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27.02.2020

Department of Aerospace, NCCRD Building

Corrigendum - 1

Tender Reference no: ASE/2020/SRCH/PIPING AND ERECTION WORK

**Name of the Item: PIPING AND ERECTION WORKS AT NCCRD,
IIT MADRAS**

**Corrigendum details: Changes in Technical Specifications & Extension of
bid submission date**

The due date for the submission of the bids is 10.03.2020 @ 5pm & technical bid opening is 11.03.2020 @ 4pm.

All other terms and conditions remain the same.

Tender Inviting Authority:


The Senior Managers
Project Purchase,
IC&SR Building, IIT Madras
Chennai 600036

Piping and erection works at NCCRD, IIT Madras

Description of the work

Two major piping works need to be done at NCCRD, IIT Madras for an upcoming project. Sealed tenders are invited from eligible bidders for installing of compressed air pipe lines and to modify the existing air receivers at NCCRD. Details of each works are described along with necessary drawings below.

1. Part 1: Receiver tank relocation and piping

The compressed air facility at NCCRD involves two 15 m³ test air receivers which stores air from the existing compressors. There are 3 screw and one reciprocating compressor which deliver air at 0.4 Kg/s at 40 bars. The air from the receivers is taken to the lab and connected to each floor with 8 “ size pipe lines.

To meet the additional requirements of 2.5 Kg/ air, we are augmenting the existing system with 6 additional screw compressors. Currently, the compressor are installed in a compressor room and the two air storage tank/ receivers are kept on the terrace of the building. In order to utilize the available space better, we are planning to keep the new compressors on the terrace of the building, and as a part of this work, the existing two 15 m³ air receivers/tanks (40 bar pressure rated) need to be relocated and positioned vertically on the ground. The proposed new arrangement and layout of the compressors are shown Figure 1-3. A concrete base will be constructed by IIT M and the receiver need to be positioned vertically with appropriate skirting arrangement (Fig.4). This needs to be fabricated and integrated to the receiver. Further, few additional valves and safety features need to be added to the receiver as shown in Fig. 5. Details of the additional features are listed in Table 1.

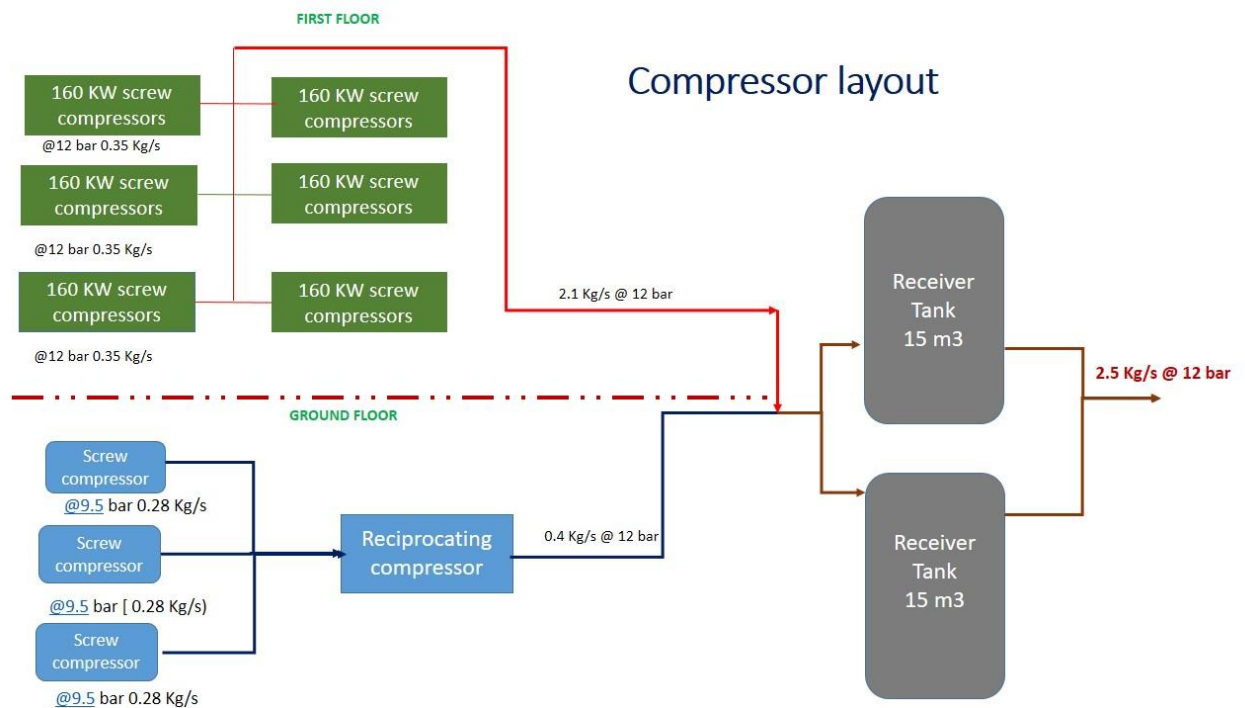


Figure 1: Proposed new compressor facility layout

Since the receivers are moved to the ground the existing pipe line is to be modified to connect the compressors and receivers. In addition to this, additional piping arrangement needs to be done to connect the new compressors to the receiver. Detailed scope of work is described below.

- 1) Modification of the 2 receivers with necessary safety features.
- 2) Fabrication and integration of the skirting arrangement to the receivers.
- 3) Erection of the receivers on the concrete base
- 4) Piping connections from the existing compressor to the receivers.
- 5) Piping connections from the new compressors to the receivers.

Vendor should show the pricing for each of the above items separately in the financial bid.

1. Modification of the 2 receivers with necessary safety features

The receiver should be modified suitably for the vertical positioning which includes fixing of the new pipe sections from the side of the receiver and closing the existing lines. Further, vent valves, pressure, temperature sensors, additional PRVs, diaphragms need to be added. Engineering drawing of the skirting arrangement is shown in Figure 4. Schematic of the receiver is shown in the Figure 5. Vendors are requested to obtain the detailed manufacturing drawings of the receivers and skirting arrangement from NCCRD office. Modifications and detailed specifications are listed below.

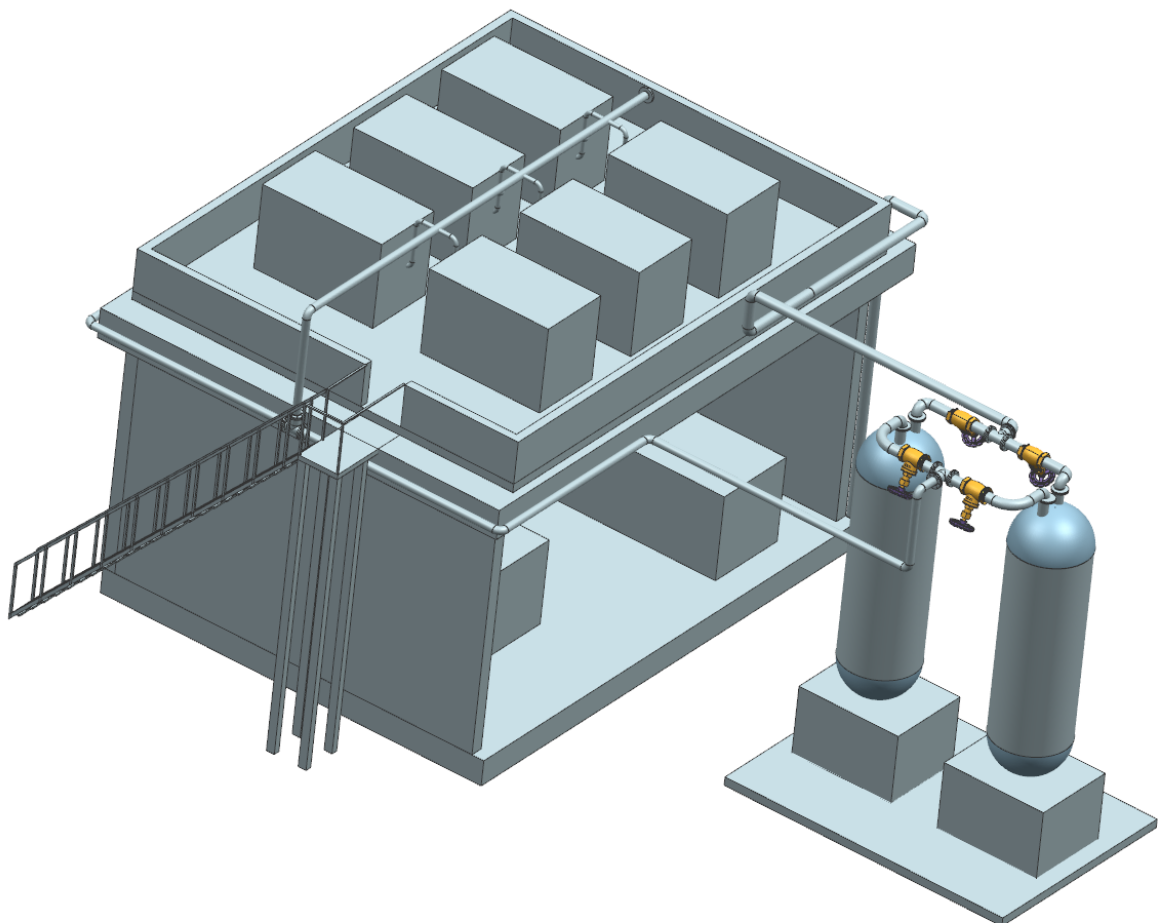


Figure 2: Proposed compressor facility along with receiver arrangement

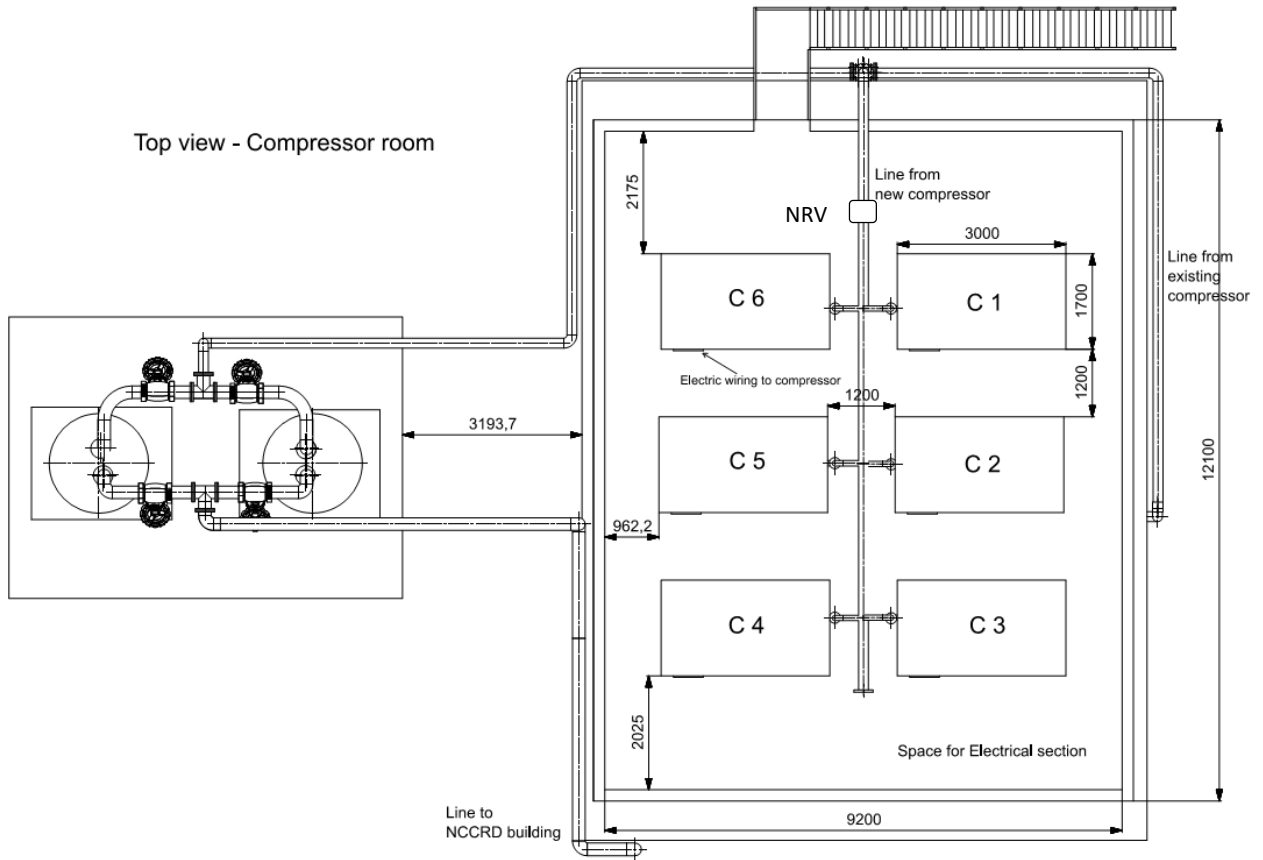


Fig. 3 Top view of the proposed new compressor facility.

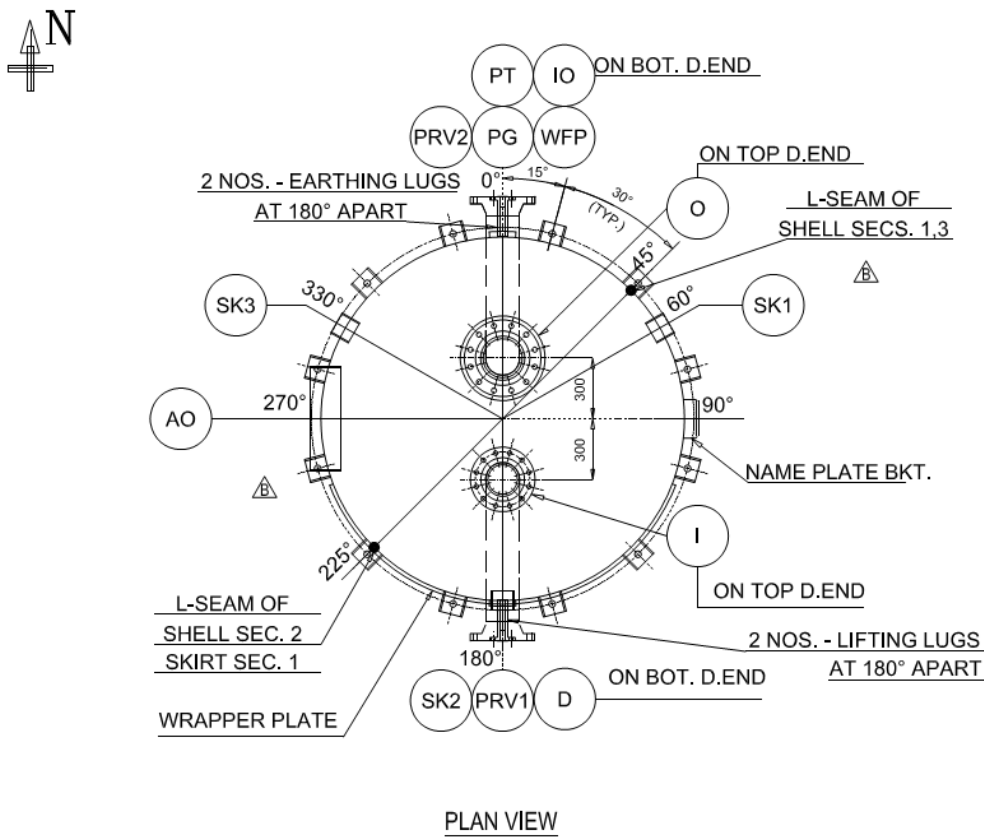


Fig. 4 Skirting arrangement to position the receivers.

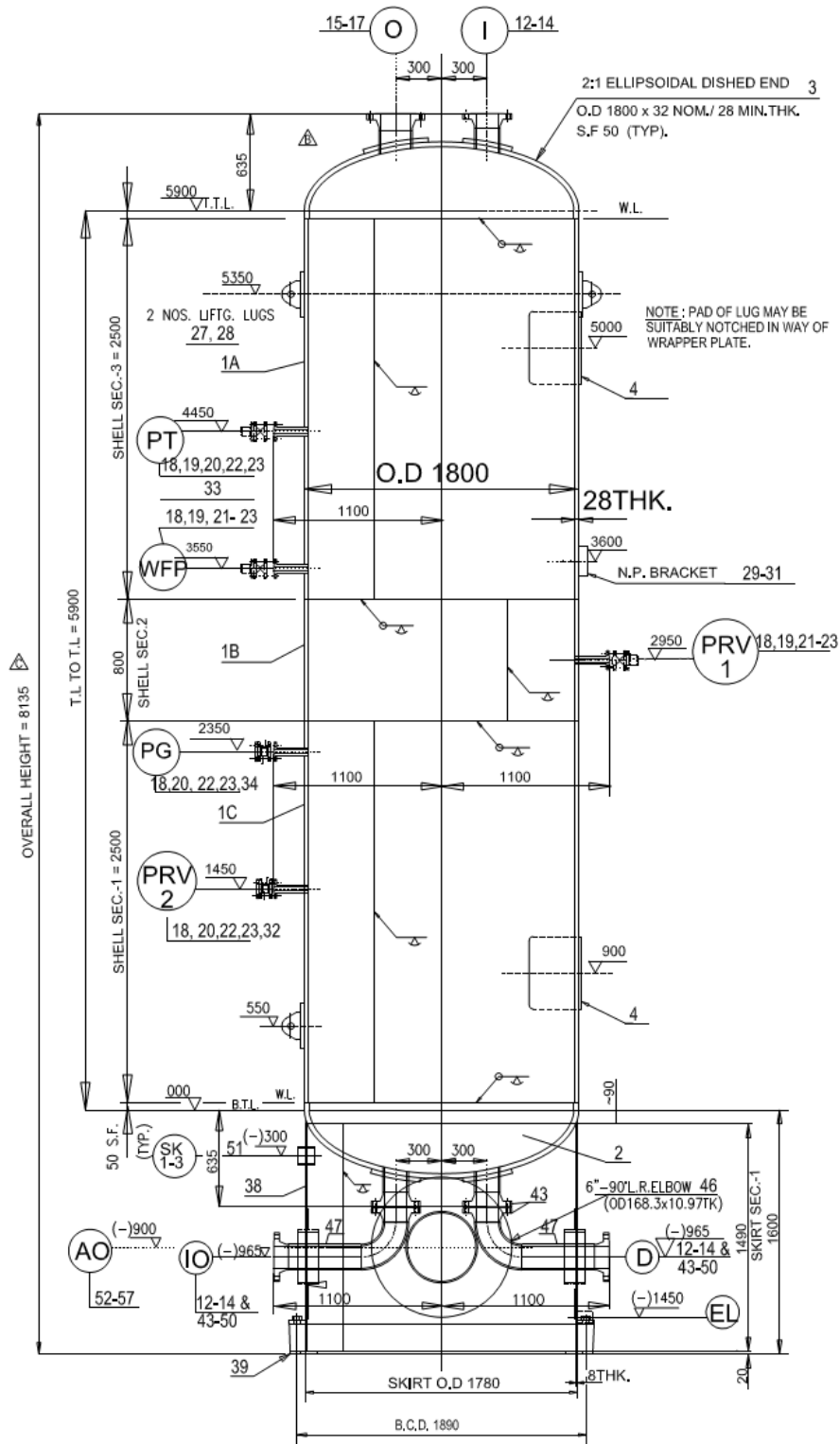


Fig. 5 Air Receiver front view.

Table 1: Receiver modifications: bill of materials

| S/no | Item | Nos. | Specifications |
|------|---------------------------|------|--|
| 1 | pressure monitoring valve | 2 | 40 bar rated nozzle and ball valve (SS material), size 1", Protrusion : 300 mm (Preferred make: Peterson, Control engineering) |

| | | | |
|---|------------------------------|---|--|
| 2 | Temperature monitoring valve | 2 | 40 bar rated nozzle and ball valve (SS material), size 1", Protrusion : 300 mm (Preferred make: Amot, Danfoss) |
| 3 | Auto drain valve | 2 | 1 "Valve and a 1" pipe line of 3 meter length. Cast iron material, port size 1", max operating pressure 40 bar. Temperature 5-35 deg.C, Media: compressed air moisture (Preferred make: Autocon, Grainger) |
| 4 | Manual drain valve | 2 | 1" valve and a 1" pipe line of 3 meter length, Cast iron material, 40 bar working pressure, Media: compressed air moisture, Temperature 5-35 deg.C (Preferred make: Gasgoo, Ultramax) |
| 5 | Water filling point | 2 | 2" nozzle and valve, 40 bar MS/ cast iron material |
| 6 | Charging point | 2 | 1" nozzle and valve, 40 bar MS/ cast iron material |
| 7 | Pressure relief valve | 2 | 40 bar max pressure, opening pressure > 5% of max pressure, SS material, 1 " size, ASME std. (Preferred make: Forbesmarshal/ spirax) |
| 8 | Diaphragm | 1 | 42 bar max pressure |

2. Pipe line from the compressors to the receiver

The new 6 compressors need to be interconnected and a single line need to be taken to the receiver. Layout of the same is given in Figures 3. The six compressors are interconnected using 3" pipes and the main line is 6" size. Operating pressure is 12 bar and maximum flow rate is 2.1 Kg/s. A rupture disc, ball valves (BV) and non-return valves (NRV) need to be installed in this line to protect the 12 bar compressors during the 40 bar compressor line operation. Similarly, the existing compressor line also need to be modified. The existing gate valves (2 inlet and outlet) need to be converted to lotto lockable gate valve. The valve positioning and specs should be arranged as per the pre-bid meeting. An approximate bill of materials are listed in Table 2.

Table 2: Pipe line work to connect new and existing compressors to receiver

Bill of materials: new compressor piping

1. 3" ball valves – 6 no.s #300, Flanged end MOC- carbon steel, PN40 Leader, Audco or equivalent
2. 6" ball valve – 1 no.s #300, Leader, Audco or equivalent
3. 6" end flange #300 SORF,
4. Reducers 6"to 3" carbon steel schedule 40 – 6 no.s
5. Rupture disc – Limit pressure – 14 bar, Reputed make
6. Support for piping – 4" channel as needed
7. NRV – 6" size, horizontal, wafer type or swing type, class 300, PN40 (flanged)
8. 6" carbon steel seamless schedule 40 pipe - ~ 45 m
9. 6" elbows carbon steel seamless schedule 40 - ~10 no.s

Bill of materials: Existing compressor piping

1. Support for piping – 4" channel as needed
2. 6" seamless carbon steel schedule 40 pipe, Make Tata, Jindal, MSL, JSW, ISMT - ~ 10 m
3. 6" elbows carbon steel seamless schedule 40 - ~ 5 no.s
4. Lotto lockable valve arrangement for the existing gate valves

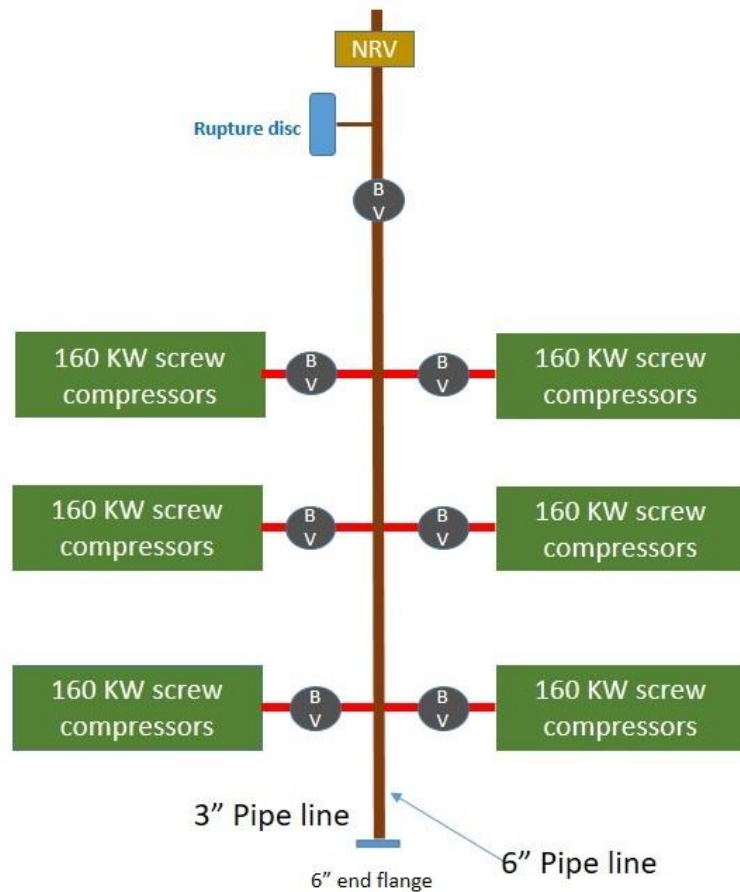


Figure 6 : New compressor arrangement.

Part 2. Piping connections to an electric air heater and from the heater to the inside lab region.

An electric heater will be installed on the terrace of the main NCCRD building. A pipe line need to be taken from the 4th floor of the building to the heater and another line need to be taken from the heater to the rig. The proposed details of bill of materials and scope of work is given in table 3. Top view of the piping that connects the heater and rig on the terrace is given in Figure 7. A brief schematic of the heater and pipe line is also give in Figure 8.

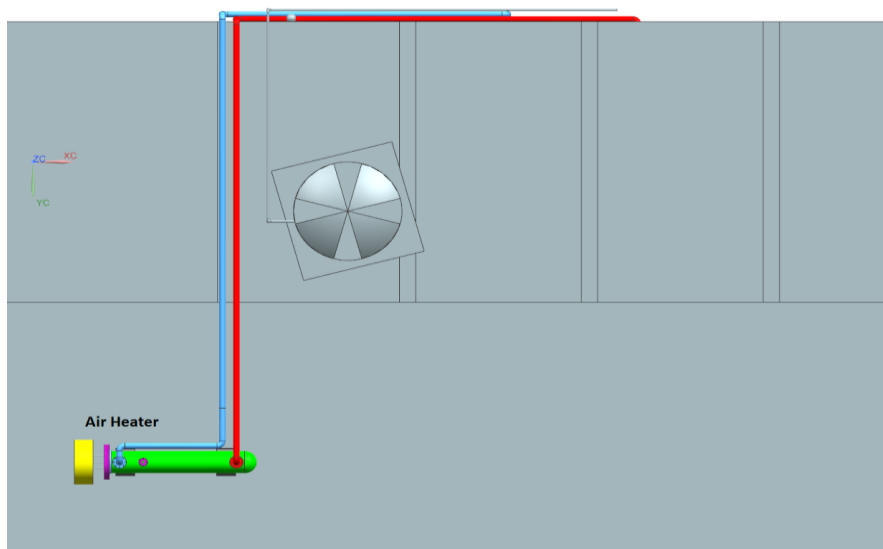


Fig. 7. Top view of the terrace of the building, showing the heater pipe line connections

Table 3: Air heater piping bill of materials

| Works to be done | Bill of materials | Specs | Total no |
|--------------------------|---|--|----------|
| Air heater piping | Inlet connections | | |
| | 4" cs seamless pipe, Schedule 40 Make: Tata/Jindal/MSL/ISMT | Working pressure= 40 bar | 26m |
| | 4" bends, Sch 40, cs seamless | Working pressure= 40 bar | 2 |
| | 4" Ball valve, Cast steel, flanged end | Working pressure= 40 bar, pneumatic operated | 1 |
| | Pressure relief valve, Make (Forbesmarshal/ spirax) and other details | 14 bar, 1" size | 1 |
| | Outlet connections | | |
| | 4" cs seamless pipe, Schedule 80 Make: Tata, Jindal | Working pressure= 40 bar, 350 deg. C temperature, | 21 m |
| | 4 " bends, cs seamless, Schedule 80 | Working pressure= 40 bar, 350 deg. C temperature | 6 |
| | Omega bend, cs seamless, Schedule 80 | Working pressure= 40 bar, 350 deg. C temperature | 1 |

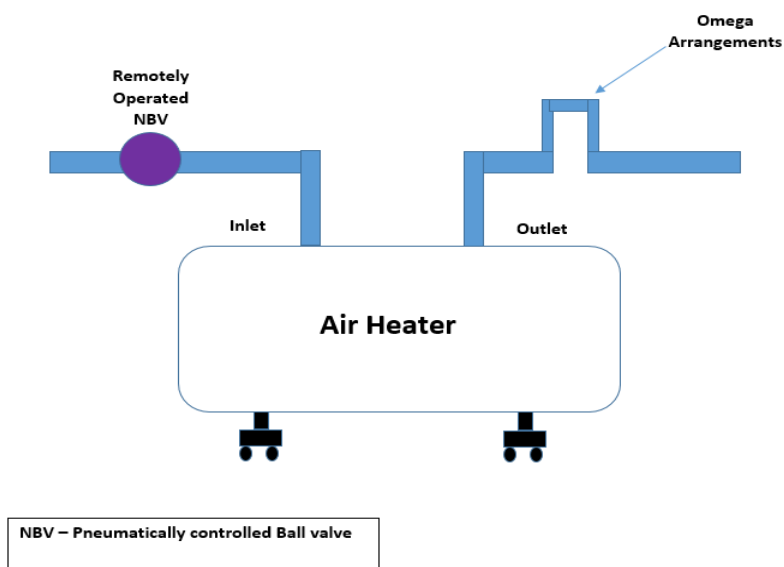


Figure 8: Air heater layout

Scope of work for the electrical heater piping

1. Erection of the 4" sch.40 pipe line from the 4 th floor lab outlet to the air heater on the terrace
2. Hot air piping connection from the heater to the 4th floor lab window with omega bends.
3. Suitable support structures for the hot and cold air pipe lines for every 3 meters.

All works to be estimated as discussed in the pre-bid meeting. It is the vendors responsibility to assess the work/ access provisions available at terrace of the building to layout the pipeline.

Work Specifications:

The material used and work should be of the specification given below:-

- 1) Pipes : Carbon steel seamless, Schedule- 40. Material as per ASTM A-106 Grade B. (sizes: 8"NB, 6"NB, 4"NB)
- 2) Pipe Make : Jindal/ Tata/MSL/ISMT
- 3) Pipe Fittings : Seamless carbon steel forged fittings as per class 300 and material as per ASTM A234 WPB
- 4) Valves : Flanged Gate Valves, class 300.
- 5) Valve Make : L&T / Leader, Audco.
- 6) Support : Support structures are to be provided.
- 7) Painting : The entire length of the pipeline should be given 1 coat of Zinc Chromate Primer & 2 coats of Enamel as per Standard blue colour for compressor air supply lines, and the supports should be painted Black as per IS 5 standard.
- 8) Pressure Testing : The pipelines should be pressure tested at 1.3 times of the working pressure for a duration of 30 minutes.
- 9) Test Certificate : Test certificates for the pipes and fittings should be furnished by the bidder.
- 10) Radiography : 15% of the joints selected at random by the end user should be Radiographically tested for defects by a third party.
- 11) Welder should furnish WQR with a valid certificate along with a recent photograph
- 12) PMI test certificate for fittings and pipelines should be provided by 3rd party.

Terms and Conditions:

1. Vendor should perform all the pipeline and receiver modifications as per the relevant ASME standards.
2. Hydrostatic testing and post weld heat treatment should be done for the receiver and pipe lines, as needed.
3. Detailed specifications of all components, along with preferred makes, will be discussed during the pre-bid meeting.
4. It is mandatory to attend the prebid meeting. All changes will be added to the present document. It is mandatory that the bidder should attend the pre-bid meeting and visit the site. Technical bid will be disqualified if the bidder does not attend the pre- bid meeting and site visit.

4. Warranty terms:

All the components quoted in the tender bid should be covered under warranty for 3 years.

5. Warranty service must be provided on-site at IIT, Madras for the duration of warranty period.

6. Vendors should provide continuous technical support and maintenance of work done. The vendor must have at least 10 years of experience in similar works as required in the tender.

7. Vendors must have sufficient experience in executing major piping and erection works in reputed organisations (end users) of value not less than Rs.50lakhs. Experience of the vendors will also be used as a criterion for the selection of bids that meet technical requirements. List of reputed end users inclusive of educational institutions in India (at least 3) with contact details wherein similar works have been executed should be furnished. Testimonials from the reputed organisations must be provided with the tender bid.

8. The vendor should complete all the works within two months from the date of release of PO.

9. Vendors must provide detailed documentation for the work to be done along with complete information on the makes of the hardware items, fabrication and erection standards.

10. For any technical clarifications please contact Mr.P.John George (9042301070).

11. To obtain any detailed drawing files of air receiver and skirt arrangement, vendors are requested to email Project engineer Mr. Sundararajan sundar.nccrd@gmail.com

12. Vendors should furnish the tender with a price split up against each of the work listed in the document.

13. Vendors should refer to the details given during the pre-bid meeting for any clarifications regarding the bill of materials or scope of work. IIT Madras will not be responsible for any lack of information in the tender documents submitted.