

## Annexure B

Supply design, fabrication, installation & commissioning of oxygen, D.A., and CO<sub>2</sub> pipelines for distribution, as per sketch.

## Part I - Gas Manifold Header assembly

S.No.	Description of Item	QTY.			Unit
		OXY.	D.A	CO2	
1	High Pressure Ball valves, Valve should be made of SS-304 with a working pressure 100 bars. The inlet and outlet thread on the body of the valve will be ½" BSP (British standard pipe) thread, The Valve should be usable in both direction i.e. reversible inlet/outlet of Zelleto/Vanaz/Audco make.	0	2	4	nos.
2	Copper flexible hose pipe with interchangeable nuts & nipples for 140 Bar working pressure & tested at 300 Bar. The length of the hose pipe should be 1 m with 8 mm diameter and bull nozzle connections on both sides for connecting the cylinder to manifold header.	0	20	40	nos.
3	The manifold shall be made out of Stainless Steel 304 grade with modular design, 150 mm long, 14 mm diameter made from hexagonal bar, The thread size is ¼" NPTM X ¼" NPTM (National pipe thread male), tested at 300 bar. The ferrule should be of Brass material, working temperature should be from 0 ° C to 60 ° C. Slip on Tee should have provision for cylinder extension in the existing gas manifold.	0	20	40	nos.
4	1/2" size Non return valves made of Stainless Steel - 304 material with micro filters of 5 microns tested at 300 bar pressure to avoid any dust particles in the system. The outlet body of non return valve is of SS 304, Viton O- ring of Vanaz/Audco/Leader make.	0	20	0	nos.
5	CO2 Gas Manifold will have central heater at the gas manifold panel with a bypass system (for heater repair) to take care of the entire pipeline. The Heater should be of IP 65 protection class, 250 watts capacity suitable for 150 bar inlet pressure. Temperature setting of 70 degree centigrade with maximum setting of 150 degree	0	0	2	nos.
6	Aluminium cylinder bracket with chain facility	0	0	40	nos.

**Part II - Manually controlled pressure reducing station**

S.No.	Description of Item	QTY.			Unit
		OXY.	D.A	CO2	
7	High Pressure Ball valves, Valve should be made of SS 304 with a working pressure 100 bars . The inlet and outlet thread on the body of the valve will be ½ $\varnothing$ BSP(British standard pipe) thread. The Valve should be usable in both direction i.e. reversible inlet/outlet of Zelleto/Vanaz/Audco make.	0	2	2	nos.
8	Low Pressure Ball valves, Valve should be made of SS 304 with a working pressure 05 bar for DA .The inlet and outlet thread on the body of the valve will be ½ $\varnothing$ BSP(British standard pipe) thread, conforms to BS: 5351.The Valve should be usable in both direction i.e. reversible inlet/outlet of Zelleto/Vanaz/Audco make	0	2	0	nos.
9	Flash Back Arrestors made out of forged Brass with SS-304 bucket filter, SS Sintered flame arrestor coupled with a flame trap,a non return valve,a thermal cut off valve,a fusible plug as per IS-11006 should have a unique identification number embossed on body <b>for future Service tracking</b> .FBA(Flash Back Arrestors) on gas manifold header should be of 1 $\varnothing$ 1 $\varnothing$ BSPF(British standard pipe female) thread connections with a flow rate of about 43 m3/hr. as per IS:11006 of Esab/Ador make.	0	1	0	nos.
10	Single stage manifold DA regulator made of brass seat area of PTFE (Poly tetra fluoro ethylene), Neoprene Rubber with safety pressure gauges approved with an inlet pressure of 30Bar and outlet pressure of 5 Bar. The flow rate should be about 50 m3/hr. The regulator should have inlet & outlet pressure gauges for showing the pressure. The bonnet of regulator to be epoxy coated. The regulator should have safety relief valve with pressure locking facility with inlet and outlet connections, in built safety relief valve of Esab/Vanaz make.	0	2	0	nos.
11	Low Pressure Ball valves, Valve should be made of SS 304 with a working pressure 5 bar for CO2 .The inlet and outlet connections will be ½ $\varnothing$ BSP(British standard pipe) thread, conforms to BS: 5351.The Valve should be usable in both direction i.e. reversible inlet/outlet of Zelleto/Vanaz/Audco make.	0	0	2	nos.

12	Single stage manifold CO2 regulator made of brass seat area of PCTFE (Poly carbon tetra fluro ethylene), Neoprene Rubber with safety pressure gauges according with an inlet pressure of 300Bar and outlet pressure of 20 Bar. The flow rate should be about 250 m3/hr. The regulator should have inlet & outlet pressure gauges for showing the pressure. The bonnet of regulator to be epoxy coated. The regulator should have safety relief valve with pressure locking facility with inlet and outlet connections, in built safety relief valve of Esab/Vanaz make.	0	0	2	nos.
13	Gauge with Electrical contact for Alarm warning signal	0	0	1	no.

<b>Part III - Pipes &amp; Fittings</b>					
<b>S.No.</b>	<b>Description of Item</b>	<b>QTY.</b>			<b>Unit</b>
		<b>OXY.</b>	<b>D.A</b>	<b>CO2</b>	
14	Supply & Fixing of high pressure seamless header Copper pipeline for Oxygen dia 41.6 mm X 2 mm thick, should be tempered, phosphorus deoxidised, non arsenic, degreased conforming to BS 2871-1971 Part . 1(Table X).	595	0	0	m
15	Supply & Fixing of high pressure seamless drop Copper pipeline for Oxygen outer dia. 16mm X 2 mm thick, should be tempered, phosphorus deoxidised, non arsenic, degreased conforming to BS 2871-1971 Part . 1(Table X).	224	0	0	m
16	Supply and fixing of Ball Valve for 41.6 mm pipe as per BS 5351 ( for header line) suitable for inlet pressure 30 bar of Zelleto/Audco/Vanaz make.	8	0	0	nos.
17	Supply and fixing of Copper socket 41.6 mm conforming to BS 2871-1971 Part . 1(Table X)	64	0	0	nos.
18	Supply and fixing of Copper Tee equal ( for header line) 41.6 mm conforming to BS 2871-1971 Part . 1(Table X).	20	0	0	nos.
19	Supply and fixing of Copper elbow 41.6 mm conforming to BS 2871-1971 Part . 1(Table X)	30	0	0	nos.
20	Supply and fixing of Copper reducer 41.6 mm x 16 mm conforming to BS 2871-1971 Part . 1(Table X)	32	0	0	nos.
21	Supply and fixing of Header line MS pipe 1" dia. MS seamless,for DA gas conforming to schedule 40 ( Part I) ASTM 106 grade- B of Tata/MSL(Maharastra Seamless (Jindal group) make.	0	595	0	m
22	Supply and fixing of Drop line MS pipe 1/2" dia. Seamless for DA gas conforming to schedule 40, ASTM 106 grade B of Tata/MSL (Maharastra Seamless (Jindal group) Make.	0	224	0	m
23	Supply and fixing of S.S.Ball valve size 25 mm (for header line) as per BS 5351 suitable for inlet pressure 05 bar of Zelleto/Audco/Vanaz make.	0	8	0	nos.
24	Supply and fixing of M.S.Forged Tee(for header line)	0	10	0	nos.
25	Supply and fixing of M.S.Bend 19 mm (for header line)	0	32	0	nos.
26	Supply and fixing of Header pipe line 2" dia M.S Seamless pipe for CO2 gas confirming to schedule 40 ( Part I) ASTM 106 grade- B of Tata/MSL (Maharastra Seamless (Jindal group) make.	0	0	595	m

27	Supply and fixing of MS seamless pipe 1/2" dia. for CO2 gas drop line conforming to ASTM 106 grade B sch.40 with reducers,bends, Tee, angles, clamps of Tata/MSL(Maharashtra Seamless (Jindal group) Make.	0	0	140	m
28	Supply and fixing of ball valve size 50mm( for header line) as per BS :5351 suitable for inlet pressure 20 bar of Zelleto/Audco/Vanaz make.	0	0	8	nos.
29	Supply and fixing of MS Flange 50 mm in Set (1 set=2 nos) for CO2 pipeline	0	0	40	Set

Part IV - Tapping Points					
S.No.	Description of Item	QTY.			Unit
		OXY.	D.A	CO2	
30	Supply & Fixing of Copper Socket 16 mm for oxygen drop line conforming to BS 2871-1971 Part . 1(Table X)	32	0	0	nos.
31	Supply & Fixing of Forged Brass Distributor Block for drop line	32	0	0	nos.
32	90 degree brass body angle ball valve for oxygen drop line size 1/2" BSP (British standard pipe) thread with SS ball suitable for 30 Bar inlet pressure as per BS 5351 of Zelleto/Vanaz/Audco make.	96	0	0	nos.
33	Tetra Chloride wash	100	0	0	litre
34	Supply & Fixing 'U' clamp of G.I. with nylon packing material	50	0	0	Kg
35	Supply and Painting of pipelines of oxy,DA & CO2 as per terms & conditions no.3.14	150	0	0	litre
36	Supply & Fixing of Flash Back arrestor for oxygen drop line as per IS-11006 heavy duty forged brass complete body with SS-304 bucket filter,SS sintered flame arrestor coupled with a flame trap with non return valve 3/8"x3/8"BSP(British standard pipe) thread connection with a flow rate of about 33m3/hr of Esab/Vanaz Make.	64	0	0	nos.
37	Tapping point oxygen regulator, inlet pressure range 0 - 40 bar and outlet pressure range 0 - 16 bar should be of low pressure with brass body and brass bonnet, diaphragm of Neoprene rubber,SS filter, fire retardent soft valve seat for leak tightness, IS:6901 of Esab/Vanaz Make.	64	0	0	nos.
38	Supply & Fixing of heavy duty forged brass body Flash Back arrestor for DA drop line with SS-304 bucket filter,SS sintered flame arrestor coupled with a flame trap with non return valve should be of 3/8"x3/8"BSP (British standard pipe) thread connection with a flow rate of about 11 m3/hr as per IS-11006 of Esab/Ador make.	0	64	0	nos.
39	Supply & Fixing of Ball valve for DA drop line size 1/2",90 degree angle with SS ball of Zelleto/Vanaz/Audco make.	0	96	0	nos.
40	M.S.Forged Union For DA drop line size 1/2"	0	32	0	nos.
41	MS bend for Flash back arrestor	0	32	0	nos.
42	Supply and fixing of angle, clamping material of M.S.	0	50	0	Kg.
43	Tapping point DA regulator Should be of low pressure with brass body and brass bonnet, diaphragm of Neoprene rubber, SS-304 filter, fire retardant soft valve seat for leak tightness and increased life,maximum inlet pressure of 20 Bar and outlet pressure of 01 bar, The regulator should also have Pressure / flow locking facility of Esab/Vanaz	0	64	0	nos.

44	Single stage Regulator suitable for CO2 operation made out of brass for inlet pressure 20 bar, outlet pressure 2-6 bar, flow rate about 15 m3/hr. of Esab/vanaz make.	0	0	40	nos.
45	Supply & fixing of U bend M.S. for CO2 drop line pipe	0	0	20	nos.
46	Ball valve, brass body, 90 degree angle with SS ball suitable size 1/2 " for CO2 drop line, 30 Bar inlet pressure with the working temperature should be from 0 ° C to 60 ° C .as per BS: 5351 of Zelleto/Vanaz/Audco make.	0	0	60	nos.
47	Supply & fixing of 19mm M.S. bend for CO2 drop line pipe	0	0	20	nos.

S.No.	Description of Item	QTY.			Unit
		OXY.	D.A	CO2	
<b>Part IV - Tapping Points</b>					
48	Supply & fixing of drop line header distributor pipe ( MS) along with nipple.	0	0	20	nos.
49	Supply & fixing of G.I.'U' clamp with packing material for CO2 pipes	0	0	50	Kg.
<b>Part V - Other charges</b>					
50	M.S angle for Gas manifold system & Pipeline layout	0	1	1	set
51	Welding machine charges, TCE (Tetra chloro ethylene) cleaning charges	0	1	1	set
52	Labour charges for DA gases, pipeline MS angle cutting, welding	0	1	0	set
53	Labour charges for Nitrogen Gas purging	0	1	1	set
54	Labour charges for CO2 gases, pipeline brazing with silver rod(Cu+Ag) & MS angle cutting, welding	0	0	1	set
55	Labour charges for oxygen Gas pipeline & Manifold.	1	0	0	set