

Table of contents Sections IV, V, VI (Bid documents Part II)

SECTION-IV Main Features and Description of Tender Requirements		
Important features of the tender		
S.N.	Contents	Page No.
1.	Instructions to Tenderers for filling Technical Bid	2
2	Description	3-5
3	Quantity and consignee	5-6
4	Scope of supply	6-7
5	Evaluation criteria	7
6	Other items to be quoted	7
7	Delivery Schedule Chart	7-8
Section V - Technical Specification		
	Abbreviations	9
Clause 1.	Basic Design features	10-11
Clause 2.	General Electrical Specification	11-13
Clause 3.	General Characteristics	13-16
Clause 4.	Technical Literature	16-17
Clause 5.	Spares	17-18
Clause 6.	Consumables	18
Clause 7.	Special Features	18
Clause 8.	Deviations	18
Clause 9.	Inspection & Testing at Manufacturer's Works	18-19
Clause 10.	Training	19
Clause 11.	Foundation & Related drawings	19-20
Clause 12.	Installation, Commissioning & Proving Test	20-22
Clause 13.	Service facility in India & Technical Support	22
Clause 14.	Bought Out Items	22-23
Clause 15.	Color	23
Clause 16.	Warranty Obligation	23
Clause 17.	Annual Maintenance Contract	23-25
Section-VI Annexure to Technical Specification		
Annexure-A	Format to be filled up by Bidder for submitting the Technical Bid	26-33
Annexure-A1	Format for performance certificate	34
Annexure-B	Format for Indemnity Bond to be filled up by Bidder and submitted with the Bid	35
Annexure-C	Format for Joint Receipt Inspection Note	36
Annexure-D	Format for Joint Commissioning Note	37
Annexure-E	Performance Appraisal Form (Appraisal on Completion of Warranty Period)	38
Annexure-F	List of Components to be loaded on machine	39
Annexure-G	Format for Consignee's Certificate for Quarterly Work Done under AMC	40
Annexure-H	Form for capability Assessment of new firms	41-46
Annexure-I	Format for Quality Assurance Plan	47
Annexure-J	Proposed Quantity Schedule wise for Price agreement	48

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Section – IV

Specification for Rotary Screw Diesel driven Air Compressor of Capacity 450 CFM at 10KG/CM<sup>2</sup>  
as per Specification no. COFMOW/IR/DAC/SC/450/10/2018 (Rev-2). Machine ID: ACDD 450/10,

IMPORTANT FEATURES OF THE TENDER	
<b>1</b>	<b>INSTRUCTIONS TO BIDDERS FOR FILLING TECHNICAL BID</b>
1.1	Unless otherwise stated, latest alterations/ revisions of specifications/ standards/ drawings shall be applicable. In respect of safety standards and environmental standards relevant to the machine, the machine manufacturers shall ensure compliance with International (CE/ISO/DIN/JIS)/National standards (IS) (wherever applicable).
1.2	Tenderers should offer and quote for all the specified concomitant accessories, as these are considered essential for commissioning and utilization of the machine. Even if bidder does not recommend the purchase of any of these accessories, the price must be quoted for comparison purposes and their recommendation/suggestion to be indicated in the offer. Tenderers should also quote for optional accessories, spares and consumable spares as asked in the specifications.
1.3	In case, any item is required in sets, please specify nos./pieces per set. This is essential for proper technical evaluation of the offer. Offers received without this may be considered as incomplete and liable to be rejected.
1.4	The bidder should quote only for the specified make of sub-assemblies and equipment wherever specified. Makes of sub-systems other than the specified ones will normally not be acceptable. In case, some other make is quoted, specific reasons for the same including its features/advantages over specified makes must be brought out in the offer.
1.5	In case there is a contradiction in any information provided (some parametric values given in the specification and those given in the brochure or some other document enclosed by the tenderer), unless specifically mentioned in the deviation cum confirmation statement under Annexure A of Section VI, the values as given in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.
1.6	Bidder or his authorized agent, in their own interest, should visit the consignees listed in clause 3 Section-IV with prior appointment with Controlling Officer of the consignee and acquaint themselves with existing process of manufacturing/remanufacturing, site conditions, availability of material Handling facilities etc.
1.7	The Purchaser may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. However, the decision of the Purchaser in this regard shall be final. A copy of the alternative specifications offered should be sent alongwith the offer. The Tenderer should also furnish "Statement of Deviations" from tender specifications (as per Annexure A, Section-VI) along with the offer.
1.8	The bidder who has not been placed with any order through COFMOW for the tendered machine (any capacity) shall be considered as New Vendor. Whenever, technically & commercially responsive bid is received from a New Vendor, a technical team from COFMOW shall carry out the Capability Assessment of the premises of the bidder to assess their capability to design and manufacture the tendered machine as per COFMOW Specifications. Based on the report of Capability Assessment the bidder will be considered as Suitable/ Unsuitable for placement of any order through COFMOW. The bidder shall submit the information on Annexure-H of Section-VI in the original offer.



<b>2.0</b>	<b>Description</b>
<b>2.1</b>	Rotary Screw Diesel driven Air Compressor of Capacity 450 CFM at 10KG/CM2 as per Specification no. COFMOW/IR/DAC/SC/450/10/2018 (Rev-2). Machine ID: ACDD 450/10 having parameters as per clause 2.2 (Schedule-I). Compressors are basically energy conversion devices for transforming electrical/ fossil fuel energy to compressed air form. They are used in the Railways, primarily for running pneumatic Tool, heavy machinery & plant, air testing of rolling stock, painting application etc.

**2.2 Leading Parameters (Schedule-I):** The machine shall conform to the following Major & Other Parameters.

<b>SCHEDULE - IE</b>	
<b>SPECIFICATION NO. COFMOW/IR/ DAC/SC/180/300/450/600/7.0/7.5/8.5/10.0/2018(REV-02)</b>	
<b>2.2.1 MAJOR PARAMETERS</b>	
2.2.1.1 Free air delivery	450 CFM +25CFM
2.2.1.2 Normal Effective Working pressure	10 Kgs/cm <sup>2</sup>
<b>2.2.2 OTHER PARAMETERS</b>	
2.2.2.1 Engine Starting System	12V/24V Battery suitable for starting the engine
2.2.2.2 Noise Level (Max.)	90±5 dB at a distance of 7 meter

**Note 1:**

- No deviation shall be permitted in Major Parameters.
- The tenderer should furnish the values of these parameters at S.N. 1 of Para 11 of the enclosed Annexure -A of Section-VI.

**Note 2:**

- Free air delivery, working pressure, power and specific energy consumption shall be as per ISO: 1217 (i.e. taking into account all losses) at the point of discharge of after cooler and moisture separator.
- The FAD will be measured at the discharge terminal point of the compressor package in accordance with the CAGI/PNEUROP. PN2CPTC3 Test Code (Annex D to ISO 1217).
- The FAD is to be given in terms of ACFM where ACFM is actual cubic feet per minute at inlet conditions.

<b>2.3</b>	<b>PERFORMANCE STANDARDS:</b>
<b>2.3.1</b>	<b>Calibration of Machine:</b> A load test must be carried out at the manufacturer's works conforming to requirements of ISO-1217 (latest). Rigidity of the machine must be demonstrated to the satisfaction of the appointed Inspector or Inspecting Agency.

<b>2.4</b>	<b>PRODUCTIVITY REQUIREMENT/CYCLE TIME</b>
<b>2.4.1</b>	The air compressor shall be capable of supplying compressed air at full rated capacity at the specified pressure as per Schedule-I of Para 2.2 of Section-IV.
<b>2.4.2</b>	The compressor shall be capable of working continuously in three shifts, 6 days in a week at Full rated capacity.
<b>2.4.3</b>	The compressor shall be capable of working in normal Indian Railways workshop environment with maximum ambient temperature up to 50°C and maximum relative humidity up to 98%.
<b>2.4.4</b>	The compressor shall be capable to perform conforming to the requirements of ISO: 1217 (latest)

**Note: i. Tools, Test pieces & Equipment required for installation of the compressor and Set of Gauge for checking the load etc. should also be brought by the tenderer. The tenderer can taken back these items after installation and commissioning of the compressor.**

<b>2.5</b>	<b>PROVE OUT AT FIRM'S PREMISES:</b>
2.5.1	The inspection of the compressor will be carried out to verify clause 2.2 & 9.0 of Section-IV & V respectively of the technical specification at manufacturer's premises by running first compressor from a batch of ready compressors offered for inspection for a period of at least 8 working hours and remaining compressors from the same batch offered for inspection for a period of 2 hours or till the steady operating conditions at full rated capacities are attained.

2.5.2	Rigidity of the various elements of the compressor must be demonstrated to the satisfaction of the appointed Inspector or Inspecting Agency.
Note: i.	Actual test schemes for each of the above tests shall be furnished by the tenderer the offer.
ii.	Test pieces (if any) for prove out of above tests at Firm's Premises shall be arranged by the firm. Details like material, drawings of the test pieces to be submitted with the offer.

## 2.6 PROVE-OUT AT CONSIGNEE'S PREMISES

2.6.1	The supplier shall demonstrate machine performance and prove out the claimed capability for successful commissioning at the consignee's works as given in para 2.2 of section IV for a period of 06 DAYS WORKING CONTINUEOUSLY IN 03 SHIFTS OF 08 HRS EACH. After such successful demonstration as therein before the consignee shall take over and watch the machine performance for a period of one month, before the final proving test certificate is issued.
2.6.2	The machine shall be deemed to be "Commissioned" at consignee premises on the date when it is tested and meets with the specified capabilities/functions according to the technical specifications as given in 2.2 of section IV parameters.

**Note: i. Tools, Test pieces & Equipment required for installation of the compressor and Set of Gauge For checking the load etc. should also be brought by the tenderer. The tenderer can taken back these items after installation and commissioning of the compressor.**

## 2.7 EQUIPMENT OPERATION CYCLE:

2.7.1	The general operation cycle sequence of the equipment shall be clearly defined in the offer.
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## 3.0 QUANTITY & CONSIGNEE

S. No.	Consignee	Quantity Required	Specification No.
1.	SSE/C&W/DNR	01	Specification no. COFMOW/IR/DAC/SC/450/10/2018 (Rev-2). Machine ID: ACDD 450/10

**Note: The above quantities are included in the proposed Schedule wise Quantity for Price agreement. (attached at Annexure-3)**

<b>4.0</b>	<b>SCOPE OF SUPPLY</b>
4.1	The scope of supply shall include design, supply, and installation, testing, commissioning and proving of Diesel Engine driven, rotary screw, air-cooled stationary air compressor ON TURNKEY BASIS (inclusive of foundation related civil work if applicable).
i.	Design, manufacture & supply of diesel engine driven rotary screw, stationary air compressor as per parameters in Schedule-I with air-cooled oil cooler, battery starting & charging system, controls, safety devices, oil reservoir cum separator.
ii.	Concomitant accessories as per clause 4.2



iii.	Maintenance & Operation instructions manual and spare parts catalogue - 4 sets
iv.	Maintenance spares for two years, as opted by purchaser, as per clause 5 & 6 of Section-V.
v.	Training as per clause 10.0 of Section-V.
vi.	Installation commissioning and prove out as per clause 12.0 of Section-V.
vii.	After sale services as per clause no. 13.0 of Section-V
viii.	Warranty services of 24 months as per clause 16.0 of Section-V & BID Document Part-I.

#### 4.2 CONCOMITANT ACCESSORIES:

4.2.1 The machine shall be accompanied by the following concomitant accessories. Cost of each of the listed concomitant accessories should be quoted separately. Wherever for any reason the cost of any concomitant accessory is included in the basic price of the machine, the same should be specifically mentioned:

i.	Vertical Air receiver of 3 m <sup>3</sup> capacity conforming to IS: 2825 and IS: 7938 with all mountings	- 1 no										
ii.	Seamless air piping of 100mm bore between Compressor and air receiver including sockets, NRV, Tee/elbow joints, isolating valves etc.	- 10 M										
iii.	First fill of oils and lubricants to be quoted as follows	- First fill										
	<table><tr><th>S. No.</th><th>Name of oil / lubricant</th><th>Cost per ltr.</th><th>Qty.</th><th>Total cost</th></tr><tr><td></td><td></td><td></td><td></td><td></td></tr></table>		S. No.	Name of oil / lubricant	Cost per ltr.	Qty.	Total cost					
	S. No.		Name of oil / lubricant	Cost per ltr.	Qty.	Total cost						
iv.	Light maintenance tool kit (List of tools to be furnished in the bid)	- 1 set										

**Note:-** The bidder shall also quote every additional per meter rate for the items required specified above in Cl. 4.2.1 (ii).

4.2.2 Any other equipment required to make the compressor fully functional at site shall be listed under concomitant accessories and quoted separately

<b>4.3</b>	<b>OPTIONAL ACCESSORIES:</b>
<b>4.3.1</b>	Any other attachment/accessory, which in the opinion of the bidder shall enhance the capability of the air compressor, shall be quoted separately bringing out the advantages thereof. Their prices are not included in the basic price of the machine. However, for the information of the purchaser item wise price should be indicated in the offer.

**5.0 EVALUATION CRITERIA**

The total value of the offer will be calculated on the basis of :

i.	The cost of the basic machine
ii.	Cost of the concomitant accessories according to tender specification.
iii.	Cost of any other offered accessory as concomitant accessories in addition to items given in clause 4.2.
iv.	Spares for two years normal operation and maintenance as per clause 5 of section V.
v.	Applicable duties and taxes, insurance, freight, installation and commissioning, training and maintenance charges during warranty etc.

**6.0 OTHER ITEMS TO BE QUOTED**

The following items will need to be quoted additionally though will not be part of commercial evaluation:

i.	Cost of comprehensive AMC for five years after the warranty as per clause 17.
ii.	Consumables as per clause 6 of section V with break up of individual items as Applicable.
iii.	Cost of Preventive Maintenance during 1 <sup>st</sup> & 2 <sup>nd</sup> year of Warranty Period.
iv.	Optional accessories with break up of individual items as specified in clause 4.3 of Section-IV

**7. DELIVERY SCHEDULE CHART:**

In the event of acceptance of the offer, the compressor (s) shall be supplied as per the following Milestone Chart:

**Name of the Machine: Diesel Driven Rotary Screw Type Air Compressor**

S.N o.	Activity	Activity Code	Outer Limit of Time Schedule expected by COFMOW
1.	Issue of LOA	D1	-
2.	Submission of PBG By Successful Bidder	D2	D1+30 days
3.	Issue of AT / Contract By COFMOW (after verification of PBG)	D3	D2+30 days
4.	Opening of LC by COFMOW (for foreign suppliers)	D4	D3+30 days
5	Submission of GA drawings and requisition for the trial component (s) (if applicable) to consignee by Successful Bidder/Supplier along with information on power and other utilities required for machine.	D5	D3 + 45 days
6.	Approval of GA drawings by consignee (to be governed by clause 11.2 of section-V) and confirmation of availability of components to be proved out at manufacturer premises and value of BG required for providing prove out components.	D6	D5+ 45 days
7.	Confirmation of availability of clear site by consignee	D7	By D6 (i.e. at the time of approval of GA drg.)
8	Completion of foundation	D8	D7+150 days or latest by D 10
9	Submission of BG and collection of components from consignee by the supplier for prove out of machine at manufacturer's works.	D9	<b><u>D6 + 60 days</u></b>

10	Supply/ Delivery of machine (for indigenous suppliers)	D10	<b>For First machine:</b> D6 + 180 days <b>Thereafter subsequent machines:</b> @ 05 machines per month
11	Power connection for the machine and other on site requirements to be provided by railways	D11	<b><u>D10 + 7 days</u></b>
12	Railway to give call to supplier for the commissioning of machine	D12	<b><u>D10 + 7 days</u></b>
13	Installation, commissioning and proving out of machine by supplier	D13	D11 + 60 or D12 + 60 (whichever is later) days
14.	Issue of PTC by consignee	D14	D13 + 30 days
15	Warranty by supplier	D15	D13 + 2 years
16	AMC	D16	D15 + 5 years

**Note: Notwithstanding the delivery period indicated elsewhere in the tender document, the delivery indicated in this schedule shall be taken as overriding and final.**



## Section-V

**TECHNICAL SPECIFICATION****ABBREVIATIONS**

A-1,A-2, A-3, A-4	Standard paper sizes
AC	Alternating Current
AMC	Annual Maintenance Contract
AT	Acceptance of Tender
BG	Bank Guarantee
CME	Chief Mechanical Engineer
CME/PCM	Chief Mechanical Engineer/Post Contract Management
CNC	Computer Numeric Control
COFMOW	Central Organization for Modernization of Workshops
COS	Controller of Stores
Db	Decibel
DC	Direct Current
FA&CAO	Financial Advisor & Chief Accounts Officer
GA (Drawing)	General Arrangement (Drawing)
HRC	Hardness Rockwell 'C' Scale (value)
Hz	Hertz
IEC-Pub	International Electro technical Commission - Publication
JCN	Joint Commissioning Note
JRI	Joint Receipt Inspection
Kw	Kilo Watt
LC	Letter of Credit
LD	Liquidated Damages
LOA	Letter of Acceptance
NC	Numeric Control
NIT	Notice Inviting Tenders
PBG	Performance Bank Guarantee
PDF	Portable Document Format
PLC	Programmable Logic Controller
PTC	Proving Test Certificate
PU	Production Unit (Any of the six Railway Production Units e.g. RCF, ICF, CLW etc.)
RDSO	Research Design & Standards Organization
SS	Stainless Steel
WBG	Warranty Bank Guarantee



## 1.0 BASIC DESIGN FEATURES:

1.1	<b>SAFETY FEATURE</b>
1.1.1	The machine design shall ensure safety of the operator and the compressor at all times including accidental slipping of the test sample under test. Details of safety features provided in the machine shall be furnished in the bid.
1.1.2	Suitable interlocks should be provided to protect the machine in the event of hydraulic Oil failure, lubrication failure, pneumatic system failure, fluctuation in voltage and frequency.
1.1.3	Mushroom type emergency stop shall be provided on the machine, which shall be easily accessible and capable of disabling the machine, drives in case of any emergency.
1.1.4	Noise measurement should be carried out as per NMTBA noise measurement Technique/ ISO-3746.
1.1.5	All the pipes, cables etc. on the machine should be well supported and protected. These should not create any hindrance to machine operator's movement for effective use of machine.

### 1.2.1 SPECIFIC CHARACTERISTIC

1.2.1.1 The tenderer must provide the actual details of the compressor offered against each item mentioned in Annexure-A to Section-VI.

1.2.1.2 Bidders must offer a design considering dual option i.e. portable as well as for installation. The compressor is mounted on a deck such that it is possible to install the compressor on plain concrete floor, thus, eliminating the need for a foundation. Details of the offered mechanism should be indicated in the offer by the bidder with supportive drawings and literatures. The compressor shall be capable to perform conforming to the requirements of ISO: 1217 (latest).

1.2.2 **Controls:** Centralized control panel within easy reach of the operator along with the necessary control equipments such as indicators/gauges/switches etc. suitably located at the control panel. All indicators/gauges/switches provided on the control panel shall be listed in the bid. Following features/ controls shall include but not necessarily be limited: -

- i. Air intake filter choking/servicing due.
- ii. Oil filter choking/servicing due.
- iii. Air-oil separator when servicing is due.
- iv. Discharge air temperature after compressor.
- v. Discharge air pressure at delivery end.
- vi. Vacuum indicator for suction filter.
- vii. Engine oil pressure gauge
- viii. Engine water temperature gauge.
- ix. Hour meter to indicate total running hours and total loaded hours.
- x. Ignition start and override switches
- xi. Automatic part load operation controls to ensure proportionately lower power consumption under part load working conditions.

### 1.2.3 Filters:

- i. **Air Intake Filters:** Heavy duty, multistage with particle removal down to 2-3 microns and maintenance user friendly with respect to cleaning and replacement.
- ii. **Oil Filters:** Filtration capacity of 25 microns and maintenance user friendly with respect to cleaning and replacement.
- iii. **Air-Oil Separator:** Multi stage oil separation to ensure oil carry over less than 5 ppm oil, Pressure drop in the separator shall not exceed 0.3 kg/cm<sup>2</sup>. It should be maintenance user friendly with respect to cleaning and replacement.

### 1.2.4 Bearings:

Only SKF/FAG/NORMA/NTN/KOYO/NBC/NSK/ TIMKIN acceptable makes

### 1.2.5 Diesel Engine:

A compatible diesel engine of compact and lightweight construction mounted on compressor skids shall be provided to drive the compressor along with suitable battery starting and battery charging system. The diesel engine should be water-cooled.

Diesel Engine of only Simpson/ Kirloskar/ Cummins/ Ashok Leyland/ Telco makes shall be acceptable. Batteries of only fully sealed type shall be acceptable.

1.2.6 **Cabling & Tubing:**

Provision of following: -

- (a) Instruments tubing from measuring points to gauge panel.
- (b) Control cabling between various instruments and starter-cum-control panel duly terminated properly lay through ducts/cable trays with fixing clamps.

2. GENERAL ELECTRIC SPECIFICATION	
2.1	The provision of this General Specification shall apply, wherever relevant.
2.2	All equipments and material shall comply with appropriate Indian Standards (latest) or National Standards of the country of origin provided the latter are equivalent to or better than the former. Items for which Indian Standards are not published, National Standards shall be acceptable. The Bidder shall indicate the Standards applicable. The following standards are applicable in particular. (Corresponding International Standards like ASA, NEMA, BSS, DIN etc. may also be quoted).
IS :	325-1979 (latest) - Three phase induction motors (corresponding to IEC pub-34-1) (Latest).
IS :	1248 (Latest) - Direct acting indicating analogue electrical measuring instruments and their accessories (corresponding to IEC Pub-51) (Latest).
IS :	1231-1974 (Latest) - Dimensions of three phase induction motors (corresponding to IEC Pub-72-1) (Latest).
IS :	1271-1985 (Latest) - Classification of insulation material for electrical machinery & apparatus in relation to their thermal stability in service (corresponding to IEC-Pub-85) (Latest).
IS :	6875 (Latest) - Push Buttons and related control switches corresponding to IEC Pub/73) (Latest).
IS :	375-1963 (Latest) - Marking and arrangement of switch gear, bus bars, main connection & auxiliary wiring.
IS :	996-1979 (Latest) - Single phase small AC and universal electrical motors.
IS :	1356 (Latest) - Electrical equipment of machine tools.
IS :	2516 (Latest) - Circuit breakers (corresponding to IEC Pub-56) (Latest)
2.3	Unless specified in the main specification, the AC motors and starters shall be of the following type. Bidder is, however, free to give alternative proposal along with justification, if in his view alternative proposal in warranted by site conditions: Type of motor type of starter.
TYPE OF MOTOR	
2.3.1	Any type of AC motor starting current of which does not exceed 75 amps.
2.3.2	AC squirrel cage, induction motors, starting current of which is above 75 amps. if started direct on line.
2.3.3	AC slipring type motor
2.3.4	AC synchronous or synchronous induction motor.
2.3.5	DC motor
2.4	The control gear for AC/DC motors shall incorporate the following protection devices as concomitant accessories.
2.4.1	<b>No Voltage Protection</b> - No voltage protection shall be provided so that machine will not start up again by itself when, following an interruption the supply is restored.
2.4.2	<b>Short Circuit Protection</b> - To protect against short circuits due to insulation failure of faulty connections HRC fuses shall be provided for each motor. The rating of the fuse shall be such as to take care of the over current due to motor starting.
2.4.3	<b>Over Load Protection</b> - To prevent motors from overloading, overload protection shall be provided separately for each motor. Three phase motors shall be protected by overload tripping devices on each phase.
2.4.4	<b>Single Phasing Protection</b> - A separate current sensitive delayed action single phasing preventor shall be provided for each motor separately. Overload protection shall not be treated as single phasing preventor.