

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 6 additional screw compressors to the existing system. 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 receiver tanks need to be relocated and positioned vertically on the ground. The proposed new arrangement is shown in Figure 1. A concrete base will be constructed by IIT M and the receiver need to be positioned vertically with appropriate skating arrangement. 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. 2. Details of the additional features are listed in Table 1.

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 skating 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.

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. Schematic of the receiver is shown in the Figure 2. Detailed engineering drawing will be provided during the Prebid meeting. Length and diameter of the receiver is ~6.2 m and 1.8 meters respectively. Pressure rating is 40 bar. Modifications and detailed spec are listed below. However the below listed spec may have minor changes based on the discussions with the vendors during the pre-bid meeting.

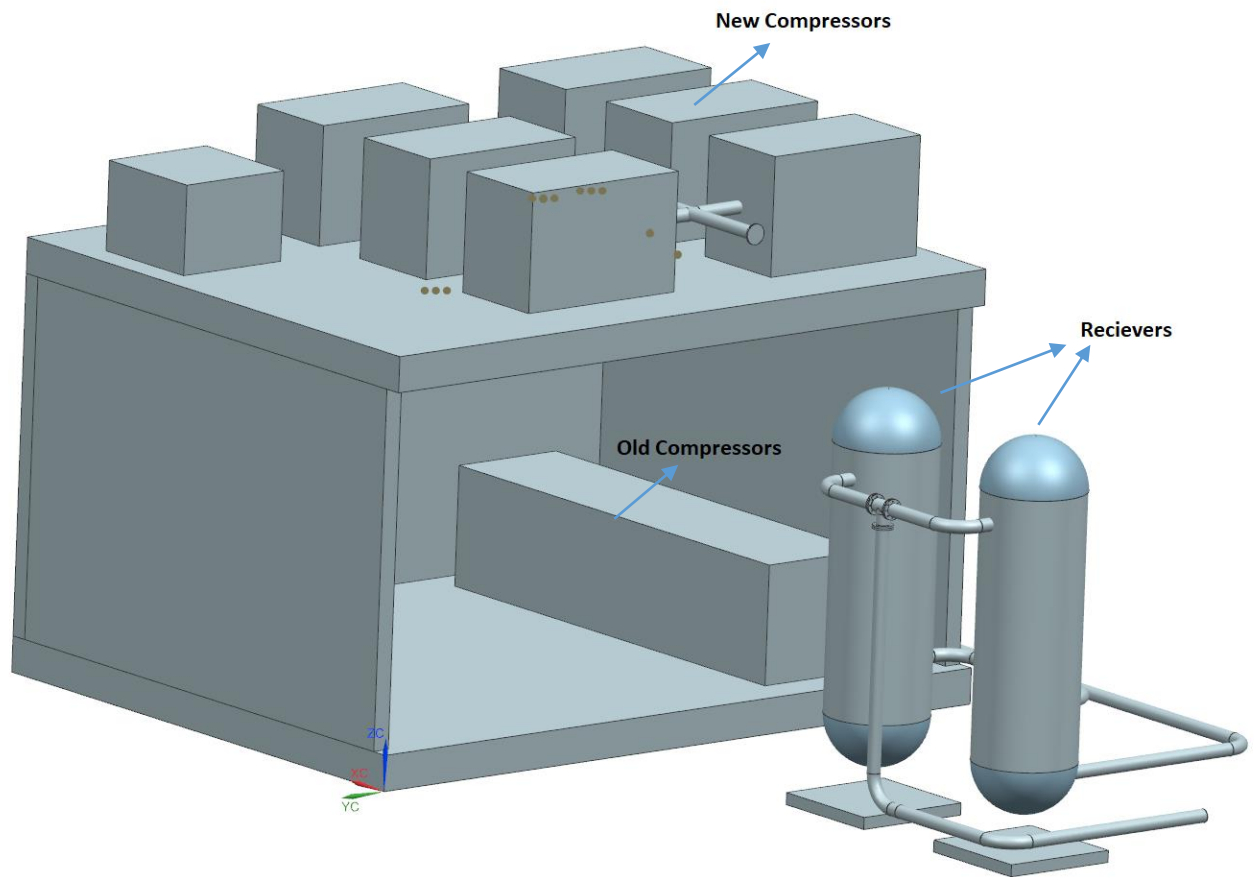


Fig. 1 Layout of the proposed new compressor facility.

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
2	Temperature monitoring valve	2	40 bar rated nozzle and ball valve (SS material), size 1", Protrusion : 300 mm
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
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
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.
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 Figure 3. Compressors are interconnected using a 4" pipes and the main line is 8" size. Operating pressure is 12 bar and maximum flow rate is 2.1 Kg/s. A rupture disc and a pneumatic ball valve need to be installed in this line to protect the 12 bar compressors during the 40 bar compressor line operation.

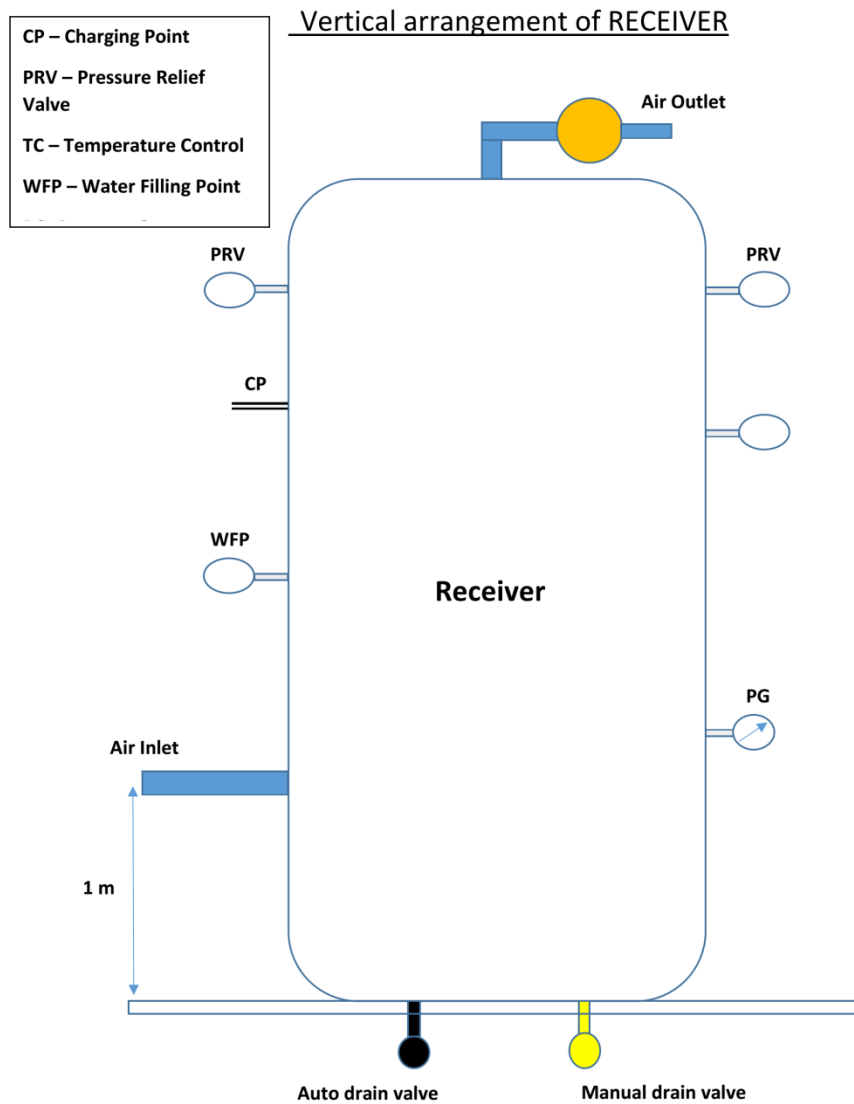


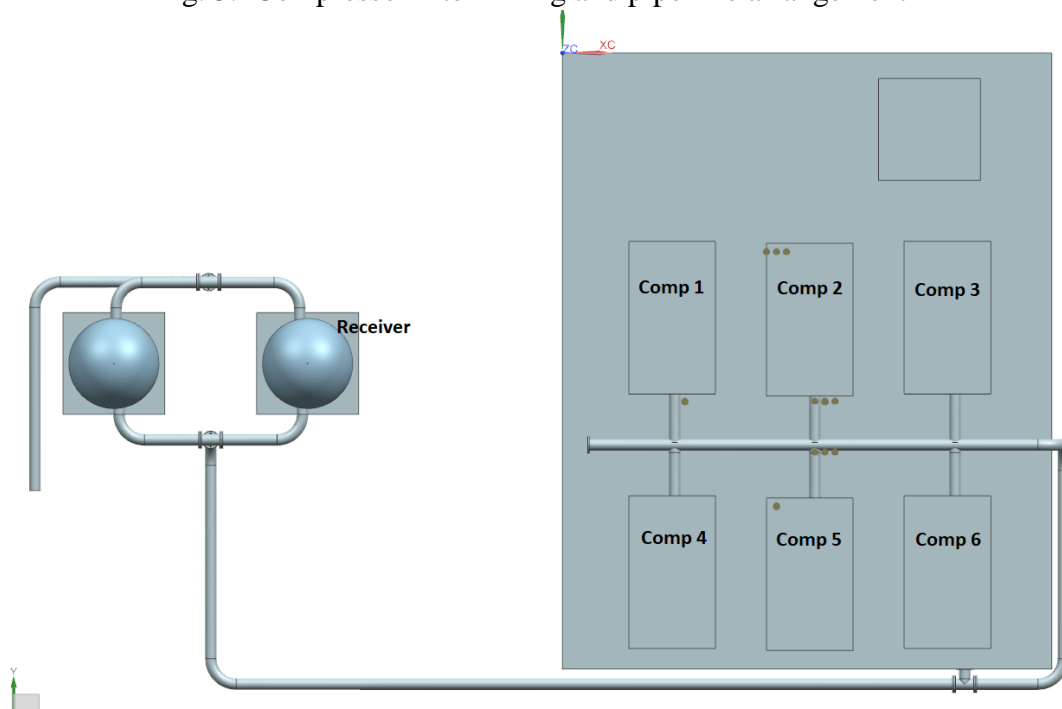
Figure 2: Vertical arrangement of the receiver tank

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 will be further discussed during the site visit along with 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: approx. bill of materials

Works to be done	Bill of materials	Specs	Total no
Air receiver - existing compressor piping	8 " seamless pipe	Working pressure= 40 bar	26 metre
	8 " bends		6no.s
	Ball valves , 8 "	40 bar working pressure, ElctroPneumatic type	2 nos
Air receiver - new compressor piping	8 " seamless pipe	12 bar working pressure	35 m
	8 " bends		3
	Pressure relief valves	3 Kg/s, 12 bar	
	Rupture discs	14 bar	1
	Inlet gate valve with loto lockable isolation	8" size, 40 bar working pressure	2
Outlet gate valve with loto lockable isolation	8" size, 40 bar working pressure	2	

Fig. 3. Compressor interlinking and pipe line arrangement



Layout of the entire assembly is shown in Figure 4.

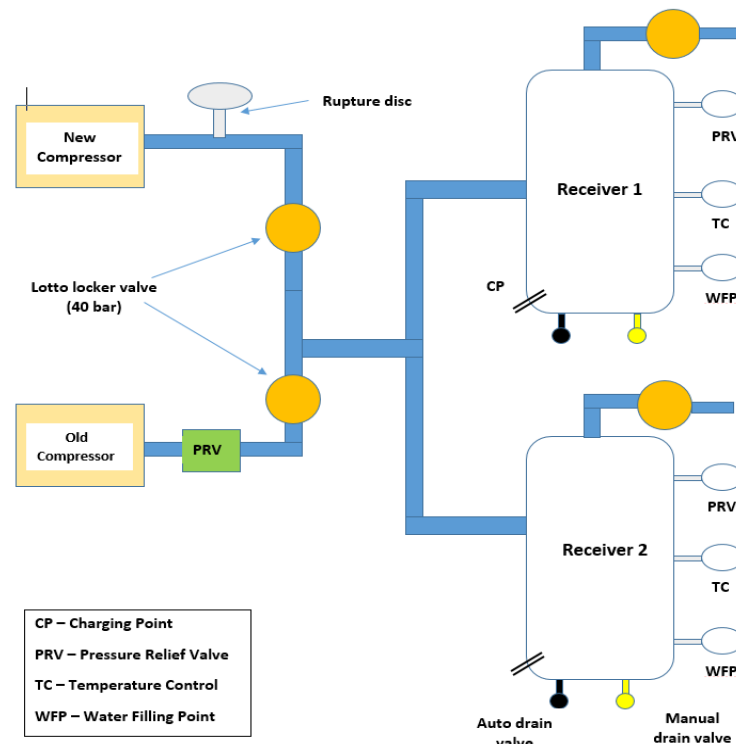


Fig.4 Layout of the receiver and compressor assembly.

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 5. A brief schematic of the heater and pipe line is also give in Figure 6.

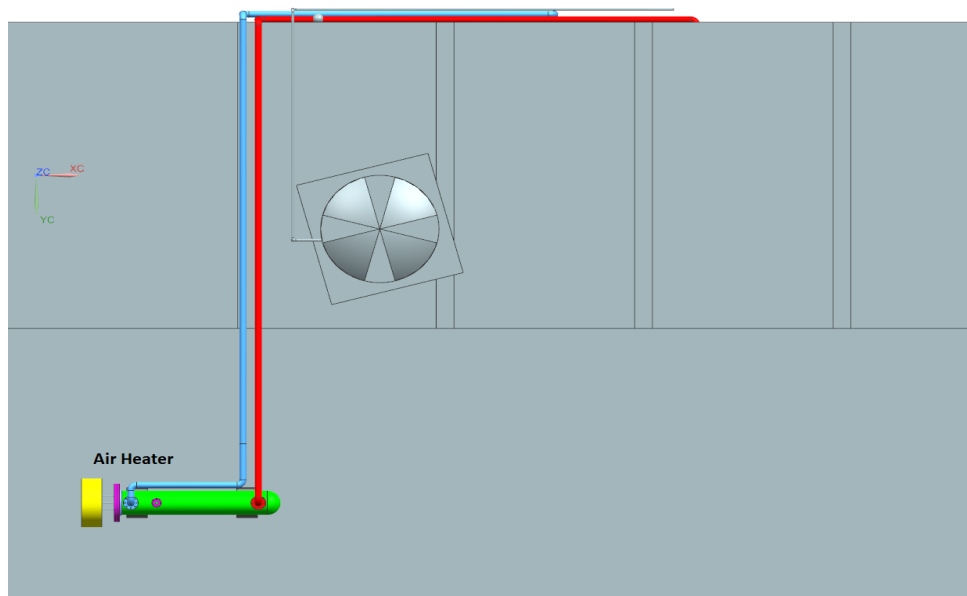


Fig. 5 Top view of the terrace, showing the heater pipe line connection

Table 3: Air heater piping bill of materials

Works to be done	Bill of materials	Specs	Total no
Air heater piping	Inlet connections		
	4" seamless pipe	Working pressure= 40 bar	26m
	Seamless carbon steel 4" bends	Working pressure= 40 bar	2
	4" Ball valve	Working pressure= 40 bar, pneumatic operated	1
	Pressure relief valve	14 bar, 1" size	1
	Outlet connections		
	Seamless carbon steel 4" seamless pipe	Working pressure= 40 bar, 350 deg. C temperature	21 m
	4 " bends	Working pressure= 40 bar, 350 deg. C temperature	6

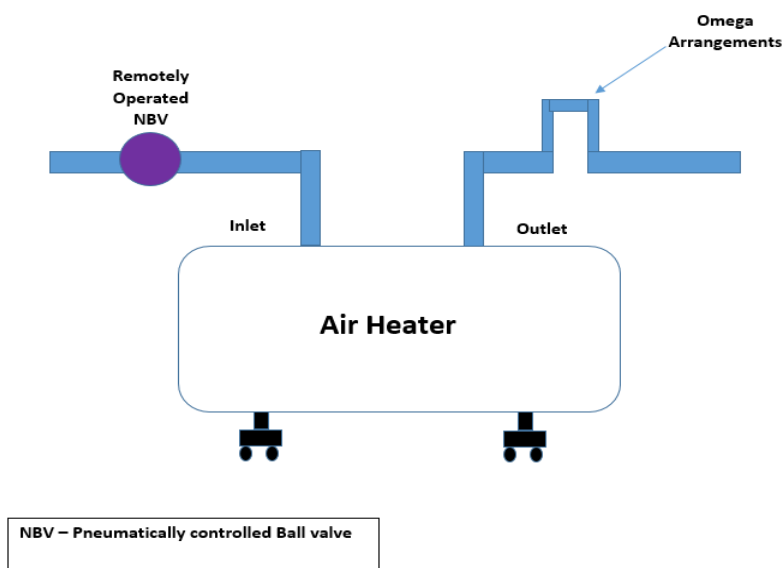


Figure 6: Air heater layout

A pre-bid meeting is planned at NCCRD, IIT Madras and site visit will be held on the same day to get better clarity and scope of work to the vendors.

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
- 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.
 - 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 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 should be provided by 3rd party.

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

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 pre-bid 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.
5. Warranty terms:
All the components quoted in the tender bid should be covered under warranty for 3 years.
6. Warranty service must be provided on-site at IIT, Madras for duration of warranty period.
7. 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.
8. Vendors must have sufficient experience in executing major piping and erection works in reputed organisations (end users) of value not less than Rs.50lakhs for a single work. 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.
9. The vendor should complete all the works within two months from the date of release of PO.
10. Vendors must provide detailed documentation for the work to be done.