

High Pressure air heater

I. Technical specifications :

S/N	Description	Specifications / Requirements
1.	Description	Proposed electric air heater is to be used for heating of compressed air, for the testing of a pneumatic motor. High pressure (35-50 bar) compressed air at room temperature is connected to the heater inlet and out let will be hot air, as per the set temperature.
2.	Configuration of heater	Configuration of the heater shall be Vertical with heating element along with pressure vessel, mounted on a skid. (A sketch of tentative configuration of the proposed heater is given in Fig.1, below) Bundled heating elements with necessary baffles and supports shall be used with necessary provision for connecting inlet and outlet flanges. Tentative configuration of heater system given here is only for easy understanding; however supplier has to design the system to meet the requirement specifications outlined in this document and overall configuration and dimensions shall be maintained as per above sketch. Horizontal configuration is not acceptable.
3.	Scope of work	Scope of work shall include design, realisation, supply, erection, installation and commissioning on turn-key basis . Supplier shall be responsible for the complete design (Mechanical, Thermal, electrical etc.,) of the proposed air heater. (A sketch for tentative arrangement of heater system is given in Fig.-2; same shall be referred for system design). The design shall be as per ASME Section-VIII Division-3 (ASME "U" stamp) with certification from a ASME recognized third party inspecting agency (TPIA). Installation and commissioning shall be carried out at VSSC, Thiruvananthapuram, with minimum one year warranty after commissioning.
4.	Previous experience	Supplier should have previous experience for the design and realisation of pressure vessels /air heaters and proof for the same shall be provided along with technical bid. Details Previous purchase order/s with state/central government institutions/ R&D labs/PSUs etc., for the similar/equivalent system, shall be provided along with offer. If any part of the work (pressure vessel/heater system) is planned to be outsourced, details of the proposed vendor shall be provided for verification. Outsourcing shall be permitted only with qualified and experienced vendors.
5.	Design of pressure vessel	The pressure vessel shall be designed according to relevant ASME standards/codes as per Section-VIII Division 3. Design pressure : 60 bar Design temperature : 600 °C Operating pressure : 35-50 bar inlet Pressure drop : 1 bar (max.), inlet to outlet Hydro Test pressure: As per relevant ASME code.
6.	Third party certification	The drawings and design shall be approved and tests shall be witnessed and certified by a third party as per above S/N: 3.
7.	Material of construction	The material of construction for pressure vessel, heater flange, inlet and outlet flanges, all internal parts etc., shall be of stainless steel (SS) . Designation of proposed material shall be mentioned in the offer.
8.	Heating element	Bundled heating elements.(heater capacity to be designed by the supplier) Heating coil : Ni-Cr Outer sheath : Seamless tubes of Incoloy 625 or equivalent

		<p>Element insulation: Magnesium oxide or equivalent.</p> <p>No. of bundles : 01</p> <p>No. of banks : 02 or more</p> <p>No. of elements : As per design</p> <p>Spare elements: Minimum spare elements shall be available.</p> <p>Terminal enclosures shall be suitable for safe area (IP65 or better)</p>
9.	Power supply	415 V, 3 Phase, 50 Hz.
10.	Temperature sensor/ thermocouple	<p>Standard thermocouple / sensor shall be used, non-standard items are not acceptable.</p> <p>No. of thermocouple: As per design (redundancy (Quadruplex) shall be available and same shall be used for control purpose). Additionally (Min. 2 Nos.) platinum based sensors shall be provided for monitoring and safety cut-off purpose. Provision for calibration/replacement of sensors to be ensured. Details of thermocouples shall be mentioned in the offer.</p>
11.	Mounting configuration	<p>Pressure vessel along with heater shall be vertically fixed on a MS skid. Design of the skid is the responsibility of the supplier. Skid base should have provision for using foundation bolts, if required. Skid shall not be directly welded with the pressure vessel and same shall be fastened with special fasteners, it is required for dis-assembly and testing, if required in future. Necessary handling provisions shall be provided on the skid for vertical handling and installation.</p>
12.	Installation environment	The proposed site for the installation of air heater is near sea shore , hence necessary surface protection measures and corrosion allowances shall be considered while design of the system.
13.	Insulation and cladding	<p>Proper insulation shall be provided over heater vessel with outer cladding. Insulation thickness shall be designed as per requirement and outside temperature on cladding shall be < 45 Deg.C.</p> <p>Aluminium or powder coated CRCA sheet shall be used for Cladding, same to be mentioned in the technical offer.</p>
14.	Control panel	<p>Thyristor based control panel (100% thyristor control) shall be suitably designed as per the load requirement. Eurotherm E-power series thyristor only shall be used. Thyristor control panel shall be directly mounted on the skid. Separate vertical panel not acceptable. Control panel shall essentially consist of all major elements like MCCB, contactors, earth leakage relays etc. All the electrical items/accessories shall be of Siemens/Schneider. Space heater with thermostat and cooling fan (with filter) with suitable rating shall be available in the control panel. A flashing LED beacon light (red/ambour colour) shall be provided on top of the heater/panel, and the same shall on 'ON' while heater is 'ON'. General industrial standards should follow for the design of electrical systems with proper identification and tagging of each component.</p>
15.	Remote control panel	<p>A remote control panel shall be provided along with heater thyristor control panel. Element Temperature controllers and safety (cut-off) temperature controllers shall be provided on remote control panel. Remote panel essentially proposed to be kept in another room (heater control room) and all the operations by the operator shall be from remote panel. Remote panel shall consist of Key actuated ON/OFF switch and the following indications.</p> <p>Power ON, Heater ON/OFF, Element over temperature, fault indication/alarms/errors. Wiring from thyristor panel to remote control panel is the responsibility of the supplier. Approximately 35m cable length may be considered for the same. Wires shall be properly routed through appropriate cable management system/conduit.</p> <p>Remote panel shall be compact and table top system and size should be</p>

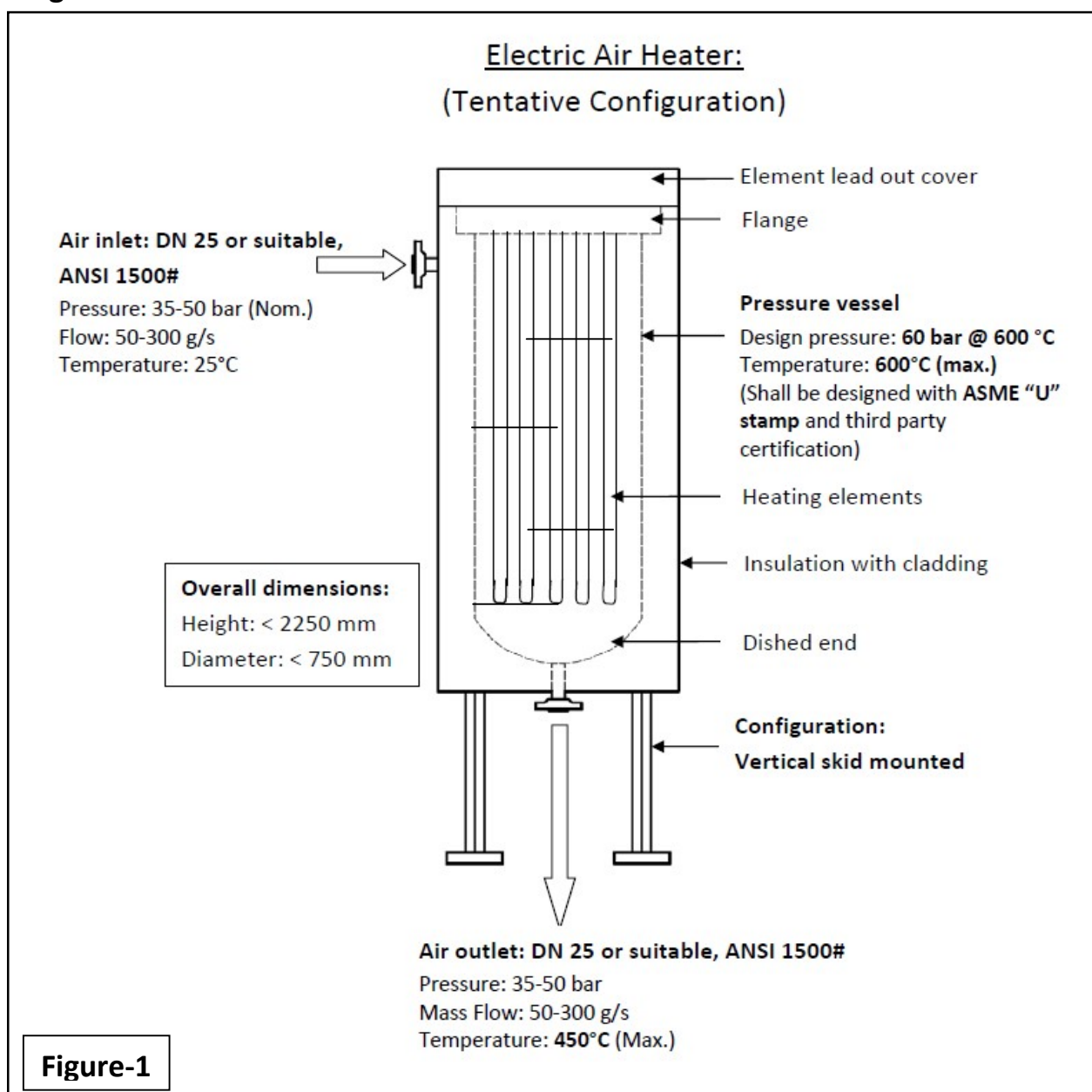
		less than 500(L) x300(W) x300(D). Latest model, Eurotherm programmable temperature controllers only shall be used for temperature control. Provision for temperature setting shall be available in the panel, from 30 ° C to 450° C. Additionally, two more programmable controllers with 4-20mA and relay output shall be provided on remote control panel for process control at VSSC side.
16.	Safety features	Current Overload protection, over temperature trip (according to different heating zones, multiple safety temperature setting may be provided), Emergency push switch etc., shall be provided as per industry standards.
17.	Mandatory inspection for heater bundle	Insulation resistance, high voltage test, cold bank resistance, temperature setting etc., shall be carried out and report to be provided.
18.	Inspection and testing on pressure vessel	100% radiography and DP test on weld joints, pressure test (hydro), leak test (hydro and pneumatic), dimension inspection etc., shall be carried on pressure vessel and report to be provided.
19.	Documentation	The following documents shall be provided upon supply and installation of heater. General arrangement drawing (GAD), Quality assurance certificate of heater, material test certificates for vessel and associated elements, Detailed engineering drawing of all items, third party certificates, Data sheets of the components, operation and maintenance manual and warranty certificate.
20.	Delivery schedule	After receipt and acceptance of purchase order, the following delivery schedule shall be applicable. Within 6 weeks: Detailed configuration along with all supporting documents, drawings, etc., shall be submitted for VSSC approval. Within 16 weeks from design approval: Item shall be ready for pre-delivery inspection at supplier's site. VSSC engineer/s shall visit supplier's site for inspection and witnessing the tests. All the certificates by TPIA shall be available for verification during PDI. Within 4 weeks from the date of dispatch clearance, item shall be delivered to VSSC. Installation and commissioning shall be carried out within 2 weeks from the date of site clearance intimation from VSSC.
21.	Overall dimension	Length : < 2250 mm (from floor level) Diameter/width : < 750 mm (excluding power control panel) Power Control panel (mm) : 1000 (H) X 750 (W) X 400 (D) – approx.
22.	Accessories	Dummy/blind flange for Heater top flange, inlet/outlet and heater bottom flange (if applicable) etc., used for the pressure test shall be provided to VSSC, for future use of periodic pressure test.
23.	Scope for up-gradation	All the electrical/electronic/controller elements shall be suitable /compatible for PLC based automation, if required in future.

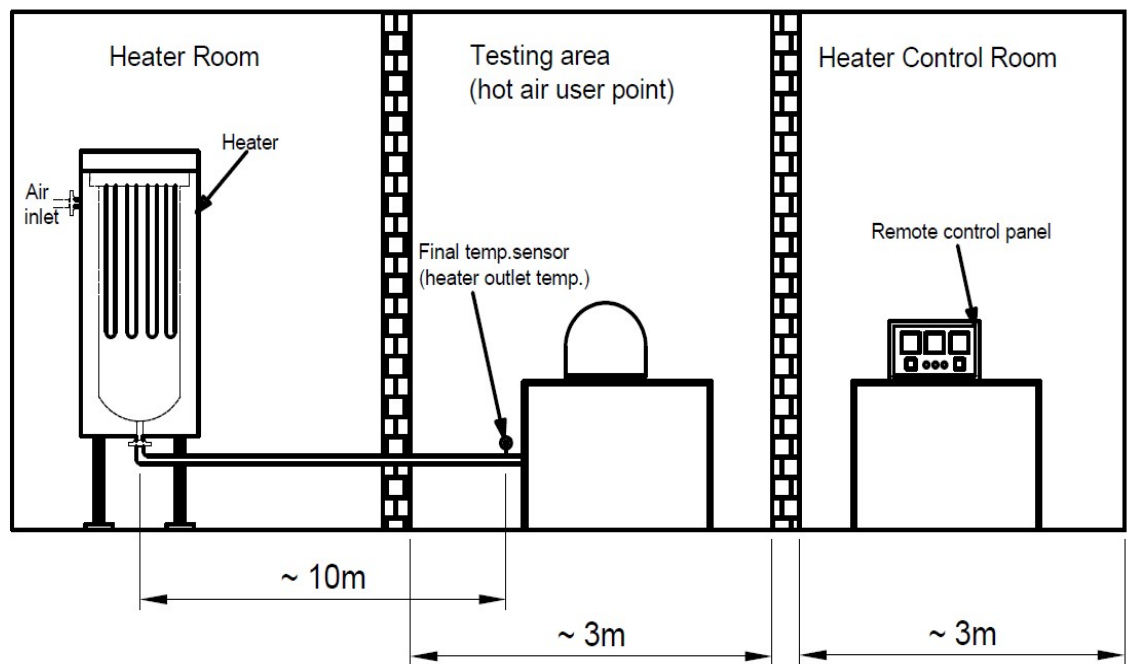
II. General terms and conditions :

S/N	Description
1.	Upon receipt of P.O, Detailed design/configuration document shall be provided to VSSC for review and approval. Manufacturing shall not be commenced without written approval from VSSC. Design document shall include detailed technical specifications of the components, overall system architecture, GA drawing, plan for handling the system, detailed design of pressure vessel, QA plan for pressure testing & design appraisal by third party, data sheets of electrical/electronic components etc.,

2.	Upon completion of installation and commissioning, Complete wiring diagram and set of documents (as per S/N I(19)) shall be provided to VSSC, as bound volume (2 sets of hard copies & digital copies).
3.	Minimum One year onsite warranty is mandatory.
4.	Standard off the shelf modules/components shall be considered for the design of the system and details of the same shall be mentioned in the offer.
5.	Price for one set of additional spares shall be quoted separately and costs for the same will not be considered for price bid evaluation. Detailed price list of spares with breakup cost for each item including make and part numbers, shall be attached in the price bid related documents section. Price details shall not be revealed in the technical bid related documents.
6.	Erection of the heater along with skid is the responsibility of the supplier same may be sub contract to local vendors, as per supplier's choice. Plan for installation and commissioning shall be mentioned in the offer.
7.	Transport/Accommodation/food/medical expenses etc., for the personnel deputed to VSSC shall be in supplier's scope.
8.	Tender is floated as two part – Public tender, Part-1 shall include all the technical and commercial proposals and part-2 shall contain only price details. No price details shall be disclosed in Part-1 (techno-commercial part), which will lead to disqualification from the tendering process.

III. Figures:





Sketch for Proposed heater arrangement
Drg. No. : SK-20240927-J01

Figure-2