

# TECHNICAL PROCUREMENT SPECIFICATION

FOR

INSTRUMENT AIR SCREW COMPRESSOR

IN

FACT- COCHIN DIVISION

TPS No:

3					
2					
1					
0	11.01.2021	Tender Purpose	<i>fact CD-TS</i>	<i>11/01/2021</i>	<i>V. K. S. (TS)</i>
REV	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED

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FACT- COCHIN DIVISION



## 1.0 GENERAL DESCRIPTION OF THE PROJECT

1.1 This TPS is for design, supply and commissioning of two numbers of Lubricating type, Base mounted, motor driven, Screw Compressors with a combined discharge capacity of 2000 Nm<sup>3</sup>/hr and discharge pressure in the range 7 to 8.5 Bar to meet Instrument air requirements of Phase II plants in FACT Cochin Division. The first compressor shall have a rated discharge capacity of 1500 Nm<sup>3</sup> / hour (with a positive deviation of around 100 Nm<sup>3</sup>/hr ) and shall have provision for loading / unloading. The second one shall have a capacity of 500 Nm<sup>3</sup>/hour and shall be driven with motor having a variable frequency drive. The cumulative capacity of both the compressors shall be equal to or above 2000 Nm<sup>3</sup>/hr. This flow parameters shall be obtained for all ambient conditions as detailed in the data sheet.

Both the compressors shall have separate on /off facilities and both shall be capable of running independently depending on various plant production loads. Both compressors shall be capable for working 24 hours a day. Low capacity compressor shall be provided with a provision to automatically come in line with higher capacity compressor if the latter is not able to meet the plant load on its own.

Both the compressors shall be designed to discharge the compressed air to common Filters and then into a common wet air receiver (which is already present at our site). The wet air receiver then discharges into a desiccant drier and finally to a dry air receiver. Receivers and drier are already at site and is excluded from bidder's scope of supply.

This compressor is to be integrated into the existing compressed Air system installed in the company.

1.2 The compressor and its accessories may be separate units with acoustic coverings.

1.3 These compressors are procured as a replacement to the existing reciprocating compressor. This new compressors are to be integrated with the existing wet air receiver, desiccant type drier and dry air receiver system. The desiccant drier at our site has a separate heater and air blower system for catering the Regeneration requirements. The compressed air is not intended to be used for the regeneration. All other accessories required for the compressor system, except the drier, dry air receiver and wet air receiver shall be under vendor's scope.

1.4 Capacity of existing facilities in FACT CD are as follows:

Drier Capacity (Existing): 1800 NM<sup>3</sup>/HOUR

Wet Air Receiver Volume: 4 M<sup>3</sup>

Dry Air Receiver Volume: 4 M<sup>3</sup>



## 2. ITEMS TO BE QUOTED

2.1 Following items (material and services) required for project shall be quoted in accordance with all the requirements specified in this requisition and documents attached herewith.

Sr. No.	Description
1	OIL INJECTED, MOTOR DRIVEN SCREW COMPRESSORS COMPLETE WITH ASSOCIATED LUBRICATION AND FILTER SYSTEM, UNLOADER MECHANISM, VFD AND ALL OTHER ACCESSORIES, EXCLUDING RECEIVER AND AIR DRYER AS DETAILED IN THIS TPS. COMBINED CAPACITY: 2000 NM <sup>3</sup> /HR. PRESSURE: MINIMUM 7.0 BAR. CAPACITY SPLIT UP SHALL BE AS DETAILED IN THIS TPS.
2	SUPERVISION FOR ERECTION & COMMISSIONING OF THE COMPRESSOR. (Note: Labour for commissioning shall be under FACT Scope)
3	TWO YEAR OPERATIONAL SPARES

## 3. CODES AND STANDARD

Design, engineering, materials, manufacturing, painting, inspection, testing, preservation, packing and forwarding and documentation may conform to manufacturer's standards as applicable with minimum provisions as detailed here in this TPS. In addition, any requirement as per Governmental Regulations and Local Laws & Regulations shall be complied by vendor.

#### 4. SCOPE OF WORK AND SUPPLY

The scope of work includes the following for both the compressors. Any other items, accessories or pipe fittings required for successful commissioning and operation, which if not specified out in this TPS shall also be under bidder's scope of supply.

4.1 The design, detailed engineering, selection of materials, preparation of drawings, fabrication, assembly, piping within the battery limits, inspection, testing, painting, packaging, documentation, assistance in erection and commissioning of the Compressors. All documentation called for in the tender shall be considered in the scope of vendor.

4.2 Bidder shall note that the items shall be supplied so that both the compressors shall be able to work independent of the other.

4.3 The Compressor Package shall consist of the following equipment/accessories, as a minimum, but not limited to,

- Electric motor driven Screw Compressor with Loading / Unloading mechanism and capacity 1500 Nm<sup>3</sup>/hr and pressure 7.0 Bar
- Electric motor driven Screw Compressor with Variable Frequency Drive and capacity 500 Nm<sup>3</sup>/hr and pressure 7.0 Bar.
- Suction Filters
- Compressed Air Filter
- Moisture separator with automatic drain.
- Oil Filters.
- Lube oil system with all associated filters and accessories.
- Inter coolers and After coolers as applicable.
- Local start / stop controls.





- Suitable compressor unloading mechanism which receives pressure feedback from the dry air receiver.
- Couplings with guards.
- Surface Preparation and External Painting as per project specification.
- Drawing and Documentation as per specifications.
- Road / Sea worthy & export packing for all equipments as per standard specifications and suitable for outdoor storage.
- Anchor bolts for foundations if required as per vendor design.
- All accessories, auxiliaries, couplings, associated piping within battery limit.
- Electrical System complete with Switch Disconnecter Fuse unit, Power Contactor, Protective Relays, Measuring Equipments, Control, Alarm and Annunciation Systems with remote monitoring and control provisions, etc. required for the stand alone operation of the compressor
- Mounting plates / Base Plates, SS Name Plate and Brackets, Earthling Lugs, Lifting Lugs etc .The drawings shall be supplied during offer stage.
- Any other accessories not specifically mentioned but necessary for the proper operation, control and safety of the unit and required by the applicable codes and standards shall be included in the scope of supply of vendor.
- Supplier shall provide all the foundation loads. The base dimensions and base area requirements may be provided with the offer.
- The scope of piping design and supply of pipes and pipe fittings from the screw compressor up to the dry air receiver, wet air receiver and desiccant drier shall be under vendor's scope. Fabrication at the site, including consumables only, shall be done by FACT. Vendor shall provide supervision for the fabrication.
- The bidder is free to visit the site during tendering stage / post order if they desire so, with the approval from FACT. The bidder shall get approval from FACT for all the detailed P&I diagrams, piping isometrics, cross sectional drawings, Operating Philosophy with detailed bill of materials after visiting the site, Post order.

- Bidder shall do the supervision and commissioning of the compressor including integration of the compressor into the existing air compression system. Bidder shall also supply all the accessories required for proper integration. The labour required for commissioning and site installation shall be under FACT scope.
- Supply of all the accessories/ tools required for the installation and normal operation of the compressor system other than those which are specifically excluded in this TPS are under bidder's scope.

#### 5.0 EXCLUSIONS

- 5.1 All civil works are excluded from Supplier's scope of work.
- 5.2 Piping Outside the areas specified in this TPS.

#### 6.0 MATERIALS

- a. Vendor shall furnish complete, item wise description of material used for construction in the drawing.
- b. Material of construction of compressor parts and inter connecting piping shall be suitable for service conditions specified and may be as per API 619 or manufacturer's standard .If manufacturers standard is used then a table depicting the components, MOC and working temperature shall be submitted by the vendor for FACT review..
- c. All materials supplied by the vendor shall meet the requirements of Data Sheets / Specifications and applicable codes and standards. Test Certificates for the materials shall be submitted for approval by M/s FACT.

#### 7.0 GENERAL TECHNICAL REQUIREMENTS

- a) The vendor shall assume unit responsibility for all equipment and all auxiliary systems included in their scope of work.
- b) All of the purchaser's connections shall be accessible for disassembly without requiring the machine, or any major part of the machine, to be moved.
- c) **Oil Coolers**

Oil cooler shall be provided as per manufacturers /API 614 standards. It may be air cooled or liquid-cooled, and the vendor shall include all the relevant details in their offer. Appropriate design shall be considered so that maintenance can be done while compressor is running.



#### Auxiliary systems piping

The auxiliary systems piping may be in accordance with API 614 or manufacturers standard. Details and schematics of Oil-supply piping and tubing, including fittings, MOC, drivers etc, shall be specified by the vendor.

- d) The compressor shall be base mounted type with all equipment, piping, electrical, instruments etc. mounted and wired up to JBs at the skid limit. All the Inter connecting piping between the components under vendor's scope of supply shall be under vendor's scope. Vendor may visit the site if they desires so with permission from FACT. All the drawings in this regard shall be sent for approval by FACT.
- e) Supplier shall submit a consolidated Exception, Deviations & Clarifications, if any, against the TPS separately. Deviation and exception written elsewhere in the offer shall not be considered. Vendor shall note that approval of documents by M/s FACT does not mean approval of any deviations mentioned at places other than the consolidated deviation statement . Such deviations, if noticed at any time, even after delivery, has to be rectified as per requisition by the Supplier.
- f) Area classification is Safe Zone.

#### g) Manuals

##### Installation manual

All information required for the proper installation of the equipment shall be compiled in a manual that must be issued no later than the time of issue of final certified drawings. For this reason, it may be separate from the operating and maintenance instructions. This manual shall contain information on alignment and grouting procedures, normal and maximum utility requirements, centers of mass, rigging provisions and procedures, and all other installation data.

##### Operating and maintenance manual

A manual containing all required operating and maintenance instructions shall be supplied not later than 2 weeks after all specified tests have been successfully completed. In addition to covering operation at all specified process conditions, this manual shall also contain separate sections covering operation under any specified extreme environmental conditions.

Technical data manual

The vendor shall provide the purchaser with a technical data manual with following details.

1. Certified dimensional outline drawing and list of connections
2. Cross-sectional drawings and bill of materials
3. Rotor assembly drawing and bill of materials
4. Drawings for Bearing assembly, Seal Assembly, Couplings, Coupling alignment with bill of materials
5. Seal-oil schematic, Lube-oil/control-oil schematic with bill of materials
- 6 Oil separator details
7. Injection-system schematic
8. Electrical and instrumentation schematics and bill of materials
9. Inlet capacity, power, and discharge temperature versus compression ratio, speed and discharge temperature
10. Starting torque versus speed
11. Vibration analysis data
12. Allowable flange loadings

**8.0 SPARE PARTS, INSTALLATION & COMMISSIONING, OPERATIONAL SPARES**

- a) Start up and Commissioning spare parts shall be procured and supplied along with the main equipment as per equipment manufacturer's recommendations. The list of such recommended spares shall be provided along with the offer. Any commissioning spares consumed over and above the recommended commissioning spare, during commissioning shall be supplied free of cost by the equipment manufacturer. Any leftover (unused) spares after commissioning, out of those included by vendor in his offer, shall be handed over to the Owner.
- b) For all the static equipment 200% gaskets and 10% bolting (minimum 2 nos) shall be considered as commissioning spares.
- c) List of 2 years' operational spares with price shall be provided along with offer. The order for the same shall be at the discretion of FACT.



#### 9.0 INSPECTION

- a) M/s FACT or their representative / TPI shall have free access to the works of the vendor or his sub-contractors (if any) to do the inspection of all items covered under their scope of purchase. Vendor shall submit a quality assurance plan for review and approval by M/s FACT. The QAP shall have the details about the following
- i. Material Inspection – with details of Radiography, PMI, Liquid penetrant test, Ultrasonic tests, Magnetic particle test etc as applicable shall be included.
  - ii. Testing – Hydrostatic tests, Mechanical Running Tests, Vibration analysis and any other tests not mentioned above, but specified in the standards shall be done.
  - iii. Provisions for measuring all the major operation parameters shall be included.
- b) Approval of work by M/s FACT shall in no way relieve the vendor of his responsibility in meeting all the provisions of Purchase Order.
- c) All equipment supplied shall be inspected in accordance with the requirements as mentioned in scope of work and supply, data sheets, specifications & other project specifications.

#### 10.0 SURFACE PREPARATION AND PAINTING.

- 10.1 All equipments, accessories and piping shall be painted as indicated in the painting specification attached.
- 10.2 All items shall be painted properly and shall be insulated if required.

#### 11.0 SUPERVISORY SERVICES

- 11.1 Supplier shall provide services for site supervision, for installation, pre-commissioning, start-up and commissioning, of the equipment.

#### 12.0 HEALTH, SAFETY & ENVIRONMENT (HSE)

- 12.1 Supplier shall indicate any specific /potential Health, Safety and Environmental aspects related to the equipment installation/operation/maintenance activities. Supplier shall ensure that during the above activities, the Equipment/ Package are in full compliance with all Indian Government/Local regulations.

### 13.0 GUARANTEE

The equipment and parts shall be guaranteed against defects in design, materials, workmanship and performance for a period of two year from date of commissioning.

### 14.0 EVALUATION OF THE LOWEST BIDDER.

#### 14.1 L1 Bidder Evaluation

The life cycle cost of a compressor shall be considered for calculating the lowest quoted bidder. A weightage for specific power consumption will be given for evaluating the L1 bidder.

The criteria for the same is detailed below.

- 1) The power consumed by first compressor at its maximum discharge flow rate will be taken as **P1 in Kw**. The power consumed by VFD equipped second compressor will be measured at a flow rate such that total flow rate from both the compressor sums to 2000m<sup>3</sup>/hour and shall be taken as **P2 in Kw**. The total **Power P shall be (P1+P2)**. This Total power consumption **P in KW** at a total discharge rate of 2000 m<sup>3</sup> /hr FAD shall be considered for evaluation of life cycle costs. The discharge pressure shall be vendor's rated discharge pressure. This value shall be above 7 bar as specified in this TPS. Bidder shall specify these values during the offer stage itself. **The bidder shall demonstrate this power consumption value during Inspection stage, Post order. Inspection shall be by FACT / TPI.**

The total power **P** consumed shall be the sum of the power consumed by individual compressors including VFD's power, power consumed by Lubricating system, Power consumed by filtration system, Power consumed by cooling system of both the compressors and any other power consumed by the auxiliaries of the both the compressor systems.

Power consumption by desiccant drier which is under FACT scope will not be considered.



- 2) A period (T) of 2 years is considered for evaluating the Life cycle costs.
- 3) 365 working days (D) shall be assumed in every year for calculating the compressor work.
- 4) The compressor shall be assumed to work 24 hours (R) a day
- 5) Unit cost of electricity shall be assumed to be Rs 5.80
- 6) Let Bidder's Quoted value for the Compressor system with accessories, commissioning charges etc as detailed in this TPS/ schedule of work be C (C is sum of rates quoted for individual compressors and accessories, commissioning charges etc). Note: Rate of spares is not considered for evaluation. All other costs included in schedule of work shall be added up for calculating C.)
- 7) Operating cost of the compressor for a period of two years shall be calculated as follows
- 8) Operating cost for two years =  $P * T * D * R * 5.80$
- 9) =  $P * 2 * 365 * 24 * 5.80 = P * 1,01,616$
- 10) Total investment and operating Cost for a period of 2 years in Rs  
=  $C + (P * 1,01,616)$ . (P in KW and C in Rupees)
- 11) This is the value that shall be considered for evaluating the L1 bidder.  
The bidder offering the minimum amount as above is the L1 bidder.

#### 14.2 Acceptance Criteria

- a) The acceptance/ performance guarantee tests shall be conducted at bidder's work.
- b) Bidder shall submit a procedure during offer stage for carrying out the acceptance tests for FACT approval as per ISO 1217:2009 Annex C and Annex E. In case of differences in acceptance criteria between ISO 1217 and the tender conditions detailed below, the tender conditions shall prevail.
- c) All the performance parameters shall be checked during the tests.
- d) The deviations permissible during acceptance tests shall be as below.

- 1) Volume flow rate : +/-4 % (separately for both the compressors.  
Ref: ISO 1217)
  - 2) The power at the certified point shall not exceed 104% of the  
quoted value with no negative tolerance on total required flow rate.  
(Ref: API 619)
  - 3) No load/ Zero Flow power +/- 10 %. (Ref: ISO 1217)
  - 4) Discharge pressure: shall be above 7.0 bar at all discharge flow  
rates.
  - 5) Vibration acceptance levels shall be stated by the bidder during  
offer stage with reference to any relevant standards and this shall  
be strictly met during acceptance tests.
- e) If Any of the performance parameters/ conditions offered by the vendor  
like discharge flow rate, discharge Pressure, specific power consumption,  
temperature or any other parameters specified during the offer stage is  
found to be outside the acceptable range during the acceptance tests then  
this shall be rectified by the vendor free of cost and the test shall be  
conducted again after the test.
- The compressor shall not be accepted if the vendor fails to rectify the  
same.
- f) All the equipments / tools tackles etc for performance test shall be under  
bidder's scope. All the equipments shall be properly calibrated. FACT  
shall have the right to check the proper calibration of all the equipments  
used for the tests. If any equipment is found to be not properly calibrated  
then it shall be corrected or a different one shall be used.

## 15 TECHNICAL DATA

The following data shall be included in the proposal.

- a) The purchaser's data sheets with complete vendor's information entered thereon and  
literature to fully describe details of the offering.
- b) A list of spare parts recommended for start-up and normal maintenance purposes.
- c) A list of the special tools furnished for maintenance.



- d) A tabulation of utility requirements, e.g. steam, water, electricity, air, gas, lube oil (including the quantity and supply pressure of the oil required, and the heat load to be removed by the oil), and the nameplate power rating and operating power requirements of auxiliary drivers.
- e) Any start-up, shutdown, or operating restrictions required to protect the integrity of the equipment.
- f) Vendor shall list all required relief valves.
- g) The vendor shall state retention time, maximum and minimum liquid levels and capacity in the separator vessel.
- h) Performance curves - The vendor shall provide complete performance curves to encompass the map of operations, with any limitations indicated thereon.

#### 16 DOCUMENTS TO BE SUBMITTED ALONG WITH THE OFFER/SUPPLY

16.1 Confirmation of Vendor Data Requirements. (See separate annexure attached. )Bidder shall confirm to provide the details as specified in VDR Post Order. Bidder shall submit the same post order for FACT review. Two hard copies and one soft copy of the same shall be provided with supply.)

16.2 Compliance statement to the complete tender documents. Deviations shall be specifically mentioned in the deviation sheet. Deviations mentioned elsewhere will not be considered.

16.3 Parts lists and recommended spares - The vendor shall submit complete parts lists for all equipment and accessories supplied. These lists shall include part names, manufacturers' unique part numbers, materials of construction (identified by applicable international standards). Each part shall be completely identified and shown on appropriate cross-sectional, assembly-type cutaway or exploded-view isometric drawings. Interchangeable parts shall be identified as such. Parts that have been modified from standard dimensions or finish to satisfy specific performance requirements shall be uniquely identified by part number. Standard purchased items shall be identified by the original manufacturer's name and part number.

16.4 List of Utility / Consumables.

16.5 Dimensioned sketch of the Equipment (General Arrangement drawing with detailed Bill of Materials).

16.6 Quality Assurance Plan.

16.7 Duly filled Data Sheets as described in Technical data sheets section.

16.8 Technical data as sought elsewhere in this TPS.

## 17.0 Technical Data Sheets

The data sheets depicting the requirements of the compressor and its auxiliary systems is as shown below. Bidder shall comply to FACT requirements. Vendor shall fill out the vendor's offer column. This data shall be provided for both the compressors.

Sl.No	Description	Technical Data/Purpose	Vendor's Offer
1	GENERAL		
	Location	Indoor, under roof	
	Service	Continuous	
	Place	SAP , FACT COCHIN DIVISION	
2	OPERATING CONDITIONS		
	Maximum Capacity		
	Rated Capacity		
	Fluid	Atmospheric Air	
	Suction Pressure	Atmospheric	
	Working Pressure	7 Bar	
	Discharge Pressure	7 Bar	
	Dry Air receiver set pressure	bar	
	Relative Humidity for design	0 - 98%	
	Area Classification	Safe	
	Suction Temperature for design	15 to 45 Degree Celsius	
	Discharge Temperature	Maximum 8 °C above ambient	
	Type of Duty / Control Mode	Continuous. Capacity Control Mode: On / Off	
	Drive	Motor with Variable Frequency drive	



Specific Power Consumption (in KW per unit discharge ) at rated operating point		
Motor Rated Power (Shall be around 110% of maximum rated compressor power.)		
Compressor Power –under loaded and unloaded conditions (performance curve and efficiency curves shall also be provided with minimum and maximum operating ranges.		
Total package Power at Zero input flow		
Total Package Input Power at Rated Capacity and Full Load Operating Pressure		
Specific Package Input Power at Rated Capacity and Full Load Operating Pressure		
Compressor and Motor speed in RPM		
Gear Box – Drawings with reduction ratio , power and torque values shall be provided		
Motor to compressor Coupling Type with their specifications and speed reduction ratios		
No of compressor Stages		
Lubrication Type		
Lubricant Cooling Method		
Pumps/ Fans for Lubrication (Main and auxiliary as applicable)	Cross sectional drawings, performance curves, and operation parameters shall be provided.	
Maximum permissible Oil Contamination at discharge	See filter specifications	Bidder shall submit a list of all the dust filters , oil filters and separators with their detailed specifications.
Maximum solid particulate contamination at discharge	See filter specifications	
Maximum water contamination at discharge	ISO 8573 –class 2. (This is not under vendor's scope. The drier is	

		under FACT scope)	
3	<b>CONSTRUCTION</b>		
	Bidder shall submit a BOQ specifying MOC of the item as well as the maximum and minimum temperature the item is exposed to.		
4	<b>Filter Specifications</b>		
	General Purpose Protection Filter	Particle removal down to 1 micron including coalesced Liquid water and oil, providing a maximum remaining oil aerosol content of 0.5 mg/cu.m @ 21°C	
	Oil / Water / Aerosol filter	Particle removal up to 0.01 micron including water and aerosols, providing a maximum oil aerosol content of 0.01mg/cu.m @ 21°C as per ISO 8573 Class 0 .	
	Activated Carbon Filter	Oil vapor and hydrocarbon odour removal giving a max remaining oil content of 0.003 mg/m3 Class 0.	
	Moisture Separator	Cyclonic with Auto drain valve and isolation valve	
	Manometers / differential pressure gauges shall be provided across all the filters for monitoring pressure drop.		
5	<b>Instrumentation</b>		
	Pressure Gauge	To indicate outlet pressure	
	Pressure switches / transmitter	To auto cut off at high pressure and auto start at low pressure Cut off pressure – On pressure -	
	Temperature Switch	To trip compressor at high temperature	
	Microprocessor based controller with LCD Display	Required	
	Switches for Start / Stop, Load / Unload, Menu selection , parameter configurations etc	Required	



	Emergency Stop button	Required	
	Power on indication	Required	
	ON/OFF type control mode with Discharge pressure Upper and Lower setpoint configurability	Required	
6	<b>Visual Indication, Warning and Trip</b> may confirm as API 619.	All the warnings / trips shall be Listed out by the vendor. If any missing item is pointed out by FACT then bidder shall provide it without cost escalation.	
7	<b>DRIVE DETAILS</b>		
	Motor with IP55 weather protection, overload protection. IE3 or superior efficiency class, squirrel cage induction motor, TEFC. Vendor to specify motor power (kW) and shaft power, RPM. Voltage required 415 +/- 10%, 50 +/- 3 Hz. Insulation class F. Motor starter "DOL" or "Star Delta. Minimum motor power shall be atleast 110 % of the total compressor power requirement .		
8	<b>UNLOADERS</b>	1500 Nm <sup>3</sup> /hour compressor shall have unloader mechanism. This shall receive the pressure feed back from dry air receiver and unload the compressor when Set pressure is achieved in the dryer. Bidder shall provide the detailed specifications.	
9	<b>SOUND EMISSION WITH ENCLOSURE</b>	Less than 80dbA at 1 m from the enclosure	
10	<b>Alarms And Trips</b>	A basic list of alarms and trips are detailed for reference. However the full list for Trips and alarms shall be as per API 619. Bidder shall list and confirm the same.	
	High vibration (for both axial and radial values)		

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	Operation of spare lube-oil pump & seal oil pump (if applicable)		
	High compressor discharge temperature		
	High gas differential pressure		
	High inlet-air-filter differential pressure		
	High level on separators		
	High lube-oil-filter differential pressure		
	High seal-oil-filter differential pressure		
	High thrust-bearing drain temperature		
	High or low lube-oil temperature		
	High or low lube-oil reservoir level		
	High or low seal-oil pressure		
	High or low seal-oil temperature High or low seal-oil reservoir level		
	Low coolant flow to compressor jacket Low lube-oil pressure		
	Low buffer-gas pressure		
	Motor over load		
Note : The vendor shall advise the purchaser of any additional alarms and/or shutdowns considered essential to safeguard the equipment			

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	Other Accessories		
11	Solenoid operated oil stop check valve/ Thermostat operated valve		
12	Display shall have the following.	A basic list of display items are detailed for reference. However the full list for display items shall be as per API 619. Bidder shall list and confirm the same.	
	Discharge pressure		
	Discharge temp		
	Sump pressure		
	Separator element pressure drop		
	Display		
	Power on indication		
	Sensor calibration		
	Instantaneous power consumed		
	Cumulative loaded and unloaded hours		
	Cumulative Kilowatt hour consumption. (loaded and unloaded hours shall be indicated separately)		
	Multi-Function Meter (MFM) to display Voltage, Current, Instantaneous Power, Power Factor, Energy etc. shall be provided.		
13	<b>SCOPE OF INSPECTION FOR AIR COMPRESSOR</b>		
	Correlation / Review of certificates / documents for bought out items, in house QAP	Bidder shall provide QAP and shall specify the Test Pressure along with Relevant API/ANSI/BIS/manufacturer	

		standards and shall get it approved by FACT. The QAP shall comprise inspection of major operating parameters like capacity, power and various controls.	
14	Power consumption in Loaded and Unloaded conditions.		
15	MOTOR DATA SHEET		
	MOTOR type	Squirell Cage Induction	
	Power system	3 Phase, Solidly Earthed	
	Applicable standard	IS 325	
	Rated voltage	415 V +/- 10%	
	Frequency	50Hz +/- 3%	
	Type of motor	Squirrel cage induction motor	
	Enclosure	TEFC	
	Class of duty as per IS 325	S1	
	Degree of protection as per IS 4691	IP55	
	Insulation class as per IS 1271	Class F with temperature rise limited to Class B	
	Method of starting	DOL starter/ Star delta	
	Efficiency class as per IS 12615	IE3 or higher	
	Direction of rotation of motor	BIDIRECTIONAL	
	Position of TB	90 degree Rotatable	
	Earth studs	2 Nos	
	Name plate	Stainless steel	
	Transmission	Bidder to Specify	
	Space heaters	Required for motor rating >=45 kW	
	Type of space heaters (if provided)	240V, 1 phase	
	Terminal box for space heaters (if provided)	Separate from Main Terminal Box	



	Acceptable Make	Siemens/ABB/Kirloskar/Bharat Bijlee/BHEL/Alstom/Compressor OEM's own Make	
	Make of motor		
	Rated Power		
	Rated voltage & frequency		
	Speed in RPM		
	Efficiency		
	Frame size		
	Method of starting		
	No load current		
	Full load current		
	Efficiency (%) and power factor		
	Allowable number of starts with driven equipment		
16	<b>LUBRICATION</b>		
	Type		
	Lubricant Specification		
	Recommended Lubrication ( list two Indian alternatives by trade name and number )		
	Quantity of Lubricant required for initial fill		
	Recommended Break - in period for Initial application ( Hours )		
	Recommended Lubrication for normal operation (trade name and number )		
	Refill quantities if different from initial charge		
	Quantity of Lubricant shipped with initial order		

Recommended time between changes of Lubricant		
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