

RAIL COACH FACTORY, KAPURTHALA		
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Mech/M&P/3600/GM/03 Rev.- NIL	PSA Industrial Oxygen Generator of 95% purity with cylinder filling facility	

Designation	Name	Signature	Date	Level
SSE/M&P	Rajat			Prepared
CME/Co-ord	G.S. Negi			Agreed & Approved

Issue/ Rev	Changes	Date

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1.0 IMPORTANT INSTRUCTIONS TO TENDERERS FOR FILLING TECHNICAL BID

- 1.1 Bidders are required to give clause wise comments on the technical specifications, confirming compliance/non-compliance with details of deviations if any along with their effect on the performance. Back references to be avoided, offers are likely to be ignored in case of non-compliance of these instructions for furnishing the information.
- 1.2 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).
- 1.3 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 any of these accessories, the price must be quoted for comparison purposes and their recommendation/suggestion indicated in the offer. Tenderers should also quote for optional accessories, spares and consumable spares as asked in the specifications.
- 1.4 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.
- 1.5 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.
- 1.6 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 the values as given in the specification shall be taken as confirmed by the tenderer and offer evaluated accordingly.
- 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.
- 1.8 Purchaser reserves the right to verify the details submitted by the bidder by actual site visits.
- 1.9 Other terms & condition of the contract will be as per Indian Railway Standard conditions of contract.
- 1.10 Tenderer not submitting the requisite information may note that his offer is liable to be ignored.
- 1.11 Layout and General Arrangement drawing of the plant shall be provided by the bidder.

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2.0 DESCRIPTION :

The specification covers supply, installation, commissioning and proving out of PSA industrial oxygen generator of at least 95% purity with cylinder filling facility of capacity 15 m³/hr or 250 lpm capable of filling at least 50 industrial grade cylinders/day of 7m³ capacity @ 150 bar. The supply shall include all concomitant accessories/equipment which the manufacturer consider essential to make the machine fully operational when installed at Rail Coach Factory Kapurthala Punjab.

3.0 SCOPE OF SUPPLY: The oxygen generation plant shall comprise following internal components/ system:

3.1 Air Circuit:

- An inlet pressure regulator to set the inlet pressure to a maximum of 7 bar.
- 2 Pneumatic actuated inlet valves to guide the air to one of the adsorber vessels.
- 2 Pneumatic actuated exhaust valves, one for each adsorber vessel, to release the pressure in the vessel and start the regeneration sequence. The exhaust valves alternate every half cycle.
- An air silencer is connected to the exhaust valves, and reduces the noise level upto max. of 85 dB during exhaust / regeneration
- A Pneumatic actuated equalization valve to bring both adsorber vessels to the same pressure
- 2 Adsorber vessels, filled with Zeolite Molecular Sieves (ZMS), to absorb the nitrogen molecules from the inlet air, while oxygen molecules can pass.
- A pressure relief valve on each adsorber vessel.

3.2 Oxygen Circuit:

- A Pneumatic actuated equalization valve to bring both adsorber vessels to the same pressure.
- A purge nozzle that allows a small portion of oxygen flow into the depressurized vessel for regeneration purposes.
- 2 Non-return valves at the outlet of each tower to avoid back flow from the outlet of the generator
- A oxygen feedback line from the oxygen storage vessel to the oxygen purity and flow sensors of the generator.

3.3 Gauges and Instrumentation:

- Pressure gauge on each adsorber vessel
- Oxygen storage vessel pressure transmitter
- Online Oxygen purity sensor in Oxygen storage vessel

3.4 The oxygen generators shall be supplied with an advance control unit having user friendly interface, shall be easy to use with at least 3.5-inch high definition color display with pictograms and LED indicators for key events. The keyboard shall be durable to resist tough treatment in demanding industrial environments. The system shall have comprehensive

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maintenance display having Process illustration feature with valve cycle indication, graph showing pressure and current operation values.

- 3.5 The oxygen generator shall be plug and play type, shall only require a supply of dry compressed air. Plug-and-play type. No specialist installation or commissioning shall be required.
- 3.6 The supply shall also include all equipments and accessories which the manufacturer considers essential to make the equipment fully functional when installed and put into operation.
- 3.7 Other concomitant accessories/ equipment which the manufacturer considers essential to make the machine fully operational when installed and commissioned with requirement of utilities, etc if any, should be clearly indicated by tenderer in the offer.
- 3.8 The total value of the offer will be calculated on:
- The cost of the basic machine.
 - Cost of the concomitant accessories according to tenderer specification.
 - Cost of any other accessory treated as concomitant accessory.
 - Application duties and taxes, insurance, freight and installation and Commissioning charges.
- 3.9 Technical experts of the manufacturer during commissioning of machine will fully and adequately train the operators/ maintenance staff nominated by the consignee including repairs of electronic gadgets, sub-assemblies and Printed Circuit Boards up to component level.
- 3.10 On-site Erection, Electrical Connection, Civil work and all sorts of licensing from various authorities shall remain optional in the scope of supplier. The offer for the above items if desired by bidder shall be provided separately, which will not be part of financial tabulation of the bid.

4.0 OPERATING PRINCIPLE:

The system shall be an On-site air-cooled Oxygen Generator based on PSA technology

5.0 LEADING PARAMETERS:

i.	Technology	On-site PSA Technology air cooled Oxygen generator
ii.	Purity	95% at least
iii.	Grade	Industrial
iv.	Capacity	15 Nm ³ /hr ~ 250 lpm at 5.5 Bar with cylinder filling facility capable of filling at least 50 cylinders/day of 7m ³ @ 150 bar capacity each

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v.	Power consumption	25 KWH @ 415V 3 Phase 50 Hz (max.)
vi.	Connected Load	25KW approx.
vii.	Temperature of product Gas	Max. 40°C
viii.	Make & Type of Compressor	Atlas Copco/ Kirloskar/ Chicago Pneumatic/ Elgi/ Kaeser make or equivalent, screw type
ix.	Refrigerant air dryer	Atlas Copco/ Kirloskar/ Chicago Pneumatic/ Elgi/ Kaeser make of Capacity 180-200 lps
x.	Air Compressor Capacity-	180-220 cfm @ 8 bar- oil injected screw compressor air cooled
xi.	Filter for removing wet dust, aerosol, water droplets	Oil Aerosol size upto 0.0009 mg/ m ³ and particle size 0.01 micron
xii.	Filter for removing oil vapors	Upto 0.003 mg/m ³
xiii.	Filter for removing dry dust and solid particle	Suitably sized
xiv.	Air receiver	At least 1 m ³ (1000 L) at 10 Bar capacity
xv.	Oxygen receiver tank	At least 1 m ³ (1000 L) at 7 Bar

Oxygen Boosting System Details

xvi.	The machine shall be pneumatic driven and must be driven from compressor to provide compressed air to the boosting system. The system shall be sufficient for 15 m ³ /hr of PSA type Oxygen generation plant @ 4 bar pressure of Oxygen
xvii.	The system shall have the caster wheel at bottom of the machine for ease of movement.
xviii.	The system shall be capable of boosting oxygen to fill industrial cylinders @ 150 bar from oxygen available @4 bar
xix.	The system shall be supplied with compressor of atleast 240 scfm capacity @ 7 bar to efficiently run the system.
xx.	The system shall also include 4 cylinder Gas filling Manifold fully equipped with Hoses, Valves and Gauges

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xxi.	MOC	Mild Steel, Stainless Steel, Brass
xxii.	Painting	Primer & Epoxy Painted
xxiii.	Noise Level	less than 70db at 1 meter distance

(Wherever range given above, better range is acceptable)

6.0 MAIN COMPONENTS/ASSEMBLIES:

1. PSA Oxygen Generator
2. Air Compressor
3. Refrigerant Air Dryer
4. Filtration System
5. Air Receiver
6. SS Oxygen Tank
7. Oxygen Boosting System
8. Compressor for Boosting System
9. Tubes and fittings for internal integration circuit

7.0 CONCOMITANT ACCESSORIES

- 7.1 The tenderer shall supply a list of concomitant accessories, which will be supplied along with the machine. The cost of each listed concomitant accessory 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.
- 7.2 Any other accessory, which in the opinion of the tenderer can contribute to higher performance, should be indicated and quoted separately.
- 7.3 A maintenance tool kit containing hand tools is required to cover all the fasteners of all sub-assemblies of the equipment.

8.0 SPARES & CONSUMABLES

- 8.1 The tenderer should furnish details of spares covered under warranty.
- 8.2 List of important spare parts and accessories with their part number and costing.
- 8.3 The tenderer should be furnishing the price list of spare parts required for two years normal maintenance of the equipment. Sources of supply of spares used other than that of manufacturer should be furnished by the tenderer.
- 8.4 List of recommended spares for normal maintenance after expiry of warranty period to till useful life of the equipment and these spares should be readily available in the market with your authorised stockists.
- 8.5 List of recommended consumables for two years shall be quoted separately.
- 8.6 Useful life estimated/expected for each equipment and its sub assembly should be indicated by the tenderers.

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9.0 INSPECTION OF EQUIPMENT & TESTING AT MANUFACTURERS WORKS

- 9.1 Manufacturers must have suitable facilities at their works for carrying out various performance tests on the equipment. The tenderer should clearly confirm that all the facilities exists and shall be made available to the inspecting authority.
- 9.2 A load and functional test must be carried out at the manufacturer's works. Reliability of the equipment shall be demonstrated to the satisfaction of the appointed inspector or inspecting agency.
- 9.3 A sample inspection chart for inspecting the equipment should be supplied along with the bid.

10.0 INSTALLATION COMMISSIONING AND PROVING TESTS

- 10.1 The contractor or his agent would be required to carry out a joint check at the consignee's end, along with the consignee, before unpacking is done, to avoid subsequent complaints regarding short shipment/transit damages. It is necessary that this joint inspection be done immediately on receipt of the machine by consignee to avoid commissioning delays due to shortages/transit damages.
- 10.2 Installation of the machine would be done under the supervision / direction of firm engineers. The contractor shall arrange commissioning of machine after installation is done. Adequate number of teams of technical experts will be made available so that the commissioning delays are eliminated. Such personnel will be required to be present as soon as the machine has been received.
- 10.3 The contractor or his agent shall commission the machine within 15 days from the date of receipt of machine.
- 10.4 The machine performance shall be demonstrated to the full satisfaction of consignee at the consignee's works.
- 10.5 If an assembly/sub-assembly requires to be taken back to the manufacturer's premises for repairs/replacement either before commissioning or during warranty, the manufacturer or his agent would be required to submit a Bank Guarantee. In case the entire machine has to be taken back, a Bank Guarantee would have to be submitted. The Bank Guarantee should be of adequate value so as to cover the cost of the assembly/sub-assembly/paid up cost of the machine.

11.0 TECHNICAL LITERATURE

- 11.1 One copy of the printed illustrative catalogue showing technical features of the machine and its elements must be enclosed with each copy of the bid.
- 11.2 The successful tenderer will have to furnish, for each machine 4 copies of spare parts catalogue giving the part list number of each component with exploded views and assembly drawings of major assemblies, maintenance manual, trouble shooting guide, operational manual of the machine and all electrical circuit diagrams to the consignee directly within 3 months of the placement of order. The bidders should provide a list of literature, they will supply along with the machine. The technical literature shall be provided for complete machine including imported and indigenously purchased components/sub-assemblies.

12.0 WARRANTY

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- 12.1 As per IRS conditions or as quoted by the tenderer whichever is later.
- 12.2 Warranty period for part or machine shall be extended after completion of warranty period by the duration under which the part or machine remains under breakdown during warranty.

13.0 SCHEDULE OF ANNUAL MAINTENANCE CONTRACT (AMC) FOR PERIOD OF 5 YEARS AFTER COMPLETION OF WARRANTY PERIOD

- 13.1 Tenderer shall provide proposal for 5 year Annual Preventive Maintenance schedule to be executed after completion of warranty period in the format as per annexure-B.
- 13.2 The firm shall maintain the machine in good working condition during the contract period and shall correct the fault or failures, repair or replace the worn or defective parts/equipment during the normal working hours of shop where the equipment has been installed. Unserviceable parts/equipment need to be replaced at no extra cost with brand new parts/equivalent or superior specification.
- 13.3 The firm shall respond by deputing service personal to oral / telephonic/ or other modes of intimation for repair and maintenance of the said machines within 2 hours.
- 13.4 The firm shall ensure that the machine is in proper working condition, to the full capacity, after repair and maintenance.
- 13.5 To have a timely supply of spares during AMC, the contractor shall furnish a total list of spares which should contain list of spares that shall be arranged by the firm, both chargeable, duly mentioning the charge against each item, and spares which shall be non-chargeable, and list of spares to be held by RCF.
- 13.6 The contractor shall clearly list-out the list of consumables required for day-to-day operation of the machine. It shall be the scope of RCF to arrange the consumables once the completion certificate is issued for the retrofitted machine.
- 13.7 The tenderer/contractor shall provide suitable standby when repairs exceeds 2 hours. When any equipment is taken for repair to the tenderer/contractor's premises suitable standby equipment should be provided.
- 13.8 Besides attending the breakdown calls, the firm shall attend to the corrective and preventive maintenance of the machines once in a month.
- 13.9 The AMC is valid for five years from the date of completion of the warranty period. No freight is admissible.
- 13.10 During the AMC period, whatever equipment is defective shall be handed over to RCF. During completion of the AMC period the machines should be handed over in full working condition to its full capacity.
- 13.11 The firm should maintain a register duly indicating the nature of defects and repair attended and got signed by RCF authority. Preventive maintenance schedule should be made. The schedule should be made in such a way that more than one machine should not be attended on the same day. A copy of the schedule should be given to RCF at the beginning of the AMC and the schedule should be strictly followed and on carrying out the preventive maintenance the same should be entered in the register and got signed by RCF authority.
- 13.12 AMC charges shall be paid quarterly as one quarter of the total AMC charges applicable for that year on submission of bills duly certified by the engineers in charge with regard to the satisfactory execution of AMC during the period for which the bill is claimed. Duties & taxes as applicable at the time of payment shall be deducted at source.

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14.0 PAYMENT TERMS

80 % on receipt of machine and balance 20% after successful commissioning of machine and submission of Bank guarantee equivalent to 10% of P.O value valid up to the warranty period of the machine.

15.0 DOCUMENTS TO BE UPLOADED FOR TECHNICAL EVALUATION

Following documents must be submitted by the tenderer along with the offer:

1. Clause wise comments on technical specification
2. Documentary evidence of previous supplies to other Railways
3. Authorisation certificate of OEM in case of Authorised dealer
4. Detailed list of spares covered under warranty.
5. Details of deviations from specification if any.

Tenderer not submitting the above information may note that his offer is liable to be ignored.

16.0 OTHER TERMS & CONDITIONS

- 16.1 Other terms & condition of the contract will be as per Indian Railway Standard conditions of contract.
- 16.2 The Purchaser may accept internationally accepted alternative specifications which ensure equal or higher quality than the specifications mentioned in the Technical Specification. Delivery period shall be within 90 days of placement of purchase order.