successor and permitted assigns, have, in response to the above mentioned tender invited by OIL, submitted their bid number …… to OIL with one of the condition that the Company shall arrange a guarantee from its parent company guaranteeing due and satisfactory performance of the work covered under the said tender including any change therein as may be deemed appropriate by OIL at any stage.

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

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

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

1. The Guarantor (Parent Company / ***100% Subsidiary Company (Delete whichever not applicable***) unconditionally agrees that in case of non-performance by the Company of any of its obligations in any respect, the Guarantor shall, immediately on receipt of notice of demand by OIL, take up the job without any demur or objection, in continuation and without loss of time and without any cost to OIL and duly perform the obligations of the Company to the satisfaction of OIL.

2. The Guarantor agrees that the Guarantee herein contained shall remain valid and enforceable till the satisfactory execution and completion of the work (including discharge of the warranty obligations) awarded to the Company.

3. The Guarantor shall be jointly with the Company as also severally responsible for satisfactory performance of the contract entered between the Company and OIL.

4. The liability of the Guarantor, under the Guarantee, is limited to the 50% of the contract price entered between the Company and OIL. This will, however, be in addition to the forfeiture of the Performance Guarantee furnished by the Company.

5. The Guarantor represents that this Guarantee has been issued after due observance of the appropriate laws in force in India. The Guarantor hereby undertakes that the Guarantor shall obtain and maintain in full force and effect all the governmental and other approvals and consents that are necessary and do all other acts and things necessary or desirable in connection therewith or for the due performance of the Guarantor's obligations hereunder.

6. The Guarantor also agrees that this Guarantee shall be governed and construed in accordance with the laws in force in India and subject to the exclusive jurisdiction of the courts of …….., India.

7. The Guarantor hereby declares and represents that this Guarantee has been given without any undue influence or coercion, and that the Guarantor has fully understood the implications of the same.

8. The Guarantor represents and confirms that the Guarantor has the legal capacity, power and authority to issue this Guarantee and that giving of this Guarantee and the performance and observations of the obligations hereunder do not contravene any existing laws.

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

M/s _____

Witness:

1. Signature _____
   Full Name _____
   Address _____

Signature _____
Name _____
Designation _____

Common seal of the Company_____

Witness:

2. Signature _____
   Full Name _____
   Address _____

INSTRUCTIONS FOR FURNISHING PARENT/SUBSIDIARY COMPANY GUARANTEE

1. Guarantee should be executed on stamp paper of requisite value and notarised.

2. The official(s) executing the guarantee should affix full signature (s) on each page.

3. Resolution passed by Board of Directors of the guarantor company authorizing the signatory(ies) to execute the guarantee, duly certified by the Company Secretary should be furnished alongwith the Guarantee.

4. Following certificate issued by Company Secretary of the guarantor company should also be enclosed alongwith the Guarantee.

   "Obligation contained in the deed of guarantee No._____ furnished against tender No. _____ are enforceable against the guarantor company and the same do not, in any way, contravene any law of the country of which the guarantor company is the subject"

****

A.1.2 Vendor's design

	Ref. subclause	ISO 13631 — Packaged reciprocating compressor — Data sheet Vendor's design					Rev. No.
1			**Vendor**		**Purchaser**		
2		Company					
3		Address					
4							
5							
6							
7							
8		Telephone					
9		E mail					
10		Fax					
11		Contact 1					
12		Contact 2					
13		Cost estimate only [ ] For purchase [ ]					
14		Project name: No.: Service:					
15		Inquiry No.: Proposal No.: Date: No. of units: Delivery quoted:					
16							
17		**MISCELLANEOUS**					
18		Copies furnished of: Proposal Reports Drawings Data books Curves Miscellaneous:					
19	5.1	Performance curves: YES [ ] NO [ ] Range:					
20	5.3	Drawings: Approval [ ], As-built [ ]. Miscellaneous [ ] Details:					
21	5.4	Noise emission: Actual sound pressure level: dB(A)					
22	5.7	Torsional report: YES [ ] NO [ ]					
23		**COMPRESSOR**					
24		Manufacturer: Model: Rated speed: r/min. Rated power: kW					
25		Stroke: mm Av. piston speed: m/s. Piston rod diam. mm					
26		Max allowable continuous combined rod load: compression/tension / kN					
27	6.1.4	Unbalanced forces and moments		Primary		Secondary	
28		Horizontal force: kN					
29		Vertical force: kN					
30		Horizontal moment: kN·m					
31		Vertical moment: kN·m					
32	6.9.1.1/6.9.3	Distance pieces: Type: 1 / 2 / 3 Pressure-relief devices: YES [ ] NO [ ]					
33	6.11.6/6.11.7	Crankcase lube system: l. storage tank; with Level gauge: YES [ ] NO [ ] Oil heater: YES [ ] NO [ ]					
34	6.12.1	Cylinder lube system: Block / Pump to point type. With: line filters [ ], flow meter [ ], fault indicators [ ]					
35	6.12.2	Cylinder lubricator l. storage tank. With level gauge: YES [ ] NO [ ]					
36	6.13.1.4	Proposed welding code:					
37	6.14.2	Coupling: Type: Manufacturer: Model: Disc pack: Steel / Stainless steel					
38		**COMPRESSOR CONSTRUCTION FEATURES**					
39	6	Service					
40		Stage					
41		Cylinder bore — mm					
42	6.5.2.2	Cooled / non-cooled cylinder					
43		**Materials**					
44		Cylinder					
45		Cylinder liner (if furnished)					
46		Piston					
47		Piston rings					
48		Wear bands					
49		Piston rod					
50		Piston rod base metal hardness — HRC					
51		Piston rod coating					
52		Coating hardness — HRC					
53		Valve seats					
54		Valve guards					
55		Valve plates					
56		Valve springs					
57		Rod packing case					
58		Rod pressure packing rings					
59		Rod wiper packing rings					
60		Crankshaft					
61		Crankshaft main journal bearings					
62		Connecting rod					
63		Connecting rod bearings					
64		Crosshead					

65		**COMPRESSOR CONSTRUCTION FEATURES** (CONTINUED)					Rev.
66		Crosshead pin					
67		Crosshead pin bushing					
68		Crosshead shoes (if furnished)					
69		Cylinder indicator connections					
70		**COMPRESSOR PERFORMANCE**					
71		Case					
72		Service					
73		Stage					
74		No. of cylinders					
75		Cylinder bore mm					
76		Rated discharge gauge pressure MPa (bar)					
77		Max allowable working temp. °C					
78		Cylinder action (DA/SACE/SAHE)					
79		Flange size/rating/facing type					
80		Piston displacement/cylinder m^3/s					
81		Molar mass kg/kmol					
82		c_p/c_V (k) value					
83		Critical pressure MPa (bar)					
84		Critical temperature K					
85		Compressibility (z) at suction					
86		Compressibility (z) at discharge					
87		Suction pressure MPa (bar)					
88		Discharge pressure MPa (bar)					
89		Suction temperature °C					
90		Discharge temperature adiabatic °C					
91		Discharge temp estimate actual °C					
92		Required capacity m^3/h					
93		Quoted capacity m^3/h					
94		Compression power/stage kW					
95		Compression power total kW					
96		Accessories power kW					
97		Compressor rated power kW					
98		$\left(\frac{\text{Compressor rated power}}{\text{Engine site rated power}}\right) \times 100\ \%$					
99		Rated speed r/min					
100		Average piston speed m/s					
101		Cylinder clearance HE %					
102		Cylinder clearance CE %					
103		Total cylinder clearance %					
104		Volumetric efficiency HE %					
105		Volumetric efficiency CE %					
106		Total volumetric efficiency %					
107		Rod load (gas) — compression kN					
108		Rod load (gas) — tension kN					
109		Combined rod load — compression kN					
110		Combined rod load — tension kN					
111		Clearance pocket position % open					
112		Valve spacers installed quantity/cyl					
113		Valve velocity — average m/s					
114		Valves/cyl end — suction/discharge					
115		Valve type and size mm					
116		Valve lift mm					
117		Valve area mm^2					
118							
119		**COMPRESSOR CAPACITY CONTROL**					
120		**PARTIAL LOAD OPERATION**					
121		Case					
122		Service					
123		Stage					
124		Cylinder action — (DA/SACE/SAHE)					
125		c_p/c_V (k) value					
126		Critical pressure MPa (bar)					
127		Critical temperature K					
128		Compressibility (z) at suction					
129		Compressibility (z) at discharge					

130		**PARTIAL LOAD OPERATION** (CONTINUED)					Rev.
131		Suction pressure MPa (bar)					
132		Discharge pressure MPa (bar)					
133		Suction temperature °C					
134		Discharge temperature adiabatic °C					
135		Discharge temp estimate actual °C					
136		Required capacity m^3/h					
137		Quoted capacity m^3/h					
138		Compression power/stage kW					
139		Compression power total kW					
140		Accessories power kW					
141		Compressor rated power kW					
142		$\left(\frac{\text{Compressor rated power}}{\text{Engine site rated power}}\right) \times 100\ \%$					
143		Actual speed					
144		Cylinder clearance HE %					
145		Cylinder clearance CE %					
146		Clearance pocket position % open					
147		Valve spacers installed quantity/cyl					
148		Clearance plug: Yes/No					
149		Clearance bottle: Yes/No					
150		Valve unloaders: Yes/No					
151		Capacity control bypass: Yes/No					
152							
153	7.3	Speed variation: YES [ ] NO [ ]: Range to r/min. Manual [ ] Automatic [ ]					
154	7.4.2	Clearance pockets Fixed (open/closed) [ ] Variable [ ] None [ ] Manual/Automatic Cylinders 1 / 2 / 3 / 4					
155	7.4.3	Valve spacers: Head end: No Cyl 1 / 2 / 3 / 4 Crank end: No Cyl 1 / 2 / 3 / 4					
156	7.4.4	Clearance bottles: YES [ ] NO [ ] Cylinders: 1 / 2 / 3 / 4					
157	7.4.6	Clearance plugs: YES [ ] NO [ ] Cylinders: 1 / 2 / 3 / 4					
158	7.6.2/7.6.3	By-pass system: Start-up [ ], Capacity control [ ]; Manual [ ] Auto [ ]; Hot [[Cold [ ]					
159	7.6.2	Valve unloaders: YES [ ] NO [ ]; Plate depressors [ ], Plug [ ]; Manual [ ] Auto [ ] Cyl: 1 / 2 / 3 / 4					
160	7.7	Suction pressure-reducing valve: YES [ ] NO [ ]					
161							
162		**PRIME MOVER — GAS ENGINE**					
163		Manufacturer: Model:					
164		Site rated power: kW; Max. allowable speed r/min Min. allowable speed r/min					
165		No. of power cylinders: Bore: mm. Stroke: mm. Displacement: m^3					
166		Turbo-charged [ ], Naturally aspirated [ ]; Compression ratio: Fuel consumption: kJ/kW·h					
167	8.2.3	Starting system: electric / air / gas; ampere-hour battery [ ] Charging generator YES [ ] NO [ ]					
168	8.2.4.2	Air filter manufacturer's standard dry type [ ]; Other [ ] Details:					
169	8.2.4.6	Air filter pressure-drop indicator: YES [ ] NO [ ]					
170	8.2.5	Exhaust silencer: manufacturer's standard [ ] Other [ ] Spark-arresting YES [ ] NO [ ]					
171	8.2.7.1	Sound attenuation: Personnel protection [ ] Details:					
172	8.2.7	Exhaust gas emissions: from manufacturer's performance test [ ] or from actual stack test data [ ]					
173	8.2.7.3	NO_X: Non-methane hydrocarbons: CO_2: SO_2: At rated power [ ], nameplate rating [ ]					
174	8.2.9	Crankcase oil storage tank: YES [ ] NO [ ] Capacity: litre					
175	8.2.10/8.2.12	Fuel gas filter/separator: YES [ ] NO [ ] Crankcase pressure relief devices: YES [ ] NO [ ]					
176							
177		**PRIME MOVER — ELECTRIC MOTOR**					
178	8.3.1	Manufacturer: Model: IEC rating kW					
179		Synchronous / Induction Rated power: kW; Rated speed: r/min. Service factor					
180		Frame type: Enclosure type:: Volts: Phase: Frequency: Hz					
181		Electrical area classification: Insulation: Temperature rise: °C above °C					
182		Space heater YES [ ] NO [ ] Volts: Phase: Frequency: Hz.					
183		Starter YES [ ] NO [ ]; IEC rating: Manufacturer: Full voltage [ ] reduced voltage [ ]					
184		Variable speed: YES [ ] NO [ ]					
185		Accessories: Temperature detectors [ ], Vibration sensing [ ] Other:					
186							
187		**COOLING SYSTEM**					
188		Manufacturer: Model: On compressor skid [ ] separate skid [ ]					
189		Vertical [ ] Horizontal [ ] Electric driven [ ] Vee-belt driven [ ] Fans: No.: diam. mm. Tip speed m/s					
190	9.3.1.3	Sight-flow [ ] and/or temperature indicators [ ] Gas after cooler to °C: YES [ ] NO [ ]					
191		MAWP MPa (bar): Water side: Gas side:1st stage: 2nd stage: 3rd stage: 4th stage: After cooler:					
192	9.6.8	Control: Automatic [ ] Manual [ ] on interstage gas [ ] and/or final discharge gas [ ]					
193		Control by: Louvres [ ], variable pitch fans [ ], variable speed fans [ ], recirculation [ ], Other [ ]					
194	9.6.9	Cooler insect screens: YES [ ] NO [ ], Hail guards: YES [ ] NO [ ]					

195	10	**PRESSURE VESSELS**					Rev.
196	10.3.1	Pulsation study: YES [ ] NO [ ] Details:					
197		**Separators**	Stage 1	Stage 2	Stage 3	Discharge	
198		Pressure vessel design code					
199		Inside diameter mm					
200		Seam-to-seam length mm					
201		Design gauge pressure MPa (bar)					
202		Design temperature °C					
203		Mesh pad/vane mist extractor					
204		Mist extractor material					
205		Manual drain YES/NO					
206		Type automatic drain control					
207		Type automatic drain valve					
208		Level gauge glass YES/NO					
209		Pressure indicator YES/NO					
210		Inlet flange size/rating/facing/type					
211		Outlet flange size/rating/facing/type					
212		Corrosion allowance mm					
213		Weld pads/saddles YES/NO					
214							
215		**Suction pulsation/volume bottles**	Stage 1	Stage 2	Stage 3		
216		Pressure vessel design code					
217		Volume m^3					
218		Swept volume factor (Annex B)					
219		Inside diameter mm					
220		Seam-to-seam length mm					
221		Design gauge pressure MPa (bar)					
222		Design temperature °C					
223		Inlet flange size/rating/facing/type					
224		Outlet flange size/rating/facing/type					
225		Corrosion allowance mm					
226		Type drain opening					
227		Weld pads/saddles YES/NO					
228							
229		**Discharge pulsation/volume bottles**	Stage 1	Stage 2	Stage 3		
230		Pressure vessel design code					
231		Volume m^3					
232		Swept volume factor (Annex B)					
233		Inside diameter mm					
234		Seam-to-seam length mm					
235		Design gauge pressure MPa (bar)					
236		Design temperature °C					
237		Inlet flange size/rating/facing/type					
238		Outlet flange size/rating/facing/type					
239		Corrosion allowance mm					
240		Type drain opening					
241		Weld pads/saddles YES/NO					
242							
243		**PIPING AND APPURTENANCES**					
244	11.1.4	Vendor will supply all piping from package suction to package discharge: YES [ ] NO [ ]					
245		Or piping supply shall be as follows:					
246		**Suction**: from separator [ ], pulsation-suppression device [ ], compressor nozzle [ ], other[ ]					
247		Details:					
248		**Interstage**: from separator [ ], pulsation-suppression device [ ], compressor nozzle [ ], sidestream connection [ ], complete interstage piping system [ ], other [ ]					
249		Details:					
250		**Discharge**: to cooler discharge [ ], pulsation-suppression device [ ], compressor nozzle [ ], spool piece from final discharge cooler to discharge separator [ ], other [ ]					
251		Details:					
252		Piping, vessels and thermowells arranged for heat tracing and/or insulation YES [ ] NO [ ]					
253	11.10	Valves in flammable or toxic service to have bolted or welded bonnets [ ], bolted glands [ ], be fire-safe [ ]					
254	11.13	Temporary start-up screens YES [ ] NO [ ]; Removable spool-piece YES [ ] NO [ ]					
255	11.14.2	Oil piping downstream of filters: steel [ ] or austenitic stainless steel [ ]					
256	11.15.1	Complete on-skid coolant piping system YES [ ] NO [ ]					
257	11.17.2	Common distance piece vent header YES [ ] NO [ ]					

258		**PIPING AND APPURTENANCES** (CONTINUED)						Rev.
259	11.17.3	Common distance piece drain header: YES [ ] NO [ ]						
260	11.17.4	Common packing vent header: YES [ ] NO [ ]						
261	11.18.6	Relief and blowdown valves vent to atmosphere [ ], common header [ ] or other [ ]						
262		Details:						
263	11.1-11.8	Process piping	Suction	1st interstage	2nd interstage	3rd interstage	Discharge	
264		Piping ID mm						
265		Design gauge pressure MPa (bar)						
266		Design temperature °C						
267								
268		Relief valve size mm						
269		Relief valve rating MPa (bar)						
270		Relief valve setting MPa (bar)						
271		Relief valve orifice mm						
272		Block valve size mm						
273		Block valve rating MPa (bar)						
274		Check valve size mm						
275		Check valve rating MPa (bar)						
276								
277								
278		**ELECTRICAL SYSTEMS**						
279	12.2	**Electric motors**						
280		Service						
281		Manufacturer						
282		Model						
283		Speed						
284		IEC rating						
285		Volts						
286		DC/AC phase/frequency						
287		Enclosure type						
288		Service factor						
289		Motor control manufacturer						
290		IEC rating						
291								
292	12.5	Electrical material suitable for tropical location: YES [ ] NO [ ]						
293								
294		**INSTRUMENTS AND CONTROLS**						
295	13.1.1	In addition to any capacity control, the following control systems are included:						
296		Function						
297		Manual/Auto						
298	13.1.6	Pneumatic instrument supply: gas [ ] or instrument air [ ]						
399	13.2.2/13.2.3	Panel: free-standing [ ], skid-mounted [ ], off-skid [ ]. With enclosed back: YES [ ] NO [ ]						
300	13.2.5	Wiring to remote panels: in conduit [ ], armoured cable [ ] on cable trays [ ]						
301	13.3.1	Panel-mounted digital [ ] or analog [ ] tachometer						
302	13.3.2-13.3.5	Liquid-filled temp. indicators [ ], liquid-filled pressure indicators [ ], fuel gas meter [ ], shut-off valves [ ]						
303								
304								
305								
306		**NOTES**						
307								
308								
309								
310								
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321		**SHUTDOWNS, ALARMS AND ANNUNCIATORS**										Rev.
322	14.1	Shutdowns, alarms and annunciators: pneumatic [ ], hydraulic [ ] or electric [ ]										
323	14.3	Note: X indicates the desired action type and location of annunciation and location of the sensor. Mark each box for multiple requirements	Desired action			Type and location of annunciation				Sensor location		
			Shutdown	Alarm	Indicator	Visual	Audible	Panel	Remote	Panel	Local	
324		**COMPRESSOR**										
325		Suction gas pressure — first stage										
326		Low	X									
327		High										
328		Suction gas pressure — interstage										
329		Low										
330		High										
331		Discharge gas pressure — interstage										
332		Low										
333		High	X									
334		Discharge gas pressure — final stage										
335		Low										
336		High	X									
337		Lubricating oil pressure										
338		In-filter										
339		Out-filter										
340		Low	X									
341		Lubricating oil temperature										
342		In										
343		Out										
344		High										
345		Gas temperature — each stage										
346		Suction										
347		Discharge — each cylinder	X									
348		High — each cylinder										
349		Lubricating oil level										
350		Low — frame										
351		Low — lubricator										
352		Lubricator — no flow	X									
353		Vibration — high	X									
354		Cylinder coolant temperature										
355		In										
356		Out — each cylinder										
357		High										
358												
359												
360		**GAS ENGINE** (if furnished)										
361		Manifold press./vacuum — High/low										
362		Coolant temperature										
363		In										
364		Out										
365		High	X									
366		Lubricating oil temperature										
367		In										
368		Out										
369		High										
370		Lubricating oil pressure										
371		In — filter										
372		Out — filter										
373		Low	X									
374		Coolant pressure										
375		In										
376		Out										
377		Low										

378		**SHUTDOWNS, ALARMS AND ANNUNCIATORS** (CONTINUED)										Rev.
379		Note: X indicates the desired action type and location of annunciation and location of the sensor. Mark each box for multiple requirements	Desired action			Type and location of annunciation				Sensor location		
			Shutdown	Alarm	Indicator	Visual	Audible	Panel	Remote	Panel	Local	
380		**GAS ENGINE** (continued)										
381		Fuel gas pressure										
382		High	X									
383		Low	X									
384		Starting air/gas pressure										
385		Vibration — High	X									
386		Lubricating oil level										
387		Low										
388		Overspeed	X									
389												
390												
391		**ELECTRIC MOTOR** (if furnished)										
392		Stator winding temperature										
393		High	X									
394		Vibration — High	X									
395												
396												
397		**OTHER**										
398		Cooler vibration — high	X									
399		Cooler coolant level										
400		Low	X									
401		Separator liquid level										
402		High	X									
403		Low										
404												
405												
406												
407	14.6.3	Furnish blowdown valve: YES [ ] NO [ ] To open automatically on shutdown: YES [ ] NO [ ]										
408												
409		**SKID**										
410	15.1	Structural steel [ ], Pre/post stressed concrete [ ], Concrete filled structural steel [ ],										
411		Other [ ] Details:										
412	15.2.6	Number of foundation bolts per side:										
413	15.4	Beam: Flange mm Mass kg Floor plate: YES [ ] NO [ ] Walkways: YES [ ] NO [ ] Stairs: YES [ ] NO [ ]										
414			Main skid									
415		Height: mm										
416		Width: mm										
417		Length: mm										
418		Mass: kg										
419												
420		**PAINT AND PAINTING**										
421	16.1	Package: Vendor's/Packager's standard [ ] Special [ ] Details:										
422	16.1	Compressor: Vendor's/Manufacturer's standard [ ] Special [ ] Details:										
423	16.1	Prime mover: Vendor's/Manufacturer's standard [ ] Special [ ] Details:										
424	16.6	Air cooler ducting/structure: Vendor's/Manufacturer's standard [ ] Special [ ] Details:										
425		Heat exchanger: Hot-dipped galvanizing [ ] Special [ ] Details:										
426		Headers: Vendor's/Manufacturer's Standard [ ], Hot-dipped galvanizing [ ], Special [ ] Details:										
427												
428		**INSPECTION AND TESTING**										
429	17.1.3/17.3	Tests performed: Review of quality control [ ], Hydrostatic [ ], Mechanical run [ ], Package leak test [ ]										
430		Other [ ] Details:										
431												
432												
433		**PREPARATION FOR SHIPMENT**										
434	19.4.1	Export crated: YES [ ] NO [ ], Vendor storage: YES [ ] NO [ ] Special shipment preparation: YES [ ] NO [ ]										
435		Details:										
436												
437												

438		**CORROSIVE GASES**				Rev.
439	20.1	Corrosive gases compressed: YES [ ] NO [ ]				
440		Piston rod: precip. hardened stainless steel [ ] or 4140 annealed to HRC22 [ ] with hardening in packing area by chrome plating [ ] or tungsten carbide coating [ ] or NACE MR 0175 equivalent material [ ]				
441		Purged packing case: YES [ ] NO [ ] with sweet natural gas [ ] or inert gas [ ] Type:				
442		Distance piece: Type 1 / 2 / 3 Evacuated [ ] or purged [ ] with sweet gas [ ] or inert gas [ ] Type:				
443						
444		**Materials:**				
445		Process piping:		Valves:		
446		Cold side		Suction block valve		
447		Hot side		Discharge block valve		
448		Bypass		Bypass valve		
449		Vent lines		Blowdown valve		
450		Drain lines		Check valve		
451		Pulsation suppressors:		Utility process valves		
452		Suction		Relief valves		
453		Discharge		Instrumentation:		
454		Separators:		Separator controls		
455		Suction		Pressure switches		
456		Interstage		Temperature switches		
457		Discharge		Tubing		
458		Gas cooler:		Fittings		
459		Header				
460		Tubes				
461						
462		**OFFSHORE AND/OR MARINE ENVIRONMENT**				
463	21.1.3	Corrosive environment YES [ ] NO [ ]				
464	21.2	Cooler headers: Vendor's/Manufacturer's standard paint [ ] or hot-dipped galvanizing [ ] or special [ ]				
465		Details:				
466	21.9.3	Block valves furnished: YES [ ] NO [ ] Suction [ ] and/or discharge [ ], Manual [ ] or pilot operated [ ]				
467						
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Annexure-AI

QAP for Gas Compressor Packages

Sl. No.	Inspection Activity	Extent of Check	Reference Documents	Acceptance Criteria	Document Required	Inspection Agency		
						Vendor	**Sub Vendor**	**OIL**
(A) BARE COMPRESSOR								
(A-1) RAW MATERIAL & IN PROCESS INSPECTION								
1A	Material Test Certificate for Crank Case, Crankshaft, Con Rod, Cylinder, Piston, Piston Rod, Liner and Cylinder Heads	Full/ Batch	PO / Datasheet	PO/Datasheet/ VENDOR Mat. Standard	Material Test compliance certificate	R	P	R
1B	Compliance Certificate for Distance piece, Piston Nut, Conrod Bolt, Main Bearing Bolt and Nut and guides	Full/ Batch	PO/ Datasheet	PO/Datasheet/ VENDOR Mat. Standard	Material Test compliance certificate	R	P	R
2	Hydrotest for Cylinder	100%	PO / Datasheet/ DR Hydro Test Procedure	No Leakage/ VENDOR Hydro Test Procedure	Test certificate	P	-	W
3	PneumaticTest for Cylinder	100%	PO / Datasheet/ VENDOR Pneumatic Test Procedure	No Leakage/ VENDOR Pneumatic Leak Test Procedure	Test certificate	P	-	R
4	Ultrasonic Test for Crankshaft, Con Rod,& Piston Rod	100%	PO/ Datasheet/ VENDOR MT PROC	PO / Datasheet/ VENDOR MT PROC	Test certificate	P	-	R
5	Magnetic Particle Test for Crankshaft , Con Rod & Piston Rod	100%	PO/ Datasheet/ VENDOR MPT PROC	PO / Datasheet/ VENDOR MPT PROC	Test certificate	P	-	R
(A-2) FINAL INSPECTION / TESTING								
1	Barring Over to check Cylinder end clearances / Rod Runout	100%	As per VENDOR Run Test Procedure	VENDOR Run Test Procedure	Test certificate	P	-	R
2	4 hrs. No Load Mechanical Run Test of Bare Compressor with shop driver and shop lube oil system	100%	As per PO/ VENDOR Run Test Procedure	PO/VENDOR Run Test Procedure	Test certificate	P	-	W
3	Partial Stripping & Internal Inspection after No Load Mechanical Run Test	100%	As per PO/ VENDOR Run Test Procedure	VENDOR Run Test Procedure	Test certificate	P	-	W
(B) VOLUME BOTTLES, SUCTION & DISCHARGE KOD								

1	Review of MTC & Material Identification for Pressure parts including Flanges, Butt Weld Fittings, Pipes	Full Batch	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	MTC/ Test Certificate	R/W	P	R
2	WPS/PQR	As per Vendor/ Code	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	WPS/PQR test report	R/W	P	R
3	Finished End dimensions with thickness check with DP test of KR	As per Vendor/ Code	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Dimension Report	R/W	R/W	R
4	Set-ups (L-Seam, C-Seam, Nozzle to shell)	As per Vendor/ Code	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Inspection Report	R/W	R/P	R
4A	Backchip DP Test	As per Vendor/ Code	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Inspection Report	R/W	R/P	R
4B	DP Test of Weld Joints as required by Code Requirement	As per Vendor/ Code	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Inspection Report	R/W	R/P	R
4C	Fitment of Internals	As per Vendor/ Code	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Inspection Report	R/W	R/P	R
5	Radiography Examination	As per Vendor/ Code	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Test Report/ RT Films for Review	R	R/P	R
6	Final, Visual & Dimensional Check	Full	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Inspection Report	R	R/P	R
7	HyVendorostatic Test	100%	Approved	Conf. to approved	Test Report	R/W	R/P	R

			Drawing/ PO/ Approved Datasheet	Drawing/Datasheet				
8	Final Paint visual and DFT Check	At Random	As per Paint Procedure	Conf. to paint procedure	Test Report	R	R/P	R
D.GAS ENGINE								
1	Certificate of Compliance for Engine Components	Full/ Batch	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Manufacturer's standard test report	R	P	R
2	Engine Full Load Performance Test as per Manufacturer's standard	100%	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Manufacturer's standard test report	R	P	R
E. Instrumentation and Safety Relief Valves								
1	Body Hydro test, Seat Leak Test & Functional Test for Control Valve	At Random 2 nos. each Size, Type/rating	Approved Datasheet	Conf. to approved Datasheet/ Instrument schedule	Manufacturer's test certificate	R	P	R
F. Air Exchanger Manufacturer's standard test report								
1	MTC & Material Identification for Pressure parts including flanges, Butt Weld Fittings, Pipe Plates, Tubes etc.	Full/ Batch	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Manufacturer's standard test report	R	P	R
2	Header Seam & Nozzle Butt Ends Radiography	100%	Approved Drawing/ PO/ Approved Datasheet	Approved Drawing/ PO/ Approved Datasheet	Manufacturer's standard test report	R	P	R
3	Certificate of compliance for Fan	Full/ Batch	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Compliance Certificate	R	P	R
4	Hydrostatic Test	100%	Approved Drawing/ PO/	Conf. to approved Drawing/Datasheet	Inspection Report	R	P	R

			Approved Datasheet					
G. CONTROL PANEL FAT								
1	Functional/ Continuity Test/ Loop Test/ Logic & Graphic Test	100%	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Inspection Report	R	P	R/W
H. PIPING								
1	Review of Gas Piping Material Test Certificate with traceability	100%/ Sample	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Inspection Report	P	-	R
2	Visual & Dimension Verification including thickness verification for Piping Material	Random 25%	ANSI B 31.3/ Piping Drawing	Conf. to approved Drawing	Compliance Certificate	R	P	R
3	WPS/PQR	As per Vendor/ Code	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	WPS/PQR Test Report	P	-	R
4	Radiography Examination & DP/MT Test for Gas piping as applicable	100%	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/Datasheet	Radiogrpahy Report & DP/MT Report	P	-	R
5	HyVendoro test & Visual Inspection of Gas Piping	100%	Approved piping Drawing/ PO/ Approved Datasheet	Conf. to approved piping Drawing/ PO/ Approved Datasheet	Hydtotest certificate	P	-	R
G. STRUCTURAL ITEMS								
1	Dimensional Check for Skid Base Frame and NDE of Lifting Lugs for Skid	100%	Approved GAD/ Fabrication Drawing	Conf. to approved GAD/ Fabrication Drawing	Inspection Report	P	-	R
2	Concrete Filling (Piling inside skid)	100%	Approved GAD/ Fabrication Drawing	Conf. to approved GAD/ Fabrication Drawing	Compliance Report	P	-	R
3	Reinforcements	100%	Approved GAD/	Conf. to approved	Compliance	P	-	R

			Fabrication Drawing	GAD/ Fabrication Drawing	Report			
H. Miscellaneous Items								
1	Certificate of Compliance for Silencer, Main Drive Coupling	Full	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/ PO/ Approved Datasheet	Compliance Certificate	R	P	R
2.	Manufacturer's test report for Instruments, Glands	Batch	Approved Drawing/ PO/ Approved Datasheet	Conf. to approved Drawing/ PO/ Approved Datasheet	Manufacturer's Test Report / Calibration certificate	R	P	R
I. Erection and Commissioning Spares								
1	Visual Inspection of the Spares	Full	Approved PO/ Approved Datasheet	Conf. to approved PO/ Approved Datasheet	Compliance certificate	P	-	W
J. Final Inspection								
1	Final Mock-up Package assembly for Verification of Battery Limit dimensions, Visual Inspection as per GA	Full	Approved GAD/ PO	Conf. to Approved GAD/ PO	Test Certificate	P	-	H
2	String Test (one unit from each Duty)	One Unit from Each Duty	As per PO / VENDOR Test Procedure	Conf. to PO / VENDOR Test Procedure	Test Certificate	P	-	H
3	Final Paint visual and DFT check for Compressor and Major accessory items	At random	As per Paint Procedure/ PO	Conf. to paint procedure / PO	Test Certificate	P	-	H
FINAL DOCUMENTATION								
1	Final review of Certificates/ Quality Dossier as per ITP and Issue of Final Dispatch Clearance	100%	As per PO/ Approved Drawing/ Datasheet	As per PO/ Approved Drawing/ Datasheet	Dispatch Release Clearance	P	-	H

H- Hold Point W- Witness Point P- Performed By R- Review