

DEENDAYAL PORT AUTHORITY
MECHANICAL ENGINEERING DEPARTMENT

No. CME/1372/36

QUOTATION

Subject: Procurement of Nitrogen Cylinders and Pressure Reducing Skid System for 1 MW Green Hydrogen Demonstration Plant Project at Kandla Gujarat.

Sr. No.	Description	Qty.	Unit	Rate	Amount (Rs.)
1	<p>Supply, Installation, Testing, Commissioning of 03 Sets of Nitrogen Cylinder Cascade each consisting of 4 Nos. Cylinders of 50 Liter W.C. including manifold valves, copper tubing, manifold, blocks for connection and valves, cascade isolation valves, pressure gauges with following Specification:</p> <p>Specifications: Working Pressure: 200 Bar Test Pressure: 340 Bar Water Capacity: 50 Ltrs. Manifold MoC: Brass & Copper MoC of Pressure Gauges: SS Gas Capacity: 10 M3 Outside Dia.: 232 mm Wall Thickness: 6.5 mm Tare Weight Approx.: 55 Kgs.</p> <p>Note: The Cylinders shall be EKC, RAMA Make, Indigenous, Empty, Brand New High Pressure, Seamless Steel Gas Cylinders, Manufactured in Accordance with IS:7285 (Part 2):2004 or latest, as Specified Under Gas Cylinder Rules, 2004 With Manufacturer's Test Certificate and Approval from The Chief Controller of Explosives, Government of India, Nagpur.</p>	3	Set		

2	<p>Supply, Installation, Testing, Commissioning of Nitrogen Pressure Reducing Skid system for 200 Kg/cm² to 8 Kg/cm² pressure reduction in Two Stages with outlet Flow of 110 Nm³/Hr. including the following components.</p> <p>Specifications: Service: Nitrogen Pressure reduction stages: First Stage: 200 Kg/cm² to 30 Kg/cm² Second Stage: 30 Kg/cm² to 8 Kg/cm² Outlet Flow Rate: 110 NM³/Hr. MoC of All Valves: SS304 (Internal SS316, Bonnet: CS) MoC of Pressure Gauges: SS</p> <p>Components of PRS: SS Braided wire hose with inner Teflon tube (As required) Isolation Block Valve (1 No.) First Stage Pressure Control Valve (1 No.) First Stage Safety Relief Valve (1 No.) Second Stage Pressure Control Valve (1 No.) Second Stage Safety Relief Valve (1 No.) Non-Return Valve (1 No.) Isolation Ball Valve (1 No.) Pressure Gauges (3 Nos.) Piping & Fitting (As required) Support (As required)</p> <p>Note: The Technical Specifications of PRS & its components shall be as described under Scope of Work and Terms & Condition.</p>	1	Set		
Total Amount (Rs.)(Excluding GST) :					
GST @ _____ :					
Total Amount (Rs.)(Including GST) :					

Rupees (Excluding GST) (In Words): _____

**Seal and Signature
of Contractor**

Note:

1. Items though not specifically mentioned but are required to make the system complete and safe trouble-free operation should be considered as included in the scope of bidder and must be mentioned in the offer unless otherwise specifically excluded in the offer.
2. All calculations/data sheets shall be submitted in soft editable (word, excel, AUTO-CAD or other tool) format.
3. At all flanged terminal connections (wherever applicable) companion flanges together with gaskets & fasteners shall be supplied by the bidder.

TERMS & CONDITIONS

- (1) The Deendayal Port Authority (DPA) intends to carry out the work of “Procurement of Nitrogen Cylinders and Pressure Reducing Skid System for 1 MW Green Hydrogen Demonstration Plant Project at Kandla, Gujarat.” The whole system shall be supplied and installed inside oil jetty no.07, Kandla.
- (2) All the Necessary statutory permit/approval along with fee, if required for Nitrogen Cylinders and Pressure Reducing Skid System shall be obtained by the bidder and the same shall be submitted in original to the DPA. The supplied cylinders must follow the applicable rules & regulation and certificate of the same shall be furnished by the bidder.

(3) **SCOPE & DESIGN REQUIREMENTS:**

The scope of work covers Supply, Installation, Testing and Commissioning of Nitrogen Cylinders and Pressure Reducing Skid System and shall include design, engineering, manufacturing, shop painting, testing at manufacturer’s works, proper marking & packaging (for transportation to site), loading of equipment and supervision of commissioning of Nitrogen cylinder along with pressure reducing skid.

(4) **DESIGN & CONSTRUCTION REQUIREMENT:**

Following are the system specific requirements. However, bidder is free to offer anything over and above the minimum stated requirement based on design requirements.

The purity of Nitrogen gas shall be as below, Humidity: < 1 ppm

Particles: < 0.1 mg/m³ Size: < 1 µm

The Block Flow Diagram (**See Attachment**) illustrates the flow of nitrogen gas from a high-pressure cylinder, regulated by a pressure reducing skid, to the downstream process.

The Nitrogen Pressure Reducing System is to supply N₂ at controlled pressure to 1 MW Green Hydrogen Plant to preserve it in shutdown condition.

(5) **INTENT OF SPECIFICATION:**

This specification is intended to cover the minimum requirement for complete system design, engineering, manufacturing, material, shop inspection, testing at manufacturer's works, painting, packing for transportation, Supervision of Testing and Commissioning at site, site painting (if any), performance guarantee test of Nitrogen cylinder along with pressure reducing skid, with all equipment and accessories.

(6) TECHNICAL SPECIFICATIONS:

CYLINDERS:

The Cylinders shall be EKC, RAMA Make, Indigenous, Empty, Brand New, High Pressure, Seamless Steel Gas Cylinders, Manufactured in Accordance with IS:7285 (Part 2):2004, as Specified Under Gas Cylinder Rules, 2004 With Manufacturer's Test Certificate and Approval from The Chief Controller of Explosives, Government of India, Nagpur.

Gas: Nitrogen with following parameters:

Humidity: < 1 ppm, Particles: < 0.1 mg/m³, Size: < 1 µm

Working Pressure: 200 Bar

Test Pressure: 340 Bar

Water Capacity: 50 Ltrs.

Gas Capacity: 10 M³

Outside Dia.: 232 mm

Wall Thickness: 6.5 mm

Tare Weight Approx.: 55 Kgs.

The manufacturer's test certificate shall be furnished by agency at the time of supply of cylinders.

CYLINDER MANIFOLD SYSTEM:

Manifold shall be fitted with cylinder isolating valves to facilitate the connection/disconnection of cylinders without interrupting the supply of gas.

Manifold shall connect to N₂ cylinders by using hose pipe. Hose pipe shall have a regulator connection and a connection to a manifold with a non-return valve.

Manifold shall be fitted with pressure gauge and isolation block valve.

Pigtail connections, Manifold line, Isolation valves, one pressure gauge and two-piece filling & discharge valve provided in each Bank.

The main header pipeline shall be of annealed copper having 19 mm O.D. & wall thickness of 3.2 mm. Brass nut made out of extrusion block shall be having ½" internal thread.

Pigtails pipe shall be of annealed copper having 8 mm O.D. & wall thickness of 2 mm Brass nuts &

nipples made out of extrusion block-rods shall be having the required threads.

Brass block including the threaded section to mount valve shall be of 38X38 and 58 mm in length.

Brazing rods used for brazing must be of hi purity & required strength.

The pressure gauge of 4" dia. G/F having an all SS & Borden tube also of SS shall be provided.

The inlet & outlet valve shall be as per IS 3224.

Painting of the manifold & the pigtail shall be done after the total assembly of the manifold.

The Pneumatic pressure test shall be done on full manifold system after the assembly of manifold.

CYLINDER CASCADE:

Each Cylinder cascade consisting of 04 nos. of cylinders and its associated manifold valves, copper tubing, blocks for connection and valve, cascade isolation valves, pressure gauges.

Cascade shall be fabricated out of 50 x 50 x 4 mm MS square pipe, angle, channel, 3.6 mm chequered plate for bottom support of cylinders with proper supporting arrangements by GMAW/SMAW electric welding process and Nuts bolts arrangement.

Fork lift provision provided at bottom and also lifting hooks provided at top of the frame.

Provision of external pre-treatment after the final job by application of anti-corrosive chemicals and two coats of Epoxy grey primer & one coat of synthetic oil paint of the necessary symbol of the nature of gas for which the bank is fabricated.

For holding the cylinders, structural support/stand in MS with chain & hook arrangement shall be provided.

Heavy duty SS Braided wire hoses with inner Teflon tube (Suitable Length) for connecting Cascade to PRS shall be provided by the agency.

PRESSURE REDUCING SKID/STATION (PRS):

Pressure Reducing Skid System including Cylinders for Nitrogen application shall be designed to reduce the pressure from 200 kg/cm²(g) at which it is stored in cylinders to the required outlet pressure 8 kg/cm²(g) in two stages with flow rate of 110 Nm³/Hr. to meet the required flow and balance as loose supply in bidder scope of supply.

The PRS shall be consisted of isolations valves for connecting cascade cylinders supply through SS braided wire hoses with the provision of spare isolation valve.

First Stage and Second Stage Safety Relief Valves shall be provided after First Stage and Second Stage Pressure Control Valves respectively for safety of piping system against over pressurization.

Pressure gauges shall be provided after each pressure reduction.

After pressure reduction, prior to outlet point, there shall be NRV and isolation valve.

The detailed specifications of the vital components of the PRS are tabulated below:

Sr. No.	Component Description	Specification
1	Isolation Block Valve	Size: 1", Body: SS304, Internal SS316, end connection I/L of IBV: Male female flange, O/L of IBV 1500# socket weld
2	First Stage Pressure Control Valve	Regulation - Downstream; size 1", Body: SS304, Trim: SS 316, First Stage Inlet Pressure: 200 Kg/cm ² ; Set Pressure: 30 Kg/cm ² , Set Pressure Range: - 27 to 33 Kg/cm ² Flow: 250nm ³ /hr.; Cal Cv:0.08, SelCv:0.16; End Connection: ANSIB16.25 1500# Socket Weld; Leakage Class: VI
3	First Stage Safety Relief Valve	Regulation - Upstream; Type - Conventional, Spring Loaded, FlangeEnd;1"X300#inlet1 1/2"X150#outlet, Body - SS304, Trim: SS 316; Set Pressure: 34 kg/cm ² , Set Pressure Range-31 to 37 kg/cm ² , Over pressure:10%, Flow:275 nm ³ /hr.; End connection: Flanged as per ANSI B16.5 RF
4	Second Stage Pressure Control Valve	Regulation - Downstream; size 1", Body: SS304, Trim: SS 316, Second Stage Inlet Pressure: 30 Kg/cm ² ; Set Pressure:8 Kg/cm ² , Set Pressure Range: - 5 to11Kg/cm ² Flow:250 nm ³ /hr.; Cal Cv: 0.57, Sel Cv: 1.56; End Connection: ANSI B16.25 300# Flanged end; Leakage Class: VI
5	Second Stage Safety Relief Valve	Regulation - Upstream; Type - Conventional, Spring Loaded, Flange End; 1" X 150# inlet1 1/2" X 150# outlet, Body - SS 304, Trim: SS 316; Set Pressure: 11 kg/cm ² , Set Pressure Range-8 to15 kg/cm ² , Overpressure:10%, Flow: 275 nm ³ /hr.; End connection: Flanged asperANSIB16.5 RF
6	Non-Return Valve	Size1"X 300#, Body: SS304, Internals: SS 316, Line Pressure-8 kg/cm ²
7	Isolation Ball Valve	Size: 1" X 300#, Body: SS304, Ball & stem SS 316: Fire safe design, Lever operated
8	Pressure Gauges	Bourdon type, 4"Dial size; SS316 case, 1/2"NPT, Bottom connection with SS304 isolation valve
9	Piping & Fitting	MOC: SS304 with necessary flange, fitting, gasket and fasteners

The entire interconnecting pipe shall be of seamless type.

All valves and specialties shall have permanent stainless steel tag plate fixed on the body, indicating the service for which these will be used and the primary pressure and temperature rating & tag number as per Name plate procedure.

All piping and fittings will be tested hydrostatically/pneumatically at the workshop/facility of agency, to test pressures which are given in the respective codes mentioned herein and elsewhere. The testing shall be carried out in the presence of the DPA appointed TPI Agency.

Pipe supports, guides, anchors, including all structural steel sub-framing are in Supplier's scope of supply and Structural steel shall conform to ASTM/IS standard.

The purchaser will provide two earthing points for the skid, while the rest of the interconnections inside the skid will be the responsibility of the bidder.

Items though not specifically mentioned but are required to make the system complete and safe trouble-free operation should be considered as included in the scope of bidder and must be mentioned in the offer unless otherwise specifically excluded in the offer.

(7) APPLICABLE CODES AND STANDARD:

All equipment, systems and services covered under this specification shall comply with all currently applicable statutes, regulations and safety codes in the area where the equipment will be installed. The equipment and systems shall also conform to the latest applicable standards specified. All codes and standards referred to in the specification shall be understood to be the latest version on the date of offer made by the bidder unless otherwise indicated. Nothing in this specification shall be construed to relieve the bidder of this responsibility. Publications of the following nationally recognized organization are applicable to the design, manufacture, and testing of the equipment included in the specification to the extent specified therein. Design, manufacture and testing of the Nitrogen cylinder and components thereof shall, unless specifically stated otherwise, conform to the following specific codes and standards as applicable, including its latest amendments subsequent to the date of publication as mentioned below.

- National Fire Protection Association (NFPA)
- International Standards Organisation (ISO)
- Bureau of Indian Standards
- Indian Explosives Act.
- Indian Factories Act
- All pipe to conform with ANSI/ASME/ASA pressure piping code and seamless type.
- Any other statutory codes / standards / regulations. Pressure Measurement:

1. Performance Test Code for pressure measurement - ASME PTC 19.2 latest edition

2. Bourdon tube pressure and vacuum gauges - IS 3624, IS 3602, ASME B 40.1

Process Connection and Piping:

3. Codes for power piping ASME B31.1
4. Seamless carbon steel pipe ASTM A-106.
5. Forged and Rolled Alloy steel pipe flanges, forged fittings, valves and parts - ASTM A-182.
6. Material for socket welded fittings - ASTM A-105.
7. Seamless ferrite alloy steel pipe - ASTM A-335.
8. Pipe fittings of wrought carbon steel and alloy steel - ASTM A-234.
9. Composition bronze or metal castings - ASTM B-62.
10. Seamless copper tube, bright annealed ASTM B-168.
11. Seamless copper tube - ASTM B-75.
12. Dimensions of fittings - ANSI B-16.11.
13. Valves flanged and butt-welding ends - ANSI B16.34.
14. Nomenclature for Instrument tube fittings ISA-RP-42.1 - 1982.

The codes and standards specified above are indicative but not exhaustive. Any other equivalent code, subject to purchaser's approval. In case of any contradiction between the above standards and data specification sheets, the stipulation in the data sheets prevails and shall be binding on the bidder. Standards not indicated in the specification are acceptable subject to the approval of purchaser/ owner, if they are established to be equal or superior to the standards indicated in the specification. Metric units / SI units shall be used in all data / drawings submitted for this package

(8) BIDDER'S DOCUMENTS SUBMISSION:

- It is the responsibility of the bidder to get the required approval for all the drawings / documents submitted by the bidder to Employer.
- Approval of Drawings / documents does not absolve the bidder from the responsibilities for correctness of Design, Workmanship, Guarantee Performance, complete technical and contractual obligations / requirements.
- Any discrepancy / deviation / defect in the material or part thereof if noticed in future or the System / Equipment fails to comply with the requirements stated in various parts of technical specifications, the same shall have to be replaced / rectified by the bidder without any financial implication to the employer.

(9) GENERAL CONDITIONS:

1. The work shall be completed within 10 days from the date of issue of work order. Successful agency has to immediately complete the procedures for issuing the gate pass from CISF on his own cost.

2. Liquidate Damage: In case of delay in completion of work, liquidate damage (LD) may be levied Rs.1000/- per day of delay or part thereof, subject to the maximum of 10% of the work order value.
3. The work order will be issued to the agency who quotes lowest amount.
4. All the Rules & Regulations governing Deendayal Port Authority will be applicable.
5. **Defect Liability Period:** The warranty period shall be valid up to twelve (12) months with effect from the date of completion of the work. The agency has to furnish undertaking in this regard.
6. The Performance Guarantee/Security Deposit equal to 5 % of the work order value shall be recovered from First & Final Bill. The same shall be refunded not later than 14 days from completion of defect liability period of 06 (six) months.
7. The complete responsibility for safe working of their staffs will be borne by the Agency. DPA will not be responsible for any loss, damage or accident to any of the staff.
8. The rates quoted shall be inclusive of all labour, materials, loading, unloading, certification, duties, taxes, levies, Transportation, tools, tackles, jigs and fixers etc. Except GST and no extra payment will be made for whatsoever reasons by Deendayal Port Authority.
9. The Agency shall quote the price exclusive of GST. The Contractor shall quote prevailing GST rate separately. GST shall be paid as per actual at the time of release of payment. All other duties, taxes, cess applicable, if any, shall be borne by the Contractor.
10. The payment shall be released, through RTGS/NEFT after completion of the work within 30 days for which party has to submit the invoice and bank details also in triplicate. The bills must have GSTIN No. of the party (if registered under GST) as well as GST No. of DPA (GSTIN No. of DPA is 24AAALK0046N1Z6).
11. Income tax/Education cess as applicable shall be deducted at source.

Sd/-

Superintending Engineer(E)
Deendayal Port Authority

CASCADE MANIFOLD MOC

(35+35) Cylinder 47 ltr WC Cascade

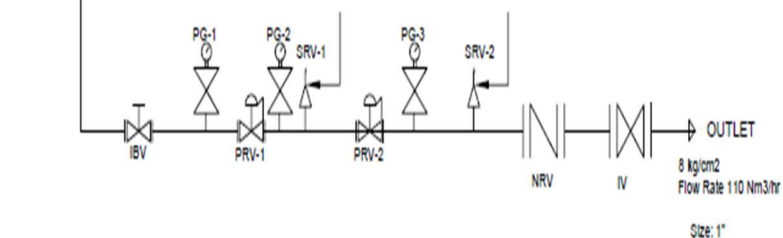
Part No	Description	Material
1	Nitrogen Manifold Valve	Brass
2	Copper Tube 8 mm OD, 2 mm Thick, 600 mm Length	Copper
3	Copper Tube 19 mm OD, 3.2 mm Thick	Copper
4	Block for Connection 28 x 28 x 60	Brass
5	Block for Valve 38x38x58 mm	Brass
6	Pressure Gauge	SS
7	Cascade Isolation Valve	Brass
8	ss braided wire hose with 2 meter length	SS&PTFE

PRS STATION MOC

SR.NO	NARATION	ITEM	M.O.C	SIZE	SET/WORKING PRESSURE
I	IBV	ISOLATING BLOCK VALVES	SS304	1" 1500#SW TO 8/16.25	---
II	PG	PRESSURE GAUGES	SS 304	1/2" NPT, OVAL SIZE 4"	---
III	PCV-1	PRESSURE CONTROL VALVE-1	SS 304	1" 1500# SW TO 8/16.25	30 KG/CM2
IV	SRV-1	SAFETY RELIEF VALVE-1	SS 304	1" 3000# 1 1/2" 150#	34 KG/CM2
V	PCV-2	PRESSURE CONTROL VALVE-2	SS304	1" 3000# FE TO 8/16.5	8 KG/CM2
VI	SRV-2	SAFETY RELIEF VALVE-2	SS304	1" 150# X 1 1/2" 150#	11 KG/CM2
VII	IV	ISOLATION BALL VALVE	SS304	1" 300#	---
VIII	NRV	NON RETURN VALVE	SS304	1" 150#	---

NOTE :- Doted portion shown as cascade and remaining portion is PRS station in this PID Drawing.

PRS Station Area



N2 Cascade -01

4 Nos Cylinders
46.7 liter W.C.

N2 Cascade -02

4 Nos Cylinders
46.7 liter W.C.

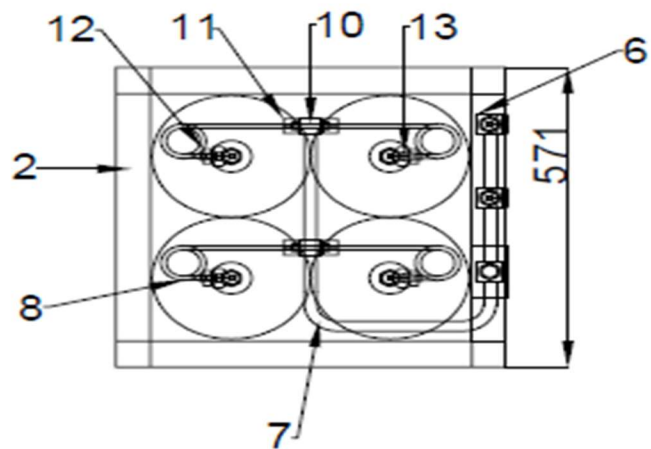
N2 Cascade -03

4 Nos Cylinders
46.7 liter W.C.

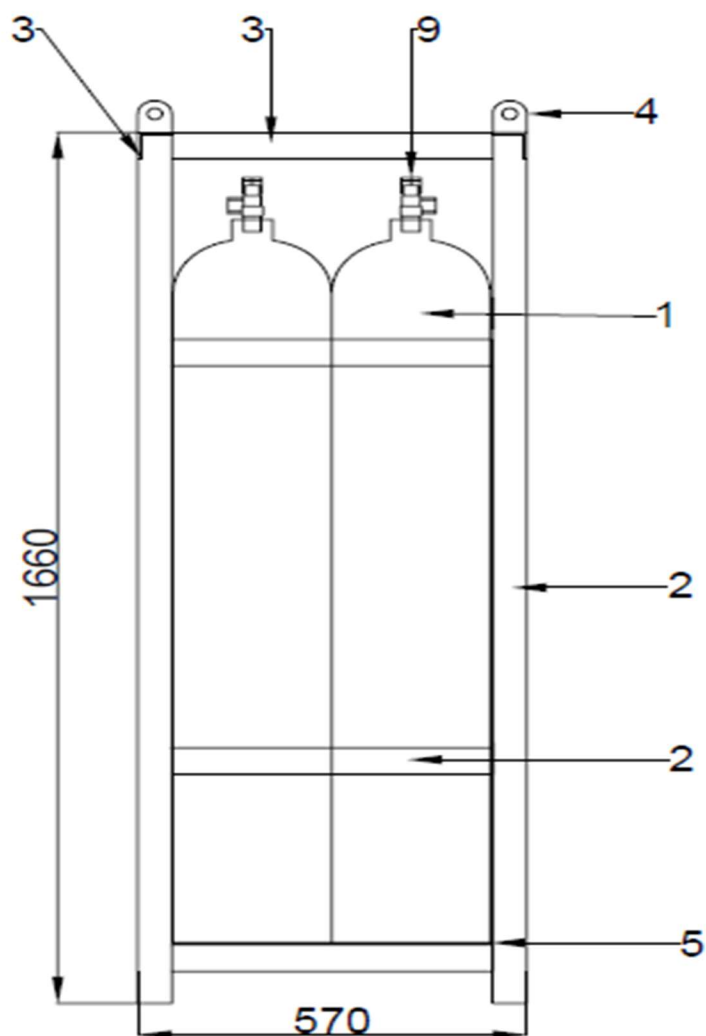
N2 Cascade -04

4 Nos Cylinders
46.7 liter W.C.

Cascade Area

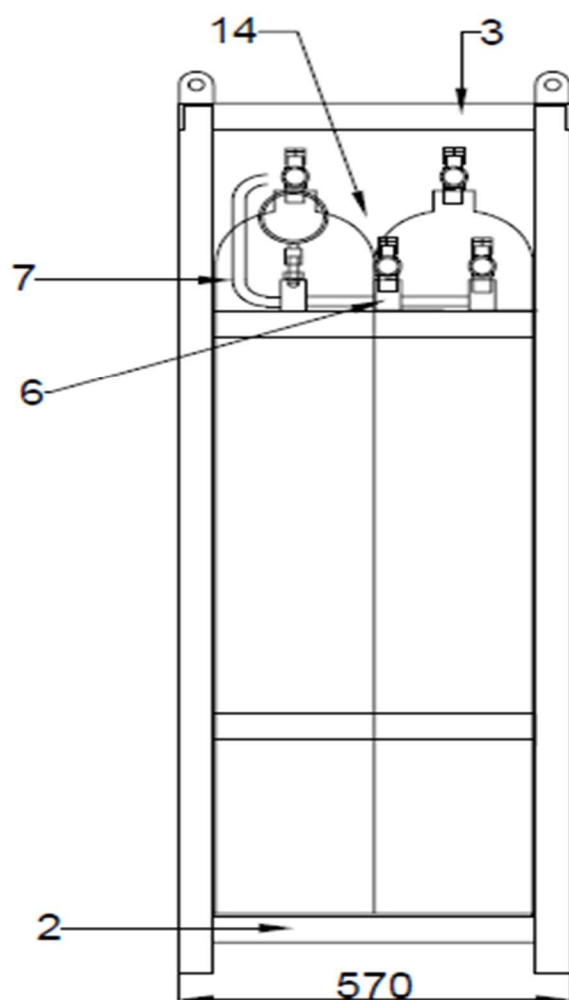


TOP VIEW



FRONT VIEW

4 CYLINDER 46.7 LTR WC VERTICAL CASCADE		
SR NO	DESCRIPTION	MAT.
1	46.7 LTR WC CYLINDER	MS
2	50*50*4 MM BOX PIPE	MS
3	40*40*5 MM ANGLE	MS
4	LIFTING HOOK	MS
5	3.6 MM SHEQUERED PLATE	MS
6	38 MM BLOCK	BRASS
7	19 MM OD 3.2 MM THICK TUBE	COPPER
8	8 MM OD 2 MM THICK TUBE	COPPER
9	CYLINDER VALVE	BRASS
10	28 MM DOUBLE CROSS	BRASS
11	1/2 BSP FEMALE NUT	BRASS
12	3/4 BSP FEMALE NUT	BRASS
13	BULLNOSE NIPPLE	BRASS
14	PRESSURE GAUGE	SS



SIDE VIEW