TECHNICAL SCHEDULES

TO BE FILLED BY BIDDER

Refer ITB 11.1 (b)

PURCHASER/CLIENT/OWNER	**:**	**MINISTRY OF MICRO, SMALL AND MEDIUM ENTERPRISES, PUDI,VISAKHAPATNAM**
PROJECT	**:**	**MSME TECHNOLOGY CENTER, PUDI**
LOCATION	**:**	**PUDI, VISAKHAPATNAM**
CONSULTANT/CMC/PROJECT MANAGER	**:**	**TATA CONSULTING ENGINEERS LIMITED**

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TECHNICAL SPECIFICATIONS – BIDDER TO FILL

FOR

PLUMBING SYSTEM

1. DATA SHEET FOR PLUMBING

1.1. BUTTERFLY VALVES

SL. NO.	DATA SHEET A BUTTERFLY VALVES ITEM	UNIT	TO BE FILLED BY BIDDER		
1.0	**GENERAL**				
1.1.	SERVICE				
1.2.	TAG NOs.				
1.3.	NO. OF VALVES	No.			
1.4.	DESIGN STANDARD				
1.5.	VALVE CATEGORY				
1.6.	DISC				
1.7.	BODY TYPE				
1.8.	VALVE SIZE	NB			
1.9.	VALVE RATING / CLASS				
1.10.	FLUID HANDLED WITH ITS SPEC. GRAVITY				
1.11.	COMPANION FLANGE TYPE AND CLASS				
1.12.	TYPE OF VALVE OPERATOR				
1.13.	MAXIMUM FLOW (INDICATE THE RELATED PRESSURE ALSO)	M^3/hr, KPa	MAX.	MIN.	OPER
1.14.	MAXIMUM FLOW VELOCITY	m/s			
1.15.	DESIGN PRESSURE	KPa			
1.16.	OPERATING PRESSURE	KPa			
1.17.	DESIGN TEMPERATURE	^{0}C			
1.18.	OPERATING TEMPERATURE	^{0}C			
1.19.	VALVE LOCATION				
4.0	**MATERIALS OF CONSTRUCTION**				
4.1	BODY				
3.2.	DISC				
3.3.	STEM				

SL. NO.	DATA SHEET A BUTTERFLY VALVES ITEM	UNIT	TO BE FILLED BY BIDDER
3.4.	SEAT		
3.5.	BODY SEAT RINGS		
3.6.	DISC SEAL RINGS		
3.7.	SEAT RETAINING RINGS		
3.8.	COMPANION FLANGE		
5.0	**TESTS AND INSPECTION**		
4.1.	HYDROSTATIC TEST PRESSURE FOR BODY	Kg/cm^2	
4.2.	HYDROSTATIC TEST PRESSURE FOR DISC	Kg/cm^2	
4.3.	DISC STRENGTH TEST PRESSURE	Kg/cm^2	
4.4.	ACTUATOR PERFORMANCE TEST PRESSURE	Kg/cm^2	
4.5.	AIR LEAK TEST PRESSURE	Kg/cm^2	
4.6.	ELECTRICAL CONTINUITY TEST		
4.7.	**SPARES**		
6.0	DISC SEAL RINGS		
5.1.	FLANGE GASKET		
5.2.	SEAT/SEAL CLAMPING BOLTS		
5.3.	'O' RING SEALS OR GLAND PACKING		
5.4.	(REF. NOTE -10)		

NOTES :-

0 FOR GENERAL REQUIREMENTS. HOWEVER, IN CASE OF OVERLAPPING REQUIREMENTS, THOSE OF THE DATA SHEET A, TO BE CONSIDERED AS THE FINAL ONE.

0 THE VALVE SHALL BE DESIGNED CONSIDERING THE LARGER OF THE FOLLOWING TORQUE REQUIREMENTS FOR WHICH CALCULATIONS SHALL BE SUBMITTED:

a) CALCULATED AS PER AWWA-C504-80

b) CALCULATED AS PER THE STANDARD TO WHICH VALVE IS DESIGNED.

0 FOR MANUALLY OPERATED VALVES, TORQUE REQUIRED AT HAND WHEEL SHALL NOT EXCEED 7 KG.M.

0 MOTOR OPERATED VALVE ACTUATOR SHALL BE RATED TO PROVIDE AN OUTPUT TORQUE OF ATLEAST 150% OF TORQUE REQUIRED AS PER NOTE-2 ABOVE UNLESS OTHERWISE NOTED.

0 THE ACTUATOR SHALL BE CAPABLE OF OPERATING IN ANY MOUNTING ANGLE.

0 THE TRANSMISSION UNIT SHALL BE DESIGNED TO TRANSMIT TWICE THE VALVE DESIGN TORQUE UNLESS OTHERWISE NOTED.

0 THE ACTUATOR SHALL PROVIDE AN UNSEATING TORQUE OF AT LEAST 50% IN EXCESS OF VALVE SEATING TORQUE AT THE SPECIFIED VOLTAGE UNLESS OTHERWISE NOTED.

0 SEGMENTAL WELDED CARBON STEEL FLANGE PLATES ABOVE 20 MM THICKNESS SHALL BE SUBJECTED TO PREHEATING BEFORE WELDING AND STRESS RELIEVING AFTER WELDING AS PER IS 2825 UNLESS OTHERWISE SPECIFIED.

0 UNLESS OTHERWISE SPECIFIED IN SECTION –C, ONE COAT OF ZINC RICH PRIMER AND TWO COATS OF ENAMEL SHALL BE APPLIED TO ALL STEEL AND CAST IRON EXPOSED SURFACES. THE MINIMUM THICKNESS OF COATING SHALL BE 100 MICRONS.

0 THE VENDOR MAY ALSO SUGGEST ANY ADDITIONAL SPARES AND TOOLS REQUIRED FOR THE SUCCESSFUL OPERATION, START UP AND MAINTAINENCE OF THE VALVE.

0	IN THE ABSENCE OF ANY TEST RELATED DATA, THE RELEVANT TESTING STANDARD FOR BUTTERFLY VALVES MAY BE INDICATED.

1.2. Y STRAINER

		DATA SHEET A **STRAINERS (Y TYPE)**	**TO BE FILLED BY BIDDER**
DESIGN DATA	1.	TAG NO.	
	2.	QUANTITY REQUIRED	
	3.	LOCATION	
	4.	TYPE	
	5.	FLUID	
	6.	FLOW RATE m^3/hr	
	7.	OPERATING PRESSURE bar	
	8.	OPERATING TEMPERATURE ° C	
	9.	DESIGN PRESSURE barg	
	10.	DESIGN TEMPERATURE ° C	
	11.	FLUID VISCOSITY (Cp) AT OP.TEMP.	
	12.	FLUID SP. GRAVITY AT OP. TEMP.	
	13.	MAX. PERMISSIBLE PR. DROP UNDER 50% CLOGGED CONDITION	
	14.	SCREEN BASKET DATA	
		1. DIA OF PERFORATIONS, mm	
		2. MIN. THICKNESS, mm	
		3. FREE STRAINING AREA	
	15.	STEAM JACKET	
		1. INLET PR. barg, OP. / DESN.	
		2. INLET TEMP. ° C, OP./DESN.	
	16.	END CONNECTIONS	
		1. SIZE, NB mm	
		2. TYPE	
		3. DETAILS/ STANDARDS	
	17.	COVER	
	18.	IBR APPROVAL	

MATERIALS	19. BODY	
	20. COVER	
	21. SCREEN BASKET	
	22. BOLTS/ STUDS	
	23. NUTS	
	24. GASKETS	
	25. JACKET	
	26. JACKET COUPLINGS/ FLANGES	
27.	ACCESSORIES BY VENDOR:	
27.1	FOUNDATION BOLTS	
27.2	DIFFERENTIAL PRESSURE GAUGE	
27.3	DRAIN/ VENT COCK (SS 316)	
27.4	SUPPORT LEGS	
26.	HYDROSTATIC TEST PRESSURE, barg	
26.1	SHELL SIDE	
26.2	JACKET SIDE	
27.	VACUUM TEST REQUIRED	
28.	PRESSURE DROP TEST REQUIRED	
	CLEAN/ 50% CLOGGED	
29.	INSPECTION:	
30.		

NOTES:

1. GENERAL REQUIREMENTS:

2. '*': BIDDER TO FURNISH INFORMATION.

3 GASKET SHALL BE METAL WIRE-REINFORCED AND GRAPHITED BOTH SIDES.

1.3. WAFER CHECK VALVES

	TO BE FILLED BY BIDDER	**DATA SHEET A** **WAFER CHECK VALVES**					SHEET : 1 OF 1
GENERAL	1. TAG NO. :	4. FLUID :	SIZ	QUANTITY			
	2. SIZE RANGE :	5. DES. PR. :					
	3. RATING :	6. DES. TEMP. :					
	7. STANDARD :	GRADE: CT	mm	P0	R0	R1	R2
CONSTRUCTION FEATURES	8. TYPE :						
	9. ENDS :						
	10.						
	11.						
	12.						
	13.						
	14. OTHER REQUIREMENTS :						
MATERIALS	15. BODY :						
	16. PLATE :						
	17. SEAL :						
	18. PLATE SEAT :						
	19. SPRING :						
	20. HINGE PIN & STOP PIN :						
	21.						
TESTS & INSPECTION	24. SHELL HYDRO :						
	25. SEAT HYDRO :						
	26. INSPECTION :						

NOTES: 1. GENERAL REQUIREMENTS :.

1.4. BALL VALVES

TO BE FILLED BY BIDDER			DATA SHEET A BALL VALVES		SHEET : 1 OF 1			
GENERAL	1.	TAG NO.	:	SIZE	QUANTITY			
	2.	SIZE RANGE	:					
	3.	RATING	:					
	4.	GRADE	:	mm	P0	R0	R1	R2
CONSTRUCTION FEATURES	5.	PORT	:	REFER SECTION F				
	6.	STEM	:					
	7.	ENDS	:					
	8.	OPERATION	:					
	9.	ANTISTATIC FEATURE	:					
	10.	FIRE SAFE DESIGN	:					
	11.	OTHER REQUIREMENTS	:					
		SIZE, (in/ mm) :						
		INS. THK., mm :						
MATERIALS	12.	BODY						
	13.	BALL (MIRROR FINISHED)						
	14.	STEM						
	15.	SEAT						
	16.	SEAL (STEM & BODY)						
	17.	BOLTS, STUDS & NUTS						
	18.							
TESTS & INSPECTION	19.	SHELL HYDRO	:					
	20.	SEAT HYDRO	:					
	21.	SEAT AIR	:					
	22.	INSPECTION :						

1.	**1.5.** SOLENOID VALVE **DATA SHEET A** **SOLENOID VALVE** **GENERAL**	
2.	Manufacturer	
3.	Model No.	
4.	Service	
5.	**PROCESS DATA**	
6.	Fluid	
7.	Pipe size	
8.	Operating Pressure : kg/sQcm	
9.	Operating Temperature : °C	
10.	Operating Flow	
11.		
12.	**FEATURES**	
13.	Shut Off Class (Leakage)	
14.	Type : Pilot ☐ Direct ☐	
15.	Body Rating : ANSI Class 300 ☐ ☐	
16.	Duty : Continuous ☐ Intermittent ☐	
17.	No. of Ports / No. of Ways : 3/2 ☐ 5/2 ☐	
18.	Power Supply : 230 V AC ☐ 110 VAC ☐ 24 VDC ☐ ☐	
19.	Style Of Coil : Moulded	
20.	Coil Insulation : Class F for high temp. as per IEC 60085/IS 1271	
21.	**MATERIAL OF CONSTRUCTION**	
22.	Body Material : Bronze ☐ SS 316 ☐ ☐	
23.	Seat Material : SS 316 ☒ Teflon ☐ ☐	
24.	Plunger Material : SS316 ☐ ☐	
25.	Packing Material	
26.	**ENCLOSURE PROTECTION**	
27.	Weather Proof To : IP 67 & 68	
28.	Ex-Proof To: Zone 1 ☐ ZONE 2 ☐ Group IIA ☐ IIB ☐ IIC ☐ Temp.Class : T1☐ T2☐ T3☐ T4☐ T5☐ T6☐	
29.	Intrinsic safe certified	
30.	**CONNECTION AND DIMENSIONS**	
31.	Process Connection Type : NPT ☐ BSP ☒	
32.	Size	

33.	Cable Entry Size : 1" ET ☐ ☐	
34.	**PAINTING**	
35.	Protection For Rust Prevention	
36.	Painting Standard : As Per IS-6005, 1970	
37.	**ACCESSORIES**	
38.	Name Plate : Required	
39.	Metalling enclosure for connecting flying leads: Required	
40.	**CODES AND STANDARDS**	
41.	ASME, ASTM, IEEE, IBR	
42.	Weather Proof : IS 13947 PART I	
43.	Ex. Proof : IS 2148 / BS EN 50014 / BS EN 50020	
44.	**TEST**	
45.	Performance; Required	
46.	Hydro Test : Required	
47.	Seat Leakage Test : Required	
48.	CV Test : Certificate to be furnished	
49.	Coil Insulation Test : Required	
50.	Test Certificate From PESO : Required for all exproof solenoid valves	
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67.		

NOTES:

1.	* - Bidder to furnish details.
2.	All accessories shall be supplied as applicable.
3.	The bidder shall indicate all applicable codes and standards
4.	The solenoid coil shall operate the valve even when the supply voltage drops down by 15% or goes up by 10%.
5.	The coil shall be wired to a terminal block located inside the housing. Flying lead wires of the coil are not acceptable.the material of housing shall be metallic unless otherwise indicated in data sheet.
6.	Each solenoid valve body shall be subjected to pneumatic pressure test by air / nitrogen with test pressure not less than 1.5 times the maximum working pressure (rated) of the valve. There shall not be any visible leakage during the test
7.	Each solenoid valve shall be subjected to seat leakage test by air / nitrogen with test pressure equal to maximum working pressure (rated) of the valve for one minute. There shall not be any seat leakage during this test.
8.	The coil shall be low power consumption type. Generally the power consumption of coil shall be less than 5 W.

1.6. TRANSFER PUMPS		**TO BE FILLED BY BIDDER**
Pump		
Make	:	
Type & Model	:	
Discharge in LPS / GPM	:	
Head (Meters of WC)	:	
Shut off Head (Meters of WC)	:	
Efficiency (%)	:	
No. of Stages		
Suction End I.D.	:	
Delivery End I.D.	:	
Details of N.P.S.H.	:	
Vibration Isolation Detail	:	
Skid Details	:	
Operating Weight	:	
Overall Dimension (MM)	:	
Mechanical Seal Detail	:	
Material		
Body	:	
Impeller	:	
Type of Impeller		

Shaft	:	
Is it suitable for direct coupling	:	
Motor	:	
Make	:	
Model	:	
Power Requirement (HP / KW)	:	
R.P.M.	:	
Rating	:	
Over Load Capacity	:	
Class of Insulation	:	
Details of Additional protection in winding	:	
Motor Efficiency	:	
It it suitable for direct coupling to pump?	:	
Type of rotary movement	:	
Method of Starting	:	
Size and type of cable for connections.	:	
Number of variable frequency drive	:	
Detail of VFD	:	

1.	**DATA SHEET** TO BE FILLED BY BIDDER 1.7. FLOAT SWITCH **GENERAL**	
2.	Manufacturer :	*
3.	Model no. :	*
4.		
5.	**FEATURES**	
6.	Calibrated scale board	
7.	Colour of numerals :	
8.	Height of numerals :	
9.	Accuracy : +/- 5 mm ☐ +/- 10 mm ☐	
10.	Range :	
11.		
12.	**MATERIAL OF CONSTRUCTION**	
13.	Float : SS 316 ☐ ☐	
14.	Float cable : SS 316 ☐ ☐	
15.	Anchor : SS 316 ☐ ☐	
16.	Spring assembly : spring steel ☐ CS with cadmium plating ☐	
17.	Board : Aluminum epoxy painted ☒ Aluminum polyurethane painted ☐	
18.	Guide wires (refer note 4 & 5) : SS 316 ☐ ☐	

19.	Elbows : : Cast Aluminum Aluminum epoxy painted ☐ Aluminum polyurethane painted ☐	
20.	Pulley: SS316 ☐ Aluminum ☐	
21.	Pipe enclosing float cable: GI ☐ SS 316 ☐	
22.	**CONNECTIONS & DIMENSIONS**	
23.	Type : flanged	
24.	Flange size :	
25.	Flange rating	
26.		
27.	**ACCESSORIES (REFER NOTE 3)**	
28.	Mounting brackets	
29.	Name plate / metal tag	
30.	Gaskets, bolts, nuts	
31.	All installation hardware	
32.		
33.	**CODES & STANDARDS**	
34.	Refer note - 2	
35.		
36.	**TESTS**	
37.	Performance :	
38.	Calibration :	
39.	Hydro test for the float :	

	DRAWINGS/DOCUMENTS	
1.	Vendor shall submit data sheets, catalogue and erection sketch for review and comments by purchaser/consultant.	
2.	Vendor shall submit instruction manual for records.	

	TEST CERTIFICATES	
1.	Vendor shall submit all routine test certificates for purchaser/consultant's review.	

NOTES :

1.0 *: bidder to state / furnish details; 3: required; – not required.

2.0 The bidder shall indicate all applicable codes & standards.

3.0 All accessories shall be supplied as applicable.

4.0 Sufficient float & guide wire to be supplied on single length to cut at site as per requirement.

5.0 Option of counter weight instead of anchoring of guide wire at bottom is decided based on site condition of the Tanks

6.0 Refer follow-up sheets for service and application details.

1.	**FLOAT TYPE LEVEL SWITCHES** **DATA SHEET A** **GENERAL**	
2.	Manufacturer :	*
3.	Model no.:	*
4.	**FEATURES**	
5.	Type: Magnetic float with guide tube ☐ Tilt type ☐	
6.	Accuracy: ± 2 MM	
7.	Mounting: Direct ☐ External chamber ☐	
8.	GUIDED FLOAT TYPE	
9.	Switch type: glass encapsulated hermetically sealed reed switch ☐	
10.	Minimum distance between reed switches	*
11.	No. of floats: single ☐ multiple ☒ Refer followup sheet	
12.	C-C distance for external chamber mounted switches: ……mm	
13.	TILT TYPE	
14.	Switch type: Microswitch encapsulated in float	
15.	No. of floats: single ☐ multiple ☐ Refer followup sheet	
16.	**ENCLOSURE PROTECTION:**	
17.	Housing : IP-65 ☒ IP_ _ ☐	
18.	Certification/ approval type: Ex d ☐ Ex ia ☐ NA ☐	
19.	Housing colour: Grey ☐ Black ☐	
20.	Ex-proof to zone: 0 ☐ 1 ☐ 2 ☐ Group: I ☐ IIA ☐ IIB ☐ IIC ☐ Temperature class: T1/2/3/4/5/6	
21.	**SUPPLY / SIGNAL**	
22.	Switch contacts: SPDT ☐ 1 NO	
23.	Switch contact rating : 0.2A, 220V DC / 5A , 230VAC	
24.	**MATERIAL:**	
25.	External chamber with drain/ vent arrangement: CS A105 ☐ SS 316 ☐ PP ☐	
26.	Float: 316 SS ☐ PP ☐ Others ☐	
27.	Guide tube: 316 SS ☒ PP ☐	
28.	Bolts & nuts : ASTM A 193 Gr.B7 / A194 Gr.2H	
29.	Gaskets : PTFE ☐ OTHERS ☐	
30.	Wetted parts: SS 316 ☐ PP ☐ OTHERS ☐	
31.	Flange: SS 316 ☐ PP ☐	
32.	Housing: Die cast Aluminium ☐ SS 316 ☐ Polyamide ☐	
33.	Cable for tilt switch:	
34.	Counter weight for titl type switch:	
35.		
36.	**CONNECTION & DIMENSIONS**	
37.	External chamber connection type: Upper side - lower side ☐ Upper side - lower bottom ☐	
38.	External chamber process connection size: ½" ☐ 1" ☐ others ☐ Type : NPT ☒ flange ☐ SW ☐	
39.	External chamber instrument flange: ANSI class 150 RF flanged (**Refer note 3.0**)	
40.	Drain arrangement for external chamber Valve ☐ Plug ☐	
41.	Vent plug	
42.	Process conncetion for direct mounted: ANSI class 150 RF flanged(**Refer note 3.0**)	
43.	Cable entry: 1"ET ☐ ½ " NPT ☐ others ☐	
44.	**ACCESSORIES**	
45.	Still well for direct mounting	
46.	Counter weight to keep tilt type switch cable and float in position	
47.	Name plate : Removable – SS	
48.	Metal tag – SS	
49.	Counter flanges	
50.	**CODES AND STANDARDS**	
51.	Refer note no. 6.0	
52.		

.		
53.	**SPARES**	
54.	Minimum one (1) no. Or 10% of total qty., whichever is higher, for each type and model no.	
55.		
56.	**TESTS**	
57.	Material test / contact rating test / hydro test / calibration test	
58.	Valid type test certificate to be provided for enclosure protection .	
59.	Vendor to submit test certificates for owner / engineer's review & records	
60.	**DRAWING**	
61.	The vendor to submit data sheet, dimensional drawing and erection sketch for review and comments by purchaser/ consultant.	
62.	The vendor shall submit all operating and service manuals for the equipment supplied for records	

NOTES:

1.0 Bidder to submit list of installations and commissions for the make & type of instrument offered and user's certificates.

2.0 Bidder to furnish details (*); required (✓); not required (-).

3.0 Float size shall be suitable to process conditions and tank height. Accordingly, instrument flange size shall be selected.

4.0 For qty. Refer to the attached bill of material.

5.0 All accessories shall be supplied as specified. In addition, any other accessories required shall be supplied without any price implication to make the measurement complete to match with process requirement.

6.0 Bidder shall indicate all applicable codes and standards.

1.8. ELECTRICAL TECHNICAL DATA SHEETS

For MCC +PDBs+MLDBs/SLDBs/DBs (To be filled by the bidders)

S.No	Description	TO BE FILLED BY BIDDER
1	Type of Panel	
2	Type of Mounting	
3	Fault kA	
4 a b c d	Thickness of CRCA sheets Structural members Covers and doors Base channel Gland plate	
5a.	Painting/ Process	
b	Paint shade; a. Inside b. Outside	
6	Details of busbars	
7	Cable Entry	
8	Enclosure Protection/	

	Ventilation		
9	Control Wiring/ Power Wiring		
a.	Voltage Circuit		
b.	Current Circuit		
c.	Minimum size of Power wiring CKt		
10	Maximum Operating Height		
11	Mounting height of Relays/Meters Control Switches		

1.9. CONSTRUCTIONAL FEATURES FOR MCC

S.No.	**Description**	**TO BE FILLED BY BIDDER**
1	MCC	
a.	Busbar Chamber	
b.	Metering Chamber	
c.	Incoming Compartment	
d.	Overall Height	
e.	Overall Depth	
f.	Overall Length	
g.	Construction	
h.	Current Density	
i.	Main Bus	
ii.	Branch Bus Rating	
iii.	Neutral Bus	
iv.	Earth Bus	
j.	Incoming and outgoing feeders.	

2	AHU Panels	
a.	Accessibility	
b.	Overall Depth	
c.	Overall Height	
d.	Incoming compartment	

1.10. PIPES

SR	Description	TO BE FILLLED BY BIDDER
1	MAKE	
2	Pressure rating	
3	MOC	
4	STANDARD	

TECHNICAL SPECIFICATION TO BE FILLED BY BIDDER

FOR

FIRE PROTECTION SYSTEM

2. DATA SHEET FOR FIRE PROTECTION SYSTEM

2.1. DATA SHEETS FOR INSTRUMENTS EQUIPMENT

2.1.1. Pressure Gauges

Sr. No.	Description	Bidder
1	Type	
2	Casing	
3	Glass	
4	Dial size	
5	Wetted Parts (including accessories)	
6	2-valve manifold	
7	Diaphragm seal	
8	Pointer	
9	Movement & socket	
10	Accuracy	
11	Process Connection	
12	Over range protection	
13	Accessories	

2.1.2. Pressure Switch

Sr. No.	Description	Bidder
1	Type	
2	Casing	
3	Wetted Parts (including accessories)	
4	Repeatability	
5	Micro switch contacts	

6	Over range protection	
7	Accessories	

2.1.3. Solenoid Valve

Sr. No.	Description	Bidder
1	Type	
2	Power supply	
3	Size	
4	Material of Construction	
5	Accessories	
6	Applications	
Notes: Terminal blocks and Manual actuator shall be provided in the solenoid valves.		

2.1.4. Level Gauge / Indicator – Float & Cord

Sr. No.	Description	Qty.	Bidder
	GENERAL		
1.	Manufacturer		
2.	Model No.		
	FEATURE		
3.	Calibrated scale board		
4.	Colour of numerals		
5.	Accuracy		
6.	Enclosure		
7.	Mounting		
8.	Height of numerals		
	MATERIAL OF CONSTRUCTION		
9.	Float		

10.	Float cable		
11.	Anchor		
12.	Spring assembly		
13.	Board		
14.	Guide wires		
15.	Elbows		
16.	Flanges		
	CONNECTION & DIMENSIONS		
17.	Type		
18.	Flange size		
19.	Flange rating		
20.	Name plate/ metal tag		
	Installation hardware		

2.1.5. Float Switch

Sr. No	Description	Bidder
40.	Manufacturer :	
41.	Model no. :	
42.		
43.	FEATURES	
44.	Calibrated scale board	
45.	Colour of numerals :	
46.	Height of numerals :	
47.	Accuracy : +/- 5 mm ☐ +/- 10 mm ☐	
48.	Range :	
49.		
50.	MATERIAL OF CONSTRUCTION	
51.	Float : SS 316 ☐ ☐	
52.	Float cable : SS 316 ☐ ☐	
53.	Anchor : SS 316 ☐ ☐	

54.	Spring assembly : spring steel ☐ CS with cadmium plating ☐	
55.	Board : Aluminum epoxy painted ☐ Aluminum polyurethane painted ☐	
56.	Guide wires (refer note 4 & 5) : SS 316 ☐ ☐	
57.	Elbows : : Cast Aluminum Aluminum epoxy painted ☐ Aluminum polyurethane painted ☐	
58.	Pulley: SS316 ☐ Aluminum ☐	
59.	Pipe enclosing float cable: GI ☐ SS 316 ☐	
60.	CONNECTIONS & DIMENSIONS	
61.	Type : flanged	
62.	Flange size :	
63.	Flange rating	
64.		
65.	ACCESSORIES (REFER NOTE 3)	
66.	Mounting brackets	
67.	Name plate / metal tag	
68.	Gaskets, bolts, nuts	
69.	All installation hardware	
70.		
71.	CODES & STANDARDS	
72.	Refer note - 2	
73.		
74.	TESTS	
75.	Performance :	
76.	Calibration :	
77.	Hydro test for the float :	

	DRAWINGS/DOCUMENTS	
1.	Vendor shall submit data sheets, catalogue and erection sketch for review and comments by purchaser/consultant.	
2.	Vendor shall submit instruction manual for records.	

	TEST CERTIFICATES	
1.	Vendor shall submit all routine test certificates for purchaser/consultant’s review.	

NOTES :

1.0 *: bidder to state / furnish details; :required; – not required.

2.0 The bidder shall indicate all applicable codes & standards.

3.0 All accessories shall be supplied as applicable.

4.0 Sufficient float & guide wire to be supplied on single length to cut at site as per requirement.

5.0 Option of counter weight instead of anchoring of guide wire at bottom is decided based on site condition of the Tanks

6.0 Refer follow-up sheets for service and application details.

2.1.6. JUNCTION BOXES

Sr. No.	Description	Qty.	Bidder	
	GENERAL			
1.	Manufacturer			
2.	Model No.			
	FEATURE			
3.	Mounting			
4.	No. of terminals			
5.	Terminal type			
6.	Terminal size			
7.	Mounting plate			
8.	Cable entry			
9.	Gland plate			
10.	Door			
11.	Lock & key			
12.	Sheet thickness			
13.	Painting			
14.	Protection class			

Sr. No.	Description	Qty.	Bidder	
	MATERIAL OF CONSTRUCTION			
15.	Enclosure			
16.	Gasket			
17.	Cable entry sealing			
18.	Name plate/ metal tag			
19.	Installation hardware			

2.2. DATA SHEETS FOR HORIZONTAL CENTRIFUGAL PUMPS

2.2.1. DATA SHEETS B

Sl. No.	Item		Bidder
1.	Designation:		
2.	Number offered		
3.	Tag numbers		
4.	Pump make and model number		
5.	Design capacity	M^3/hr	
6.	Differential head	Mlc	
7.	Shut-off head	Mlc	
8.	Hydrostatic test pressure	$Kg/cm^2(g)$	
9.	Number of stages		
10.	Pump efficiency at duty point	%	
11.	Pump speed	Rpm	
12.	Pump bkw	Kw	
13.	Maximum pump power requirement	Kw	
14.	Power input to driver at duty point	Kw	
15.	Method of lubrication		
17.	Npsh required	Mlc	

18.	Driver rating	Kw	
19.	Driver speed	Rpm	
20.	Driver efficiency	%	
21.	Suction nozzle		
21.1	Orientation		
21.2	Size	Mm nb	
22.	Discharge nozzle		
22.1	Orientation		
22.2	Size	Mm nb	
23.	Type and make of mechanical seal		
24.	Type of coupling		
25.	Minimum capacity for continuous	M^3/hr	
	Operation		
26.	Maximum allowable size of solids	Mm	
27.	External water requirement for		
	Cooling		
27.1	Flow rate	M^3/hr	
27.2	Pressure	$Kg/cm^2(g)$	
28.	External water requirement for		
	Sealing		
28.1	Flow rate	M^3/hr	
28.2	Pressure	$Kg/cm^2(g)$	
29.	Weight of bare pump	Kg	
30.	Weight of driver	Kg	
31.	Weight of common base plate	Kg	
32.	Moment of inertia of pump rotor	$Kg\text{-}m^2$	
33.	Accessories as per data sheet a to		whether included
	Be included		Yes no
34.	Outline dimensional drawing to be		Whether enclosed

	Enclosed		Yes/no
35.	Foundation drawing with static		Whether enclosed
	And dynamic loads to be enclosed		Yes/no
36.	Cross-section drawing of pump		
	With part list and materials of		Whether enclosed
	Construction and relevant		Yes/no
	Standards to be enclosed		
37.	Performance curves flow rate vs		
	Head, bkw, efficiency, npshr and		Whether enclosed
	Torque-speed curve to be enclosed		Yes/no
38.	Performance guarantee		
38.1	Capacity	M3/hr	(+) (-)
38.2	Differential head	Mlc	(+) (-)
38.3	Power consumption	Kw	(+) (-)

2.2.2. DATA SHEET C

DATA TO BE FURNISHED BY THE VENDOR AFTER THE ISSUE OF PURCHASE ORDER

(a) List of drawings and documents to be submitted for review, approval and information with scheduled submission dates

(b) Quality Assurance Plan (QAP)

(c) Detailed dimensioned general arrangement drawing of pump and driver. This drawing shall indicate all the design data and information furnished in data sheets A and B.

(d) Foundation drawing of pump and driver with static and dynamic loads, details of fixing, grouting and all relevant data required for design of foundation

(e) Cross-section drawing of the pump with complete part list, materials of construction and relevant standards for each part

(f) Pump performance curves flow rate Vs head, BKW, efficiency, NPSHR from zero flow to maximum flow and torque-speed curve

(g) Scheme for pump sealing, lubrication and cooling

(h) Driver dimensional drawing

(i) Surface preparation and painting procedures

(j) Catalogues, data sheets and drawings for instruments

(k) Installation, operation and maintenance manual along with lubricant.

2.3. DATA SHEETS FOR DIESEL ENGINE AND ACCESSORIES

2.3.1. DATA SHEETS B

Sr.No	Item		Bidder
1.0	DIESEL ENGINE & AUXILIARIES (Design Features)		
1.1	Name of manufacturer / Model no.		
1.2	Engine rating at ISO standard reference condition	KW	
1.3	Engine rating at site	KW	
1.4	Maximum engine rating at site	KW	
1.5	Derating factors :		
	(a) Altitude (b) Inlet air temperature (c) Humidity (d) Cooling Water Temperature (e) Overall Derating Factors	% % % % %	
1.6	Period of maximum engine rating	Hour	
1.7	Operating speed	RPM	
1.8	No. of strokes/cycle		
1.9	No. of cylinders		
1.10	Arrangement of cylinders		
1.11	Rotation direction (viewed from free end)		
1.12	Compression ratio		
1.13	Supercharging air pressure at rated load	mm of Hg	
1.14	Firing order (viewed from power take-off end)		
1.15	Jacket Water temperature at rated load Inlet / Outlet	° C	

1.16	Jacket Water pressure (at engine inlet)	Kg / cm^2 (g),	
1.17	Fuel system injector pressure	Kg / cm^2 (g),	
1.18	Fuel system booster pump pressure	Kg / cm^2 (g),	
1.19	Lube oil pressure at pump discharge	Kg / cm^2 (g),	
1.20	Lube oil temperature at pump in engine sump	° C	
1.21	Minimum acceptable lube oil temperature at start up	° C	
1.22	Minimum acceptable lube oil pressure at start - up	Kg / cm^2 (g),	
1.23	Maximum period for which the engine can operate without cooling water supply	min.	
2.0	DIESEL ENGINE & AUXILIARIES (Construction Features)		
2.1	Bed Plate :		
2.1.1	Material		
2.1.2	Construction		
2.2	Crankcase housing :		
2.2.1	Material		
2.2.2	Construction		
2.3	Cylinder heads :		
2.3.1	Material		
2.3.2	Construction		
2.4	Cylinder liners		
2.4.1	Material		
2.4.2	Construction		
2.5	Crank Shaft :		

2.5.1	Material		
2.5.2	Construction		
2.5.3	Method of attachment of balance weights		
2.6	Connecting rods :		
2.6.1	Material		
2.6.2	Construction		
2.7	Connecting rod bearings :		
2.7.1	Material		
2.7.2	Construction		
2.8	Pistons		
2.8.1	Material		
2.8.2	Construction		
2.9	Nos. of inlet valves/cylinder head		
2.10	Nos. of exhaust valves/cylinder head		
2.11	Fly wheels :		
2.11.1	Material		
2.11.2	Construction		
2.11.3	Diameter	mm	
2.11.4	Moment of inertia	Kg/sq.m	
2.12	Supercharger :		
2.13.1	Type		
2.13.2	Manufacturer		
2.13.3	Number		
2.13.4	Drive		
2.13.5	Speed	RPM	
2.13.6	Lubrication		

2.13.7	Bearing cooling		
2.14	Fuel oil system :		
2.14.1	Type		
2.14.2	Filters :		
	(a) Type (b) Number (c) Location		
2.14.3	Engine drive booster pump :		
	(a) Type (b) Rating		
2.14.4	Injection pumps :		
	(a) Type (b) Number		
2.14.5	Injection :		
	(a) Type (b) Cooling		
2.14.6	AC motor driven priming pump, if any.		
	(a) Type (b) Rating		
2.14.7	Day tank :		
	(a) Capacity (b) Material (c) Location	Litres	
2.14.8	Characteristics of fuel oil to be used		
2.15	Lube oil system		
2.15.1	Type		
2.15.2	Filters :		
	(a) Type (b) Number (c) Location		
2.15.3	Engine driven lube oil pump :		

	(a) Type (b) Rating		
2.15.4	DC motor driven standby pump, if any :		
	(a) Type (b) Location (c) Rating		
2.15.5	AC motor driven priming pump, if any :		
	(a) Type (b) Location (c) Rating		
2.15.6	Lube oil tank		
	(a) Capacity (b) Material (c) Location		
2.15.7	Grade of lube oil to be used		
2.16	Jacket water system :		
2.16.1	Type		
2.16.2	Quality of water to be used		
2.16.3	Quantity of water :		
	(a) Engine cooling circuit		
	(b) Lube oil cooler		
	(c) Charge air cooler		
2.16.4	Make up tank		
	(a) Capacity (b) Material (c) Location		
2.16.5	Engine driven pump :		
	(a) Type		
	(b) Rating	KW	
2.16.6	Bypass control valves :		
	(a) Type (b) Location		

2.16.7 2.17	Radiator (If provided) (a) Rating of radiator fan Air Intake System :	KW	
	(a) Intake filter type (b) Location		
2.18	Exhaust gas system :		
2.18.1	Manifolds :		
	(a) Location (b) Size (c) Construction (d) Material		
2.18.2	Expansion joints :		
	(a) Number (b) Type (c) Location (d) Material		
2.18.3	Exhaust silencer :		
	(a) Type (b) Location		
2.19	Air starting system :		
2.19.1 2.19.2	Type Distributor, if any		
	(a) Drive (b) Type (c) Location		
2.19.3	Starting air valves, if any :		
	(a) Type (b) Location		
2.19.4	AC motor driven air compressor :		
	(a) Manufacturer (b) Type		

2.19.5	Air receiver :		
	(a) Number (b) Construction (c) Material (d) Capacity	Litres	
2.19.6	Time to replenish system after six consecutive engine starts	Min	
2.19.7	Quantity of free air/start		
2.19.8	Starting air pressure	Kg/cm^2	
2.19.9	Minimum air pressure at which engine can be started	Kg/cm^2	
2.20	Terminal piping		
2.20.1	Day oil tank :		
	(a) Size (b) Type		
2.22.2	Lube oil heat exchanger Cooling water 'IN'		
	(a) Size (b) Type Cooling water 'Out'		
	(a) Size (b) Type		
2.22.3	Jacket water heat Exchanger : Cooling Water 'IN'		
	(a) Size (b) Type		
	Cooling Water 'OUT'		
	(a) Size (b) Type		
2.21	Heat exchangers (shell and tube type)		
	A. Construction Features :		
	.1 Position (Horizontal/vertical) .2 Size (shell dia. X str. Tube length) .3 Type .4 Surface		

	B. Shell Slide		
	.1 Fluid circulated		
	.2 Quantity of fluid circulated	m^3/ hr	
	.3 Temperature, inlet	° C	
	.4 Temperature, outlet	° C	
	C. Tube Side		
	.1 Fluid circulated	m^3/ hr	
	.2 Quantity of fluid circulated		
	.3 Temperature, inlet	° C	
	.4 Temperature, outlet	° C	
	D. MATERIAL SPECIFICATION		
	.1 Shell		
	.2 Tubes .3 Tube sheet .4 Gaskets .5 Bolts .6 Nuts .7 Channel .8 Channel cover .9 Flanges		
3.0	PERFORMANCE GUARANTEE		
3.1	Net electrical output at engine shaft at site after engine derating factors ad auxiliary power requirements have been taken into account		
3.2	Specific Fuel oil consumption :		
	(a) Full load	g/kW hr.	

	(b) 75% load (c) 50% load (d) 25% load	g/kW hr. g/kW hr. g/kW hr.	
3.3	Lube oil consumption at rated load	Litres / hr	
3.4	Jacket water temperature 'IN' to engine	° C	
3.5	Jacket water temperature 'OUT' from engine	° C	
3.6	Lube oil temperature 'IN' to engine	° C	
3.7 3.8 3.9	Lube oil temperature 'OUT from engine Vibration level Noise level	° C mm / s db (A)	
4.0	WEIGHT SCHEDULE		
4.1	Weight of engine, less flywheel including standard accessories	Kg.	
4.2	Weight of flywheel	Kg.	
4.3	Weight of day oil tank	Kg.	
4.4	Total shipping weight	Kg.	
4.5	Weight of control panel	Kg.	
4.6	Total equipment weight	Kg.	
4.7	Heaviest single piece to be handled during (a) Erection (b) Maintenance	Kg	
5.0	DIMENSIONS		
5.1	Shipping dimension of engine		
5.2	Overall dimensions of the engine including flywheel		
5.3	Overall dimensions of day oil tank		
5.4	Maintenance space required around the diesel engine		

2.3.2. DATA SHEET C

DATA TO BE SUBMITTED BY THE CONTRACTOR AFTER THE AWARD OF CONTRACT

(a) General arrangement drawings showing overall dimensions, equipment arrangement and details and arrangement of terminals.

(b) Equipment details drawing

(c) Equipment foundation drawing with load details

(d) Fuel oil system with instrumentation and control with write up

(e) Lube oil system with instrumentation and control with write up

(f) Governor system with write up

(g) Piping drawing for the entire system

(h) Detailed instruction manual for installation, operation, maintenance repairs and major overhaul

(i) Wiring diagram of various sensing devices mentioned, on engine, air receiver, etc. control panel and governor system

2.4. DATA SHEET FOR HYDRANT VALVE

2.4.1. DATA SHEETS B

Sl. No.		Item	Unit	Bidder:
General	1.	Sub vendor's name / make		/
	2.			
	3.			
	4.			
	5.			
	6.			
	7.			
	8.			

2.4.2. DATA SHEETS C

DATA TO BE FURNISHED BY THE CONTRACTOR AFTER THE AWARD OF CONTRACT

(a) List of drawings and documents to be submitted for review, approval and

(b) information along with scheduled submission dates

(c) Quality Assurance Plan (QAP)

(d) Descriptive catalogues

(e) Dimensional drawings

(f) Cross-sectional drawing of hydrant valve assembly with part list and material of construction of each part

(g) Material test certificates

(h) Current ISI certificates

2.5. DATA SHEET FOR BRANCH PIPES AND NOZZLES

2.5.1. DATA SHEETS B

	Sl.no.	Item	Unit	Bidder:
General	1.	Sub-vendor's name / make		/
	2.			
	3.			
	3.			
	4.			
	5.			
	6.			
	7.			
	8.			
	9.			
	10.			
Documents	11.	Dimensional drawings of branch pipe with nozzle is enclosed?		Yes / no
	12.			
	13.			
	14.			
	15.			
	16.			

2.5.2. DATA SHEETS C

DATA TO BE FURNISHED BY THE CONTRACTOR AFTER THE AWARD OF CONTRACT

(a) Technical Data Sheet

(b) Quality Assurance Plan (QAP)

(c) Dimensional outline drawing, Part list with material specifications.

(d) Material test certificates

(e) Current ISI Certificate

2.6. DATA SHEET FOR FIRE HOSES WITH COUPLING

2.6.1. DATA SHEETS B

	Sl. No.	Item	Bidder	
General	1.	Sub-vendor's name / make		/
	2.	Brand name of the product offered		
	3.	Design code for hose		
	4.	Design code for coupling		
	5.	Manufacturer's catalogues for hoses and delivery couplings to be enclosed		Yes / no
	6.			
	7.			
	8.			
	9.			
	10.			
	11.			

2.6.2. DATA SHEETS C

DATA TO BE FURNISHED BY THE CONTRACTOR AFTER THE AWARD OF CONTRACT

(a) Technical data Sheet

(b) Quality Assurance Plan (QAP)

(c) Dimensional outline drawing, Part list with material specifications.

(d) Material test certificates

(e) Hose proof pressure and bursting pressure test certificates

(f) Coupling hydrotest pressure test certificates

(g) Any other document / details as required as per approved QAP

(h) Current ISI certificates

2.7. DATA SHEET FOR FIRE HOSES CABINETS

2.7.1. DATA SHEETS B

	Sl. No.	Item	Unit	Bidder
General	1.	Sub-vendor's name / make		/
	2.	Dimensions		L b d
	2.1	Suitable for hydrants	Mm	X x
	2.3	Suitable for hydrant and hose reel assembly	Mm	X x
	3.	Whether tac approved		-na-
	4.			
	5.			
	6.			
	7.			
	8.			
	9.			
	10.			
Documents	11.	Dimensional drawings of cabinets to be		Whether enclosed : yes/no
		Enclosed		
	12.	Cross-sectional drawings of		Whether enclosed : yes/no
		Cabinets to be enclosed		
	13.			
	14.			
	15.			
	16.			

2.7.2. DATA SHEETS C

DATA TO BE FURNISHED BY THE CONTRACTOR AFTER THE AWARD OF CONTRACT

(a) Technical data Sheet

(b) Quality Assurance Plan (QAP)

(c) Dimensional outline drawing indicating plan, elevation and end views showing arrangement of accessories, Part list with material specifications.

(d) Cabinet supporting arrangement

2.8. DATA SHEET FOR FIRE HOSES REELS

2.8.1. DATA SHEETS B

	Sl no.	Item		Bidder:
General	1.	Subvendor's name / make		/
	2.	Descriptive catalouges listing all		
		Items and accessories with brief		Yes/no
		Specifications to be enclosed		
	3.	Overall dimensional drawing of		
		Hose reel to be enclosed		Yes/no
	4.	Whether tac approved		-na-
	5.	Whether isi marked		Yes/no
	6.	Whether certifed by any		
		Authorities		Yes/no

2.8.2. DATA SHEETS C

DATA TO BE FURNISHED BY THE CONTRACTOR AFTER THE

AWARD OF CONTRACT

(a) Schedule of drawings and documents to be submitted along with submission dates

(b) Quality Assurance Plan (QAP)

(c) Descriptive catalogues

(d) Dimensional drawings

(e) Cross-sectional drawing of hose reel assembly with part list and material of construction of each part

(f) Current ISI certificates

(g) Material test certificates

2.9. DATA SHEETS FOR PORTABLE FIRE EXTINGUISHERS

2.9.1. DATA SHEETS B

Sl no	Type	Capacity	Make	Isi marked	Catalouge for each type to be enclosed. Whether enclosed
1.	Sand/water bucket	10.0 lit		Yes/no	Yes/no
2.1	Carbon dioxide	2.0 kg		Yes/no	Yes/no
2.2		3.0 kg		Yes/no	Yes/no
2.3		4.5 kg		Yes/no	Yes/no
2.4		6.5 kg		Yes/no	Yes/no
2.5		9.0 kg		Yes/no	Yes/no
2.6		22.5 kg		Yes/no	Yes/no
2.7		6 to 7 kg × 2 nos.		Yes/no	Yes/no
2.8					
2.9					
3.1	Chemical foam	9.0 lit		Yes/no	Yes/no
3.2		50.0 lit		Yes/no	Yes/no
3.3		150.0 lit		Yes/no	Yes/no
3.4					
4.1	Mechanical foam	9.0 lit		Yes/no	Yes/no
4.2		135.0 lit		Yes/no	Yes/no
4.3					
5.1	Soda acid	9.0 lit		Yes/no	Yes/no
5.2		50.0 lit		Yes/no	Yes/no
6.1	Abc dry chemical powder	0.5 kg		Yes/no	Yes/no
6.2		1.0 kg		Yes/no	Yes/no
6.3		2.0 kg		Yes/no	Yes/no
6.4		6.0 kg		Yes/no	Yes/no
6.5		9.0 kg		Yes/no	Yes/no
6.6		1.0 kg		Yes/no	Yes/no
6.7		2.0 kg		Yes/no	Yes/no

Sl no	Type	Capacity	Make	Isi marked	Catalouge for each type to be enclosed. Whether enclosed
6.8		5.0 kg		Yes/no	Yes/no
6.9		10.0 kg		Yes/no	Yes/no
6.10		25.0 kg		Yes/no	Yes/no
6.11		50.0 kg		Yes/no	Yes/no
612		75.0 kg		Yes/no	Yes/no
				Yes/no	Yes/no
7.1	Halon 1211	1.25 kg		Yes/no	Yes/no
7.2		2.5 kg		Yes/no	Yes/no
7.3		4.0 kg		Yes/no	Yes/no
7.4		5.0 kg		Yes/no	Yes/no
7.5		6.5 kg		Yes/no	Yes/no
8.1	Water(gas cartridge)	9.0 lit		Yes/no	Yes/no
8.2					

2.9.2. DATA SHEETS C

DATA TO BE FURNISHED BY THE CONTRACTOR AFTER THE AWARD OF CONTRACT

(a) List of drawings and documents to be submitted for review, approval and information along with scheduled submission dates

(b) Quality Assurance Plan (QAP)a

(c) Descriptive catalogues for each type of extinguisher

(d) Detailed dimensional drawings for each type of extinguisher with trolley (wherever applicable)

(e) Cross-sectional drawing of hydrant valve assembly with part list and material of construction of each part

(f) Dimensional drawing of supporting stand for each type of floor mounted extinguisher

(g) Fixing detail for each type of wall mounted and column mounted extinguisher

(h) Material test certificates

(i) Current ISI certificates

2.10. VALVES AND SPECIALITIES GENERAL REQUIREMENTS

2.10.1. DATA SHEET-B (GATE VALVE)

								Size	Quantity			
General	1.	Tag no.:										
	2.	Size range:										
	3.	Rating:						Mm	P0	R0	R1	R2
	4.	Grade:										
	5.	Fluid :										
Construction features	8.	Stem :										
	9.	Ends :										
	11.	Bonnet :										
	12.	Wedge :										
	13.	Operator :										
	14.	Seat :										
		:										
	15.	Other requirements :										
		Conforming to										
Materials	16.	Body/ bonnet	:									
	17.	Wedge	:									
	18.	Stem	:									
	19.	Body seat ring	:									
	20.	Wedge facing ring	:									
	21.	Gland packing	:									
	22.	Gasket	:									
	23.	Bolts & nuts	:									
	24.	Handwheel	:									
Tests & inspection	25.	Shell hydro	:									
	26.	Seat hydro	:									
	27.											
	28.	Inspection :										

Notes: 1. General requirements: as per valves and specialities general requirements
2. Additional tests indicated as 'b' in shops inpection requiremets shall also be carried out when it is applicable.

2.10.2. DATA SHEET-B (WAFER CHECK VALVES)

General	1.	Tag no.	:		4. Fluid :	Size	Quantity			
	2.	Size range	:		5. Des. Pr. :					
	3.	Rating	:		6. Des. Temp. :	Mm	P0	R0	R1	R2
	7.	Standard			Grade:					
Construction features	8.	Type	:							
	9.	Ends	:							
	10.									
	11.									
	12.									
	13.									
	14.	Other requirements	:							
Materials	15.	Body	:							
	16.	Plate	:							
	17.	Seal	:							
	18.	Plate seat	:							
	19.	Spring	:							
	20.	Hinge pin & stop pin	:							
	21.									
Tests & inspection	24.	Shell hydro	:							
	25.	Seat hydro	:							
	26.	Inspection :								

Notes: 1. General requirements: as per valves and specialities general requirements
2. Additional tests indicated as 'b' in shops inpection requiremets shall also be carried out when it is applicable.

2.10.3. DATA SHEET-B (BALL VALVES)

General	1.	Tag no.	:	--		Size	Quantity			
	2.	Size range	:							
	3.	Rating	:				P0	R0	R1	R2
	4.	Grade	:							
Construction features	5.	Port	:			Refer boq				
	6.	Stem	:							
	7.	Ends	:							
	8.	Operation	:							
	9.	Antistatic feature	:	Not required						
	10.	fire safe design (api 607)	:	Not required						
	11.	other requirements	:	Three piece construction						
		Size, (in/ mm) :								
		Ins. Thk., mm :								
Materials	12.	Body	:							
	13.	Ball (mirror finished)	:							
	14.	Stem	:							
	15.	Seat	:							
	16.	Seal (stem & body)	:							
	17.	Bolts, studs & nuts	:							
	18.									
Tests & inspection	19.	Shell hydro	:		Barg					
	20.	Seat hydro	:		Barg					
	21.	Seat air	:		Barg					
	22.	Inspection :								

Notes: 1. General requirements: as per valves and specialities general requirements
2. Additional tests indicated as 'b' in shops inpection requiremets shall also be carried out when it is applicable.

2.10.4. DATA SHEET-B (Y STRAINER)

Design data	1.	Tag no.	
	2.	Quantity required	
	3.	Location	
	4.	Type	
	5.	Fluid	
	6.	Flow rate m^3/hr	
	7.	Operating pressure barg	
	8.	Operating temperature ° c	
	9.	Design pressure barg	
	10.	Design temperature ° c	
	11.	Fluid viscosity (cp) at op.temp.	
	12.	Fluid sp. Gravity at op. Temp.	
	13.	Max. Permissible pr. Drop Under 50% clogged condition	
	14.	Screen basket data	
		1. Dia of perforations, mm	
		2. Min. Thickness, mm	
		3. Free straining area	
	15.	Steam jacket	

		1. Inlet pr. Barg, op. / desn.	
		2. Inlet temp. ° c, op./desn.	
	16.	End connections	
		1. Size, nb mm	
		2. Type	
		3. Details/ standards	
	17.	Cover	
	18.	Ibr approval	
Materials	19.	Body	
	20.	Cover	
	21.	Screen basket	
	22.	Bolts/ studs	
	23.	Nuts	
	24.	Gaskets	
	25.	Jacket	
	26.	Jacket couplings/ flanges	
ests & inspection	27.	Accessories by vendor:	
	27.1	Foundation bolts	
	27.2	Differential pressure gauge	
	27.3	Drain/ vent cock (ss 316)	
	27.4	Support legs	
	26.	Hydrostatic test pressure, barg	
	26.1	Shell side	
	26.2	Jacket side	
	27.	Vacuum test required	
	28.	Pressure drop test required	
		Clean/ 50% clogged	
	29.	Inspection: as per a) shop inspection and testsand	
	30.		

Notes: 1. General requirements: as per valves and specialities general requirements

2. Additional tests indicated as 'b' in shops inpection requiremets shall also be carried out when it is applicable.

3. '*': Bidder to furnish information.

4. Additional tests indicated as 'b' in shops inpection requirements shall also be carried out when it is applicable.

5. Gasket shall be metal wire-reinforced and graphited both sides.

2.10.5. DATA SHEET-B (BUTTERFLY VALVE)

Sl. No.	Item	Unit	
1.0	**General**		
5.5.	Service		
5.6.	Tag nos.		
5.7.	No. Of valves	No.	

Sl. No.	Item	Unit			
5.8.	Design standard				
5.9.	Valve category (in case api std.is being considered)				
5.10.	Disc				
5.11.	Body type				
5.12.	Valve size	Nb			
5.13.	Valve rating / class				
5.14.	Fluid handled with its spec. Gravity				
5.15.	Companion flange type and class				
5.16.	Type of valve operator				
5.17.	Maximum flow (indicate the related pressure also)	M^3/hr, Kpa			
5.18.	Maximum flow velocity	M/s			
5.19.	Design pressure	Kpa			
5.20.	Operating pressure	Kpa			
5.21.	Design temperature	^{0}c			
5.22.	Operating temperature	^{0}c			
5.23.	Valve location				
5.24.	Maximum differential pressure	Kpa			
5.25.	Shut off class / requirements				
5.26.	Valve flange face				
5.27.	Type of mating flange				
5.28.	Drilling standard				
5.29.	Surface finish				
5.30.	Preferred face to face dimension	Mm			
5.31.	Power supply	Phase ,v, hz,			
5.32.	Air / hydraulic supply pressure	Bar			
5.33.	Valve opening / closing time	Secs			
5.34.	Fail safe position of actuator				
5.35.	Shut off applicability				
5.36.	Frequency of valve operation				
5.37.	Valve shaft orientation				
5.38.	Fire tested				
5.39.	Electric continuity between shaft /				

Sl. No.	Item	Unit	
	body / disc		
5.40.	Motor spec. (for motorised actuator only)		
5.41.	Application of valve for dead – end service		
5.42.	Application of valve for bi-directional service.		
6.	**Accessories**		
6.1.	Floor stand		
6.2.	Companion flange with bolts, nuts & gaskets		
6.3.	Lifting lugs		
6.4.	Tapped holes in lug		
6.5.	Extension spindle		
6.6.	Torque & limit switch mechanism		
6.7.	End limit switches		
6.8.	Adjustable seat		
6.9.	Reduction gear unit		
6.10.	Locking device		
6.11.	Valve position indicator		
6.12.	Body lining		
6.13.	Auxilliary hand wheel		
6.14.	Blow out proof stem		
7.	**Additional requirement**		
7.1.	Painting(refer note-9)		
7.2.	Seismic qualification of valve required If yes, indicate the document no. For response spectrum or equivalent data which the vendor has to refer		
7.3.	Any other requirement		
8.	**Materials of construction**		
8.1.	Body		
8.2.	Disc		
8.3.	Stem		
8.4.	Seat		
8.5.	Body seat rings		

Sl. No.	Item	Unit	
8.6.	Disc seal rings		
8.7.	Seat retaining rings		
8.8.	Companion flange		
9.	**Tests and inspection**		
9.1.	Additional tests indicated as 'b' in shops inpection requiremets shall also be carried out when it is applicable.		
9.2.	Hydrostatic test pressure for body	Kg/cm^2	
9.3.	Hydrostatic test pressure for disc	Kg/cm^2	
9.4.	Disc strength test pressure	Kg/cm^2	
9.5.	actuator performance test pressure	Kg/cm^2	
9.6.	Air leak test pressure	Kg/cm^2	
9.7.	Electrical continuity test		
10.	**spares**		
10.1.	Disc seal rings		
10.2.	Flange gasket		
10.3.	Seat/seal clamping bolts		
10.4.	'O' ring seals or gland packing		
10.5.			

NOTES:-

1. For general requirements refer valve and specialities. However, in case of overlapping requirements, those of the data sheet a, to be considered as the final one.
2. The valve shall be designed considering the larger of the following torque requirements for which calculations shall be submitted:
    a. Calculated as per awwa-c504-80
    b. Calculated as per the standard to which valve is designed.
3. For manually operated valves, torque required at hand wheel shall not exceed 7 kg.m.
4. Motor operated valve actuator shall be rated to provide an output torque of atleast 150% of torque required as per note-2 above unless otherwise noted.
5. The actuator shall be capable of operating in any mounting angle.
6. The transmission unit shall be designed to transmit twice the valve design torque unless otherwise noted.
7. The actuator shall provide an unseating torque of at least 50% in excess of valve seating torque at the specified voltage unless otherwise noted.
8. Segmental welded carbon steel flange plates above 20 mm thickness shall be subjected to preheating before welding and stress relieving after welding as per is 2825 unless otherwise specified.

9. Unless otherwise specified in section –c, one coat of zinc rich primer and two coats of enamel shall be applied to all steel and cast iron exposed surfaces. The minimum thickness of coating shall be 100 microns.
10. The vendor may also suggest any additional spares and tools required for the successful operation, start up and maintainence of the valve.
11. In the absence of any test related data, the relevant testing standard for butterfly valves may be indicated.

2.10.6. DATA SHEET-C

Data to be furnished by the vendor after the

Issue of purchase order

(a) List of drawings and documents to be submitted for review, approval or information with scheduled submission dates.

(b) Quality Assurance Plan (QAP)

(c) Drawings showing outline dimensions, clearance dimensions for disassembly, weight, part numbers, materials of construction, test pressures, statutory and any special requirements, sizes, tag numbers and quantities. All information covered in data sheets A and B shall be incorporated in this drawing. The PURCHASER'S identifying tag numbers shall be shown on each drawing or on a sheet attached to the drawing with proper cross-references.

(d) Operation and maintenance manuals

2.11. FIRE WATER PIPING GENERAL REQUIREMENTS

2.11.1. DATA SHEET B

Scope	1. Supply of pipes and fittings:	Design data	8. Piping:
	2. Supply of valves and specialities:		9. Welding: as per specification
			10. Underground protection:
	3. Supply of structural steel for		
	pipe supports		11.-Valve chambers: brick masonry/
	4. Erection, testing and		Stone masonry/rcc as per drg
	commissioning of piping system:		
		Tests and inspection	
	5. Excavation and back filling:		
	6. Valve chambers with covers (whereever necessary):		(note 1)
			13.
	7. Painting and corrosion		14.
	protection:		15.

Notes:	
1.	Additional tests indicated as 'b' in shops inpection requiremets shall also be carried out when it is applicable.
	Also be carried out when these are applicable.
*	bidder shall submit the drawing and the same shall be revised to incorporate the comments of client / consultant before being released for construction.

2.12. FIRE UNDERGROUND PROTECTION FOR PIPING

2.12.1. (DATA SHEETS A)

General and materials	1.	Supply of all coating and	By contractor
		Wrapping materials	
	2.	Soil resistivity	
	3.	Type of underground protection	
	4.		
Application	5.	Application methodology	
	6.		
Testing	7.	Coating thickness	
	8.	Bond/ adhesion test for coating /	
		Wrapping tapes	
	9.	Holiday test	
Documents	10.	Documents required after the	
		Award of contract	

2.13. FIRE PROTECTION EQUIPMENT WET PIPE TYPE SPRINKLER SYSTEM

2.13.1. DATA SHEETS B

General	1. Standard:	Materials of construction (contd.)	11.3 clapper:
	2. Area to be covered:		
			11.4 clapper facing:
	3. Hazard class:		11.5 handhole cover:
	4. Quality of water: raw water		11.6 clapper/ handhole gasket:
	5.		
	6.		11.7
Construction features	7. Installation control valve:		11.8
	7.1 size:		12. Sprinkler:
	7.2 pressure at inlet:		
	7.3 end connection:		
			13.
	7.4 water motor gong		14.
			15.
	8. Sprinkler:	Companion specifications	16. P&i diagram:
	8.1 standard:		
	8.2 type:		17. Ga drawing:
	8.3 nominal temperature rating:		18. Pump:
			19. Piping:
	9.		
	10.		20. Instruments:
	11. Installation control valve:		21. Control panel:
	11.1 body:		
			22.
	11.2 seat ring:		23.
			24.
Tests and	25.	Approved sub-	33. Installation control valve:
			33.1
			33.2
			33.3

			33.4
	for installation controlvalve and sprinkler		33.5
	27.		34. Sprinkler:
	28.		34.1
	29.		34.2
	30.		34.3
	31.		34.4
	32.		34.5

Notes	
1.	Test connection at the remotest nozzle shall be provided.
2.	Additional tests indicated as 'b' in shops inpection requiremets shall also be carried out when it is applicable.

2.14. LOW VOLTAGE INDUCTION MOTORS

2.14.1. DATA SHEET-B

1.0	Application				
2.0	Manufacturer				
3.0	Country of Origin				
4.0	Applicable Standards				
5.0	Efficiency Category(For Energy Efficient Motors only)				
6.0	Rated				
	(a)	Output		kW	
	(b)	Speed		RPM	
	(c)	Frame size			
7.0	Type of Duty (IS 325 or equivalent)				
8.0	(a)	Supply Conditions			
		i)	Rated Voltage	V	
		ii)	No. of Phases	No(s).	
		iii)	Frequency	Hz	

	(b)	Allowable Variations in			
		i)	Voltage	%	
		ii)	Frequency	%	
		iii)	Combined	%	
9.0	Current				
	(a)	Full Load Amps			
	(b)	Starting		% FL	
10.0	Method of Starting				
11.0	Insulation				
11.1	Class of Insulation				
11.2	Whether Tropicalised			Yes/No	
12.0	(a)	Ref. Ambient Temp.		deg.C	
	(b)	Temp. rise of windings by Res. Method			
	i)	Stator		deg.C	
	ii)	Rotor		deg.C	
	(c)	Temp. rise of bearings		deg.C	
13.0	Degree of Protection (IS 4691 or equivalent)				
14.0	Suitable for Outdoor Operation			Yes/No	
15.0	Normal winding connection			Star/Delta	
	(i)	Stator			
	(ii)	Rotor			
16.0	Space heater Rating Terminal box			Watts	
	(i)	Type & No. of Terminals brought Out			
	(ii)	Fault withstand capacity at rated voltage & duration			
	(iii)	Maximum size of Aluminium armoured cable that can be Terminated		cores X Sq mm	

17.0	Dimensional Dwg. Enclosed		Yes/No	
18.0	Torque			
	a)	Full load torque	kg-m	
	b)	Starting torque	% FLT	
	c)	Pull out Torque	% FLT	
	d)	Pull up Torque	% FLT	
19.0	Efficiency (%)			
	a)	Full Load Efficiency		
	b)	75% Load Efficiency		
	c)	50% Load Efficiency		
	d)	25% Load Efficiency		
20	LUBRICATION ARRANGEMENT			

2.14.2. Low voltage induction motors data sheet-c

(a) Information to be submitted by the vendor

(b) After award of contract

(c) Technical particulars as per data sheet B of tender specification. (Based on motor manufacturer)

(d) Type and frame size:

(e) Starting time (Secs)

(f) With 100% voltage at terminals

(g) With minimum voltage at terminals (at ____ % Rated voltage)

(h) With 110% voltage at terminals

(i) Safe stall time at 100/110% rated voltage under hot/cold condition.

(j) Type and size of cable for which gland is provided in the terminal box :

(k) Type of bearings and expected life.

(l) Total weight of motor (kg)

(m) Weight of Stator (kg)

(n) Weight of Rotor (kg)

(o) Motor GD2:

(p) Efficiency (%)

(q) Full Load Efficiency

(r) 75% Load Efficiency

(s) 50% Load Efficiency

(t) 25% Load Efficiency

(u) Power Factor

(v) Full Load Power Factor

(w) 75% Load Power Factor

(x) 50% Load Power Factor

(y) 25% Load Power Factor

(z) Torque (% FLT)

(aa) Starting

(bb) Maximum (Pullout torque)

(cc) Pull up torque

(dd) Type of Enclosure

(ee) Cooling designation

(ff) Space heaters

(gg) Rated voltage/number

(hh) Rating total

(ii) Separate terminal box provided

(jj) Motor reactances (Pu)

(kk) Sub transient reactance

(ll) Transient reactance

(mm) Steady state reactance

(nn) Guaranteed losses (kW)

(oo) Iron loss

(pp) Copper loss

(qq) Friction, Windage & Stray losses.

(rr) Motor outline dimension drawing (Number of copies as per distribution schedule)

(ss) Type test certificates (Number of copies as per distribution schedule)

(tt) Speed torque curve at rated & minimum starting voltage with Speed/Torque curve of the driven equipment superimposed.

(uu) Current - speed curve.

(vv) Current - time curve.

(ww) Efficiency, power factor, slip, current against output curve.

(xx) Thermal withstand characteristic for motors of 100 kW & above - Hot & Cold.

(yy) Negative sequence current Vs time curve for motor of 100 kW & above.

(zz) Rotor voltage/Rotor current (for wound motors).

TECHNICAL SPECIFICATION TO BE FILLED BY BIDDER

FOR

HVAC WORKS

3. DATA SHEET FOR HVAC WORKS

3.1. SPLIT AIR-CONDITIONERS DATA SHEET for BIDDER

SL. NO.	ITEM	UNIT	
1.0	**GENERAL**		
1.1	DESIGNATION		
1.2	NUMBERS REQUIRED	Nos.	
1.3	TAG NUMBERS		
1.4	REFRIGERANT USED		
1.5	STAR RATING (BEE)		
1.6	OPERATION		
2.0	**DESIGN DATA**		
2.1	REQUIRED MINIMUM ACTUAL CAPACITY REQUIRED	TR	
2.2	DESIGN OUTDOOR CONDITIONS		
2.2.1	DRY BULB TEMPERATURE	^{0}C	
2.2.2	WET BULB TEMPERATURE	^{0}C	
2.3	DESIGN INDOOR CONDITIONS		
2.3.1	DRY BULB TEMPERATURE	^{0}C	
2.3.2	WET BULB TEMPERATURE	^{0}C	
3.0	**INDOOR UNIT**		
3.1	TYPE		
3.2	REQUIRED DEHUMIDIFIED AIR FLOW CAPACITY OF EACH INDOOR UNIT		
3.3	FILTRATION		
3.3.1	ANTIDUST FILTERS (PRE-FILTERS)		
3.3.2	DEODORIZATION FILTERS		
3.3.3	ANTI-BACTERIA FILTERS		
3.4	ULTRAVIOLET SCREEN		
3.5	FAN TYPE		
3.6	FAN SPEED		
3.7	FAN MOTOR TYPE		
3.8	NOISE LEVEL @ 1.0 M FROM UNIT	dB(A)	

SL. NO.	ITEM	UNIT	
3.9	NO. OF UNITS / OUTDOOR		
3.10	RETURN GRILLE		
3.11	COOLING COIL		
3.12	FINS		
3.13	ANTI-CORROSIVE COATING ON COIL		
4.0	**OUTDOOR UNIT**		
4.1	COMPRESSOR		
4.2	VIBRATION ISOLATORS		
4.3	NOISE LEVEL @ 1.0 M FROM UNIT	dB(A)	
4.4	ANTI-CORROSIVE COATING ON BODY		
4.5	ANTI-CORROSIVE COATING ON COIL		
4.6	FAN TYPE		
4.7	FAN SPEED		
5.0	**ELECTRICAL**		
5.1	OUTDOOR MOTOR		
5.2	POWER SUPPLY		
5.3	POWER SUPPLY LOCATION		
5.4	MINIMUM CABLE LENGTH WITH PLUG & SOCKET	m	
6.0	**INTERCONNECTED PIPING**		
6.1	MAXIMUM PERMISSIBLE DISTANCE BETWEEN IDU AND ODU		
6.1.1	VERTICAL	m	
6.1.2	TOTAL	m	
6.2	INSULATED REFRIGERANT PIPING BETWEEN IDU AND ODU	m	
6.3	ACCESSORIES IN REFRIGERANT PIPING		
6.3.1	ECONOMIZER		
6.3.2	SIGHT GLASS		
6.4	INSULATED CONDENSATE DRAIN PIPING		
7.0	**ACCESSORIES, AUXILIARIES AND SERVICES**		

SL. NO.	ITEM	UNIT	
7.1	CORDLESS REMOTE CONTROLLER		
7.2	OCCUPANCY SENSOR IN IDU		
7.3	ON-OFF TIMER		
7.4	MOUNTING FRAME FOR IDU & ODU WITH ALL ACCESSORIES		
7.5	MOUNTING FRAME WITH EPOXY COATING		
7.6	SEQUENTIAL CONTROLLER		
8.0	**SPARES AND MAINTENANCE TOOLS AND TACKLES**		
8.1			
8.2	ESSENTIAL SPARES		
8.3	SPECIAL TOOLS		
9.0	**PERFORMANCE GUARANTEES**		
9.1	CAPACITY OF EACH SAC AT DESIGN CONDITION	TR	
9.2	TOTAL POWER INPUT AT DESIGN CONDITION	kW	
9.3	DEHUMIDIFIED AIR FLOW OF INDOOR UNIT	m^3/hr	
9.4	NOISE LEVEL		
9.4.1	AT INDOOR UNIT @ 1.0 M	dB(A)	
9.4.2	AT OUTDOOR UNIT @ 1.0 M	dB(A)	
10.0	**COST LOADING AND PENALTY**		
10.1	FOR DIFFERENTIAL TOTAL POWER INPUT AT DESIGN CONDITIONS	Rs/kW	
11.0	**TESTS AND INSPECTION**		
11.1	AS PER STANDARD		

3.2. AIR-COOLED VARIABLE REFRIGERANT FLOW SYSTEM DATA SHEET for BIDDER:

1.0 Make	Dakin/ Bluestar/ Voltas
2.0 Casing	CS/ (CS/ CAST AL)/ EN8
3.0 Type: Ductable/ Cassete/ High wall	Ductable/Package Floor Mounted/ High wall
4.0 Dimension WxDxH (M)	Ductable -
	Package Floor Mounted
	High wall
	VRF Table is given below
5.0 Cooling Capacity	
6.0 Air quantity at max. Speed	
And 1 m long duct collar CMH	
7.0 Air quantity at min. Speed	
And 1.0 m. Long duct collar CMH	
8.0 Whether auxiliary drain pan	
Provided: Yes/No.	Yes/No.
9.0 Make & model of room thermostat.	
10.0 Whether acoustic lined	Yes/No.
duct collar included in Unit price	Yes/No.
11.0 Does Indoor Unit have return air plenum. Yes/No.	Yes/No.
12.0 Noise Level at 1 m distance:	db
OUTDOOR	
1. Manufacturer	Daikin/ Bluestar/ Voltas
2. Type	
3. Model	
4. Overall dimensions (mm) WxDxH	
5. Operating Weight (kg.)	300
6. No. of fans	
7. CMH per fan	
8. Outlet velocity (Mts. Per min)	
9. Tip speed (Mts per min)	
10. Compressor Type	
11. Vibration isolator	Rubber pads
12. Noise Level at 1 m distance:	db

3.3. THERMAL INSULATION FOR COLD SURFACES DATA SHEET for BIDDER:

SL. NO.	ITEM		
1.	INSULATION MATERIALS		
1.1	EQUIPMENT		
1.2	PIPING SYSTEMS		
1.3	AIR-CONDITIONING DUCT		
2	INSULATION ADHESIVES		
3.	VAPOUR BARRIERS		
4.	FINISHING MATERIALS		
4.1	EQUIPMENT		
4.2	PIPING SYSTEMS		
4.3	AIR-CONDITIONING DUCT		
5.0	DENSITY OF EACH OF THE INSULATING MATERIALS	Kg/M^3	
6.0	IS ANY INSULATION MATERIAL CORROSIVE TO CARBON STEEL OR ALLOY STEEL SURFACE IN CONTACT		
7.0	INSULATION THICKNESSES FOR ALL INSULATION MATERIALS SELECTED, IN THE FORMAT SIMILAR TO THAT IN DATA SHEET A, TO BE ENCLOSED.		

3.4. PANEL TYPE AIR FILTERS:

SL. NO.	ITEM	UNIT	
1.	DESIGNATION		
2.	NUMBER OFFERED:		
3.	TAG NUMBERS:		
4.	MAKE AND MODEL NUMBER		
5.	PLACE OF MANUFACTURE		
6.	NORMAL CAPACITY AT SUCTION	M^3/Hr	
	CONDITIONS		
7.	STATIC PRESSURE	mmWC	
8.	STATIC EFFICIENCY	%	
9.	MATERIALS OF CONSTRUCTION		
9.1	CASING		CS /GI WITH 220 GSM ON BOTH SIDES
9.2	IMPELLER		CS / CAST AL / PP / PPG / PAG
9.3	SHAFT		EN 8 /
10.	IMPELLER DIAMETER	mm	
11.	IMPELLER SPEED	RPM	
12.	POWER REQUIREMENT		
12.1.	POWER INPUT TO FAN AT DUTY POINT (BKW)	KW	
12.2	MAXIMUM POWER REQUIREMENT AT SELECTED SPEED	KW	
12.3	MOTOR RATING	KW	

SL. NO.	**ITEM**	**UNIT**	
12.4	POWER INPUT TO MOTOR AT DUTY POINT	KW	
13	WEIGHT OF FAN-MOTOR ASSEMBLY	Kg	
14.	NOISE LEVEL AT 1.5 M DISTANCE FROM FAN	dB(A)	
15.			
SL. NO.	ITEM	UNIT	
	DOCUMENTS TO BE ENCLOSED		WHETHER ENCLOSED
16	GENERAL ARRANGEMENT DRAWING WITH		YES / NO
	MAJOR DIMENSIONS		
17.	PARTS LIST WITH CODES AND MATERIALS		YES / NO
	OF CONSTRUCTION		
18.	RATING CHARTS OR TABLES WITH		YES / NO
	SELECTION MARKED		
19.	PERFORMANCE CURVE WITH DUTY POINT		YES / NO
	MARKED		
20.	FAN MOUNTING DETAILS WITH WALL		YES / NO
	OPENING REQUIREMENTS		
21.	RECOMMENDED SPARE PARTS LIST FOR		YES / NO
	2 YEARS NORMAL OPERATION		
	PERFORMANCE GUARANTEES		

SL. NO.	ITEM	UNIT	
22.	CAPACITY AT SUCTION CONDITIONS	M3/Hr	(+) (-)
23.	STATIC PRESSURE	mmWC	(+) (-)
24.	POWER CONSUMPTION	KW	(+) (-)

3.5. AXIAL FANS FOR VENTILATION SYSTEM

SL. NO.	ITEM		
1.	DESIGNATION		
2.	NUMBER OFFERED		
3.	TAG NUMBERS		
4.	TYPE		
5.	MAKE AND MODEL NUMBER		
6.	PLACE OF MANUFACTURE		
7.	NORMAL CAPACITY AT SUCTION		
	CONDITIONS	M^3/Hr	
8.	STATIC PRESSURE	Mm WC	
9.	STATIC EFFICIENCY	%	
10.	MATERIALS OF CONSTRUCTION		
10.1	CASING		
10.2	IMPELLER		
10.3	SHAFT		
11.	IMPELLER DIAMETER	mm	
12.	IMPELLER SPEED	RPM	
13.	POWER REQUIREMENT		
13.1	POWER INPUT TO FAN AT DUTY POINT (BKW)	KW	
13.2	MAXIMUM POWER REQUIREMENT AT		
	SELECTED SPEED	KW	
13.3	MOTOR RATING	KW	
13.4	POWER INPUT TO MOTOR AT DUTY POINT	KW	
14.	WEIGHT OF FAN-MOTOR ASSEMBLY	Kg	
15.	MINIMUM CAPACITY FOR STABLE		
	OPERATION	M^3/Hr	

SL. NO.	ITEM		
16.	NOISE LEVEL AT 1.5 M DISTANCE FROM FAN	dB(A)	
	DOCUMENTS TO BE ENCLOSED		
17.	GENERAL ARRANGEMENT DRAWING WITH		
	MAJOR DIMENSIONS		
18.	PARTS LIST WITH CODES AND MATERIALS		
	OF CONSTRUCTION		
19.	RATING CHARTS OR TABLES WITH		
	SELECTION MARKED		
20.	PERFORMANCE CURVE WITH DUTY POINT		
	MARKED		
21.	FAN MOUNTING DETAILS WITH WALL		
	OPENING REQUIREMENTS		
22.	RECOMMENDED SPARE PARTS LIST FOR		
	2 YEARS NORMAL OPERATION		
	PERFORMANCE GUARANTEES		
23.	CAPACITY AT SUCTION CONDITIONS	M^3/Hr	
24.	STATIC PRESSURE	Mm WC	
25.	POWER CONSUMPTION	KW	

3.6. AIR HANDLING UNIT

	SL. NO.	BIDDER ITEM	uints	
GENERAL	1.	DESIGNATION		AIR HANDLING UNIT FOR
	2.	NUMBERS OFFERED		(W + S)
	3.	TAG NUMBERS		
	4.	TYPE		SINGLE SKIN/DOUBLE SKIN
				DRAW / BLOW THROUGH
	5.	MAKE, MODEL NUMBER AND PLACE OF		
		MANUFACTURE		
	6.	MATERIAL AND GAUGE OF CASING		
	7.	OVERALL SIZE (L) x (W) x (H)	mm	x x
	8.	MINIMUM SERVICE SPACE REQUIRED ON		
		ALL SIDES FOR MAINTENANCE	mm	
	9.	OPERATING WEIGHT	Kg	
	10.	TYPE OF VIBRATION ISOLATORS		
	11.	NOISE LEVEL AT 1.5 M DISTANCE	dB (A)	
	12.	MARINE LIGHTS		YES / NO
	13.	PAINTING OF FAN AND MS STRUCTURAL		
		FRAME WORK		
FILTERS	14.	PRE-FILTERS		YES / NO
	14.1	MAKE AND MODEL NUMBER		
	14.2	NUMBER OF FILTERS		
	14.3	SIZE OF EACH FILTER (L) x (W) x (H)	mm	x x
	14.4	RATED CAPACITY OF EACH FILTER	M3/Hr	
	14.5	AIR FACE VELOCITY	M/Sec	
	14.6	FILTER MEDIA		
	14.7	EFFICIENCY	%	DOWN TO MICRONS
	14.8	PRESSURE DROP IN CLEAN CONDITION	mmWC	
(CONTI	14.9	PRESSURE DROP IN CLOGGED CONDITION	mmWC	

	15.	FINE FILTERS		YES / NO
	15.1	MAKE AND MODEL NUMBER		
	15.2	NUMBER OF FILTERS		
	15.3	SIZE OF EACH FILTER (L) x (W) x (H)	mm	x x
	15.4	RATED CAPACITY OF EACH FILTER	M3/Hr	
	15.5	AIR FACE VELOCITY	M/Sec	
	15.6	FILTER MEDIA		
	15.7	EFFICIENCY	%	DOWN TO MICRONS
	15.8	PRESSURE DROP IN CLEAN CONDITION	mmWC	
	15.9	PRESSURE DROP IN CLOGGED CONDITION	mmWC	
	16.	HEPA FILTERS		YES / NO
	16.1	MAKE AND MODEL NUMBER		
	16.2	NUMBER OF FILTERS		
	16.3	SIZE OF EACH FILTER (L) x (W) x (H)	mm	x x
	16.4	RATED CAPACITY OF EACH FILTER	M3/Hr	
	16.5	AIR FACE VELOCITY	M/Sec	
	16.6	FILTER MEDIA		
	16.7	EFFICIENCY	%	DOWN TO MICRONS
	16.8	PRESSURE DROP IN CLEAN CONDITION	mmWC	
	16.9	PRESSURE DROP IN CLOGGED CONDITION	mmWC	
COOLING COIL	17.	TYPE OF COIL		CHILLED WATER/BRINE/DX
	18.	COOLING CAPACITY	TR	
	19.	ENTERING AIR DRY BULB TEMPERATURE	OC	
	20.	ENTERING AIR WET BULB TEMPERATURE	OC	
	21.	LEAVING AIR DRY BULB TEMPERATURE	OC	
	22.	LEAVING AIR WET BULB TEMPERATURE	OC	
	23.	NUMBER OF ROWS DEEP	NOS.	
	24.	NUMBER OF FINS/CM	NOS.	
COIL (CON	25.	AIR FACE VELOCITY	M/Sec	
	26.	FINNED COIL FACE AREA	M2	

	27.	TUBE OUTSIDE DIAMETER AND THICKNESS	mm	AND
	28.	CHILLED WATER/BRINE FLOW RATE	M3/Hr	
	29.	CHILLED WATER/BRINE INLET		
		TEMPERATURE	OC	
	30.	CHILLED WATER/BRINE OUTLET		
		TEMPERATURE	OC	
	31.	CHILLED WATER/BRINE PRESSURE DROP	Kg/cm2	
	32.	AIR SIDE PRESSURE DROP	mmWC	
	33.	REFRIGERANT TEMPERATURE FOR DX-COIL	OC	
HEATING COIL	34.	TYPE		STEAM/HOT WATER/ ELECTRIC STRIP HEATERS WITH CONTROLS IN STEPS
	35.	HEATING CAPACITY	KW	
	36.	NUMBER OF ROWS DEEP	NOS.	
	37.	NUMBER OF FINS/CM	NOS.	
	38.	AIR FACE VELOCITY	M/Sec	
	39.	FINNED COIL FACE AREA	M2	
	40.	TUBE OUTSIDE DIAMETER AND THICKNESS	mm	AND
	41.	AIR SIDE PRESSURE DROP	mmWC	
	42.	STEAM		
	42.1	STEAM FLOW RATE	Kg/Hr	
	42.2	STEAM INLET PRESSURE	Kg/cm2g	
	43.	HOT WATER		
	43.1	HOT WATER FLOW RATE	M3/Hr	
	43.2	HOT WATER INLET TEMPERATURE	OC	
	43.3	HOT WATER OUTLET TEMPERATURE	OC	
	43.4	HOT WATER PRESSURE DROP	Kg/cm2	
G COIL (CONTD	44.	ELECTRIC STRIP HEATER		
	44.1	NUMBER OF STEPS		
	44.2	RATING OF EACH STEP	KW	
HUMIDIFIER	45.	TYPE		PAN / STEAM
	46.	PAN HUMIDIFIER		
	46.1	MAXIMUM WATER CONSUMPTION	M3/Hr	
	46.2	ELECTRICAL HEATER RATING	KW	
	47.	STEAM HUMIDIFIER		
	47.1	STEAM FLOW RATE	Kg/Hr	

	47.2	STEAM INLET PRESSURE AT CONTROL	Kg/cm2g	
		VALVE		
FAN	48.	MAKE AND MODEL NUMBER		
	49.	TYPE		FORWARD CURVED /
				BACKWARD CURVED
	50.	CAPACITY	M3/Hr	
	51.	STATIC PRESSURE	mmWC	
	52.	DISCHARGE DIRECTION		HORIZONTAL / VERTICAL
	53.	IMPELLER SPEED	RPM	
	54.	FAN OUTLET AIR VELOCITY	M/Sec	
	55.	CLASS OF CONSTRUCTION		I / II / III
	56.	BRAKE POWER / LIMIT LOAD	KW	/
	57.	MOTOR RATING / SYNCHRONOUS SPEED	KW / RPM	/
	58.	POWER INPUT TO MOTOR AT DUTY POINT	KW	
	59.	VIBRATION ISOLATORS		
	59.1	MAKE AND MODEL NUMBER		
	59.2	VIBRATION DAMPENING EFFICIENCY	%	
	60.			
	61.			

MIXING BOX AND DAMPER	62.	MIXING BOX		YES / NO
	63.	FRESH AIR DAMPER		YES / NO
	64.	SIZE OF FRESH AIR DAMPER	mm	x
	65.	RETURN AIR DAMPER		YES / NO
	66.	SIZE OF RETURN AIR DAMPER	mm	x
	67.	TYPE OF FRESH AND RETURN AIR DAMPERS		MANUAL / ELECTRIC /
				PNEUMATIC
	68.	SUPPLY AIR DAMPER		YES / NO
	69.	SIZE OF SUPPLY AIR DAMPER	mm	x
	70.	TYPE OF SUPPLY AIR DAMPER		MANUAL / ELECTRIC /
				PNEUMATIC
MISCELLANEOUS		DOCUMENTS TO BE ENCLOSED		WHETHER ENCLOSED
	71.	SPARE PARTS LIST		YES / NO
	72.	PERFORMANCE CURVE AND RATING		
		CHARTS WITH OPERATING POINTS		
		MARKED FOR FILTERS, COOLING COIL,		YES / NO
		HEATING COIL AND FAN		
	73.	DETAILED DESCRIPTION AND DESIGN		

		PARAMETERS OF HUMIDIFIER PACKAGE		YES / NO

3.7. CONDENSER UNIT

GENERAL	1.	DESIGNATION					
	2.	NUMBERS OFFERED		(W+S)			
	3.	TAG NUMBERS					
	4.	MAKE /MODEL NUMBER					
	5.	PLACE OF MANUFACTURE					
	6.	NOMINAL CAPACITY OF EACH CONDENSING					
		UNIT(CNU)	TR				
	7.	CAPACITY OF EACH CNU AT SPECIFIED DESIGN CONDITION	TR				
	8.	REFRIGERANT		R22 / R 134a			
	9.	OVERALL SIZE OF EACH CNU L x D x H	mm	x x			
	10.	CLEARANCE REQUIRED ON ALL SIDES OF EACH CNU	mm	FRONT	BACK	SIDES	TOP
	11.	OPERATING WEIGHT	Kg				
	12.	NOISE LEVEL AT 1.86 M DISTANCE :					
	12.1	COMPRESSOR	dBA				
	12.2	CONDENSER FAN(IF AIR COOLED)	dBA				
	13.	NUMBER OF REFRIGERATION CIRCUITS/ CNU	Nos.				
	14.	TOTAL INPUT POWER AT SPECIFIED DESIGN					
		CONDITIONS PER CNU	kW				
	15.	TYPE OF VIBRATION ISOLATORS					
COMPRESSOR	16.	TYPE , MAKE AND MODEL NUMBER					
	17.	NUMBER OF COMPRESSORS PER CNU	Nos.				
	18.	PLACE OF MANUFACTURE					
	19.	SUCTION TEMPERATURE	OC				
	20.	SUCTION PRESSURE	Kg/cm2g				
	21.	CONDENSING TEMPERATURE	OC				

COMPRESSOR	22.	CONDENSING PRESSURE	Kg/cm2g	
	23.	OPERATING SPEED AT SPECIFIED DESIGN CONDITION	RPM	
	24.	CAPACITY AT SPECIFIED DESIGN CONDITION PER COMPRESSOR	TR	

	25.	BKW AT SPECIFIED DESIGN CONDITION PER COMPRESSOR	BKW		
	26.	MOTOR RATING PER COMPRESSOR	kW		
	27.	CAPACITY CONTROL AVAILABLE		YES / NO	
	28	IN STEPS OF			
CONDENSER	29.	TYPE , MAKE AND MODEL NUMBER			
	30.	WATER COOLED CONDENSER			
	30.1	NUMBER OF CONDENSERS PER CNU	Nos.		
	30.2	HEAT REJECTION CAPACITY AT SPECIFIED DESIGN CONDITIONS PER CONDENSER	KCal/ Hr		
	30.3	TOTAL HEAT REJECTION CAPACITY AT SPECIFIED DESIGN CONDITIONS PER CNU	KCal/ Hr		
	30.4	CONDENSER COOLING WATER FOULING FACTOR	HR.SQ FTOF/ BTU		
	30.5	COOLING WATER FLOW RATE/ CONDENSER	M3/Hr		
	30.6	COOLING WATER INLET TEMPERATURE	OC		
	30.7	COOLING WATER OUTLET TEMPERATURE	OC		
	30.8	WATER VELOCITY IN TUBES	M/Sec		
	30.9	WATER SIDE PRESSURE DROP	Kg/cm 2		
	31.	AIR COOLED CONDENSER			
	31.1	NUMBER OF CONDENSERS PER CNU	Nos.		
	31.2	HEAT REJECTION CAPACITY AT SPECIFIED	KCal/ Hr		
		DESIGN CONDITIONS PER CONDENSER			
	31.3	TOTAL HEAT REJECTION CAPACITY AT SPECIFIED DESIGN CONDITIONS PER CNU	KCal/ Hr		
	31.4	MAXIMUM PERMISSIBLE DISTANCE BETWEEN CNU AND INDOOR UNIT	M	VERTICAL	TOTAL
	31.5	CONDENSER FANS			
	31.5. 1	NUMBERS IN EACH CONDENSER			
	31.5. 2	CAPACITY OF EACH FAN	M3/Hr		
	31.5. 3	STATIC PRESSURE	mmW C		
	31.5. 4	IMPELLER MATERIAL			
	31.5. 5	BRAKE POWER OF EACH FAN	kW		

	31.5.6	INPUT POWER OF EACH FAN	kW	
	31.5.7	MOTOR RATING OF EACH FAN	kW	
MAKE OF ACCESSORIES	32.	HIGH AND LOW PRESSURE CUT OUTS		
	33.	THERMOSTAT		
	34.	SOLENIOD VALVE		
	35.	SINGLE PHASE PREVENTOR		
	36.	STARTERS		
	37.	VIBRATION ISOLATORS		
	38.	CONTROL PANEL		
PERFORMANCE GUARANTEE	39.	CAPACITY OF EACH CNU AT DESIGN CONDITIONS	TR	
	40.	TOTAL POWER INPUT AT DESIGN CONDITIONS	kW	
	41.	NOISE LEVEL AT 1.86 M DISTANCE FROM CNU	dBA	
GENERAL	42.	CONFIRM THAT UNITS CAN BE INSTALLED,		
		OPERATED AND SERVICED IN AVAILABLE		
		PLANT ROOM SPACE		YES/NO
	43.	CONFIRM THAT UNITS ARE SUITABLE FOR		
		SPECIFICIED VOLTAGE AND FREQUENCY		YES/NO
	44.	PERFORMANCE CURVE/RATING CHARTS		
		ENCLOSED.		YES/NO

TECHNICAL SPECIFICATION TO BE FILLED BY BIDDER

FOR

COMPRESSED AIR WORKS

4. DATA SHEET FOR COMPRESSED AIR WORKS

4.1. DATA SHEET B :AIR COMPRESSOR

TO BE FILLED BY BIDDER

	SL. NO.	CONTRACTOR ITEM				
GENERAL	1.	DESIGNATION		COMPRESSORS FOR		
	2.	NUMBER OFFERED		(W+S)		
	3.	TAG NUMBERS				
	4.	TYPE OF COMPRESSOR		RECIPROCATING/CENTRIFUGAL/ SCREW		
				LUBRICATED / NON-LUBRICATED		
	5.	MAKE AND MODEL NUMBER				
	6.					
	7.					
				RECIP	CENT	SCREW
	8.	NUMBER OF STAGES				
COMPRESSOR DATA	9.	NUMBER OF CYLINDERS PER			NA	NA
		STAGE				
	10.	TYPE OF CYLINDER		VER / HOR	NA	NA
	11.	CYLINDER LINER PROVIDED		YES / NO	NA	NA
	12.	SINGLE ACTING /DOUBLE		SINGLE/		
		ACTING		DOUBLE	NA	NA
	13.	CAPACITY (FAD)	M^3/ Hr			
	14.	MASS FLOW RATE	Kg/Hr	NA		NA
	15.	TYPE OF SUCTION AND		PLATE /	IGV/	BUTTERFLY
		DISCAHRGE VALVE		CHANNEL	BUTTERFLY	/ PISTON
				TYPE	VALVE (OP)	VALVE (OP)
					AT SUCTION	AT SUCTION
	16	SUCTION PRESSURE	Kg/ cm^2(g)			
	17.	DISCHARGE PRESSURE	Kg/ cm^2(g)			
		LEGEND : RECIP = RECIPROCATING, CENT= CENTRIFUGAL, VER = VERTICAL,				

		HOR = HORIZONTAL,IGV = INLET GUIDE VANES, OP = OPTIONAL, NA = NOT APPLICABLE

	SL. NO.	CONTRACTOR ITEM				
COMPRESSORS DATA (CONTD.)				RECIP	CENT	SCREW
	18.	SUCTION TEMPERATURE -				
		EACH STAGE	^{0} C			
	19.	DISCHARGE TEMPERATURE -				
		EACH STAGE	^{0} C			
	20.	SELECTED COMPRESSOR SPEED	RPM			
	21.	BKW AT SELECTED COMPRESSOR				
		SPEED	KW			
	22.	RECOMMENDED MAXIMUM				
		SPEED	RPM			
	23.	BKW AT RECOMMENDED				
		MAXIMUM SPEED	KW			
	24.	VOLUMETRIC EFFICIENCY	%			
	25.	MECHANICAL EFFICIENCY	%			
	26.	MOTOR RATING AND SPEED	KW/RPM	/	/	/
	27.	LUBE OIL CONSUMPTION				
		FOR EACH COMPRESSOR	LPM			
	28.	LUBE OIL PUMP DRIVEN BY				
		COMPRESSOR MOTOR		YES/ NO	YES/ NO	YES/ NO
	29.	MOTOR RATING, IF LUBE OIL				
		PUMP IS DRIVEN BY SEPARATE	KW			
		MOTOR				
	30.	AUXILIARY LUBE OIL PUMP		WHETHER PROVIDED		
		TO BE PROVIDED			YES/ NO	
	31.	AUXILIARY LUBE OIL PUMP		/	/	/
		MOTOR RATING AND SPEED	KW/RPM			
	32.	TYPE AND MAKE OF BEARINGS				
	33.	COOLING WATER				

	REQUIREMENTS (NOTE 1)					
33.1	FOR COMPRESSOR COOLING					
33.1.1	FLOW RATE	M^3/ Hr				
33.1.2	INLET AND MINIMUM OUTLET		/	/	/	
	PRESSURE	Kg/cm^2(g)				
33.1.3	INLET AND MAXIMUM OUTLET		/	/	/	
	TEMPERATURE	^{0} C				
33.2	FOR BEARING COOLING -					
	IF REQIRED					
33.2.1	FLOW RATE	M^3/ Hr				
33.2.2	INLET AND MINIMUM OUTLET		/	/	/	
	PRESSURE	Kg/cm^2 (g)				
33.2.3	INLET AND MAXIMUM OUTLET		/	/	/	
	TEMPERATURE	^{0} C				
33.2.4						
33.2.5						
34.	INTAKE FILTER TYPE					
34.1	FILTER ELEMENT					
34.2	RATED CAPACITY	M^3/ Hr				
34.3	EFFICIENCY	%				
34.4	DESCRIPTIVE LITERATURE		WHETHER ENCLOSED			
	TO BE ENCLOSED			YES/ NO		
34.5						
35.	CAPACITY CONTROL					
35.1	TYPE AND NUMBER OF STEPS		BY SPEED VARIATION / AT CONSTANT SPEED AND			
35.2	METHOD EMPLOYED IN CASE OF CONSTANT SPEED TYPE					
35.3	CONTROL SYSTEM WRITE-UP TO		WHETHER ENCLOSED			
	BE ENCLOSED		YES/ NO			
35.4	WIRING AND TUBING DIAGRAM		WHETHER ENCLOSED			
	WITH CONTROL SCHEME TO BE		YES / NO			

		ENCLOSED				
	36.	EQUIPMENT AND ACCESSORIES				
		MOUNTED ON COMMON BASE				
		FRAME WITH THE COMPRESSOR				
	36.1	WEIGHT OF ENTIRE UNIT MOUNTED				
		ON COMMON BASE FRAME	Kg			
	36.2	OVERALL DIMENSIONS OF		X	X	X
		COMMON BASE FRAME L X W	M			
	37.	EQUIPMENT AND ACCESSORIES				
		MOUNTED ON SEPARATE BASE				
		FRAME				
	37.1	WEIGHT OF EQUIPMENT AND ACCESSORIES MOUNTED ON SEPARATE BASE FRAME	Kg			
	37.2	OVERALL DIMENSIONS OF		X	X	X
		SEPARATE BASE FRAME L X W	M			
	38.	NAME AND OVERALL DIMENSIONS OF SINGLE LARGEST COMPONENT TO BE LIFTED L X W X H	M	X	X	X
	39.	NAME AND WEIGHT OF HEAVIEST SINGLE COMPONENT TO BE LIFTED	Kg			
INTER-COOLERS / AFTER-				RECIP	CENT	SCREW
	40.	SUCTION FLANGE - FIRST STAGE SIZE/ STANDARD/ RATING	mm NB/			
	41.	DISCHARGE FLANGE - FINAL STAGE - SIZE/ STANDARD/ RATING	mm NB/			
	42.	IF DRIVE MOTOR IS TO BE FURNISHED BY THE PURCHASER				
	42.1	RATING/ SPEED	KW/RPM			
	42.2	STARTING TORQUE	Kg M			

	42.3	DIRECTION OF ROTATION OF MOTOR AS VIEWED FROM COUPLING END		/	/	/	
	43.	ALL THE ACCESSORIES AS		WHETHER INCLUDED			
		CALLED FOR IN DATA SHEET A TO BE INCLUDED		YES / NO			
	44.						
				I/C			A/C
				1 STG	2 STG	3 STG	
	45.	DESIGNATION					
	46.	NUMBER OFFERED					
	47.	TAG NUMBERS					
	48.	TYPE		VER/ HOR			VER/HOR
	49.	CAPACITY (FAD)	M^3/Hr				
	50.	COOLING WATER FLOW RATE	M^3/ Hr				
	51.	AIR/ GAS INLET/OUTLET		/	/	/	/
		TEMPERATURE	^{0} C				
	52.	COOLING WATER INLET/ MAXI-		/	/	/	/
		MUM OUTLET TEMPERATURE	^{0} C				
				I/C			A/C
	53.	AIR/ GAS INLET AND OUTLET		/	/	/	/
		PRESSURE	$Kg/cm^2(g)$				
	54.	COOLING WATER INLET/		/	/	/	/
		MINIMUM OUTLET PRESSURE	$Kg/cm^2(g)$				
	55.	COOLING SURFACE AREA	M^2				
	56.	DESIGN PRESSURE - AIR/ GAS SIDE	$Kg/cm^2(g)$				
	57.	DESIGN PRESSURE - WATER SIDE	$Kg/cm^2(g)$				
	58.	CODE OF CONSTRUCTION					
	59.	CORROSION ALLOWANCE	mm	3	3	3	3
	60.	NUMBER OF PASSES					
	61.	EMPTY WEIGHT	Kg				
	62.	OPERATING WEIGHT	Kg				
	63.	WATER FILLED WEIGHT	Kg				

	64.	ALL THE ACCESSORIES				
		AS CALLED FOR IN DATA SHEET A		WHETHER INCLUDED		
		TO BE INCLUDED		YES / NO		
RECEIVERS	65.	DESIGNATION		RECEIVERS FOR		
	66.	NUMBER OFFERED				
	67.	TAG NUMBERS				
	68.	TYPE		VER/ HOR	VER/ HOR	VER/ HOR
	69.	CAPACITY	M^3			
	70.	SIZE				
	70.1	DIAMETER	mm			
	70.2	HEIGHT TAN TO TAN	mm			
	71.	DESIGN PRESSURE	$Kg/cm^2(g)$			
	72.	CODE OF CONSTRUCTION				
	73.	CORROSION ALLOWANCE	mm			
RECEIVERS (CONTD.)	74.	THICKNESS				
	74.1	SHELL	mm			
	74.2	DISHED ENDS	mm			
	75.	WEIGHT				
	75.1	EMPTY	Kg			
	75.2	OPERATING	Kg			
	75.3	FILLED WITH WATER	Kg			
	76.	ALL THE ACCESSORIES AS CALLED				
		FOR IN DATA SHEET A TO BE		WHETHER INCLUDED		
		INCLUDED		YES / NO		
MISCELLANEOUS	77.	ALL THE VALVES, SPECIALITIES,				
		INSTRUMENTS, COUNTER FLANGES,				
		FOUNDATION BOLTS ETC. AS				
		CALLED FOR IN DATA SHEET A AND		WHETHER INCLUDED		
		AS PER ENCLOSED P & I D TO BE		YES / NO		
		INCLUDED				
PERFORMANCE GUARANTEES	78.	CAPACITY OF COMPRESSOR	M^3/ Hr	(+)	(–)	
	79.	DISCHARGE PRESSURE	$Kg/cm^2(g)$	(+)	(–)	
	80.	POWER CONSUMPTION	KW	(+)	(–)	
	81.	TEMPERATURE OF AIR AT OUTLET OF AFTER-COOLER	^{0} C	(+)	(–)	
	82.	COOLING WATER FLOW RATE	M^3/ Hr	(+)	(–)	

	83.	COOLING WATER OUTLET TEMP.	^{0} C	(+)	(–)
	84.	COOLING WATER PRESSURE DROP	Kg/cm^2(g)	(+)	(–)
	85.				
	Notes 1. IF AIR COOLED COMPRESSOR IS OFFRERED, CONTRACTOR TO FURNISH COOLING SYSTEM DETAILS LIKE NATURAL OR FORCED COOLING, FAN CAPACITY, MOTOR RATING ETC. LEGEND : I/C = INTER-COOLER, A/C = AFTER-COOLER, STG = STAGE				

NOTES TO CONTRACTOR 1. DATA SPECIFIED IN DATA SHEET-A HAS NOT BEEN REPRODUCED IN DATA SHEET-B. IN CASE OF DEPARTURE FROM DATA SHEET-A, CONTRACTOR SHALL BRING OUT THE SAME IN SCHEDULE OF DEVIATIONS, FAILING WHICH IT SHALL BE CONSTRUED THAT CONTRACTOR COMPLIES WITH THE REQUIREMENTS STIPULATED IN DATA SHEET-A. 2. THIS DATA SHEET SHALL BE FILLED UP COMPLETELY AND A COPY SHALL BE ENCLOSED WITH EACH COPY OF THE BID.	SIGNATURE OF CONTRACTOR DATE	

4.2. DATA SHEET C : AIR COMPRESSOR

DATA TO BE FURNISHED BY THE CONTRACTOR AFTER THE

AWARD OF CONTRACT

1. List of drawings and documents to be submitted for review, approval and information with scheduled submission dates

2. Quality Assurance Plan (QAP)

3. Calculations for compressor capacity, drive motor rating, selection of speed reducers and couplings. Torsional vibration analysis for centrifugal and screw compressors

4. Thermal design calculations for inter-coolers, after-coolers and oil-coolers

5. Detailed P&I diagram showing clearly the scope of supply of equipment, piping with line sizes and material specifications, valves, specialities, instrumentation and control and all the accessories. All equipment, lines, valves, specialities and instruments shall be tagged as per the PURCHASER's procedure to be given to the successful CONTRACTOR. All terminal points shall be clearly identified. All design data and

other information furnished in data sheets A and B shall be covered either in this drawing or other relevant drawings or documents mentioned below.

6. Detailed equipment list and bill of materials of all items in the CONTRACTOR's scope

7. Sub-vendor list for all bought-out items

8. Mechanical design calculations for inter-coolers, after-coolers, oil-coolers, moisture and oil separator and receivers

9. Characteristic curves of compressors. For centrifugal compressors, in addition to curves for operating conditions, characteristic curves shall be submitted considering minimum and maximum ambient temperature, minimum and maximum humidity and minimum and maximum frequency conditions

10. Dimensioned to-scale equipment layout drawing showing all equipment, accessories, relevant external dimensions, location and elevation of terminal points, details of piping and electrical connections to be made by the PURCHASER, clearances required for erection, dismantling, operation and maintenance

11. Dimensioned cross-section drawings of compressors and other proprietary items with part list and materials of construction

12. Detailed fabrication drawings of all fabricated equipment like inter-coolers, after-coolers, air receivers etc.

13. Line designation schedule for all lines in the CONTRACTOR'S scope

14. List of valves, specialities and instruments in the CONTRACTOR'S scope with tag numbers, type, makes, pressure ratings, materials of construction and ranges for instruments etc.

15. Manufacturer's drawings, data sheets and catalogues for valves, specialities and instruments etc.

16. Dimensioned to-scale piping layout drawing for piping in the CONTRACTOR's scope with allowable forces and moments on the piping nozzles and displacement of the nozzles

17. Overall foundation plan, base frame drawing for each equipment, static and dynamic loads on each of the anchor bolts and dimensional details of pockets and anchor bolts

18. Motor drawings

19. Electrical control wiring diagrams with all interlocks

20. Control philosophy, interlock description and logic diagrams

21. Dimensional to-scale general arrangement and section drawings of MCC and instrument control panel with complete bill of materials

22. List of alarms and trip settings

23. Erection, start-up, operation and maintenance manual complete with lubrication schedule etc.

4.3. DATA SHEET B– AIR DRYING PLANT (REFRIGERATED TYPE)

SL. NO.	ITEM	UNIT	SPECIFICATION
1.0	**GENERAL**		
1.1	DESIGNATION		AIR DRYING PLANT FOR
1.2	NUMBER REQUIRED		
1.3	TAG NUMBERS		
1.4	OPERATION	Hrs/DAY	CONTINUOUS / INTERMITTENT
1.5	LOCATION		INDOOR / OUTDOOR
1.6	INLET AIR QUALITY		OIL FREE OR OIL CONTAMINATED COMPRESSED AIR
1.7	APPLICABLE CODE		IS 11989 / ISO-8573-1 (2.4.7.1)
2.0	**DESIGN DATA**		
2.1	DESIGN CAPACITY (FAD)	M^3/Hr	
2.2	OPERATING PRESSURE	Kg/cm²(g)	
2.3	DESIGN PRESSURE	Kg/cm²(g)	

SL. NO.	ITEM	UNIT	SPECIFICATION
2.4	MAXIMUM ALLOWABLE PRESSURE DROP ACROSS AIR DRYING PLANT	Kg/cm²	0.5
2.5	AIR INLET TEMPERATURE	°C	
2.6	AIR OUTLET TEMPERATURE	°C	
2.7	OUTLET AIR DEW POINT (NOTE 1)		
2.7.1	AT ATMOSPHERIC PRESSURE	°C	(-) 15
2.7.2	AT OPERATING PRESSURE	°C	(+) 3
2.8	QUALITY OF COOLING WATER (CW)		
2.9	CW INLET TEMPERATURE		
2.10	MAXIMUM ALLOWABLE CW OUTLET TEMPERATURE	°C	
SL. NO.	**ITEM**	**UNIT**	
2.11	CW INLET PRESURE	Kg/cm²(g)	
2.12	MAXIMUM ALLOWABLE CW PRESSURE DROP	Kg/cm²	
2.13	CONTROL POWER SUPPLY	V	
2.14	P&I DIAGRAM NO.		
2.15	PIPING		REFER PIPING MATERIAL SPECIFICATION (PMS)
2.16	TYPE OF REFRIGERANT		R407C, R410A, R134
3.0	**AIR-TO-AIR HEAT EXCHANGER**		
3.1	DESIGN CODES		ASME SEC VIII DIV 1 AND TEMA C
3.2	CORROSION ALLOWANCE	mm	1.5

SL. NO.	ITEM	UNIT	SPECIFICATION
3.3	SHELL		SA 106 GR B / IS 2002 GR 2
3.4	TUBES		COPPER/ADMIRALITY BRASS AS PER BS EN 1057(NOTE 2)
3.5	TUBE SHEET		IS 2002 GR 2 / SA 105
3.6	BAFFLE PLATES		IS 2062 GR B / IS 2002 GR 2
3.7	MOISTURE SEPARATOR		
			CENTRIFUGAL TYPE WITH DEMISTER PAD AND AUTOMATIC DRAIN TRAP
4.0	**CONTROLS** (NOTE 3)		
4.1	CONTROL SIGNAL LAMPS FOR POWER, CONTROL SUPPLY ON		REQUIRED
4.2	SWITCHES/PUSH BUTTONS FOR		
4.2.1	COMPRESSOR ON / OFF		REQUIRED
4.2.2	ACKNOWLEDGE/RESET/ TEST		REQUIRED
4.2.3	AUTO/MANUAL CHANGEOVER SELECTOR SWITCH		REQUIRED
4.3	ANNUNCIATION SYSTEM		REQUIRED
5.0	**MISCELLANEOUS**		
5.1	BY PASS ARRANGEMENT FOR THE PLANT REQUIRED		YES / NO
5.2	ALL THE VALVES, SPECIALITIES, INSTRUMENTS AND ACCESSORIES AS PER ENCLOSED P&ID		REQUIRED
5.3	COUNTER FLANGES FOR ALL THE CONNECTIONS AT BATTERY LIMITS WITH NUTS, STUDS BOLTS, GASKETS AND WASHERS		YES / NO

SL. NO.	ITEM	UNIT	SPECIFICATION
	REQUIRED		
5.4	FLANGES		AS PER ANSI B16.5
5.5	FOUNDATION BOLTS REQUIRED		YES / NO
5.6	ERECTION BY CONTRACTOR		YES / NO
5.7	ERECTION SUPERVISION BY CONTRACTOR		YES / NO
6.0	**PAINTING**		
6.1	PRIMER		RED OXIDE/ EPOXY
6.1.1	NUMBER OF COATS		
6.1.2	DRY FILM THICKNESS PER COAT	µ	
6.2	FINISH PAINT		SYNTHETIC ENAMEL / EPOXY /
	NUMBER OF COATS		
	DRY FILM THICKNESS PER COAT	µ	
7.0	**COMPANION SPECIFICATIONS**		
7.1	INSULATION		
8.0	**SPARES AND MAINTENANCE TOOLS AND TACKLES**		
8.1			
8.2	ESSENTIAL SPARES		
9.0	**TESTS AND INSPECTION**		
9.1			
9.2			
10.0	**PERFORMANCE GUARANTEES**		
10.1	DESIGN CAPACITY (FAD)		

SL. NO.	ITEM	UNIT	SPECIFICATION
		M3/Hr	(+)
		M3/Hr	(–) 0.00
10.2	OUTLET AIR DEW POINT AT ATMOSPHERIC		
	PRESSURE	°C	(+) 0.00
		°C	(–)
10.3	PRESSURE DEW POINT AT OUTLET		
		°C	(+) 0.00
		°C	(–)
10.4	AIR PRESSURE DROP ACROSS THE PLANT		
		Kg/cm²	(+) 0.00
		Kg/cm²	(–)
10.5	TOTAL POWER CONSUMPTION PER CYCLE		
		KW	(+) 0.00
		KW	(–)
11.0	**COST LOADING AND PENALTY**		
11.1	TOTAL POWER CONSUMPTION / CYCLE	Rs.	/ KW

4.4. WELDED UNFIRED PRESSURE VESSEL DATA SHEET C :

DATA TO BE FURNISHED BY THE VENDOR AFTER THE ISSUE OF PURCHASE ORDER

1. Schedule of complete design calculations, drawings and documents to be submitted along with submission dates
2. Quality Assurance Plan (QAP)
3. Complete design calculations
4. General arrangement drawing indicating overall dimensions, complete design data, general notes, BOM, specifications of each of the pressure and non-pressure parts, nozzle schedule with nozzle tag number, service, size, nozzle wall thickness, complete end connection details, nozzle elevations, locations, and orientation, support details, locations and orientation etc. Operating weight, erection weight and weight filled with water shall be indicated.
5. Detailed fabrication drawing for each part and welding details
6. Details of internals
7. Details of external cleats and structurals
8. Welding procedure

4.5. MOTOR DATASHEETS B :

TO BE FILLED BY BIDDER

1.	Application/Designation		
2.	Manufacturer		
3.	Applicable standards		
4.	Country of Origin		
5.	Efficiency Category(For Energy Efficient Motors only)		
6.	Rated		
	a) Output	KW	
	b) Speed	RPM	
	c) Frame size		
7.	Type of Duty (CI.10.2 of IS 325 OR CL-9.3 OF IS 4722)		
8.	Supply conditions		

	a) 1) Rated voltage	V	
	2) No. of phases		
	3) Frequency	Hz	
	b) Allowable Variations in		
	1) Voltage	%	
	2) Frequency	%	
	3) Combined	%	
	c) Permissible Unbalance in Supply Voltage	%	
9.	Current		
	a) Full Load	Amps	
	b) Starting	% FL	
10.	Method of Starting		
11.	Insulation		
11.1	Class of Insulation		
11.2	Whether Tropicalised	Yes/ No	
12.	a) Reference ambient Temperature		
	b) Temp. rise by res. Method		
	Stator	^{0} C	
	Rotor	^{0} C	
	c) Temp. rise of bearing	^{0} C	
13.	Type of bearing Lubricating Grease / Oil		
14.	Facility for On line Greasing of bearing for motors above 15kW		
15.	Degree of Protection(IS 4691 or equivalent)		
16.	Suitable for Outdoor Operation		Yes/No
17.	Normal winding connection		Star/Delta
18.	Space Heater rating	Watt	
19.	Noise level	db	
20.	(i) Type & No. of Terminals brought Out		
	(ii) Fault withstand capacity at rated voltage & duration		
	iii) Maximum size of Aluminium armoured cable that can be Terminated	cores X Sq	

		mm	
21.	Dimensional Dwg. Enclosed		
22.	Torque		
22.1	Full Load	Kg-m	
22.2	Starting torque	%FLT	
22.3	Pull out Torque	%FLT	
22.4	Pull up Torque	%FLT	

INFORMATION TO BE SUBMITTED BY THE CONTRACTOR AFTER AWARD OF CONTRACT

1.0 Technical particulars as per data sheet B of tender specification. (Based on motor manufacturer)
2.0 Type and frame size :
3.0 Starting time (Secs)
3.1 With 100% voltage at terminals
3.2 With minimum voltage at terminals (at ____ % Rated voltage)
3.3 With 110% voltage at terminals
4.0 Safe stall time at 100/110% rated voltage under hot/cold condition.
5.0 Type and size of cable for which gland is provided in the terminal box :
6.0 Type of bearings and expected life.
7.0 Total weight of motor (kg)
7.1 Weight of Stator (kg)
7.2 Weight of Rotor (kg)
8.0 Motor GD^2 :
9.0 Efficiency (%)
9.1 Full Load Efficiency
9.2 75% Load Efficiency
9.3 50% Load Efficiency
9.4 25% Load Efficiency
10.0 Power Factor
10.1 Full Load Power Factor
10.2 75% Load Power Factor
10.3 50% Load Power Factor
10.4 25% Load Power Factor
11.0 Torque (% FLT)
11.1 Starting

11.2 Maximum (Pullout torque)
11.3 Pull up torque
12.0 Type of Enclosure
13.0 Cooling designation
14.0 Space heaters
14.1 Rated voltage/number
14.2 Rating total
14.3 Separate terminal box provided
15.0 Motor reactances (Pu)
15.1 Subtransient reactance
15.2 Transient reactance
15.3 Steady state reactance
16.0 Guaranteed losses (kW)
16.1 Iron loss
16.2 Copper loss
16.3 Friction, Windage & Stray losses.
17.0 Motor outline dimension drawing (Number of copies as per distribution schedule)
18.0 Type test certificates (Number of copies as per distribution schedule)
19.0 Speed torque curve at rated & minimum starting voltage.
20.0 Current - speed curve.
21.0 Current - time curve.
22.0 Efficiency, power factor, slip, current against output curve.
23.0 Thermal withstand characteristic for motors of 100 kW & above - Hot & Cold.
24.0 Negative sequence current Vs time curve for motor of 100 kW & above.
25.0 Rotor voltage/Rotor current (for wound motors).

TECHNICAL SPECIFICATIONS – BIDDER TO FILL

FOR

ELECTRICAL SYSTEM

5. DATA SHEET FOR ELECTRICAL

DATA SHEET A1 - TECHNICAL REQUIREMENTS

DATA SHEET A2 - CODAL REQUIREMENTS

DATA SHEET B - TO BE FILLED BY BIDDER

5.1. DATA SHEET A1 HIGH VOLTAGE METAL ENCLOSED SWITCHGEAR

SL. NO.		ITEM	UNIT	TECHNICAL PARTICULARS
1.0 SWITCHGEAR RATINGS	1.1	NOMINAL SYSTEM VOLTAGE PHASES & FREQUENCY	VOLTS, PH, HZ	33000V, 3Ph, 50Hz
	1.2	SYSTEM NEUTRAL EARTHING		EFFECTIVELY EARTHED
	1.3	MAXIMUM SYSTEM VOLTAGE	VOLTS	36000V
	1.4	POWER FREQUENCY WITHSTAND VOLTAGE	kV (rms), 1 min	70
	1.5	1.2/50 µ SEC. IMPULSE WITHSTAND VOLTAGE	kV (peak),	170
	1.6	SHORT CIRCUIT WITHSTAND		
	1.6.1	SHORT TIME (1 SEC.) AT RATED VOLTAGE	kA (rms)	25kA for 1 sec
	1.6.2	SHORT TIME (3 SEC.) AT RATED VOLTAGE	kA (rms)	--
	1.6.3	DYNAMIC RATING	kA (peak	62.5kA
	1.7	REFERENCE SITE AMBIENT TEMPERATURE		~~☐ 40^{0}C~~ ~~☐ 45^{0}C~~ 50^{0}C ☑
	1.8	CONTINUOUS CURRENT RATING OF BUS BARS UNDER REFERENCE SITE AMBIENT TEMP.		REFER. SR. NO. 2.0 BELOW
	1.9	MAXIMUM TEMPERATURE OF BUS BARS AND DROPPERS/CONNECTORS UNDER CONDITIONS SPECIFIED – SR. NOS. 1.7 and 1.8 ABOVE		90^{0}C FOR BUSBARS HAVING NON-SILVER PLATED JOINTS 105^{0}C FOR BUSBARS HAVING SILVER PLATED JOINTS

SL. NO.		ITEM		UNIT		TECHNICAL PARTICULARS	
2.0 SWITCHGEAR RATINGS	SR. NO.		BUS BARS COPPER (TINNED) ALUMINIUM	CABLE ENTRY		TOTAL NO. OF CUBICLES PER SWITCHGEAR	REMARKS (DIMENSIONAL LIMITS IF ANY)
			AMPS.	TOP	BOTTOM		
	2.1	HT PANEL-3 VCB SWITCHGEAR	630, ALUMINIUM		BOTTOM	03	HEIGHT < / = 2.3 M INCLUDING BASE FRAME
SWITCHGEAR CONSTRUCTIONAL REQUIREMENRTS	3.1	CLEARANCE IN AIR PHASE TO PHASE		mm		320	
	3.2	BUS BAR INSULATION		–		☐ ~~HEAT SHRUNK~~ ☑ HR – PVC ☐ ~~ENCAPSULATED~~ ☐ ~~BARE~~	
	3.3	DEGREE OF PROTECTION		–		- IP 4X: ENCLOSURE - IP 2X: PARTITION BETWEEN COMPARTMENTS	
	3.4	BUS DUCT CONNECTION		–		☐ ~~REQUIRED~~ ☑ NOT REQUIRED ☐ ~~SEE PROJECT DWG.~~	
	3.5	EARTHING BUS		MATERIAL		☑ Cu ☐ ~~Al~~ ☐ ~~GI~~	
				SIZE		50 x 06mm Cu	
	3.6	COLOUR FINISHED SHADE					

SL. NO.		ITEM	UNIT	TECHNICAL PARTICULARS
	3.6.1	INTERIOR		RAL 7032 POWDER COATED MINIMUM THICKNESS 80 MICRONS
	3.6.2	EXTERIOR		ENAMEL ☑EPOXY LIGHT GREY SEMI GLOSSY SHADE 631 FO IS:5
4.1 CIRCUIT BREAKERS	4.1	BREAKER PARTICULARS		
	4.1.2	CIRCUIT BREAKER TYPE (REF. SPEC. CL. 3.1.4)		☐ SF6 ☑ VCB
	4.1.3	VOLTAGE, FREQUENCY, & NO.OF PHASES	VOLTS, Ph, Hz	33000V, 3Ph, 50Hz
	4.1.4	RATED OPERATING DUTY		O–3 MIN–CO–3 MIN–CO
	4.1.5	RATED CURRENT AT REFERENCE SITE AMBIENT TEMPERATURE		AS PER PROJECT DRAWING(S)
	4.1.6	RATED BREAKING CURRENT	kA (rms)	25
	4.1.7	RATED MAKING CURRENT	kA (peak)	66
	4.1.8	SHORT TIME CURRENT WITHSTAND FOR 1 SEC. DURATION.	kA (rms)	25
	4.1.9	ASYMMETRICAL BREAKING CURRENT		
		(a) AC COMPONENT	kA (rms)	kA (rms) – BY BIDDER
		(b) D.C. COMPONENT	kA	kA – BY BIDDER
	4.1.10	TOTAL OPENING TIME	CYCLES / mSEC	LESS THAN 3 CYCLES
	4.1.11	TOTAL CLOSING TIME	CYCLES / mSEC	LESS THAN 5 CYCLES
	4.1.12	OPERATING MECHANISM, TYPE	–	NORMAL - SPRING CHARGING FOR CLOSING AND TRIPPING EMERGENCY - MANUAL TRIP AND SPRING CHARGED FOR CLOSING AND TRIPPING

SL. NO.		ITEM	UNIT	TECHNICAL PARTICULARS
	4.1.13	MINIMUM NO. OF AUXILIARY CONTACTS	–	6 'NO' + 6 'NC' FOR PURCHASER'S USE
	4.1.14	AUXILIARY CONTROL VOLTAGE		
4.1 CIRCUIT BREAKERS (CONTD.)		(a) FOR CLOSING/TRIPPING COIL	VOLTS	110V DC
		(b) FOR SPRING CHARGING MOTORS	VOLTS	230V AC
		(c) FOR SPACE HEATERS & LIGHTING	VOLTS	230V AC
	4.1.15	BREAKER APPLICATION		
		(a) TRANSFORMER CONTROL		YES ~~/ NO~~
		(b) MOTOR CONTROL		~~YES~~ / NO
		(c) FURNACE CONTROL		~~YES~~ / NO
		(d) CAPACITOR CONTROL		~~YES~~ / NO
4.2 VACUUM CONTACTOR	4.2	VACUUM CONTACTOR	–	NA
	4.2.1	APPLICATION (CONTROLLED EQPT.)	–	~~MOTOR , CAPACITOR~~
	4.2.2	MAX. SYSTEM VOLTAGE & FREQUENCY	V. Hz.	NA
	4.2.3	NO. OF POLES	–	~~ONE TWO THREE~~
5.0 MECHANISM	5.1	SPRING CHARGING	–	YES ~~NO~~
	5.2	TYPE	–	~~AC DC~~ UNIVERSAL
	5.3	RATING VOLTAGE	V	230
	5.4	RATING	kW	BIDDER TO SPECIFY
	5.5	OTHER	–	MECH & ELECT INDICATIONS REQUIRED WITH REMOTE INDICATIONS
6.0 DISCONNECTORS	6.1	APPLICATION (CONTROLLED EQPT.)	–	NA
	6.2	TYPE	–	NA
	6.3	RATED CURRENT AT REFERANCE SITE AMBIENT TEMPERATURE	–	NA
	6.4	RATED MAKING & BREAKING CAPACITIVE CURRENT	A	NA

SL. NO.		ITEM	UNIT	TECHNICAL PARTICULARS
	6.5	S.C. WITHSTAND CURRENTS	–	NA
		a) MOMENTARY	kA (peak)	NA
		b) 1 SEC. CURRENT	kA (rms)	NA
	6.6	OPERATING MECHANISM CLOSING & OPENING		~~MOTORISED~~ ~~MANUAL~~
		CONTROL VOLTAGE	VOLTS	~~☐ AC ☐ DC~~
	6.7	MINIMUM NO. OF AUX. CONTACTS	–	~~2 NO. + 2 NC.~~
	6.8	HRC FUSES (RATING TO SUIT APPLN.)	SEE PROJ. DRAWINGS	~~REQUIRED~~ ~~NOT REQUIRED~~
7.0 CURRENT TRANSFORMER	7.1	TYPE		CAST RESIN BAR PRIMARY
	7.2	SYSTEM VOLTAGE & FREQUENCY		33000 VOLT, 50Hz
	7.3	CLASS OF INSULATION		CLASS-B OR BETTER
	7.4	RATED PRIMARY CURRENT & RATIO		REFER SINGLE LINE DIAGRAM
	7.5	ACCURACY CLASS & BURDEN	METERING	AS PER SLD
			PROTN.	CL.PS/ 5P20 /AS PER SLD
	7.6	SHORT TIME 1 SEC. CURRENT RATING & DYNAMIC RATING	kA (rms) kA (peak)	25kA 66kA
	7.7	CORE BALANCE CTs SHALL BE SUITABLE FOR CABLE SIZES OF THE RESPECTIVE FEEDERS AND SHALL BE COMPLETE WITH SUITABLE SUPPORTS.	-	NA
8.0 VOLTAGE TRANSFORMERS	8.1	TYPE	–	CAST RESIN
	8.2	RATED VOLTAGE		
	8.2.1	PRIMARY (P1)	Volts	33000/√3
	8.2.2	SECONDARY (S1)	Volts	110/√3
	8.2.3	SECONDARY (S2)	Volts	--
	8.3	METHOD OF CONNECTION		
	8.3.1	PRIMARY (P1)	P1	STAR EARTHED

SL. NO.		ITEM	UNIT	TECHNICAL PARTICULARS
	8.3.2	SECONDARY (S1)	S1	STAR EARTHED
	8.3.3	SECONDARY (S2)	S2	~~OPEN DELTA~~ ~~STAR EARTHED REF SLD~~
	8.4	RATED VOLTAGE FACTOR	–	1.2 CONT., 1.9 TIMES FOR 8 HOURS.
	8.5	CLASS OF INSULATION	–	CLASS – B OR BETTER
	8.6	PROVISION OF PT & ALARM ON EATHING TROLLEY		YES/ ~~NO~~
9.0 H.V.FUSE	9.1	RATED CURRENT	A	NA
	9.2	VOLTAGE CLASS	kV	NA
	9.3	SYM. INTERRUPTING RATING	kA (rms)	NA
10.0 METERS	10.1	TYPE		DIGITAL/ ~~ANALOGUE~~
	10.2	ACCURACY CLASS	–	FOR INDICATING INSTRUMENTS: 1.5 OR BETTER, MICROPROCESSOR BASED WITH RS 485 PORT
11.0 RELAYS	11.1	TYPE	–	~~ELECTRO MAGNETIC~~ ~~SOLID STATE~~ NUMERICAL - REF SLD
	11.2	OTHER SPECIFICATION	–	SUITABLE FOR 1A CT SEC (REFER SLD)
12.0 LIST OF ESSENTIAL SPARES	12.1	ONE COMPLETE POLE OF EACH BREAKER		NA
	12.1.1	A. RATING	SET	--
	12.1.2	A. RATING	SET	--
	12.1.3	A. RATING	SET	--
	12.2	LOOSE BREAKER COMPLETE WITH OPERATING MECHANISM AND TRUCK MOUNTED		

SL. NO.		ITEM	UNIT	TECHNICAL PARTICULARS
	12.2.1	A. RATING	SET	--
	12.2.2	A. RATING	SET	--
	12.2.3	A. RATING	SET	--
	12.2.4	A. RATING	SET	--
	12.3	CLOSING & TRIPPING COILS SET	SET	THREE
	12.4	SPRING CHARGING MECHANISM	SET	NA
	12.5	SPRING CHARGING MOTOR ALONE	SET	NA
	12.6	SET OF GASKETS FOR ALL RATINGS	SET	TWO
	12.7	VACUUM CONTACTORS		
	12.7.1	ONE COMPLETE SET	EA	NA
	12.7.2	OPERATION COIL SET	EA	NA
12.0 LIST OF ESSENTIAL SPARES (CONTD.)	12.8	BUSBAR SUPPORT INSULATORS	SET	TWO
	12.9	AUXILIARY SWITCH ASSEMBLY	EA	TWO
	12.10	LIMIT POSITION SWITCH	EA	TWO
	12.11	LOCAL/REMOTE SELECTOR SWITCH	EA	TWO
	12.12	BREAKER CONTROL SWITCH	EA	TWO
	12.13	BUS SEAL OFF BUSHING	SET	TWO
	12.14	PROTECTIVE RELAYS:	–	ONE OF EACH APPLICABLE TYPE
		DEVICE NO. RELAY FUNCTION	QTY	
	12.14.1	49 THERMAL OVERLOAD	SET	NA
	12.14.2	50 S/C PHASE SHORT CIRCUIT	SET	
	12.14.3	50 N EARTH SHORT CIRCUIT	SET	
	12.14.4	51 PHASE OVERLOAD	SET	
	12.14.5	51 N EARTH OVERLOAD	SET	
	12.14.6	50 LR LOCKED ROTOR	SET	NA
	12.14.7	27 UNDER VOLTAGE	SET	

SL. NO.		ITEM	UNIT	TECHNICAL PARTICULARS
	12.14.8	64 RESIDUAL CURRENT	SET	NA
	12.14.9	86 LOCKOUT (MASTER)	SET	
	12.14.10	87 T TRANSFORMER DIFFERENTIAL	SET	NA
	12.14.11	95 FUSE FAILURE	SET	NA
	12.14.12	AUX.RELAYS OF ALL CONFIG.	SET	
	12.14.13	TIMERS OF ALL RATINGS	SET	
12.0 LIST OF ESSENTIAL SPARES (CONTD.)	12.15	INDICATING LAMP	-	MUILT CHIP LED TYPE
	12.15.1	RED, YELLOW, BLUE, GREEN, AMBER	SET	THREE OF EACH TYPE
	12.16	CAST RESIN CURRENT TRANSFORMER	SET	ONE OF EACH RATING
	12.17	CAST RESIN VOLTAGE TRANSFORMER	SET	ONE NO. AS PER SLD.
	12.18	INSTRUMENTS		
	12.18.1	AMMETER	SET	ONE
	12.18.2	VOLTMETER	SET	ONE
	12.18.3	WATTMETER	SET	NA
	12.18.4	WATT HOUR METER	SET	ONE
	12.19	FUSES		
	12.19.1	HRC HV FOR VT	EA	ONE EACH
	12.19.2	HRC LV OF DIFFERENT RATINGS	SET	--
		NOTES : 1) ITEM TICK MARKED TO BE PROVIDED IN SPECIFIED QUANTITY. 2) UNIT PRICES TO BE INDICATED BY THE BIDDER IN QUOTATION APART FROM ABOVE LIST OF SPARES, BIDDER TO INDICATE LIST OF RECOMMENDED SPARES FOR 3 YEARS OF TROUBLE FREE OPERATION.		

5.2. DATA SHEET A2 HIGH VOLTAGE METAL ENCLOSED SWITCHGEAR

SL. NO.		DESCRIPTION	REFERENCE STANDARDS	
APPLICABLE STANDARDS	1	METAL ENCLOSED SWITCHGEAR	☑IS : 3427	IEC : 60265
	2	CIRCUIT BREAKERS	IS : 13118	☑ IEC : 62271
	3	SWITCHES & SWITCH DISCONNECTORS ABOVE 1000 V & UPTO 11 KV		☑ IEC : 60265
	4	(OFF LOAD) DISCONNECTORS		☑ IEC : 62271
	5	ARRENGEMENT FOR SWITCHGEAR BUSBARS, MAIN CONNECTION AND AUXILIARY WIRING	☑IS :5578,11353	IEC :
	6	BUSBARS		
	6.1	COPPER		
	6.2	ALUMINIUM	☑IS: 5082	IEC:
	7	BUSBAR SUPPORT INSULATORS	☑IS : 2544	IEC :
	8	DEGREE OF PROTECTION	☑IS : 3427	IEC :60529
	9	CURRENT TRANSFORMERS	☑IS : 2705	IEC : 60044
	10	POTENTIAL TRANSFORMERS	☑IS : 3156	IEC : 60044
	11	A.C. ELECTRICITY METERS	☑IS : 722	IEC :
	12	ELECTRICAL INDICATING INSTRUMENTS	☑IS : 1248	IEC : 60051
	13	ELECTRICAL RELAYS FOR POWER SYSTEM PROTECTION	☑IS : 3231	IEC :60255
	14	HIGH VOLTAGE FUSES	☑IS : 9385	IEC :60282
	15	HRC FUSES	☑IS : 13703	IEC : 60269
	16	CODE OF PRACTICE FOR PHOSPATING IRON AND STEEL	☑IS : 6005	IEC :
	17	SF_6 GAS	IS :	☑ IEC : 60376
	18	H.V. CABLE TERMINATION	IS :	☑ IEC : 62329
NOTE	1. EQUIPMENT, ACCESSORIES, COMPONENTS / PARTS, RAW MATERIALS AND TEST SHALL IN GENERAL CONFORM TO : IS ☑ IEC ☑ ~~ANSI ☐~~			

5.3. DATA SHEET A1 LOW VOLTAGE SWITCHGEAR

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
1.0	**SWITCHGEAR & BUSBAR RATING**		
1.1	RATED VOLTAGE, PHASES & FREQUENCY		415 V, 3 Ph, 4 WIRE, 50 Hz
1.2	SYSTEM NEUTRAL EARTHING: (EFFECTIVELY/ NON EFFECTIVELY)		EFFECTIVELY EARTHED
1.3	MAXIMUM SYSTEM VOLTAGE		456.5 VOLTS (415+10%)
1.4	ONE MINUTE POWER FREQUENCY VOLTAGE		
	A) POWER CIRCUITS B) CONTROL CIRCUITS C) AUX. CIRCUITS CONNECTED TO SEC. OF CTS	VOLTS VOLTS VOLTS	2500 1500 2000
1.5	CONTINUOUS CURRENT RATING OF BUSBARS UNDER SITE REFERENCE AMBIENT TEMPERATURE		REFER ITEM-2 BELOW AND ENCLOSED SLD
1.6	REFERENCE AMBIENT TEMPERATURE	°C	50
1.7	MAXIMUM TEMPERATURE OF BUSBARS, DROPPERS AND CONTACTS AT CONTINUOUS CURRENT RATING UNDER SITE REFERENCE AMBIENT TEMPERATURE	°C	85
1.8	SHORT CIRCUIT WITHSTAND FOR BUSBARS AND DROPPERS A) SHORT TIME (1 SEC.) AT 415V B) DYNAMIC RATING	KA (RMS) KA (PEAK)	50/ 35 105/ 73.5
1.9	STANDARD APPLICABLE		AS PER DATA SHEET-A2
2.0	**SWITCHGEAR CONSTRUCTIONAL REQUIREMENTS**		
2.1	THICKNESS OF SHEET STEEL COLD ROLLED ~~HOT ROLLED~~	 mm mm	AS PER SECTION-D FRAME 2.0 DOORS 2.0 COVERS 1.6 ~~FRAME DOORS COVERS~~

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
2.2	DEGREE OF ENCLOSURE PROTECTION	AS PER IS:13947	IP-52 FOR INDOOR PANELS & IP-55 FOR OUTDOOR PANELS
2.3	DEGREE OF ENCLOSURE PROTECTION AGAINST EXTERNAL MECHANICAL IMPACTS		AS PER IEC - 62262
2.4	COLOUR FINISH SHADE AS PER IS:5 INTERIOR EXTERIOR		 GLOSSY WHITE RAL 7032/ 631 LIGHT GREY SEMI GLOSSY SHADE
2.5	EARTHING BUS MATERIAL SIZE	mm	GI TO SUIT SHORT CIRCUIT LEVEL
2.6	PURCHASER'S EARTHING CONDUCTOR MATERIAL SIZE	mm	GI 75 x12 mm
2.7	CLEARANCES IN AIR OF LIVE PARTS		PHASE TO PHASE : 25.4 MM PHASE TO EARTH : 19.4 MM
2.8	METAL ENCLOSED BUSDUCT/ BUS TRUNKING ENTRY TO CUBICLES IF REQUIRED		TOP/ ~~BOTTOM~~ INDOOR/ ~~OUTDOOR~~
2.9	FORM OF SEPARATION AS PER IEC 60439-1		PANELS HAVING ACB AS INCOMER – FORM 4A; OTHER PANELS – FORM 3B
2.10	REQUIREMENT OF ARC RESISTANCE FEATURE		YES/ ~~NO~~
3.0	**STARTERS**		
3.1	TYPE		UPTO 7kW – DOL, 8kW to 45kW - Y-Δ, >45kW – RELAY PROTECTION
3.2	CONTACTOR RATED DUTY		AS PER IS:13947
3.3	UTILISATION CATEGORY		AS PER IS:13947
3.4	CONTROL SCHEME & BILL OF MATERIAL ENCLOSED	~~YES~~/NO	IF YES, REF.NO. SEE ENCLOSED DWG LIST IN SECTION-C
3.5	CONTROL TRANSFORMER :		NOT APPLICABLE

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
3.5.1	SEPARATE FOR EACH MODULE	YES/NO	NO
3.5.2	COMMON FOR EACH SWITCHGEAR SECTION WITH 100% STANDBY	YES/NO	NO
3.6	SINGLE PHASING PREVENTOR REQUIRED	YES/NO	YES
3.7	STANDARD APPLICABLE		AS PER DATA SHEET-A2
3.8	THERMAL OVER LOAD RELAY RESET		HAND/ ~~AUTO~~
4.0	**CIRCUIT BREAKER**		
4.1	CIRCUIT BREAKER TYPE		AIR CIRCUIT BREAKER
4.2	VOLTAGE, FREQUENCY & NO. OF PHASES		415 V, 3 PHASE, 4 WIRE, 50 Hz
4.3	RATED BREAKING DUTY		B-0.3 SEC-MB-3 SEC-MB
4.4	RATED BREAKING CAPACITY (a) MVA (b) kA(RMS) AT 415V 0.25 P.F.		36/ 26 50/ 36
4.5	SHORT CIRCUIT WITHSTAND CURRENT FOR 1 SEC. DURATION	kA	50/ 36
4.6	RATED MAKING CURRENT	kA(PEAK	105/ 75.6
4.7	RATED CURRENT AT SITE REFERENCE AMBIENT TEMPERATURE	A	REFER 415V SLDs
4.8	TYPE OF OPERATING MECHANISM		~~MANUAL SPRING ASSISTED /~~ MANUAL SPRING CHARGED/ MOTOR WOUND SPRING CHARGED
4.9	KEY INTERLOCKING REQUIRED		YES/~~NO~~
4.10	SHUNT TRIP REQUIRED		YES/~~NO~~
4.11	PROTECTION REQUIRED (a) RELAYS/ SERIES RELEASES (b) RELAY TYPE & SETTINGS (c) UNDER VOLTAGE RELEASE REQUIRED SETTING		AS PER SLD, YES/ ~~NO~~ DG PCC PANEL WITH/ ~~WITHOUT~~ TIME DELAY

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
4.12	MINIMUM NO OF AUXILIARY CONTACTS		6 'NO' + 6 'NC'
4.13	CONTROL VOLTAGE **(a) FOR SPRING CHARGING MOTOR** (b) FOR CLOSING/TRIPPING	V AC/ DC	230V, 1 PH, AC 230V, 1 PH, AC UPS SUPPLY
4.14	EMERGENCY MANUAL OPERATION REQUIRED IN ADDITION TO ELECTRICAL OPERATING DEVICES (a) FOR SPRING CHARGING & CLOSING (b) FOR TRIPPING		YES/ ~~NO~~ YES/ ~~NO~~
4.15	ANNUNCIATOR REQUIRED		~~YES~~/ NO
4.16	STANDARDS APPLICABLE		AS PER DATA SHEET-A2
5.0	**MCCB's**		
5.1	MOULDED CASE CIRCUIT BREAKERS TO BE PROVIDED. (a) FOR MOTOR CONTROL CIRCUITS (b) FOR OTHER CIRCUITS		YES/ ~~NO~~ YES/ ~~NO~~
5.2	VOLTAGE, FREQUENCY & NO OF PHASES		415 V, 50 Hz, 3 PHASE, 4 WIRE
5.3	RATED OPERATING DUTY		AS PER IS
5.4	RATED BREAKING CAPACITY (AT 415V 0.25 P.F.)	kA(RMS)	36/ 25/ 16
5.5	RATED MAKING CURRENT	kA (Peak)	75.6/ 52.5/ 33.6
5.6	RATED CURRENT AT SITE REFERENCE AMBIENT TEMPERATURE		REFER 415V SLDs
5.7	ON/OFF OPERATION MANUAL REMOTE POWER OPERATED		YES/~~NO~~ ~~YES~~/NO
5.8	RELEASES REQUIRED OVER LOAD INVERSE TIME UNDER VOLTAGE		YES/~~NO~~ ~~YES~~/NO
5.9	STANDARDS APPLICABLE		AS PER DATA SHEET-A2

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
	NOTES: (a) MCCB SHALL BE PROVIDED IN DQ STARTER FEEDERS OF AUXILIARY MCC (b) NO SWITCH FUSE UNITS SHALL BE USED (c) OUTGOING OF AMF CUM DG SWITCHGEAR SHALL BE 1200A MOULDED CASE CIRCUIT BREAKER WITHOUT RELEASES		
6.0	**ESSENTIAL SPARES**		
	DESCRIPTION		ESSENTIAL SPARES TO BE FURNISHED (REFER NOTE-2)
6.1	COMPLETE BREAKER WITH OPERATING MECHANISM AND RELEASES WHERE SPECIFIED I) A II) A III) A IV) A		
	CLOSING & TRIPPING COILS		
6.2	SPRING, CHARGING MOTORS, ALONG WITH CLOSING & TRIPPING SPRINGS IN CASE OF SPRING OPERATED BREAKERS		10% OF EACH RATING WITH MINIMUM 1NO.
6.3	AUXILIARY CONTACT BLOCKS		10% OF EACH RATING WITH MINIMUM 1NO.
6.4	MOVING AUXILIARY CONTACT BLOCKS		10% OF EACH RATING WITH MINIMUM 1NO.
6.5	BREAKER CONTROL SWITCHES		10% OF EACH RATING WITH MINIMUM 1NO.
6.6	LOCAL/REMOTE SELECTOR SWITCHES		10% OF EACH RATING WITH MINIMUM 1NO.
6.7	PROTECTIVE RELAYS I) 50 S/C II) 49 III) 50N IV) 50 LR V) 27 VI) 51 VII) AUXILIARY RELAYS VIII) TIMERS		

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
6.8	INDICATING LAMPS WITH SERIES RESISTORS : I) RED II) GREEN III) AMBER IV) V)		10% OF EACH RATING WITH MINIMUM 5NOS. OF EACH TYPE.
6.9	CURRENT TRANSFORMERS I) II) III) IV) V) VI) VII)		10% OF EACH RATING WITH MINIMUM 1NO.
6.10	VOLTAGE TRANSFORMERS I) II) III) IV) V)		10% OF EACH RATING WITH MINIMUM 1NO.
6.11	CONTRTOL TRANSFORMERS RATIO 415/110V I) II) III) IV) V)		10% OF EACH RATING WITH MINIMUM 1NO.
6.12	INSTRUMENTS : I) AMMETER FOR 5A OPERATION II) VOLTMETER FOR 110V OPERATION		10% OF EACH RATING WITH MINIMUM 1NO.
6.13	CONTACTORS, RATING : I) II) III) IV) V)		10% OF EACH RATING WITH MINIMUM 1NO.

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
6.14	BI-METALLIC THERMAL ELEMENTS TO SUIT MOTORS OF FOLLOWING RATINGS : I) II) III) IV) V) VI) VII)		NA
6.15	POWER FUSES TO SUIT CIRCUITS OF FOLLOWING RATINGS : I) II) III) IV) V) VI) VII)		NA
6.16	CONTROL CIRCUIT FUSES		
6.17	PUSH BUTTONS : I) START II) STOP		
7.18	HEAVY DUTY AIR BREAK SWITCHES I) II) III) IV) V) VI) VII)		NA
7.19	MCBs FOR SPACE HEATERS		

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
7.20	CONTROL CABLE GLANDS TO SUIT FOLLOWING CABLE SIZES; I) II) III) IV) V) VI) VII)		
7.21	IN ADDITION TO ABOVE ITEMS QUANTITIES AND ITEMISED PRICES OF FOLLOWING ITEMS AND ANY OTHER ITEMS RECOMMENDED BY THE BIDDER SHALL BE FURNISHED I) ARCING CONTACTS OF BREAKERS II) ARC CHUTES III)		
NOTES : 1) ITEM TICK MARKED TO BE PROVIDED 2) RECOMMENDED QUANTITY AND UNIT PRICES TO BE INDICATED BY THE BIDDER IN HIS QUOTATIONS			

5.4. DATA SHEET A2 LOW VOLTAGE SWITCHGEAR

1.	SWITCHGEAR GENERAL REQUIREMENTS	☑ IS:13947 ☐ BSEN:60947 ☑ IEC:60439-1
2.	AC CIRCUIT BREAKERS	☐BSEN 60947-2 ☐ BS:3871(PI) ☑ IEC 947-2
3.	FACTORY BUILT ASSEMBLIES OF SWITCHGEAR AND CONTROL GEAR FOR VOLTAGES UPTO AND INCLUDING 1000V A.C. & 1200 V D.C	☑ IS:8623 ☐ BS:5486 ☐ IEC:439
4.	AIR BREAK SWITCHES	☑IS:13947 ☐ BSEN:60947-3 ☐ IEC-947-3

5.	MINIATURE CIRCUIT BREAKERS	☑IS:8828 □ BS:3871 ☐ IEC:
6.	HRC CARTRIDGE FUSES	☐IS:13703(P2) □ BS:88 ☐ IEC-769
7.	D TYPE FUSES	□ IS:8187 □ BS: □ IEC:
8.	CONTACTORS	☑ IS:13947 □ BSEN-60947-1 □ IEC:9474-1
9.	STARTERS	☑ IS:13947 □ BSEN-60947-4-1 □ IEC:947-4-1
10.	CONTROL SWITCHES/PUSH BUTTONS	☑ IS:13947 □ BS: □ IEC:
11.	CURRENT TRANSFORMERS	☑IS:2705 □ BS:7626 □ IEC:60044
12.	VOLTAGE TRANSFORMERS	☑ IS:3156 □ BS:7625 □ IEC:60044
13.	RELAYS	☑IS:3231 □ BS:142 □ IEC:255
14.	INDICATING INSTRUMENTS	☑ IS:1248 □ BS:89 □ IEC:51
15.	ARRANGEMENT FOR BUSBARS MAIN CONNECTIONS AND ACCESSORIES	☑ IS:5578 □ BS:159 □ IEC: ☑IS:11353
16.	AC ELECTRICITY METERS	☑ IS:8530 □ BS:37 □ IEC:
17.	DEGREE OF PROTECTION	☑IS:13947(PI) □ BS: □ IEC:947-1
18.	THE PERFORMANCE OF AC CONTROL GEAR EQUIPMENT RATED UPTO 600 V FOR USE ON HIGH PROSPECTIVE FAULT CURRENT SYSTEM	☑IEC:62262 □ IS: □ BS: □ IEC:
19.	CODE OF PRACTICE FOR INSTALLATION AND MAINTENANCE OF SWITCHGEAR	☑ IS:10118 □ BS: □ IEC:
20	CLIMATE PROOFING OF ELECTRICAL EQUIPMENT	☑ IS: □ BS: □ IEC:

21.	CODE OF PRACTICE FOR PHOSPHATING IRON AND STEEL	☑IS: 6005 □ BS: 3169 □ IEC:
22.	WROUGHT ALUMINIUM AND ALUMINIUM ALLOYS FOR ELECTRICAL PURPOSES	☑ IS:5082 □ BS:2898 □ IEC:
23.	CONTROL TRANSFORMER FOR SWITCHGEAR AND CONTROL GEAR FOR VOLTAGE NOT EXCEEDING 110V AC	☑ IS:12021 □ BS: □ IEC:
24.	TESTING GUIDE	☑ANSI / IEEE C.37.20.7
	EQUIPMENT, ACCESSORIES, COMPONENT PARTS, RAW MATERIALS AND TESTS SHALL BE IN GENERAL CONFORM TO IS: ☑ ~~BS~~ IEC: ☑	

5.5. DATA SHEET A1 CONTROL PANEL

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
1.0	**GENERAL PARTICULARS**		
1.1	DESIGNATION		RTCC, MARSHALLING BOX
1.2	LOCATION	INDOOR / OUTDOOR	INDOOR
1.3	DESIGN AMBIENT TEMPERATURE	^{0} C	50
1.4	TYPE OF MOUNTING	FLOOR / PEDESTAL / COLUMN /WALL	FLOOR, TRANSFORMER TANK
1.5	CABLE ENTRY		

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
	A) TOP / BOTTOM		TOP / BOTTOM - AS PER SITE CONDITION
	B) GLANDS / CONDUITS -SIZE		AS PER REQUIREMENT
	C) GLANDS IF REQUIED	YES/NO	YES
1.6	PURCHASER'S EARTHING CONDUCTOR		
	A) MATERIAL	COPPER / ALUMINIUM / G I	G I
	B) TYPE	STRIPS / ROPE / WIRE./ ROD	STRIPS
	C) SIZE		75 x12 mm
1.7	PAINTING		MIN. THICKNESS 80 MICRONS
	A) COLOUR FINISH		
	OUTSIDE		RAL 7032 SIEMENS GREY (PEBBLE GREY) WITH TEXTURED FINISH – FOR RTCC AND COLOUR SHADE 632 OF IS-5 FOR MARSHALLING BOX.
	INSIDE		GLOSSY WHITE
	B) EPOXY PAINT REQUIRED	YES/NO	YES – POWDER COATED
1.8	CONTROL SCHEME & BILL OF MATERIAL, ENCLOSED If NO, TO BE FURNISHED BY VENDOR	NO	TO BE FURNISHED BY BIDDER

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
2.0	VOLTAGE		
2.1	POWER DEVICES, MOTOR DRIVES, ETC.		
	A)SUPPLY VOLTAGE	415V, 3PH / 3PH -N, 50Hz/ 240V, 1PH-N, 50Hz	415V, 3PH-N, 50Hz/ 230V, 1PH-N, 50Hz
	B) DUPLICATE FEED	PROVIDED/ NOT PROVIDED	NOT PROVIDED
2.2	CONTROL VOLTAGE	V, AC/DC	230V AC
2.3	CONTROL TRANSFORMER	REQD./ NOT REQD.	REQUIRED
2.4	SPACE HEATER/ LIGHTING SUPPLY VOLTAGE		230 V, 1-PH, 50 Hz
3.0	OTHER PARTICULARS WHEN APPLICABLE		
3.1	STARTERS TYPE		DOL
3.2	CONTACTOR RATED DUTY (AS PER IS:2459 & 8544)		BY BIDDER

NOTES:

The Bidder shall also indicate his recommendation of spares, in addition to above, if necessary.

5.6. DATA SHEET A2 CONTROL PANEL

1.	APPLICABLE STANDARDS			
2.	SWITCHGEAR GENERAL REQUIREMENTS	☑ IS 4237	□ BSEN	□ IEC 60947
3.	FACTORY BUILT ASSEMBLIES OF SWITCHGEAR AND CONTROL GEAR FOR VOLTAGES UPTO AND INCLUDING 1000V. A.C. & 1200 V. D.C.	☑IS:8623	□ BS : 5486	□ IEC 60439-1
4.	AIR BREAK SWITCHES	☑ IS-13947	□ BSEN 60947-3	□ IEC60405
5.	MINIATURE CIRCUIT BREAKERS	☑ IS:8828	□ BS: 3871	□ IEC IEC- (PI)
6.	H.R.C. CARTRIDGE FUSES	☑IS :13703	□ BS-88	□ IEC 60269-1 & IEC 60269-2 & IEC-60269-4
7.	D TYPE FUSES	☑IS-8187	□ BS :	□ IEC:
8.	CONTACTORS	☑IS-13947	□ BS-775	□ IEC-947-4-1
9.	STARTERS	☑IS-13947	□ BSEN-60947	□ IEC-947-4-2
10.	CONTROL SWITCHES/PUSH BUTTONS	☑IS-13947	□ BS	□ IEC
11.	CURRENT TRANSFORMERS	☑IS-2705	□ BS-60044-1	□ IEC- 60185
12.	POTENTIAL (VOLTAGE) TRANSFORMERS	☑IS-3156	□ BS-7625	□ IEC-60186
13.	RELAYS	☑IS-3231	□ BS-142	□ IEC-60255
14.	INDICATING INSTRUMENTS	☑ IS-1248	□ BS-89	□ IEC-60051
15.	ARRANGEMENT FOR BUS BARS, MAIN CONNECTIONS AND ACCESSORIES	☑IS-5578 & IS-11353	□ BS-159	□ IEC

16.	A.C. ELECTRICITY METERS	☑IS-722	□ BS-5685	□ IEC
17.	DEGREE OF PROTECTION	☑IS-13947	□ BS:	□ IEC-60947-1
18.	THE PERFORMANCE OF A.C. CONTROL GEAR EQUIPMENT RATED UP TO 660V FOR USE ON HIGH PROSPECTIVE FAULT CURRENT SYSTEM	☑IS	□ BS	□ IEC
19.	CODE OF PRACTICE FOR INSTALLATION AND MAINTENANCE SWITCHGEAR	☑IS-10118	□ BS:	□ IEC
20	CLIMATE PROOFING OF ELECTRICAL EQUIPMENT	☑IS-3202	□ BS	□ IEC
21.	CODE OF PRACTICE FOR PHOSPHATING IRON & STEEL	☑IS-6005	□ BS-3189	□ IEC
22.	WROUGHT ALUMINIUM & ALUMINIUM ALLOYS FOR ELECTRICAL PURPOSES	☑IS-5082	□ BS-2898	□ IEC-114

5.7. DATA SHEET A1 POWER FACTOR CORRECTION SYSTEM

1.0	**ITEM**	**UNIT**	**TECHNICAL PARTICULAR**
1.1	APPLICATION/DESIGNATION		P.F. IMPROVEMENT/~~HARMONIC FILTERS/ COMBINED P.F. + HARMONIC FILTER~~
1.2	ITEM NO.		APFCP
1.3	QUANTITY		TWO
1.4	RATED CAPACITY	KVAR	475
1.5	RATED VOLTAGE	VOLTS	415
1.6	FREQUENCY	Hz	50
1.7	NO OF PHASES		3
1.8	EXPECTED POWER FACTOR		0.98 OR BETTER
1.9	EXPECTED DISTORTION FACTOR		3%
1.10	APPLICABILITY OF		

	a) TCE M4-219-01	YES/NO	YES
	IF YES, WHETHER ENCLOSED	YES/NO	YES
	b) TCE M4-204-02	YES/NO	NO
	IF YES, WHETHER ENCLOSED	YES/NO	NO
2.0	DESIGN REQUIREMENT		
2.1	AMBIENT TEMPERATURE	^{0}C	50
2.2	TEMPERATURE RISE	^{0}C	AS PER IS:2834
2.3	TYPE OF MOUNTING, FLOOR/WALL/PEDESTAL		FLOOR
2.4	LOCATION INDOOR/ OUTDOOR		INDOOR
2.5	TYPE		ALL PP (DOUBLE LAYER) /MIXED DIELECTRIC
2.6	INSULATION LEVEL		1100V
2.7	SIZE OF CABLE		REFER SLD DRW NO: TCE-10106A-4000-AU-40077
2.8	CABLE GLAND REQUIRED	YES/NO	YES
2.9	SIZE OF EARTHING CONDUCTOR AND MATERIAL		REFER EARTHING SCHEMATIC LAYOUT
2.10	CAPACITOR BANK OPEN /METAL ENCLOSED CUBICILE		METAL ENCLOSED CUBICILE
2.11	TYPE OF CAPACITOR BANK CONNECTION	STAR/ DELTA	DELTA
2.12	IF STAR CONNECTED, MODE OF NEUTRAL CONNECTION - EARTHED/UNEARTHED		NA
2.13	TYPE OF ATMOSPHERE CHEMICAL WITH FUME/ NORMAL		NORMAL
3.0	SWITCHES		
3.1	TYPE OF SWITCHING AUTOMATIC/MANUAL		THYRISTERISED AUTOMATIC & MANUAL
3.2	IF AUTOMATIC A) BREAKER/SWITCH RATING I) VOLTAGE	 VOLTS	 REFER ENCLOSED SLD 415 V
	II) CURRENT	AMPS	REFER ENCLOSED SLD

	III) FAULT LEVEL	MVA	REFER ENCLOSED SLD
	B) VOLTAGE OPERATED	YES/NO	NO
	C) P.F. OPERATED	YES/NO	YES
	D) PARALLEL OPERATION OF CAPACITORS REQUIRED/NOT REQUIRED		NOT REQUIRED
4.0	DISCHARGE DEVICE – RESISTOR		
4.1	RATED VOLTAGE	V	RESISTOR SHALL BE SUITABLE TO DISCHARGE TO 50V WITHIN 300SEC. RATINGS TO BE DECIDED ACCORDINGLY BY BIDDER
4.2	RATED RESISTANCE	OHMS	RESISTOR SHALL BE SUITABLE TO DISCHARGE TO 50V WITHIN 300SEC. RATINGS TO BE DECIDED ACCORDINGLY BY BIDDER
4.3	RATED CONTINUOUS WATTAGE	WATTS	BY BIDDER
4.4	TYPE AND MATERIAL		BY BIDDER
5.0	VTs		NA
5.1	RATED VOLTAGE RATIO	KV	NA
5.2	BASIC IMPULSE LEVEL	KV	NA
5.3	V.A. BURDEN		NA
5.4	ACCURACY CLASS		NA
5.5	TYPE OF INSULATION USED		NA
5.6	WEIGHT AND DIMENSIONS		NA
5.7	TECHNICAL BULLETIN SHOWING COMPLETE DESIGN FEATURES OF VTs ENCLOSED	YES/NO	NA
6.0	SERIES REACTOR		
6.1	APPLICATION		DETUNED FILTER REACTOR
6.2	TYPE/MAKE		DRY TYPE IRON CORED
6.3	NO. OF PHASES		3
6.4	BIL	KV	0.456.5
6.5	FREQUENCY	Hz	50
6.6	REACTANCE IN OHMS/IN		7%

	PERCENTAGE		
6.7	CURRENT RATING	AMP	130% OF RATED CAPACITOR BANK CURENT
6.8	MAXIMUM SWITCHING SURGE FOR EACH BANK WITH & WITHOUT REACTOR		BIDDER TO SPECIFY
6.9	VOLTAGE RATING	KV	415
6.10	SHORT CIRCUIT RATING	AMP	GENERALLY 16 TIMES OF 130% RATED CURRENT OF CAPACITOR BANK FOR 3 SECONDS.
6.11	TYPE OF SHIELDING MAGNETIC/NON-MAGNETIC		NON-MAGNETIC
6.12	TYPE OF COOLING	OIL/AIR	AIR
7.0	SPECIAL TESTS TO BE CONDUCTED		
	HARMONIC MEASUREMENTS	YES/NO	NO
8.0	NOTES		

5.8. DATA SHEET A2 POWER FACTOR CORRECTION SYSTEM

1.0	APPLICABLE STANDARDS		
1.1	SHUNT CAPACITORS FOR POWER SYSTEMS		☑ IS 13585 & 13925 ☐ BS ☐ IEC
1.2	SERIES REACTOR		☑IS 5553 ☐ BS ☐ IEC
1.3	INTERNAL FUSES AND INTERNAL OVERPRESSURE DISCONNECTORS FOR SHUNT CAPACITORS		☑IS 12672 ☐ BS ☐ IEC
1.4	PORCELAIN POST INSULATORS (3.3 KV AND ABOVE)		☐ IS2544 ☐ BS ☐ IEC
1.5	LIGHTENING ARRESTORS (SURGE ARRESTORS)		☐ IS 15086 ☐ BS ☐ IEC
2.0	NOTES		

5.9. DATA SHEET A1 DISTRIBUTION TRANSFORMER

1.0	ITEM	UNIT	TECHNICAL PARTICULAR
1.1	APPLICATION/DESIGNATION		DISTRIBUTION TRANSFORMER-1
1.2	QUANTITY REQUIRED		1
1.3	INSTALLATION (INDOOR/OUTDOOR)		OUTDOOR
1.4	DEGREE OF PROTECTION AS PER IS:13947		IP 55
2.0	**RATINGS**		
2.1	RATING	KVA	2000
2.2	NUMBER OF PHASES & FREQUENCY		3 PH
2.3	TYPE OF COOLING		ONAN
2.4	NO LOAD VOLTAGE HV	V	33000
	LV	V	433
2.5	VECTOR GROUP		DYN11
2.6	PERCENTAGE IMPEDANCE	%	6.25
3.0	**SYSTEM VOLTAGE**		
3.1	NOMINAL SYSTEM VOLTAGE HV	V	33000
	LV	V	415
3.2	HIGHEST SYSTEM VOLTAGE HV	KV	36 KV
	LV	V	0.457 KV
4.0	**NEUTRAL EARTHING**		
4.1	SYSTEM NEUTRAL		
	A) EFFECTIVELY EARTHED	HV	NOT APPLICABLE (DELTA CONNECTED)
4.2	TRANSFORMER NEUTRAL		

		HV	NOT APPLICABLE (DELTA CONNECTED)
		LV	EFFECTIVELY EARTHED
5.0	**INSULATION WITHSTAND**		
5.1	IMPULSE (1.2/50 MICROSEC/WAVE)	HV	170
5.2	POWER FREQUENCY HV	KV	70
	(DRY & WET) LV	KV	3
6.0	**TEMPERATURE RISE**		
6.1	REFERENCE AMBIENT	^{0}C	45
6.2	OIL BY THERMOMETER	^{0}C	50
6.3	WINDING BY RESISTANCE	^{0}C	50
7.0	**TAP CHANGING GEAR**		
7.1	TAPS		ON LOAD
7.2	TAPPINGS ON WINDINGS	HV/LV	HV
7.3	TOTAL TAPPING RANGE		-5% TO +12%
7.4	STEPS	%	2.5%
8.0	**DETAILS OF TRANSFORMER OPERATING IN PARALLEL**		
8.1	MANUFACTURER'S NAME		
8.2	RATING	KVA	2000
8.3	FULL LOAD LOSS CORRECTED TO 75^{0}C		25 KW
8.4	% IMPEDANCE AT PRINCIPAL TAPPINGS		6.25%
8.5	VECTOR GROUP		DYN 11
9.1	**HV CABLE BOX- CABLE ENTRY (**TOP/ BOTTOM)		BOTTOM.

9.2	**LV TERMINATION ARRANGEMENT**(BUS DUCT/ CABLE BOX)		BUS DUCT.
9.3	IF CABLE BOX - CABLE ENTRY (TOP/ BOTTOM)		N A
9.4	IF BUS DUCT- ENTRY TYPE (TOP/SIDE)		TOP
9.5	**NEUTRAL CTS**		
9.6	QUANTITY		ONE - ONE
9.7	RATIO		3200/1A - 3200/1A
9.8	VA BURDEN		-- 10VA
9.9	ACCURACY CALSS		CL PS CL5P20
9.10	KNEE POINT VOLTAGE		380V ---
9.11	MAGNETIZING CURRENT AT KNEE-POINT VOLTAGE		30MA ---
10.0	**TERMINAL CONNECTIONS**		
10.1	CABLE SCHEDULE COMPLETE WITH CABLE SIZES,TERMINATION DETAILS OF EITHER SIDE /INTERCONNECTION SCHEDULE BETWEEN THE TRANSFORMER ,M. BOX ,OLTC TO RTCC PANEL		BIDDER SCOPE
10.2	ORIENTATION OF HV & LV TERMINATIONS		90 °
10.5	BUSHING TERMINALS		
	A) REQUIRED	YES/NO	YES
	B) SIZE OF PURCHASER'S TAKE OFF CONDUCTOR		
10.6	CABLE BOX, LUGS AND GLANDS		
	A) REQUIRED	YES/NO	
	B) PURCHASER'S CABLE		

	DETAILS		
11.0	**EARTHING TERMINAL**		
11.1	MATERIAL OF CONDUCTOR		GI
11.2	SIZE OF CONDUCTOR		BY BIDDER
12.0	**MISCELLANEOUS**		
12.1	WHEELS		
	A) PLAIN/FLANGED		
	B) UNIDIRECTIONAL/BIDIRECTIONAL		BIDIRECTIONAL
12.2	VACUUM WITHSTAND CAPABILITY MAIN TANK WITH BUSHING RADIATORS, FITTINGS & ACCESSORIES		
13.0	**OPTIONAL FITTINGS REQUIRED**		
13.1	DIAL TYPE THERMOMETER WITH TWO CONTACTS FOR OIL TEMP. AS PER CLAUSE 7.1 OF SECTION-D	YES/NO	YES
13.2	MAGNETIC OIL LEVEL GAUGE WITH LOW OIL LEVEL ALARM CONTACT AS PER CLAUSE 7.2 OF SECTION D	YES/NO	YES
13.3	GAS AND OIL ACTUATED (I.E.BUCHHOLZ) RELAY	YES/NO	YES
13.4	GAS SAMPLING DEVICE AS PER CLAUSE 7.4 OF SECTION-D	YES/NO	YES
13.5	WINDING TEMPERATURE INDICATOR AS PER CLAUSE 7.5 OF SECTION-D	YES/NO	YES
13.6	ONLOAD TAP CHANGING MECHANISM AS PER CLAUSE	YES/NO	YES

	7.6 OF SECTION-D		
13.7	VALVES PER CLAUSE 7.7 OF SECTION-D	YES/NO	YES
13.8	FOUR PLAIN ROLLERS IN PLACE OF FIXING CHANNELS	YES/NO	YES
14.0	**EVALUATION & PENALTY**		
14.1	FORMULA FOR EVALUATION OF BIDS		
14.2	RATES OF PENALTY FOR EXCEEDING THE GUARANTEED LOSSES		
15.0	**NOTES**		
16.0	**ESSENTIAL SPARES**		
16.1	COMPLETE SET OF GASKETS		
16.2	BUSHING OF EACH TYPE		
16.3	CT OF EACH TYPE		
16.4	DIAL TYPE THERMOMETER		
16.5	OIL LEVEL GAUGE		
16.6	COMPLETE SET OF WINDING TEMPERATURE INDICATING EQUIPMENT		
16.7	EXPLOSION VENT DIAPHRAGMS		
16.8	SILICA-GEL BREATHER		
16.9	BUCHHOLZ RELAY OR FAULT PRESSURE RELAY		
16.10	ONE VALVE OF EACH TYPE		
	NOTES:		
	1. ITEMS TICK MARKED TO BE PROVIDED.		
	2. RECOMMENDED QUANTITIES AND UNIT PRICES TO BE INDICATED BY THE BIDDER IN HIS QUOTATIONS.		

5.10. DATA SHEET A2 DISTRIBUTION TRANSFORMER

1.0	**APPLICABLE STANDARDS**		
1.1	POWER TRANSFORMER		☒IS:2026, ☒ BS:171 ☒ IEC 176
1.2	FITTINGS AND ACCESSORIES		☒ IS:3639, ☒ BS: ☒ IEC
1.3	DISTRIBUTION TRANSFORMER		☒ IS:1180, ☒ BS: ☒ IEC
1.4	LOADING OF OIL IMMERSED TRANSFORMER		☒ IS:6600, ☒ BS:CP:1010 ☒ IEC 354
1.5	OIL		☒ IS:335, ☒ BS: 148 ☒ IEC:296
1.6	BUSHING FOR > 1000 V, AC		☒ IS:2099, ☒ BS: 223 ☒IEC:137
1.7	BUSHING FOR ≤ 1000 V, AC		☒ IS:7421, ☒ BS: ☒ IEC
1.8	DEGREE OF PROTECTION		☒ IS:13947, ☒ BS: ☒ IEC:144
1.9	TESTS & TOLERANCES ON GUARANTEED PARTICULARS		☒IS:2026, ☒ BS:171 ☒ IEC:176
1.10	BUCHHOLZ RELAY		☒IS:3637, ☒ BS: ☒IEC
1.11	ELECTRICAL INSULATION CLASSIFIED BY THERMAL STABILITY		☒IS:3637, ☒BS: ☒ IEC
1.12	CLIMATE PROOFING		☒IS:3202, ☒BS: 1014 ☒IEC
2.0	**NOTES**		
2.1	EQUIPMENT, ACCESSORIES, COMPONENTS /PARTS RAW MATERIALS AND TESTS SHALL IN GENERAL CONFORM TO ☒IS ☒ BS ☒IEC		

5.11. DATA SHEET A1 BUS DUCT

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
1.0	**DESIGN PARTICULARS**		
1.1	TYPE OF BUS DUCT		BUS DUCT - ALUMINUM (SANDWICH TYPE)
1.2	TYPE OF COOLING		AIR NATURAL COOLED
1.3	INSTALLATION INDOOR/OUTDOOR		BUS DUCT - INDOOR
1.4	NOMINAL SERVICE VOLTAGE	KV	0.433
1.5	RATED VOLTAGE CLASS	KV	1.1
1.6	CONTINUOUS CURRENT RATING OF BUS DUCTS UNDER SITE CONDITIONS	A	3200
1.7	BASIC IMPULSE INSULATION LEVEL (1.2 X 50 MICRO SECOND WAVE)	KV (PEAK)	-
1.8	ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE	KV (PEAK)	2.5KV
1.9	MOMENTARY CURRENT RATING	KA (PEAK)	125KA FOR 1 SEC
1.10	SHORT TIME CURRENT RATING FOR ONE SECOND	KA (RMS)	50
1.11	DESIGN MAXIMUM TEMPERATURE (HOT SPOT) OF BUSBARS AT RATED CURRENT (a) PLAIN JOINT (b) SILVER PLATED JOINTS	°C	80 DEG C

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
1.12	DESIGN MAXIMUM TEMPERATURE (HOT SPOT) OF ENCLOSURE AT RATED CURRENT	°C	70 DEG C
1.13	BUSBAR MATERIAL		ALUMINUM
1.14	BUSBAR SECTION	SQ.MM.	BY BIDDER
1.15	BUS ENCLOSURE MATERIAL & THICKNESS	MM	2MM THICK- G I/ EXTRUDED ALUMINUM
1.16	SHAPE OF ENCLOSURE		BY BIDDER
1.17	MATERIAL OF PHASE BARRIERS & THICKNESS		BY BIDDER
1.18	PHASE CLEARANCE (MINIMUM) - PHASE TO PHASE - PHASE TO EARTH	MM	SHALL WITHSTAND POWER FREQUENCY VOLTAGE WITHOUT BREAKDOWN
1.19	TYPE OF JOINTS BETWEEN ADJACENT SECTIONS OF BUS CONDUCTOR WELDED/BOLTED		BOLTED
2.0	**INSULATORS AND SEAL OFF BUSHING**		
2.1	RATED VOLTAGE	KV	0.433
2.2	ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE		
2.2.1	DRY	KV (RMS)	2.5KV
2.2.2	WET	KV (RMS)	--
2.3	IMPULSE WITHSTAND VOLTAGE (1.2 X 50 MICRO-SECOND WAVE)	KV	--
2.4	MINIMUM CREEPAGE DISTANCE	MM	50

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
2.5	MATERIAL OF INSULATORS		EPOXY/ MULTILAYER POLYESTER
2.6	CURRENT RATING OF SEAL OF BUSHINGS	A	BY BIDDER
2.7	MATERIAL OF SEAL OFF BUSHINGS		BY BIDDER
2.8	END CABLE TAP BOX		REFER SLD DWG NO. TCE-10106A-4000-AU-40077
2.9	PHASE TRANSPOSITION CHAMBER		BY BIDDER
2.10	NEUTRAL BUS		REFER SLD DWG NO. TCE-10106A-4000-AU-40077
3.0	**LINKS**		BY BIDDER
3.1	DISCONNECTING LINKS		
3.1.1	QUANTITY		
3.1.2	RATED CURRENT	A	
3.1.3	REFERENCE DWGS.		
3.2	SHORTING LINKS		
3.2.1	LOCATION		
4.0	**BUS DUCTS TENTATIVE LENGTH**		
4.1	BUS DUCT LENGTH.	M	
4.2	90° BEND		
4.3	TEES		
4.4	NO. OF TERMINATIONS		

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
5.0	**GENERAL**		
5.1	EARTHING CONDUCTOR		
5.1.1	MATERIAL SIZE		GI. SUITABLE FOR 50KA.
5.2	FINISH OF BUS ENCLOSURE		
5.2.1	EXTERIOR		-
5.2.2	INTERIOR		-
5.3	LAYOUT DRAWING REFERENCE NO.		-
5.4	RAIN HOOD REQUIRED	YES/NO	NO
6.0	**TESTS**		
6.1	ROUTINE TEST		AS PER STANDARDS IN DATA SHEET A2
6.2	ACCEPTANCE TESTS		WATER AND AIR TIGHTNESS
6.3	TYPE TESTS		TEST CERTIFICATES ON SIMILAR UNITS FOR TYPE TEST AS PER STANDARD IN DATA SHEET-A SHOULD BE FURNISHED.(NOT OLDER THAN THREE YEARS)
6.4	TESTS ON COMPONENTS SUCH AS INSULATORS, SEAL-OFF BUSHINGS, BOLTED AND FLEXIBLE JOINTS, BUSBARS, ENCLOSURE MATERIAL, GALVANIZING OF SUPPORTING STRUCTURES, CTS, VTS AND FUSES		TYPE AND ROUTINE TEST CERTIFICATES SHOULD BE FURNISHED.
7.0	**START-UP AND ESSENTIAL SPARES**		

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
7.1	BUS SUPPORT INSULATORS	NOS.	ONE SET
7.2	FLEXIBLE CONNECTOR	NOS.	ONE SET OF EACH TYPE/ SIZE (LENGTH)
7.3	ISOLATING LINK	NOS.	ONE SET
7.4	SEAL-OFF BUSHING	NOS.	--
7.5	FUSES	NOS.	--
7.6	DRAIN PLUGS	NOS.	--
7.7	GASKETS	NOS.	THREE SETS OF EACH TYPE.
7.8	CLAMPS	NOS.	SIX
	NOTES :		
	1. ITEMS TICK-MARKED TO BE PROVIDED 2. RECOMMENDED QUANTITIES AND UNIT PRICES TO BE INDICATED BY THE BIDDER IN HIS QUOTATIONS IN RESPECTIVE SCHEDULE.		

5.12. DATA SHEET A2 DISTRIBUTION TRANSFORMER

SL. NO.	ITEM	
1.0	APPLICABLE STANDARDS	
1.1	Bus Conductor material	☑ IS 5082 ☐ BS 159 ☐ IEC 60105
1.2	Water and Air Tightness tests	☑IS 8084
1.3	Current Transformer	☐ IS 2705 ☐ BS 7626 ☐ IEC 60044
1.4	Voltage Transformers	☐ IS 3156 ☐ BS 7625 ☐ IEC 60186
1.5	HV Porcelain Bushing	☐ IS 2099 ☐ IEC 60137 ☐ BSEN 60137
1.6	Porcelain Post Insulators	☐ IS 2544 ☐ BS 3297 (Part I & II) ☐ IEC 60168 ☐ BSEN 60168
1.7	Reactor	☐ IS 5553 ☐ IEC 60289 ☐ BSEN 60289
1.8	Hot Dip Galvanizing	☑ IS 2629 & 2633 ☐ BS 729
1.9	Interconnecting Bus Bars for A.C. Voltage above 1 kV upto and including 36 kV	☐ IS 8084
1.10	Fuses	☐ IS 13703, 9385, 2692 & 88 ☐ IEC 60269 & 60282
2.0	NOTES	
2.1	Equipment, Accessories, Component Parts, Raw Materials and Tests shall in General Confirm to ☑IS ☐ BS ☐ IEC	

5.13. DATA SHEET A1 XLPE INSULATED H.V. POWER CABLES

1.0 GENERAL REQUIREMENTS

TCE Group Desig-nation	Voltage Grade	No.of Cores	Conductor A/C	Armour W/F/AW/AS	Remarks
A3/1	1.9 / 3.3 kV	Three	___NA_____	___NA_____	
A3/2	1.9 / 3.3 kV	Single	___NA_____	___NA_____	
A3/3	3.8 / 6.6 kV	Three	___NA_____	___NA_____	
A3/4	3.8 / 6.6 kV	Single	___NA_____	___NA_____	
A3/5	6.35/ 11 kV	Three	___NA_____	___NA_____	
A3/6	6.35/ 11 kV	Single	___NA_____	___NA_____	
A3/7	11 / 11 kV	Three	___NA_____	___NA_____	
A3/8	11 / 11 kV	Single	___NA_____	___NA_____	
A3/9	12.7/ 22 kV	Three	___NA_____	___NA_____	
A3/10	12.7/ 22 kV	Single	___NA_____	___NA_____	
A3/11	19 / 33 kV	Three	ALUMINIUM	GALVANISED STEEL DOUBLE STRIP ARMOURING	
A3/12	19 / 33 kV	Single	___NA_____	___NA_____	

2.0 SYSTEM DETAILS

2.1 Nominal Power System Voltage kV 33

2.2 Maximum System Voltage for continuous operation kV 36

2.3 System Neutral Earthing UE/E E

2.4 Design ambient air temperature ^{o}C 50

3.0 FRLS PVC outer sheath required ☑ YES ☐ ~~NO~~

4.0 NOTES

5.14. DATA SHEET A1 1100V XLPE POWER CABLES

1.0 GENERAL REQUIREMENTS (POWER CABLES)

TCE Group Desig-nation	Voltage Grade	Core A/C	Conductor W/F/AW/AS	Armour	Remarks
A4/1	1100	Multi	Cu	W	UPTO & INCLUDING 6sq.mm
A4/2	1100	Single	Cu	W	UPTO & INCLUDING 6sq.mm
A4/3	1100	Multi	Al	W	UPTO & INCLUDING 16sq.mm
A4/4	1100	Single	Al	W	UPTO & INCLUDING 16sq.mm
A4/5	1100	Multi	NA	NA	
A4/6	1100	Single	NA	NA	
A4/7	1100	Multi	NA	NA	
A4/8	1100	Single	NA	NA	
A4/9	1100	Multi	NA	NA	
A4/10	1100	Single	NA	NA	

2.0 SYSTEM DETAILS

2.1 Nominal Power System Voltage kV 0.415
2.2 Maximum System Voltage for continuous operation kV 0.457

2.3 System Neutral Earthing UE/E E

2.4 Design ambient air temperature ^{o}C 50

3.0 FRLS PVC outer sheath required ☑ YES ☐ ~~NO~~

4.0 NOTES

5.15. 1100V PVC INSULATED CONTROL CABLES

1.0 GENERAL REQUIREMENTS

TCE Group Desig-nation	Cores	Copper Conductor Area, sq.mm (No. of strands/dia)	Armour W/F	Remarks
A2/1	Multi upto 10 C	1.5 (7 / 0.5)	W	
A2/2	Multi upto 10 C	1.5 (7 / 0.5)	X	
A2/3	Multi > 10 C	1.5 (7 / 0.5)	F	
A2/4	Multi > 10 C	1.5 (7 / 0.5)	X	
A2/5	Multi upto 7 C	2.5 (7 / 0.67)	W	
A2/6	Multi upto 7 C	2.5 (7 / 0.67)	X	
A2/7	Multi > 7 C	2.5 (7 / 0.67)	F	
A2/8	Multi > 7 C	2.5 (7 / 0.67)	X	
A2/9	Multi > 7 C	4.0 (7 / 0.85)	W	
A2/10	Multi > 7 C	4.0 (7 / 0.85)	X	

X Items not required

2.0 SYSTEM DETAILS

2.1 Nominal Power System Voltage kV 0.415
2.2 Maximum System Voltage for continuous operation kV 0.457
2.3 System Neutral Earthing UE/E E
2.4 Design ambient air temperature ^{o}C 50
3.0 FRLS PVC outer sheath required ☑ YES ☐ ~~NO~~

4.0 NOTES

5.16. DATA SHEET A2 CABLING ACCESSORIES, CABLE TRAYS AND CONDUITS / PIPES

1 CABLE TRAYS		1.1	HOT DIP GALVANISING	☑IS: 2629			
2 CABLE GLANDS		2.1	BRASS GLANDS FOR PVC CABLES	☑ IS: 12943	☐ BS:	☐ IEC	☐
		2.2	FLAME-PROOF ENCLOSURES OF ELECTRICAL APPARATUS	☑ IS: 2148	☐ BS:4683	☐	☐
3 LUGS		3.1	COMPRESSION TYPE TUBULAR TERMINAL ENDS	☑ IS:8309	☐ BS:4683	☐ IEC	☐
4 CONDUITS AND PIPES		4.1	RIGID STEEL CONDUITS	☑ IS:9537	☐ BS:	☐	
		4.2	RIGID NON-METALLIC CONDUITS	☑ IS:9537	☐ BS:	☐	☐
		4.3	ACCESSORIES FOR RIGID STEEL CONDUITS	☑ IS:3837	☐ BS:	☐	☐
		4.4	FITTINGS FOR RIGID STEEL CONDUITS	☑ IS:2667	☐ BS:	☐	☐
		4.5	FITTINGS FOR RIGID NON-METALLIC CONDUITS	☑ IS:3419	☐ BS:	☐	☐
		4.6	FLEXIBLE STEEL CONDUITS	☑ IS:3480	☐ BS:	☐	☐
		4.7	FLEXIBLE NON-METALLIC CONDUITS	☑ IS:6946	☐ BS:	☐	☐
		4.8	ADAPTORS FOR FLEXIBLE STEEL CONDUITS	☑ IS:4649	☐ BS:	☐	☐
		4.9	MILD STEEL TUBES	☑IS:1239	☐ BS:	☐	☐
5 POWER RECEPTACLES		5.1	PLUGS AND SOCKETS	☑IS:1293	☐ BS:	☐ IEC	☐
		5.2	SWITCHES AND DISCONNECTORS	☑IS:13947	☐ BS:	☐ IEC	☐
		5.3	BOXES FOR ENCLOSURE OF ELECTRICAL ACCESSORIES	☑IS:5133	☐ BS:	☐ IEC	☐

5.17. DATASHEET-A1 UPS SYSTEM

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
1.1	APPLICATION		FOR SUPPLY TO CRITICAL MACHINE LOAD , SERVERS& PC'S.
1.2	POWER RATING AT LOAD PF 0.8 LAGGING		200 KVA CONTINUOUS
1.3	QUANTITY (NOS.)		2 NOS
1.4	METHOD OF ENERGY STORAGE		BATTERY BACK -UP
1.5	TYPE		~~(a) NON-REDUNDANT WITH STATIC BY PASS TO REGULATED SUPPLY~~ ~~(b) PARALLEL REDUNDANT WITHOUT BYPASS~~ (c) PARALLEL REDUNDANT WITH STATIC BY PASS TO REGULATED SUPPLY
1.6	INSTALLATION		INDOOR , NORMAL VENTILATION
1.7	AMBIENT TEMPERATURE (^{0}C)		50^0 C
1.8	RELATIVE HUMIDITY		UPTO 95% NON CONDENSING
2.0	**ENCLOSURE**		
2.1	SHEET STEEL THICKNESS		2MM, CRCA FOR DOORS AND 1.6MM CRCA FOR SIDE COVERS
2.2	DEGREE OF PROTECTION AS PER IS-13947		IP42 IF LOCATED IN NON-AIR CONDITIONED AREA /IP31 IF LOCATED IN AIR-CONDITIONED

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
			AREA.
2.3	PAINTING		
	EXTERIOR		RAL 7032/ 631 LIGHT GREY SEMI GLOSSY SHADE
	- INTERIOR		GLOSSY WHITE
2.4	CABLE ENTRY		~~BOTTOM /~~ TOP
2.5	ACOUSTIC NOISE LEVEL MEASURED AT A DISTANCE OF 1M		60 – 65 DBA UPTO 120KVA 65 – 75DBA ABOVE 120KVA
2.6	SPACE HEATER, 240V, 1 PH		REQUIRED / ~~NOT REQUIRED~~
3.0	**UPS SYSTEM**		
3.1	INPUT		
3.1.1	SUPPLY VOLTAGE		415 V, 3 PH, 3 W, 50 HZ AC ~~NON-EFFECTIVELY EARTHED /~~ EFFECTIVELY EARTHED.
3.1.2	ALLOWABLE VARIATION		
	(a) VOLTAGE		± 10%
	(b) FREQUENCY		± 5%
	(c) COMBINED VOLTAGE + FREQUENCY		10%
3.1.3	HARMONIC CONTENT (INPUT)		<5%
3.2	OUTPUT		
3.2.1	OUTPUT VOLTAGE		~~110V.1 PH, 240 V, 1 PH,~~ 415 V, 3 PH, 4

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
			W
3.2.2	AC VOLTAGE ACCURACY (STEADY STATE) OVER ENTIRE LOAD, LOAD PF & DC VOLTAGE RANGE.		$\pm$ 2% FOR BALANCED LOAD
3.2.3	TRANSIENT VOLTAGE REGULATION		8% AT 100% LOAD STEP
3.2.4	TRANSIENT RECOVERY		RETURN TO STEADY STATE CONDITION WITHIN 50 MS AFTER DISTURBANCE.
3.2.5	VOLTAGE WAVE FROM		SINUSOIDAL
3.2.6	RANGE OF ADJUSTMENT OF AC OUTPUT VOLTAGE		$\pm$ 5% AT RATED LOAD
3.2.7	AC HARMONIC CONTENT(THD-VOLTAGE)		AS PER IEEE 519
3.2.8	PHASE DISPLACEMENT FOR THREE PHASE OUTPUT		$120^0 \pm 1^0$ FOR BALANCE LOAD $120^0 \pm 3^0$ FOR 20% UNBALANCED LOAD.
3.2.9	NOMINAL FREQUENCY		50 HZ
3.2.10	FREQUENCY REGULATION (WITHOUT STATIC BY-PASS SOURCE)		$\pm$ 0.1 %
3.2.11	FREQUENCY REGULATION (WITH STATIC BY-PASS SOURCE)		$\pm$ 2 HZ
3.3	AC STANDBY SUPPLY		

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
3.3.1	(a) SERVO CONTROLLED VOLTAGE STABILIZER (SCVS)		~~REQUIRED~~/NOT REQUIRED
	(b) RATING		~~TO MATCH UPS CONTINUOUS RATING~~
	(B) OVERLOAD CAPACITY		~~10 TIMES RATED CURRENT FOR 100MS~~
	(C) INPUT VOLTAGE PHASE & FREQUENCY		~~415V ± 10% 3 PH 3 WIRE 50 HZ~~
	(D) PERCENTAGE VOLTAGE REGULATION		~~+ 2%~~
	(e) SPIKE BUSTERS / SURGE SUPPRESSORS AND INPUT FILTERS		REQUIRED~~/NOT REQUIRED~~
3.3.2	ISOLATION TRANSFORMER		
	(a) RATING		REQUIRED
	(b) INPUT VOLTAGE PHASE & FREQUENCY		
3.4	MAINTENANCE BY PASS SWITCH		REQUIRED/~~NOT REQUIRED~~
4.0	**RECTIFIER**		
4.1	PARALLEL OPERATION		REQUIRED/~~NOT REQUIRED~~
4.2	RECHARGE TIME ON BATTERY BOOST CHARGE		AS PER BATTERY MANUFACTURERS RECOMMENDATION

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
5.0	**INVERTER**		
5.1	OVERLOAD CAPACITY		125% FOR 10 MIN.
			~~150% FOR 1MIN~~
			~~300% FOR 4 MILLI SECONDS~~
5.2	SYNCHRONISING		
	- BETWEEN INVERTERS		REQUIRED/~~NOT REQUIRED~~
	- BETWEEN INVERTERS AND STANDBY SUPPLY		REQUIRED/~~NOT REQUIRED~~
5.3	PARALLEL OPERATION		REQUIRED/~~NOT REQUIRED~~
5.4	SYNCHRONISING RANGE		50 ± 3 HZ(ADJUSTABLE)
6.0	**STATIC SWITCH**		
6.1	MAXIMUM TRANSFER TIME		5MS (1/4 CYCLE)
6.2	SHORT TIME CURRENT RATING		1000% FOR 10 MILLI SECONDS
7.0	**CIRCUIT BREAKER & LOAD BREAK SWITCHES**		
7.1	TYPE		~~ACB/~~MCCB

5.18. DATASHEET-A2 UPS SYSTEM

1.	UPS		IEC - 62040 (PART-III)
2.	BASIC CLIMATIC & MECHANICAL DURABILITY TESTS FOR COMPONENTS FOR ELECTRONIC AND ELECTRICAL EQUIPMENT		IS 9000
3.	ENVIRONMENTAL TESTS FOR ELECTRONIC & ELECTRICAL EQUIPMENT		IS 9000
4.	TRANSFORMER AND INDUCTORS (POWER, AUDIO, PULSE & SWITCHING) FOR ELECTRONIC EQUIPMENT		IS 6297
5.	PRINTED WIRING BOARDS		IS 7405
6.	ENVIRONMENTAL REQUIREMENTS FOR SEMICONDUCTOR DEVICES AND INTEGRATED CIRCUITS		IS 6553
7.	TERMINALS FOR ELECTRONIC EQUIPMENT		IS 4007
8.	HRC CARTRIDGE FUSES		IS 9224/IEC 60269.1
9.	INDICATING INSTRUMENTS		IS 1248/IEC 60051
10.	DEGREE OF PROTECTION		IS 13947/IEC60 947-1
11.	SEMICONDUCTOR CONVERTERS		IEC 60146
12.	SEMICONDUCTOR RECTIFIER		IS 6619

	EQUIPMENT CODE		
13.	THYRISTOR CONVERTERS		IS 5082
14.	EMERGENCY STD BY POWER SYSTEMS		IEEE 446
15.	SEALED LEAD ACID CELLS		IEC 60896-2
16.	VENTED TYPE NI-CD BATTERIES		IEC 60623
17.	STATIONARY CELLS OF BATTERIES LEAD ACID TYPE		
18.	(A) TABULAR PLATE		IEC 60896-1
19.	(B) PLANTE PLATE		IEC 60896-1
20.	IEEE RECOMMENDED PRACTICE FOR SIZING NI-CD BATTERIES FOR STATIONARY APPLICATION.		IEEE 1115
21.	1100V CABLES		IS 1554
22.	SURGE WITHSTAND CAPABILITY TEST IN ACCORDANCE WITH		IEC 60255-5
23.	HARMONIC LEVELS		IEEE-519
	SPARE LIST		
1.	MCB/MCCB OF EACH RATING		ONE SET
2.	SEMICONDUCTOR FUSES OF EACH RATING		TWO SETS
3.	CONTROL CARDS		ONE SET

5.	THYRISTORS / POWER TRANSISTORS OF EACH RATING		ONE SET
6.	POWER DIODES OF EACH RATING		ONE SET
7.	AUXILIARY RELAYS & POWER CONTACTORS OF EACH TYPE.		ONE SET
8.	FILTER CAPACITORS		ONE SET
9.	FILTER CHOKE		ONE SET

5.19. DATASHEET-A1 LEAD ACID BATTERY

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
A	**GENERAL**		
1.	APPLICATION		UPS
2.	TYPE OF BATTERY		VRLA
3.	NOMINAL VOLTAGE	V	230
4.	BATTERY CAPACITY	AH	BY BIDDER
5.	NUMBER OF BATTERY BANKS REQUIRED	NO.	1
6.	NUMBER OF CELLS (APPROXIMATE)	NO.	BY BIDDER
7.	TEMPERATURE		
8.	MIN. TEMP.	^{0}C	5
9.	DESIGN AMBIENT TEMPERATURE	^{0}C	50
B	**RATING**		
10.	DESIGN MARGIN	%	10
11.	AGEING FACTOR		BY BIDDER
12.	DC SYSTEM VOLTAGE AT DC BUS OF THE SWITCHBOARD.		
a. A	NORMAL	V	BY BIDDER
b.	MAXIMUM	V	BY BIDDER
c.	MINIMUM	V	BY BIDDER

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
13.	END CELL VOLTAGE (VOLTS/CELL)	(V/CELL)	1.85
C	**DISCHARGE DUTY**		
14.	AMPERE HOUR CAPACITY OF BATTERY AT MIN. TEMPERATURE, 10 HOUR RATE TO GIVE FINAL END CELL VOLTAGE	C10	10
15.	SKETCH NO. SHOWING LOAD DUTY CYCLE DIAGRAM		BY BIDDER
D	**LAYOUT AND CONSTRUCTION**		
16.	TENTATIVE SIZE OF CABLES TO CONNECT BATTERY TO EXTERNAL CIRCUIT		
a.	TYPE		BY BIDDER
b.	SIZE	MM^2	BY BIDDER
17.	AVAILABLE AREA IN BATTERY ROOM (L X B)	MM X MM	REFER TENDER DRAWING
18.	LAYOUT DRG. NO. (IF ANY)		BY BIDDER
19.	MOUNTING ARRANGEMENT		MULTI TIER
20.	WHETHER METALLIC STANDS TO BE DESIGNED FOR SEISMIC FORCE	YES/NO	YES

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
a.	IF YES, SEISMIC ZONE		GRADE 3
21.	TYPE OF BATTERY CELL CONTAINER		BY BIDDER
22.	BMS TO BE SUPPLIED	YES/NO	YES
E	**MISCELLANEOUS**		
23.	TAPPED CELL ARRANGEMENT FOR FLOAT CUM BOOST CHARGING ARRANGEMENT.	***1.1.a.i.1.1.1.1***	REQUIRED

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
24.	DROPPER DIODE ARRANGEMENT FOR FLOAT CUM BOOST CHARGING ARRANGEMENT.	***1.1.a.i.1.1.1.1***	REQUIRED
25.	**SPARES**		
a.	INTER-CELL / INTER-ROW/	NOS.	20% OF TOTAL QUANTITY.

SL. NO.	ITEM	UNIT	TECHNICAL PARTICULARS
	~~INTER-BANK /~~ CONNECTORS		
b.	NUTS, BOLTS, WASHERS ETC	NOS.	20% OF TOTAL QUANTITY.

5.20. DATASHEET-A2 LEAD ACID BATTERY

1.\	GENERAL REQUIREMENT AND METHOD OF TESTS STATIONARY LEAD ACID BATTERIES -		
a)	WITH TUBULAR POSITIVE PLATE		IS 1651 IEC- 60896
B)	WITH PLANTE POSITIVE PLATE		IS 1652 IEC- 60896
2.	WATER FOR STORAGE BATTERY		IS: 1069
3.	SULPHURIC ACID		IS: 266
4.	RUBBER AND PLASTIC CONTAINERS FOR LEAD ACID STORAGE BATTERY		IS: 1146
5.	SEALING COMPOUND FOR LEAD ACID BATTERIES (BITUMEN BASED)		IS: 3116
6.	SYNTHETIC SEPARATOR FOR LEAD ACID BATTERIES		IS: 6071
7.	GENERAL REQUIREMENTS AND METHODS OF TEST FOR LEAD ACID STORAGE BATTERIES		IS: 8320
8.	RECOMMENDED PRACTICE FOR SIZING LARGE LEAD ACID STORAGE BATTERIES FOR GENERATING STATIONS AND SUBSTATIONS		IEEE: 485
9.	CONTAINERS & VENT PLUGS		UL : 994
10.	BATTERY ENCLOSURES		UL : 1778
11.	RECOMMENDED PRACTICE FOR DESIGN AND INSTALLATION OF VENTED LEAD ACID BATTERIES.		IEEE-484

5.21. DATASHEET-A1 LIGHTING

1.0	GENERAL		
1.1	NORMAL SUPPLY VOLTAGE, PHASE AND FREQUENCY	AC ~~DC~~	230V,1PH , 50HZ
1.2	VARIATION IN SUPPLY		
	A) VOLTAGE	%	± 10%
	B) FREQUENCY	%	± 3%
	C) COMBINED VOLTAGE & FREQUENCY	%	± 10%
1.3	DESIGN AMBIENT AIR TEMPERATURE	ºC	50 ºC
1.4	LUMINAIRE TERMINAL SUITABLE FOR		3C X 2.5 SQ.MM CU CONDUCTOR PVC INSULATION
1.4.1	INDOOR NON HAZARDOUS AREA		
	A) CONDUCTOR MATERIAL		XLPE CU , FRLS
	B) WIRE SIZE	CORES X SQ.MM	2R/~~C~~ X 2.5 +1R X 1.5 SQ.MM CU.WIRE (HFFR) FOR INDOOR
1.4.2	INDOOR HAZARDOUS / OUTDOOR AREA		
	A) CONDUCTOR MATERIAL		XLPE CU , FRLS
	B) CABLE SIZE	CORES X SQ.MM	4C X16 SQ.MM CABLE (FRLS) FOR OUTDOOR. 3C X 2.5SQ.MM CABLE (FRLS) FOR DG YARD AREA.
1.5	LUMINAIRE EARTHING TERMINAL SUITABLE FOR		
	A) CONDUCTOR MATERIAL		GI /~~CU~~

	B) CONDUCTOR SIZE	SWG	8/ 12 SWG GI / 2.5SQ.MM CU

5.22. DATASHEET-A1 LED LUMINAIRES

SL. NO.	TECHNICAL PARAMETERS	SPECIFIC REQUIREMENRT
1	LIGHT SOURCE	HIGH POWER LED
2	MAKE OF LED LAMPS	OSRAM / PHILIPS / LUMILED / CREE/ NICHIA
3	LIGHTING DISTRIBUTION TYPE	CUT OFF/ SEMI CUT OFF TYPE AS PER IESNA TYPE II/ III LIGHTING DISTRIBUTION.
4	LUMINARY EFFICACY	>100 LM/W +/- 5 %
5	OPERATING VOLTAGE RANGE	140- 280V
6	OPERATING VOLTAGE	230V • +/- 10%
8	OPERATING FREQUENCY	50 HZ +/- 3% HZ
9	TOTAL HARMONIC DISTORTION	CURRENT < 15%; VOLTAGE < 5%
10	POWER FACTOR	>= 0.95
11	OPERATING CURRENT	<700 MA
12	USAGE HOURS	DUSK TO DAWN (12 HOURS)
13	AUDIBLE NOISE	SHALL HAVE CLASS-A SOUND RATING WITH AUDIBLE NOISE IN POWER SUPPLY
14	BEAM ANGLE	120 DEGREES (MINIMUM)
15	LIFE SPAN	50000 BURNING HOURS WITH 80% LUMEN MAINTENANCE
16	COLOR TEMPERATURE	5500 - 6000K (SUITABLE FOR “COOL WHITE” LIGHT)

17	COLOR RENDERING INDEX (CRI)	MIN. 70
18	UNIFORMITY RATIO (EMIN/ EAVG)	60%
19	TRANSVERSE UNIFORMITY RATIO (EMIN/EMAX)	40%
20	INGRESS PROTECTION	IP 66 FOR STREET LIGHTING
	DRIVER:	
21	DRIVER EFFICIENCY	>90%
22	OPTICAL EFFICIENCY	> 95%
23	P/N JUNCTION TEMPERATURE	<100 DEGREES C AT JUNCTION POINT AND <60 AT HEAT SINK.
24	SURGE IMMUNITY LEVEL	4.5 KV
25	EARTHING	DRIVER UNIT SHALL HAVE PROVISION FOR PROPER GROUNDING
26	SHORT CIRCUIT PROTECTION	RECOVERS AUTOMATICALLY AFTER FAULT CONDITION IS REMOVED.
27	OVER VOLTAGE PROTECTION	SHOULD BE ABLE TO WITHSTAND 320V FOR MINIMUM 24 HOURS

28	HIGH – LOW VOLTAGE CUTOFF	IN SIDE LUMINARY OR A DEVICE TO BE INSTALLED ON THE POLE IN AN IP PROTECTED BOX SUSTAINING 270V FOR HIGHER SIDE CUTOFF & 140 V ON LOWER SIDE CUTOFF-BEYOND& BELOW IT SHUT DOWN & RESTORE NORMAL WORKING CONDITION WHEN VOLTAGE
29	HOUSING WITH SUPPLIER WORD MARK / NAME	ENGRAVED / EMBOSSING ON THE DIE CAST HOUSING/ BODY PART
30	CONNECTING WIRES & CABLES USED	FRLS THREE CORE COPPER WIRE OF 2.5 MTR OUTSIDE LUMINARIE
31	IMPACT RESISTANCE OF COMPLETE LUMINARIE	IK 05 OR ABOVE
32	REPLACEMENT GUARANTEE OF COMPLETE LUMINARY	5 YEARS AGAINST ANY DEFECTS/FAULTS (IN CASE OF LUMEN DEPRECIATION BEYOND LIMIT OF L70, NON-WORKING ANY LED, DISCOLORATION IN LENS OR GLASS OR POLYCARBONATE COVER RESULTING INTO DEPRECIATION IN LUX LEVEL WITH RESPECT TO L70)
33	FINISH	AESTHETICALLY DESIGNED HOUSING WITH POWDER COATED CORROSION RESISTANT HOUSING
34	WORKING TEMPERATURE	-20 DEGREE TO 50 DEGREE
35	WORKING HUMIDITY	10% TO 90% RH

36	HOUSING	THE FIXTURE SHOULD COMPRISE OF A TOP CANOPY MADE OF DI-CAST HIGH PRESSURE ALUMINUM ALLOY OF ADEQUATE THICKNESS AND A LOWER PART COMPRISES OF UV RESISTANT ACRYLIC BOWL TOP FROSTED FOR VISUAL COMFORT
37	CONSTRUCTION	LED'S ARE MOUNTED ON A CIRCULAR/ ARRAY MCPCB WHICH IS THERMALLY GLUED TO AN ALUMINUM SHEET PROVIDED WITH ALUMINUM FINS FIRMLY CONNECTED TO THE HOUSING FOR EXCELLENT HEAT DISSIPATION.

DATASHEET-B

TO BE FILLED BY BIDDER

5.23. DATASHEET-B HIGH VOLTAGE METAL ENCLOSED SWITCHGEAR

SR.NO.	ITEM	UNIT	
1.0	**GENERAL**	–	
1.1	MANUFACTURER'S NAME	–	
1.2	APPLICABLE STANDARD (S)	–	
1.3	TYPE OF CIRCUT BEAKER	–	☐ VACUUM ☐ SF 6
1.4	**NOMINAL SYSTEM VOLTAGE**	kV	
1.5	MAXIMUM CONTINUOUS VOLTAGE	kV	
1.6	POWER FREQUENCY WITHSTAND (ONE MINUTE) VOLTAGE	kV	
1.7	A) SHORT CIRCUIT WITHSTAND	kV (rms)	
	B) MOMENTARY WITHSTAND	kV (peak)	
1.8	IMPULSE 1.2/50 μ SEC WITHSTAND VOLTAGE	kV (peak)	
1.9	TYPE TEST REPORT	–	☐ ENCLOSED ☐ NOT ENCLOSED
2.0	**COMPLIANCE WITH SPECIFICATION**	–	☐ YES ☐ NO, DEVIATION ATTACHED
3.0	**CONSTRUCTIONAL FEATURES**	–	
3.1	DIMENSIONS	–	
	a) SWITCHGEAR CUBICLE	–	Lx Wx Dmm
	b) ADAPTER PANEL	–	Lx Wx Dmm
	c) OVERALL BASED ON (a) & (b)	–	Lx Wx Dmm
3.2	MINIMUM CLEAR. REQUIRED	Mm	Front : mm, Rear : mm

3.3.1	CUBICLE WEIGHT WITH CIRCUIT BREAKER	Kg.	
3.3.2	TOTAL SWITCHGEAR WEIGHT	Kg.	
3.4	DYNAMIC LOADING PER CUBICLE	Kg.	
3.5	PAINTING SPECIFICATION	–	☐ ENAMEL ☐ EPOXY ☐ POWDER COATED
4.0	**BUSBARS**	–	
4.1	MATERIAL	–	☐ COPPER ☐ AL-ALLOY
4.2	APPLICABLE STANDARD	–	
4.3	BUSBAR INSULATION	–	
4.4	STANDARD TO WHICH THE BUSBAR ARRANGEMENT CONFORMS	–	
4.5	MINIMUM CLEARANCE :	–	
	A) PHASE TO PHASE	Mm	
	B) PHASE TO EARTH	Mm	
5.0	**CIRCUIT BREAKERS**	–	COMPLIANCE WITH SPEC. ☐ YES ☐ NO, DEVIATIONS ATTACHED
5.1	FEEDER RATINGS	Amps	AS PER SPEC. ☐ YES ☐ NO DETAIL ATTACHED
5.2	SWITCHING OVERVOLTAGE	–	
	a) SWITCHING OFF MOTOR RUNNING AT NO LOAD	P.U./ms	
	b) SWITCHING OFF MOTOR WITH ITS ROTOR LOCKED	-----DO----	
	c) SWITCHING OFF MOTOR RUNNING AT FULL LOAD	-----DO----	
	d) SWITCHING OFF UNLOADED TRANSFORMER	-----DO----	Amps

5.2.1	MAXIMUM PERMISSIBLE CHOPPING CURRENT.	–	
5.3	EXTERNAL SWITCHING OVERVOLTAGE LIMITINGS DEVICES REQUIRED	–	☐ YES ☐ NO
5.3.1	DETAILS OF VOLTAGE LIMITING DEVICE :	–	
	a) TYPE	–	
	b) RATED VOLTAGE	–	Volts
	c) CONTINUOUS WITHSTAND VOLTAGE BETWEEN LINE AND EARTH	–	Volts
	d) RESIDUAL VOLTAGE AT DISCHARGE CURRENT OF	–	
	- 100 A	–	Volts
	- 500 A	–	Volts
	- 1000 A	–	Volts
5.4	MAIN CONTACTS :		
	a) TYPE	–	
	b) MATERIAL	–	
	c) SILVER FACING PROCESS	–	
	d) THICKNESS OF THE FACING	MICRON	
	e) DESIGN CONTACT PRESSURE	KG./Sq.cm	
5.5	ARCING CONTACTS :	–	
	A) TYPE	–	
	B) MATERIAL	–	
	C) SILVER FACING PROVIDED	–	
	D) THICKNESS OF THE FACING	Microns	

	E) DESIGN CONTACT PRESSURE	Kg./Sq.Cm	
5.6	TRIP COIL CONSUMPTION AT RATED VOLTAGE	Watts	
5.7	SATISFACTORY OPERATION OF CLOSING BETWEEN 80% - 100% OF RATED CONTROL VOLTAGE	–	☐ YES ☐ NO
5.8	**SF6 BREAKER**	–	
	a) STANDARD TO WHICH SF6 GAS CONFORMS	–	
	b) SF6 GAS PRESSURE	Kg./Sq.cm.	
	c) GAS DENSITY MONITOR PROVIDE & DETAILS ATTACHED.	–	☐ YES ☐ NO, BEING SUBMITED
	d) LEAKAGE OF SF6 GAS	gm/year	
	e) SF6 GAS LEAKAGE DETECTOR PROVIDED	–	☐ YES ☐ NO, REASON GIVEN
	f) WEIGHT OF SF6 GAS PER POLE	Kg.	
	g) DECOMPOSED GASES AND MOISTURE ABSORBANT PROVIDED	–	☐ YES ☐ NO, REASON GIVEN
5.9	VACUUM BREAKERS	–	
	a) PRESSURE INSIDE THE INTERRUPTER	Mm.Hg.	
	b) CONTACT WEAR INDICATION PROVIDED	–	☐ YES ☐ NO, REASON GIVEN
	c) MECHANICAL FACILITY FOR CHECKING LOSS OF VACUUM PROVIDED	–	☐ YES ☐ NO, REASON GIVEN
	d) VACUUM MONITORING RELAY PROVIDED	–	☐ YES ☐ NO, REASON GIVEN
	e) ADEQUATE SHIELDING AGAINST X-RAY RADIATIONS PROVIDED	–	☐ YES ☐ NO, REASON GIVEN
5.10	**TYPE TEST REPORT**	–	☐ ENCLOSED ☐ NOT ENCLOSED

6.0	**CIRCUIT BREAKER OPERATING MECHANISM**	–	
6.1	TYPE OF CLOSING MECHANISM	–	
6.2	SPRING CHARGING MECHANISM :	–	
a)	SPRING CHARGING MOTOR :	–	
	i) RATED VOLTAGE	Volts	
	ii) RATING	Watts	
	Iii) SPEED	RPM	
	iv) CLASS OF INSULATION	–	
	v) SATISFACTORY OPERATION OF SPRING CHARGING MOTOR BETWEEN 80% - 100% OF RATED VOLTAGE	–	☐ YES ☐ NO, DEVIATION GIVEN
	vi) TIME REQUIRED TO CHARGE THE SPRING FROM FULLY DISCHARGED CONDITION	SEC.	
	vii) OVERLOAD AND SHORT CIRCUIT PROTECTION PARTICULARS	–	
b)	IS PROVISION MADE FOR IMMEDIATE CHRAGING OF CLOSING SPRING AFTER A CLOSURE	–	☐ YES ☐ NO, REASON GIVEN
c)	ADEQUATE SPRING RESERVE FOR ONE O-C-O OPERATION WITHOUT INTENTIONAL TIME DELAY	–	☐ YES ☐ NO, REASON GIVEN
d)	MECHANICAL INDICATION FOR SPRING CHARGED CONDITION PROVIDED	–	☐ YES ☐ NO, REASON GIVEN
e)	WHETHER SLOW CLOSING/OPENING IS FEASIBLE FOR MAINTENANCE TESTING	–	☐ YES ☐ NO, REASON GIVEN

6.3	METHOD OF CLOSING DURING POWER SUPPLY FAILURE	–	
7.0	**VACUUM CONTACTORS**	–	
7.1	MAKERS NAME AND COUNTRY OF MANUFACTURE	–	
7.2	MANUFACTURER'S TYPE DESIGNATION	–	
7.3	APPLICABLE STANDARDS	–	
7.4	TYPE TEST REPORT	–	☐ ENCLOSED ☐ NOT ENCLOSED
7.5	CLEARANCES	–	
	a) BETWEEN PHASES	mm	
	b) BETWEEN LIVE PARTS AND EART	mm	
	c) CENTRE TO CENTRE DISTANCE BETWEEN PHASES	mm	
7.6	WHETHER THE VACUUM CONTACTOR IS MECHANICALLY LATCHED OR ELECTRICALLY HELD	–	☐ YES ☐ NO, REASONS ATTACHED
7.7	a) TYPE OF OPERATING MECHANISM	–	
	b) POWER FOR OPERATING STATION MECHANISM	Battery or control transforme	
7.8	METHOD OF CLOSING	–	
	a) NORMAL VOLTAGE OF COIL	Volts	
	b) POWER FOR CLOSING MECHANIS	Watts	
7.9	NUMBER OF OPERATIONS THE VACUUM CONTACTOR IS CAPABLE OF PERFORMING WITHOUT INSPECTION	Nos.	
7.10	**SWITCHING OVER VOLTAGES BY THE VACUUM CONTACTOR**	Per unit peak line to earth	

7.11	METHOD OF CLOSING DURING POWER SUPPLY FAILURE	–	
7.12	WHETHER INSTRUCTION MANUAL I ENCLOSED	YES / NO	
8.0	**INSTRUMENT TRANSFORMERS**	–	
8.1	CURRENT TRANSFORMERS - METERING AND PROTECTION	–	COMPLIANCE WITH SPECIFICATION & PROJECT DWGS ☐ YES ☐ NO, DEVIATIONS ATTACHED
8.1.1	MAKE	–	
8.1.2	TYPE (BAR / WOUND / ANY OTHER)	–	
8.1.3	APPLICABLE STANDARD	–	
8.1.4	CLASS OF INSULATION	–	
8.1.5	CORE BALANCE CTs. (FOR EACH CT	–	
	a) RATIO	–	
	b) RATED VA BURDEN	VA	
	c) ACCURACY CLASS	–	☐ CL, PS
	d) MINIMUM KNEE-POINT VOLTAGE	Volts	
	e) MAXIMUM MAGNETISATION CURRENT AT PROPOSED SETTING	Ma	
	f) CT SECONDARY RESISTANCE	Ohms	
	g) MAGNETISATION CHARACTERISTIC CURVE ATTACHED	–	☐ YES ☐ NO
	h) DIMENSIONED DRAWING ATTACHED	YES / NO	
	i) APPLICABLE STANDARD	–	
8.1.6	TYPE TEST REPORT FOR ALL CT DESIGNS	–	☐ ENCLOSED ☐ NOT ENCLOSED

8.2	**VOLTAGE TRANSFORMERS**	–	COMPLIANCE WITH SPEC. PROJECT DWGS ☐ YES ☐ NO, DEVIATIONS ATTACHED
8.2.1	MAKE	–	
8.2.2	TYPE	–	
8.2.3	APPLICABLE STANDARD	–	
8.2.4	TYPE OF INSULATION	–	
8.5	TYPE TEST REPORT	–	☐ ENCLOSED ☐ NOT ENCLOSED
9.0	**INDICATING METERS**	–	COMPLIANCE WITH SPEC. /DWGS ☐ YES ☐ NO, DEVIATIONS ATTACHED
9.1	*1.1.a.i.1.2 GENERAL*	–	
9.1.1	MAKE	–	
9.1.2	APPLICABLE STANDARD	–	
9.1.3	TYPE OF MOVEMENT	–	
9.1.4	SIZE	–	X mm
9.1.5	SCALE SIZE (IN DEGREES)	–	
9.1.6	MOUNTING, FLUSH TYPE OTHER	–	
9.1.7	ACCURACY	–	
9.1.8	RANGE AS PER SPECIFICATION	–	☐ YES ☐ NO, DEVIATIONS ATTACHED
9.1.9	VA BURDEN FOR EACH TYPE	–	
9.2	**WATT HOUR METER**	–	
9.2.1	MAKE	–	
9.2.2	TYPE	–	
9.2.3	STANDARD TO WHICH IT CONFORMS	–	

9.2.4	MAXIMUM NUMBER OF DIGITS	–	
9.2.5	VOLTAGE COIL RATING	Volts	
9.2.6	CURRENT RATING	Amps.	
9.2.7	VA BURDEN	VA	
9.2.8	ACCURACY	–	
9.2.9	RANGE AS PER SPECIFICATION	–	☐ YES ☐ NO, DEVIATION ATTACHED
9.2.10	DRAW OUT / NON – DRAWOUT TYPE	–	
9.2.11	MOUNTING, FLUSH TYPE OTHER	–	
9.2.12	TEST PLUG/TEST BLOCKS TESTING TERMINALS WITH LINKS	–	☐ ELECTROMECHANICAL ☐ SOLID STATE ☐ μ P BASE
10.0	*1.1.a.i.1.3 PROTECTION RELAYS*	–	**MAKE TYPE**
10.1	INVERSE TIME OVER-CURRENT RELAY	–	
10.2	INSTANTANEOUS OVER-CURRENT RELAY	–	
10.3	THERMAL OVERLOAD PROTECTION RELAY	–	
10.4	LOCKED ROTOR PROTECTION RELA	–	
10.5	THERMAL OVERLOAD ALARM RELA	–	
10.6	NEGATIVE SEQUENCE VOLTAGE OPERATED RELAY	–	
10.7	EARTH LEAKAGE RELAY FOR USE WITH CORE BALANCE CT	–	
10.8	EARTH FAULT RELAY FOR USE IN THE RESIDUAL CIRCUIT OF MAIN CTS.	–	
10.9	DIFFERENTIAL RELAY (HIGH STABILITY CIRCULATING CURRENT TYPE)	–	

10.10	DIFFERENTIAL RELAY FOR USE WIT THROUGH-TYPE CTS.	–	
10.11	VOLTAGE OPERATED EARTH FAULT RELAY (NEUTRAL DISPLACEMENT RELAY)	–	
11.0	**TERMINATION / WIRING**	–	COMPLIANCE WITH SPEC. ☐ YES ☐ NO, DEVIATIONS ATTACHED
11.1	COLOUR CODING FOR WIRES FOR :	–	
	a) D.C. CONTROL CIRCUITS	–	
	b) A.C. AUXILIARY POWER CIRCUIT LIKE PANEL SPACE HEATER, PANEL ILLUMINATION ETC.	–	
	c) A.C. METERING CIRCUIT	–	
	d) EARTHING	–	
11.2	NUMBERED FERRULES AT BOTH ENDS	–	☐ YES ☐ NO, REASON GIVEN
11.3	INSULATED SLEEVES PROVIDED AT WIRE TERMINATIONS	–	☐ YES ☐ NO, REASON GIVEN
11.4	TERMINALS :	–	
	a) MAKE	–	
	b) CURRENT RATING	Amps	
	c) CLAMP TYPE / BOLT TYPE	–	
	d) MOULDED INTER-TERMINAL BARRIERS PROVIDED	–	☐ YES ☐ NO
	e) MAXIMUM CONDUCTOR SIZE AND NUMBER OF CONDUCTORS WHICH IT CAN RECEIVE	sq.mm	
	f) DISCONNECTING TYPE FOR CT CIRCUITS	–	☐ YES ☐ NO

	g) TERMINAL MARKING FACILITY PROVIDED	–	☐ YES ☐ NO
	h) CRIMP TYPE CONNECTORS PROVIDED AT THE TERMINALS	–	☐ YES ☐ NO
	i) 10% SPARE TERMINAL PROVIDED	–	☐ YES ☐ NO
11.5	**TYPE TEST REPORT FOR WIRING MATERIALS**	–	☐ ENCLOSED ☐ NOT ENCLOSED
12.0	CABLE BOXES / POTHEADS	–	
12.1	INCLUDED IN SCOPE OF SUPPLY	–	
12.2	RATED VOLTAGE	KV	
12.3	APPLICABLE STANDARD	–	
12.4	COMPOUND FILLED/EPOXY RESIN / SHRINKABLE TYPE	–	
12. 5	ALL FURNISHING MATERIAL AND ACCESSORIES INCLUDING COMPOUND, TAPES, BINDINGS, WIRES, FILTERS, ARMOUR CLAMPS, BRASS GLAND, ETC. INCLUDED	–	☐ YES ☐ NO
13.0	**SPARES**	–	
13.1	LIST OF RECOMMENDED SPARES FOR NORMAL MAINTENANCE FOR A PERIOD OF 3 YEARS FURNISHED	–	☐ YES ☐ NO
14.0	**TESTS**		
14.1	ALL TEST CERTIFICATES ON BOUGHT ITEMS BE FURNISHED	–	☐ YES ☐ NO
14.2	LIST OF ROUTINE TESTS TO BE CARRIED OUT ATTACHED	–	☐ YES ☐ NO
15.0	DRAWINGS AND DATA		

15.1	DRAWINGS SUBMITTED ALONG WITH BID	–	☐ YES ☐ NO

5.24. DATASHEET-B LT SWITCHGEAR

1.0	SPECIFIC PARTICULARS		
1.1	SWITCHGEAR DESIGNATIONS		
1.2	SINGLE FRONT OR DOUBLE FRONT	SF/DF	
1.3	APPLICABLE STANDARD		
1.4	FULLY DRAWOUT/SEMI DRAWOUT/FIXED	FD/SD/F	
1.5	TOTAL DIMENSIONS OF EACH COMPLETE SWITCHGEAR L X W X D	MM L W D	
1.6.1 1.6.2	WIDTH OF EACH VERTICAL SECTION WITH CABLE ALLEY WIDTH OF CABLE ALLEY ONLY	MM MM	
1.7	MINIMUM CLEAR SPACE REQUIRED A) IN FRONT B) BACK	 MM MM	
1.8	MAX. CUBICLE WEIGHT WITH COMPONENTS	KG	
1.9	HAVE ALL THE FEEDERS AND COMPONENTS SPECIFIED IN ENCLOSED DRAWINGS AND DATA SHEETS A - 3 BEEN PROVIDED ?		YES/NO

2.0	GENERAL PARTICULARS		
2.1	SHEET STEEL A) COLD ROLLED/HOT ROLLED B) THICKNESS : I) FRAMES II) DOOR III) REAR COVER IV) SIDE AND TOP COVERS V) PANEL PARTITIONS	 MM MM MM MM MM	
2.2	DEGREE OF PROTECTIONS PROVIDED BY THE ENCLOSURE (AS PER IS : 13947)		
2.3	EARTH BUSBAR SIZE	SQ.MM	GI/AL/CU
2.4	BUSBAR A) MATERIAL OF BUSBARS B) SECTION C) CONTINUOUS CURRENT RATING UNDER SITE CONDITIONS D) WHETHER BUSBARS HAVE BEEN INSULATED E) TYPE OF INSULATION F) TEMPERATURE RISE OVER THE REFERENCE AMBIENT WHEN CARRYING RATED CURRENT	 SQ.MM A °C	 AL/CU PH : N: YES/NO

	G) MATERIAL OF BUSBAR SUPPORTS H) CLEARANCE IN AIR : I) BETWEEN PHASES II) BETWEEN PHASES EARTH I) SHORT TIME RATING (ONE SEC.) J) MOMENTARY RATING (PEAK)	 MM MM KA KA	
3.0	CIRCUIT BREAKERS		
3.1	MAKER'S NAME		
3.2	MAKER'S TYPE DESIGNATION		
3.3	APPLICABLE STANDARDS		
3.4	CIRCUIT BREAKERS TYPE (AIR BREAK AND OR MCCB)		
3.5	RATED VOLTAGE	V	
3.6	RATED OPERATING DUTY		
3.7	RATED CURRENT	A	
3.8	DERATING FACTOR FOR OPERATION UNDER SITE CONDITIONS		
3.9	RATED SYMMETRICAL BREAKING CURRENT AT RATED VOLTAGE. (INDICATE POWER FACTOR)	KA P.F.	
3.10	RATED PEAK MAKING CURRENT	KA	
3.11	RATED SHORT TIME WITHSTAND RATING (FOR 1 SEC.) (FOR MCCB, BIDDER TO INDICATE THE TIME)		
3.12	OPERATING MECHANISM TYPE		
3.13	LIMITS OF VOLTAGE FOR SATISFACTORY OPERATION OF THE FOLLOWING DEVICES AS A % OF NORMAL VOLTAGE I) OPERATING MECHANISM II) CLOSING AT NORMAL	 % %	

	VOLTAGE IV) TRIP COIL	% 	
3.14	POWER REQUIRED FOR CLOSING AT NORMAL VOLTAGE	W	
3.15	POWER REQUIRED FOR TRIPPING AT NORMAL VOLTAGE	W	
3.16	SPRING CHARGING MOTOR DETAILS : I) RATING II) RATED VOLTAGE III) SPRING CHARGING	 KW V, AC/DC SEC.	
3.17	OVERLOAD RELEASE PROVIDED	YES/NO	
3.18	SHORT CIRCUIT RELEASE SETTINGS AND TIME DELAY FEATURES		
3.19	UNDERVOLTAGE RELEASE SETTING		
3.20	HAVE ELECTRICAL AND MECHANICAL ANTI-PUMPING FEATURES BEEN PROVIDED	YES/NO	
3.21	HAVE TYPE TEST CERTIFICATES BEEN ENCLOSED ?	YES/NO	
4.0	AIR BREAK SWITCHES		
4.1	MAKE		
4.2	TYPE		
4.3	RATED VOLTAGE		
4.4	APPLICABLE STANDARDS		
4.5	MAXIMUM PROSPECTIVE FAULT CURRENT WITHSTAND OF COMPOSITE UNIT OF SWITCH AND FUSE	KA (PEAK)	
5.0	FUSES		
5.1	MAKE		
5.2	TYPE		
5.3	APPLICABLE STANDARDS		
5.4	RATED VOLTAGE	V	
5.5	RATED CURRENT FOR INDIVIDUAL CIRCUITS TO BE PROVIDED AS PER REQUIREMENTS OF PROTECTION COORDINATION	YES/NO	

6.0	CONTACTORS		
6.1	MAKE		
6.2	RATED DUTY		
6.3	RATED UTILISATION CATEGORY		
6.4	APPLICABLE STANDARDS		
6.5	RATED (THERMAL) CURRENT PROVIDED AS PER SPECIFICATION	YES/NO	
6.6	RATED VOLTAGE OF AUXILIARY CONTACTS	V	
6.7	RATED VOLTAGE OF COIL	V	
6.8	RATED BREAKING CAPACITY	FACTOR OF RATED CURRENT	
6.9	RATED MAKING CAPACITY	FACTOR OF RATED CURRENT	
6.10	LIMITS OF OPERATION I) SUPPLY VOLTAGE VARIATION II) SUPPLY FREQUENCY VARIATION FOR CLOSING III) DROP OUT VOLTAGE	 + % + % %	
6.11	NO OF AUXILIARY CONTACTS : I) NORMALLY OPEN II) NORMALLY CLOSED		
7.0	SINGLE PHASING PREVENTERS		
7.1	IS IT IN BUILT-IN BIMETAL THERMAL OVERLOAD RELAY	YES/NO	
8.0	CURRENT TRANSFORMERS		
8.1	MAKE		
8.2	APPLICABLE STANDARDS		
8.3	ALL OTHER PARAMETERS OF CT AS PER ENCLOSED SLD/LIST AND SECTION-D	YES/NO	
9.0	VOLTAGE TRANSFORMERS		

9.1	MAKE		
9.2	APPLICABLE STANDARDS		
9.3	RATIO	V/V	
9.4	OUTPUT PER PHASE	VA	
9.5	ACCURACY CLASS		
9.6	OVER VOLTAGE FACTOR		
9.7	CLASS OF INSULATION		
10.0	CONTROL TRANSFORMERS		
10.1	MAKE		
10.2	TYPE		
10.3	APPLICABLE STANDARDS		
10.4	RATIO		
10.5	CLASS OF INSULATION		
10.6	RATED OUTPUT	VA	
11.0	INSTANTANEOUS OVERCURRENT RELAY		
11.1	APPLICATION (PHASE FAULT OR EARTH FAULT)		
11.2	MAKE		
11.3	TYPE DESIGNATION		
11.4	SETTING RANGE		
12.0	INVERSE TIME AND THERMAL OVERCURRENT RELAY		
12.1	APPLICATION		
12.2	MAKE		
12.3	TYPE		
12.4	CURRENT SETTING RANGE		
12.5	TIME SETTING RANGE AT 10 TIMES THE CURRENT SETTING	SEC.	
13.0	UNDERVOLTAGE RELAY		
13.1	MAKE		
13.2	TYPE		
13.3	VOLTAGE RATING	V	
13.4	SETTING RANGE	V	
14.0	AUXILIARY RELAYS AND TIMERS		
14.1	MAKE		
14.2	TYPE		
14.3	COIL VOLTAGE	V	
15.0	CONTROL/SELECTOR SWITCH		
15.1	MAKE		
15.2	TYPE DESIGNATION		
16.0	VOLTMETER		
16.1	MAKE		

16.2	TYPE		
16.3	APPLICABLE STANDARDS		
16.4	ACCURACY CLASS		
17.0	AMMETER		
17.1	MAKE		
17.2	TYPE		
17.3	APPLICABLE STANDARDS		
17.4	ACCURACY CLASS		
18.0	WATTMETER		
18.1	MAKE		
18.2	TYPE		
18.3	APPLICABLE STANDARD		
18.4	ACCURACY CLASS		
19.0	INDICATING LAMPS		
19.1	MAKE		
19.2	TYPE		
19.3	VOLTAGE	V	
19.4	SERIES RESISTOR	OHMS	
19.5	WATTAGE OF LAMP	W	
20.0	PUSH BUTTONS		
20.1	MAKE		
20.2	TYPE DESIGNATION		
20.3	NO OF CONTACTS: I) NORMALLY OPEN II) NORMALLY CLOSED		
20.4	CONTACT RATING	A	
21.0	SPACE HEATER		
21.1	MAKE		
21.2	TYPE		
21.3	RATED VOLTAGE	V	
21.4	HEATER OUTPUT FOR EACH VERTICAL PANEL	W	
21.5	THERMOSTAT AT SETTING °C		
22.0	WIRING AND TERMINAL BLOCKS		
22.1	VOLTAGE GRADE		
22.2	INSULATION		
22.3	MINIMUM SIZE OF CONDUCTOR FOR : I) POWER WIRING	 SQ.MM SQ.MM	

	II) CONTROL WIRING		
22.4	TYPE OF TERMINAL BLOCKS : I) FOR WITHDRAWABLE TYPE II) FOR FIXED TYPE		
22.5	MINIMUM CURRENT RATING OF TERMINAL BLOCKS	A	
22.6	WHETHER TERMINALS FOR CT'S HAVE BEEN PROVIDED WITH SHORT CIRCUITING FACILITIES	YES/NO	
23.0	PUSH BUTTON STATION		
23.1	METAL ENCLOSURE : I) DIE-CAST ALUMINIUM/SHEET METAL OF		
	2MM THICKNESS II) DEGREE OF PROTECTION III) PAINTING, INSCRIPTION EARTHING TERMINALS AS SPECIFIED	YES/NO	
23.2	GLAND PLATE AND CABLE GLANDS PROVIDED	YES/NO	
22.3	FACILITY FOR FIXING ON WALL/STRUCTURE PROVIDED	YES/NO	
23.4	NO. OF CONTACTS : I) NORMALLY OPEN II) NORMALLY CLOSED		
23.5	CONTACT RATING : I) AT 415 V AC II) AT 110 V AC III) AT 220 V DC	 A A A	

5.25. DATASHEET-B HT TERMINATIONS

1.0	MANUFACTURER			
2.0	APPLICABLE STANDARDS			
3.0	GUARANTEED PARTICULARS			
	FOR THE NOMINAL (PHASE TO PHASE) SYSTEM VOLTAGES		KV	
3.1	A.C WITHSTAND VOLTAGE (PH / GROUND)		KV	
	TIME DURATION		MINS	
3.2	PARTIAL DISCHARGE AT 2 UO		PC	
3.3	IMPULSE WITHSTAND, 1.2 / 50 μS		KV	
3.4	LOAD CYCLE TEST			
	(A)	EACH CYCLE – HEATING - DURATION	HRS	
		TEMPERATURE	^{0}C	
		COOLING DURATION	HRS.	
	(B)	NUMBNER OF CYCLES		
	(C)	CONTINUOUS PHASE TO GROUND VOLTAGE WITHSTAND	KV	
3.5	THERMAL WITHSTAND SHORT CIRCUIT CURRENT 1 SEC.		KA	
3.6	DYNAMIC SHORT CIRCUIT WITHSTAND		KA/PEAK	
3.7	TYPE TEST REPORT FOR ALL THE TESTS ENCLOSED AS SPECIFIED		YES / NO.	
4.0	KIT PARTICULARS			

4.1	MATERIAL OF THE TUBING / MOULDED PARTY			
4.2	METHOD OF STRESS CONTROL			
4.3	METHOD OF ENVIRONMENTAL SEAL			
4.4	LIST OF ITEMS INCLUDED IN THE KIT			
	(A)	FOR TERMINATIONS		
	(B)	FOR JOINTS		
	(C)	WHETHER HEATING DEVICE INCLUDED	YES / NO.	
		(I) HOW MANY SUCH DEVICE INCLUDED	QTY.	
	(D)	ALLOWABLE KIT STORAGE TEMPERATURE	^{0}C	
	(E)	KIT SHELF LIFE	YEARS	
5.0	CABLE TERMINATIONS / JOINTS INSTRUCTION MANUAL ENCLOSED		YES / NO	

5.26. DATASHEET-B POWER TRANSFORMER

1.0	TRANSFORMER APPLICATION/ DESIGNATION		
2.0	APPLICABLE STANDARDS		
3.0	QUANTITY REQUIRED		
4.0	FULL LOAD RATING	MVA	
5.0	3 PHASE UNIT / BANK OF THREE (3) 1 PHASE UNITS		
6.0	AUTO WOUND / TWO WINDING TRANSFORMERS / THREE WINDING TRANSFORMERS		
7.0	RATED NO-LOAD VOLTAGES :		
7.1	HV	KV	
7.2	MV	KV	
7.3	LV	KV	
8.0	COOLING (ONAN / ONAF / OFAN / OFAF / OFWF)		
9.0	RATINGS		
9.1	RATINGS OF WINDINGS		
9.1.1	HV	MVA	
9.1.2	MV	MVA	
9.1.3	LV	MVA	
9.2	RATINGS CORRESPONDING TO COOLING METHODS		
9.2.1	ONAN	MVA	
9.2.2	ONAF	MVA	

9.2.3	OFAN	MVA	
9.2.4	OFAF	MVA	
9.2.5	OFWF	MVA	
10.0	GUARANTEED (SUBJECT TO TOLERANCE) IMPEDANCE VOLTAGE AT RATED CURRENT FOR THE PRINCIPAL TAPPING		
10.1	HV – LV	%	
10.2	HV – MV	%	
10.3	MV – LV	%	
11.0	EFFICIENCY AT 750C AT UNITY P.F.		
11.1	AT FULL LOAD	%	
11.2	AT ¾ FULL LOAD	%	
11.3	AT ½ FULL LOAD.	%	
12.0	REGULATION AT FULL LOAD, 0.8 P.F AT 750C WINDING TEMPERATURE	%	
13.0	RATED FREQUENCY	HZ.	
14.0	EXTERNAL SHORT CIRCUIT WITHSTAND CAPACITY	MVA	
15.0	CORE :		
15.1	MATERIAL OF CORE LAMINATION		
15.2	THICKNESS OF CORE PLATES.		
15.3	INSULATION OF CORE LAMINATION.		

15.4	INSULATION OF CORE BOLTS		
15.5	INSULATION OF CORE BOLT WASHERS		
15.6	INSULATION OF CORE CLAMPING PLATES.		
16.0	WINDING CONNECTIONS :		
16.1	HV		
16.2	MV		
16.3	LV		
16.4	VECTOR GROUP		
17.0	TAPPINGS ON WINDING		
17.1	ON-LOAD / OFF TAPS		
17.2	ON HV / MV / LV WINDING		
17.3	FULL POWER TAPPING RANGE +	%	
17.4	FOR CBVV RATING :		
17.4.1	MAXIMUM VOLTAGE TAPPING AND CORRESPONDING VOLTAGE		
17.4.2	MAXIMUM CURRENT TAPPING AND CORRESPONDING CURRENT		
18.0	IF ON LOAD TAPS, SPECIFY DETAILS OF OLTC GEAR.		
18.1	MANUAL / AUTOMATIC CONTROL		
18.2	REMOTE / LOCAL CONTROL		

18.3	IF REMOTE CONTROL, WHETHER THE REMOTE CONTROL CUBICLE INCLUDED IN BIDDER'S SCOPE OF SUPPLY		
18.4	VOLTAGE CLASS OF THE OLTC		
18.5	CURRENT RATING OF THE OLTC	A	
19.0	TERMINALS OF TERTIARY (STABILISING) WINDING BROUGHT OUT TO BUSHINGS	YES / NO	
20.0	WINDING INSULATION CATEGORY :		
20.1	HV UNIFORM / NON-UNIFORM		
20.2	MV UNIFORM / NON-UNIFORM		
20.3	LV UNIFORM / NON-UNIFORM		
21.0	TYPE OF AXIAL COIL SUPPORTS		
21.1	HV		
21.2	MV		
21.3	LV		
22.0	TYPE OF RADIAL COIL SUPPORTS		
22.1	HV		
22.2	MV		
22.3	LV		
23.0	IMPULSE VOLTAGE WITHSTAND 1.2 / 50 μS WAVE		
23.1	HV	KV/PEAK	

23.2	MV	KV/PEAK	
23.3	LV	KV/PEAK	
24.0	POWER FREQUENCY WITHSTAND VOLTAGE (DRY AND WET)		
24.1	HV; HV NEUTRAL	KV(RMS)	
24.2	MV	KV(RMS)	
24.3	LV	KV(RMS)	
25.0	GUARANTEED MAXIMUM TEMPERATURE RISE		
25.1	OIL BY THERMOMETERS	^{0}C	
25.2	WINDING BY RESISTANCE FOR :		
25.2.1	ON / OB / OW COOLING	^{0}C	
25.2.2	OFN / OFB COOLING	^{0}C	
25.2.3	OFW COOLING	^{0}C	
26.0	SWITCHING IMPULSE WITHSTAND VOLTAGE FOR HIGHEST EQUIPMENT VOLTAGE > 145 KV).		
27.0	TANK COVER CONVENTIONAL / BELL SHAPED		
28.0	MINIMUM CLEARANCE HEIGHT FOR LIFTING CORE AND WINDINGS FROM TANK	MM	
29.0	BUSHINGS		

29.1	RATED VOLTAGE CLASS	KV	
29.2	RATED CURRENT	A	
29.3	1.2 / 50 μS IMPULSE WITHSTAND	KV(RMS)	
29.4	ONE MINUTE POWER FREQUENCY WITHSTAND DRY AND WET	KV(RMS)	
29.5	MINIMUM CLEARANCE IN AIR	MM	
29.6	MINIMUM CREEPAGE DISTANCE		
29.6.1	TOTAL	MM	
29.6.2	PROTECTED	MM	
29.7	QUANTITY OF OIL IN OIL FILLED BUSHINGS	LITRES	
29.6.8	FREE SPACE REQUIRED AT TOP FOR REMOVAL	MM	
30.0	LOAD LOSS AT RATED CURRENT AT 750C WINDING TEMPERATURE (GUARANTEED SUBJECT TO TOLERANCE AS PER APPLICABLE STANDARD AND EXCLUDING COOLER LOSSES)		
31.0	ESTIMATED MAXIMUM COOLER LOSSES AT FULL LOAD	KW	
32.0	NO LOAD LOSSES (CORE LOSS AND DI-ELECTRIC LOSS) AT 100% RATED VOLTAGE AND FREQUENCY, GUARANTEED SUBJECT TO TOLERANCE AS PER APPLICABLE STANDARD		

33.0	GUARANTEED NO-LOAD CURRENT :		
33.1	WHEN EXCITED FROM LV SIDE AT 100% RATED VOLTAGE	A	
33.2	WHEN EXCITED FROM LV SIDE AT 110% RATED VOLTAGE	A	
34.0	MAXIMUM FLUX DENSITY		
34.1	AT RATED VOLTAGE	WB/M^2	
34.2	AT 110% RATED VOLTAGE	WB/M^2	
34.3	OVERFLUXING CAPABILITY.		
35.0	CURRENT DENSITY		
35.1	HV	A/CM^2	
35.2	MV	A/CM^2	
35.3	LV	A/CM^2	
36.0	WHEELS		
36.1	PLAIN / FLANGED		
36.2	UNIDIRECTIONAL / BI-DIRECTIONAL		
36.3	QUANTITY		
36.4	GAUGE (S)		
37.0	VACUUM WITHSTAND CAPABILITY :		
37.1	MAIN TANK	MM OF HG.	

37.2	RADIATORS AND ACCESSORIES	MM OF HG	
38.0	ALL ACCESSORIES SUPPLIED AS SPECIFIED	YES / NO	
39.0	COOLER CONTROL SCHEME CONFORMS TO SPECIFICATION	YES / NO	
40.0	OLTC CONTROL SCHEME CONFORMS TO SPECIFICATION		
41.0	WEIGHTS		
41.1	NET WEIGHT OF THE CORE	YES / NO	
41.2	NET WEIGHT OF COPPER		
41.2.1	HV	KG	
41.2.2	LV	KG	
41.2.3	TERTIARY	KG	
41.2.4	TOTAL	KG	
41.3	OIL	KG	
41.4	TANK, COOLERS AND FITTINGS	KG	
41.5	TOTAL	KG	
41.6	UNTANKING WEIGHT	KG	
42.0	SHEET METAL THICKNESS		
42.1	OUTDOOR COOLER CONTROL CABINET	MM	

42.2	INDOOR OLTC CONTROL CABINET		
43.0	COOLING FANS :		
43.1	TYPE		
43.2	QUANTITY	NO.	
43.3	RATING	KW	
44.0	COOLING OIL PUMPS		
44.1	TYPE		
44.2	QUANTITY	NO.	
44.3	RATING	KW	
45.0	COOLING WATER PUMPS		
45.1	TYPE		
45.2	QUANTITY	NO.	
45.3	RATING	KW	
46.0	CAPABILITY OF TRANSFORMER TO REMAIN IN OPERATION FROM HOT CONDITION AFTER FAILURE OF FORCED COOLING		
46.1	FULL LOAD	MINUTES	
46.2	WITHOUT LOAD CURRENT (FOR TRANSFORMERS WITHOUT ONAN RATING)	MINUTES	
47.0	ON-LOAD TAP CHANGER		
47.1	MAKE		

47.2	TYPE DESIGNATION		
47.3	SUITABLE FOR AUTO / MANUAL OPERATION		
47.4	RATED VOLTAGE	KV	
47.5	RATED CURRENT	AMP	
47.6	NUMBER OF STEPS		
47.7	STEP VOLTAGE	VOLTS	
47.8	RATED VOLTAGE OF DRIVE MOTOR	V	
47.9	RATED VOLTAGE OF CONTROL CIRCUIT	V	
47.10	TIME TO COMPLETE TAP CHANGING OPERATION FROM ANY ONE STEP TO NEXT HIGHER OR LOWER STEP		
47.10.1	ON 'AUTO' OPERATION	SEC.	
47.10.2	ON 'MANUAL' OPERATION I.E., THROUGH PUSH BUTTON	SEC.	
48.0	LIST OF ROUTINE TESTS TO BE CARRIED OUT		
49.0	LIST OF OTHER TESTS WHICH WILL BE CARRIED OUT AGAINST EXTRA PRICE QUOTED ELSEWHERE		
50.0	DRAWING NUMBER OF GENERAL OUTLINE DRAWING ENCLOSED WITH THE BID SHOWING THE TRANSFORMER		

	WITH ALL ITS FITTINGS AND ACCESSORIES IN PLAN, FRONT AND SIDE ELEVATIONS AND OTHER DETAILS		
51.0	SHIPPING SECTION		
51.1	SIZE OF LARGEST PACKAGE (LXBXH)	MM	
51.2	WEIGHT OF THE LARGEST PACKAGE	TONNES	
52.0	MANUFACTURER'S MAINTENANCE PROCEDURE AND SCHEDULE FOR SPARE UNCHARGED TRANSFORMER		
53.0	HYDRAULIC JACK		
53.1	MAKE		
53.2	TYPE		
53.3	NUMBER		
53.4	CAPACITY		
55.0	OVERLOAD CAPACITY OF TRANSFORMER FOR BOTH 100% OFAF COOLERS WORKING SIMULTANEOUSLY.		
56.0	BUSHINGS CTS, IF OFFERED		
56.1	QUANTITY		
56.2	RATIO		
56.3	VA BURDEN		
56.4	ACCURACY CLASS		

56.5	KNEE POINT VOLTAGE	VOLTS	
56.6	MAGNETISING CURRENT AT KNEE-POINT VOLTAGE	AMPS	
56.7	SECONDARY RESISTANCE	OHMS	
57.0	VALUES OF TRANSFER SURGE VOLTAGE WITHSTAND FOR :		
57.1	LIGHTNING SURGES		
57.1.1	AMPLITUDE	KV	
57.1.2	RATE	KV/SEC.	
57.2	SWITCHING SURGES		
57.2.1	AMPLITUDE	KV	
57.2.2	RATE	KV/SEC.	
58.0	TERTIARY WINDING, IF ANY, IF KEPT ISOLATED THEN THE BIDDER TO STATE WHETHER ONE TERMINAL TO BE EARTHED OR NOT.		
59.0	TORQUE FOR COIL CLAMPING BOLTS	KG-M	
60.0	WHETHER NEUTRAL END SURGE DIVERTER RECOMMENDED BY THE BIDDER		
61.0	IF YES, DETAILS OF SURGE DIVERTER		
61.1	MAKE		

61.2	TYPE	_____	
		_____	
61.3	KV CLASS	_____	
		_____	
61.4	KV RATING	_____	
		_____	
62.0	IF UNIT COOLER ARRANGEMENT OFFERED FOR COOLING, ADVISE ?	_____	
		_____	
62.1	TOTAL NO. OF UNIT COOLERS PROVIDED.	_____	
		_____	
62.2	NO. OF UNIT COOLERS WHICH WOULD BE IN SERVICE FOR FULL LOAD OPERATION OF TRANSFORMER.	_____	
		_____	
62.3	NO. OF ‘SPARE’ UNIT COOLERS	_____	
		_____	
62.4	NO. OF FANS IN EACH UNIT COOLER	_____	
		_____	
62.5	NO. OF PUMPS IN EACH UNIT COOLER	_____	
		_____	
62.6	RATING OF EACH FAN MOTOR	_____	
		_____	
62.7	RATING OF EACH OIL PUMP MOTOR	_____	

5.27. DATASHEET-B BUS DUCT

1.0	**BUS DUCT**		
1.1	MANUFACTURER/ COUNTRY		
1.2	BUS CONDUCTOR		
	(A) BUSBAR GRADE		
	(B) SHAPE OF BUSBAR		
	(C) SIZE OF BUSBAR	MM^2	
1.3	BARRIERS		
	(A) THICKNESS OF PHASE BARRIER	MM	
1.4	PHASE TO PHASE SPACING	MM	
1.5	SIZE OF ENCLOSURE W X H OR DIAMETER IF CIRCULAR	MMXMM/ MM	
1.6	RESISTANCE/METRE/PHASE AT 20°C OF CONDUCTOR	OHM	
1.7	INDUCTIVE REACTANCE/METRE/PHASE AT 20°C	OHM	
1.8	CAPACITIVE REACTANCE/METRE/PHASE AT 20°C	OHM	
1.9	HEAT LOSS IN THE BUS DUCT AT FULL RATED CURRENT	WATTS/ PH/ M	
1.10	WEIGHT OF 3-PHASE DUCT	KG/METRE	
1.11	STANDARD SECTION LENGTH	M	
1.12	MINIMUM REQUIRED CLEARANCES FROM THE PERIPHERY OF THE BUS DUCT		
	I) TO STRUCTURAL STEEL WORK PARALLEL TO THE DUCT	MM	

	II) TO STRUCTURAL STEEL WORK PERPENDICULAR TO THE DUCT	MM	
2.0	**INSULATORS**		
2.1	MANUFACTURER/ COUNTRY		
2.2	TYPE		
2.3	CANTILEVER STRENGTH		
	I) UPRIGHT	KG.	
	II) UNDERHUNG	KG.	
2.4	WEIGHT OF EACH INSULATOR	KG.	
3.0	**SEAL OFF BUSHINGS**		
3.1	MANUFACTURER/ COUNTRY		
3.2	TYPE		
3.3	MECHANICAL STRENGTH		
	I) COMPRESSION	KG.	
	II) TENSION	KG.	
3.4	WEIGHT OF EACH BUSHING	KG.	
4.0	**BUS DUCT LAYOUT**		
4.1	REFERENCE DRAWING NO.		
4.2	BUS ENCLOSURE - SECTION		
5.0	**GENERAL**		
5.1	TECHNICAL SPECIFIC REQUIREMENTS CONFORM TO DATA SHEET-A1 AND A2 OF THIS SPECIFICATION		YES/NO

5.2	IF ANY DEVIATION IN TECHNICAL SPECIFIC REQUIREMENTS, IT IS BROUGHT OUT SEPARATELY IN DEVIATION SCHEDULE		YES/NO REFERENCE OF DEVIATION SCHEDULE

5.28. DATASHEET-B CONTROL PANEL

1.0	GENERAL PATICULARS		
1.1	DESIGNATION		
1.2	LOCATION		(INDOOR / OUTDOOR)
1.3	DESIGN AMBIENT TEMPERATURE	^{0} C	
1.4	TYPE OF MOUNTING		(FLOOR / PEDESTAL / COLUMN /WALL)
1.5	CABLE ENTRY		
	A) TOP / BOTTOM		
	B) GLANDS / CONDUITS -SIZE		
	C) GLANDS IF REQUIED		YES/NO
1.6	PURCHASER'S EARTHING CONDUCTOR		
	A) MATERIAL		COPPER / ALUMINIUM / G I
	B) TYPE		STRIPS / ROPE / WIRE./ ROD
	C) SIZE		
1.7	PAINTING:		
	A) COLOUR FINISH		
	OUTSIDE		
	INSIDE		
	B) EPOXY PAINT REQUIRED	Yes/No	
1.8	CONTROL SCHEME & BILL OF MATERIAL, ENCLOSED	YES. Ref.No	
	If NO, TO BE FURNISHED BY VENDOR		
2.0	VOLTAGE		
2.1	POWER DEVICES, MOTOR DRIVES, ETC.		
	A) SUPPLY VOLTAGE		415V, 3PH / 3PH-N, 50Hz / 240V, 1PH-N, 50Hz
	B) DUPLICATE FEED		PROVIDED/ NOT PROVIDED
2.2	CONTROL VOLTAGE	V, AC,DC	
2.3	CONTROL TRANSFORMER	REQD. NOT REQD.	

2.4	SPACE HEATER/LIGHTING SUPPLY VOLTAGE		
3.0	OTHER PARTICULARS WHEN APPLICABLE		
3.1	STARTERS TYPE	DOL/REVY / <	
3.2	CONTACTOR RATED DUTY (AS PER IS:2459 & 8544)		

5.29. DATASHEET-B CABLE SYSTEM INSTALLATION WORKS

			1 2 3 4
			SADDLES SPACING TYING CORD
1.0	CLEATING / CLAMPING OF CABLES & CONDUITS		
(A)	MAKE		
(B)	MATERIAL		
(C)	PAINTED / GALVANISED		
2.0	CABLE IDENTIFICATION TAG		
(A)	MAKE		
(B)	MATERIAL		
(C)	THICKNESS	MM	
(D)	BINDING WIRE MATERIAL		
			1 2
3.0	BURIED CABLES MARKERS / PROTECTIVE COVERS		HV CABLES LV CABLES
(A)	APPLICABLE STANDARDS		
(B)	MATERIAL OF PROTECTIVE COVERS		
(C)	MATERIAL OF CABLE ROUTE / JOINT MARKERS		
4.0	CONDUIT & FLOOR OPENINGS SEALING COMPOUNDS		
	MATERIAL & COMPOSITION FOR :		
	(I) WATER PROOFING		
5.0	GROUNDING OF CABLE ARMOUR / SHEATHS TRAYS / CARRIER STRUCTURES / CONDUITS		
(A)	MATERIAL OF CONDUCTOR		
(B)	SIZE		

5.30. DATASHEET-B LIGHTING INSTALLATION WORKS

1.0	**ACCESSORIES, PART OF INSTALLATION WORK**		
1.1	**MISCELLANEOUS ITEMS**		
1.1.1	MATERIAL AND GUAGE FOR: A) SADDLES B) SPACER PLATES		

	C) JUNCTION BOXES D) FIXING HARDWARE		
1.1.2	ACCESSORIES GALVANISED.	YES/NO	
1.1.3	JUNCTION / INSPECTION BOXES PROVIDED WITH NECESSARY TERMINALS	YES/NO	
1.1.4	APPLICABLE STANDARDS FOR JUNCTION BOXES		
1.2	**MOUNTING / SUSPENSION CONDUITS**		
1.2.1	MAKE		
1.2.2	MATERIAL AND GUAGE FOR EACH SIZE		
1.2.3	SIZES	MM	
1.2.4	GALVANISED	YES/NO	
1.2.5	APPLICABLE STANDARDS		
1.3	**BOXES FOR HOUSING 2 SWITCHES / SOCKETS**		
1.3.1	APPLICABLE STANDARDS		
1.3.2	MATERIAL AND GUAGE		
1.3.3	GALVANISED	YES/NO	
1.3.4	EARTHING TERMINAL PROVIDED	YES/NO	
1.3.5	MATERIAL AND THICKNESS OF COVER SHEET		
1.4	**EARTHING CONDUCTOR AND CLAMPS**		
1.4.1	MATERIAL		

1.4.2	SIZES FOR A) INDOOR LIGHTING SYSTEM B) OUTDOOR LIGHTING SYSTEM C) HAZARDOUS AREAS	 SWG/M M^2 SWG/M M^2 SWG/M M^2	
1.4.3	WHETHER SUITABLE EARTHING CLAMPS PROVIDED	YES/NO	
2.0	**SUPPLY ITEMS** TECHNICAL DATA FURNISHED IN DATA SHEET 'B' OF ENCLOSED RELEVANT SPECIFICATION	 YES/NO	
3.0	**POINT WIRING** THE FOLLOWING WILL BE SUPPLIED PER POINT BASIS OF INSTALLATION WORK :		
3.1	WIRE / CABLE : A) MINIMUM SIZE / VOLTAGE GRADE I) INDOOR LIGHTING II) RECEPTACLE III) OUTDOOR LIGHTING IV) HAZARDOUS AREA LIGHTING B) CONDUCTOR MATERIAL	YES/NO	
3.2	CONDUIT A) GALVANISED / BLACK ENAMELED B) MINIMUM SIZE / GUAGE	YES/NO	
3.3	REQUIRED CONTROL SWITCHES	YES/NO	
3.4	REQUIRED SWITCHES AND RECEPTACLES	YES/NO	
3.5	EARTHING SYSTEM	YES/NO	

5.31. DATASHEET-B LEAD ACID BATTERIES

1.0	Manufacturer's name		
2.0	Standards to which battery is manufactured		
3.0	Rated capacity		
3.1	At 27^0C and 10 hr discharge rate	Ah	
3.2	Capacity at minimum ambient temperature and the formulae used for calculations		
3.3	Capacity at high discharge rate at 27^0C at different end cell voltages (Enclose capacity rating factor curves)		
3.3.1	15 minutes	Ah	
3.3.2	30 minutes	Ah	
3.3.3	45 minutes	Ah	
3.3.4	1 hour	Ah	
3.3.5	2 hour	Ah	
3.3.6	3 hour	Ah	
3.3.7	4 hour	Ah	
3.3.8	5 hour	Ah	
3.3.9	6 hour	Ah	
3.3.10	7 hour	Ah	
3.3.11	8 hour	Ah	
3.3.12	9 hour	Ah	
3.4	Maximum Momentary current 1 minute	Amps	

3.5	Expected life of battery	Years	
4.0	Recommended charging rate		
4.1	Float charging voltage / current	V / A	
4.2	Trickle charging voltage / current	V / A	
4.3	Normal Boost charging voltage / current and duration (from fully discharged to fully charged state)	V / A	
4.4	Rapid Boost charging voltage / (current in 8 hours duration)	V / A	
4.5	Equalising charge		

	(a)	Voltage / current	V/A	
	(b)	Duration	Hrs	
	(c)	Interval between successive equalising charges and criteria to initiate the same	days	
5.0	Expected fault level at bus due to battery		kVA	
6.1	Internal resistance of each battery cell (fully charged)		Ohms	
6.2	Total Resistance of battery including resistance of inter-cell / inter row connectors		Ohms	
7.1	Ah efficiency at rated load		%	
7.2	Watt hour efficiency		%	
8.1	Type of positive plate			
8.2	No. of positive plates / cell			
8.3	No. of cells per battery, with recommended float voltage			
8.4	Whether the battery can meet the duty			

	cycle requirements with design margin, temperature correction factor , ageing factor etc., as specified (enclose battery sizing calculations)			
8.5	**Inter – cell / Inter – row connectors**			
	(a)	Type (lead, lead plated copper or lead plated aluminium)		
	(b)	Thickness of lead plating (shall be not less than 0.025 mm as measured in accordance with IS : 6848).		
8.6	Whether acid level indicators, included (applicable for opaque containers)			
8.7	Type of containers			
8.8	Type of cell			
9.0	Overall dimensions			
9.1	Each cell LxWxH			
9.2	Whether battery room size adequate (enclose dimensioned drawing indicating battery layout)			
10.0	Weight of each cell			
10.1	With electrolyte		kg	
10.2	Without electrolyte		kg	
11.0	Are the vent plugs explosion proof		Yes / No	
12.0	Ventilation requirements No. of air changes required		Changes/ Hr	
13.0	Whether copy of the Type test reports (for a similar type & rating battery) enclosed. (clause 9.2 of write-up)			
14.0	List of spares / accessories enclosed (Ref.		Yes / No	

	CL. 4 and CL. 10 of wirte-up)		
15.0	List of deviation enclosed	Yes / No	

5.32. DATASHEET-B SHUNT CAPACITORS

1.0	CAPACITOR BATTERY		
1.1	NAME OF MANUFACTURER		
1.2	TYPE		ALL PP (DOUBLE LAYER) /MIXED DIELECTRIC
1.3	REFERENCE STANDARDS		
1.4	RATED KVAR CAPACITY OF THE CAPACITOR BATTERY	KVAR	
1.5	RATED VOLTAGE/SERVICE VOLTAGE	VOLTS	
1.6	RATED FREQUENCY	HZ	
1.7	OUTPUT OF THE CAPACITOR BATTERY AT RATED VOLTAGE	KVAR	
1.8	TEMPERATURE RISE OVER THE SPECIFIED AMBIENT TEMPERATURE AS MENTIONED IN DATA SHEET - A	^{0} C	
1.9	A) HOTSPOT TEMPERATURE AT RATED CURRENT	^{0} C	
	B) MAXIMUM OPERATING TEMPERATURE	^{0} C	
1.10	CAPACITANCE	MICRO FARADS	
1.11	A) RATED LINE CURRENT	AMPS	
	B) MAXIMUM PERMISSIBLE OVERLOAD CURRENT	AMPS	
1.12	CAPACITOR LOSSES		
	A) FOR COMPLETE BATTERY	WATTS	
	B) FOR INDIVIDUAL UNITS	WATTS	
1.13	ELECTRICAL CLEARANCE IN THE BANK		
	A) PHASE TO PHASE	MM	
	B) PHASE TO EARTH	MM	
2.0	UNIT CAPACITORS		
2.1	RATED VOLTAGE	VOLTS	

2.2	RATED OUTPUT	KVAR	
2.3	NO. OF PHASES		
2.4	WHETHER SINGLE BUSHING OR MULTIBUSHING TYPE		
2.5	MAXIMUM OVERVOLTAGE THE UNIT CAPACITOR IS CAPABLE OF WITHSTANDING CONTINUOUSLY	%	
2.6	INSULATION STRENGTH TO EARTH		
2.7	NO OF CAPACITOR ELEMENTS PER CAPACITOR		
2.8	MODE OF INTERNAL CONNECTION OF THE CAPACITOR ELEMENT SKETCH ENCLOSED.	YES / NO	
2.9	a) TYPE OF ACTIVE ELEMENT b) WATT LOSS OF ACTIVE ELEMENT VARIOUS DIELECTRIC TEMPERATURE ENCLOSED c) THICKNESS d) ALTERNATING NOMINAL R.M.S. VOLTAGE STRESS ON THE DIELECTRIC ELEMENT	YES / NO MM VOLTS / MM	
2.10	a) TYPE OF IMPREGNANT USED b) PRESSURE AT WHICH THE IMPREGNANT IS KEPT WITHIN THE UNIT	KG / MM 2	
3.0	CAPACITOR FUSES		
3.1	RATING OF THE FUSE ELEMENT		
	A) CURRENT	A	
	B) VOLTAGE	V	
	C) RATED RESISTANCE	OHM	
	D) RATED CONTINUOUS WATTAGE	W	
	E) TYPE & MATERIAL		
3.2	STRENGTH OF THE FUSE ELEMENTS IN AMP 2 SEC AT WHICH IT MELTS.	AMP2 SEC.	

3.3	a) MATERIAL OF THE FUSE ELEMENT b) TYPE (INTERNAL/EXTERNAL)		
3.4	GRAPH OF THE ALLOWABLE I2T INTEGRAL OF THE FUSE ELEMENTS ENCLOSED	YES/NO	
4.0	DISCHARGE DEVICE		
4.1	RESISTOR a) RATED VOLTAGE b) RATED RESISTANCE c) RATED CONTINUOUS WATTAGE d) TYPE & MATERIAL	 V OHM W	
4.2	VOLTAGE TRANSFORMER		
	A) RATED VOLTAGE	KV	
	B) BASIC IMPULSE LEVEL	KV	
	C) VA BURDEN	VA	
	D) TYPE OF INSULATION USED		
	E) WEIGHT	KG	
	F) DIMENSIONS	MM	
	G) TECHNICAL LITERATURE SHOWING COMPLETE DESIGN FEATURES OF THE VT ENCLOSED	YES/NO	
	H) INDOOR/OUTDOOR		
5.0	SERIES REACTORS		
5.1	SERVICE		
5.2	TYPE		
5.3	NUMBER OF PHASES		
5.4	BASIC IMPULSE LEVEL	KV	
5.5	FREQUENCY	HZ	
5.6	REACTANCE	OHMS	
	(REACTANCE IN % OF CAPACITOR REACTANCE)		
5.7	NOMINAL CURRENT RATING	AMPS	

5.8	CONTINUOUS OVERCURRENT RATING	AMPS	
5.9	MAXIMUM SWITCHING SURGE WITHSTAND FOR EACH BANK		
	A) WITH REACTOR	KV	
	B) WITHOUT REACTOR	KV	
5.10	VOLTAGE RATING	KV	
5.11	SHORT CIRCUIT RATING	KA	
5.12	TYPE OF CONSTRUCTION		
	A) AIR CORE		
	B) IRON CORE		
	I) WITH SHIELDING II) WITHOUT SHIELDING		
5.13	TEMPERATURE RISE ABOVE DESIGN AMBIENT	^{0} C	
5.14	NOISE LEVEL	DB	
5.15	TYPE OF COOLING (N.A.C./M.O.C./S.N.I.L.C. ETC.)		
5.16	QUANTITY OF OIL, IF REQUIRED	LITRES	
5.17	TYPE OF OIL		
6.0	GENERAL		
6.1	OVERALL DIMENSIONS OF BANK AND UNITS	MM	
6.2	LAYOUT AND DIMENSION DRAWINGS ATTACHED	YES/NO	
7.0	BREAKERS/SWITCHFUSE DETAILS		
8.0	PROTECTION SCHEME DETAILS		
9.0	SWITCHING SCHEME DETAILS		
10.0	TYPE TEST CERTIFICATES ENCLOSED	YES/NO	

5.33. DATASHEET-B LED

SL. NO.	TECHNICAL PARAMETERS	SPECIFIC REQUIREMENRT	BIDDER TO CONFIRM
1	LIGHT SOURCE	HIGH POWER LED	
2	MAKE OF LED LAMPS	OSRAM / PHILIPS / LUMILED / CREE/ NICHIA	
3	LIGHTING DISTRIBUTION TYPE	CUT OFF/ SEMI CUT OFF TYPE AS PER IESNA TYPE II/ III LIGHTING DISTRIBUTION.	
4	LUMINARY EFFICACY	>100 LM/W +/- 5 %	
5	OPERATING VOLTAGE RANGE	140- 280V	
6	OPERATING VOLTAGE	230V • +/- 10%	
8	OPERATING FREQUENCY	50 HZ +/- 3% HZ	
9	TOTAL HARMONIC DISTORTION	CURRENT < 15%; VOLTAGE < 5%	
10	POWER FACTOR	>= 0.95	
11	OPERATING CURRENT	<700 MA	
12	USAGE HOURS	DUSK TO DAWN (12 HOURS)	
13	AUDIBLE NOISE	SHALL HAVE CLASS-A SOUND RATING WITH AUDIBLE NOISE IN POWER SUPPLY	

14	BEAM ANGLE	120 DEGREES (MINIMUM)	
15	LIFE SPAN	50000 BURNING HOURS WITH 80% LUMEN MAINTENANCE	
16	COLOR TEMPERATURE	5500 - 6000K (SUITABLE FOR “COOL WHITE” LIGHT)	
17	COLOR RENDERING INDEX (CRI)	MIN. 70	
18	UNIFORMITY RATIO (EMIN/ EAVG)	60%	
19	TRANSVERSE UNIFORMITY RATIO (EMIN/EMAX)	40%	
20	INGRESS PROTECTION	IP 66 FOR STREET LIGHTING	
	DRIVER:		
21	DRIVER EFFICIENCY	>90%	
22	OPTICAL EFFICIENCY	> 95%	
23	P/N JUNCTION TEMPERATURE	<100 DEGREES C AT JUNCTION POINT AND <60 AT HEAT SINK.	
24	SURGE IMMUNITY LEVEL	4.5 KV	
25	EARTHING	DRIVER UNIT SHALL HAVE PROVISION FOR PROPER GROUNDING	

26	SHORT CIRCUIT PROTECTION	RECOVERS AUTOMATICALLY AFTER FAULT CONDITION IS REMOVED.	
27	OVER VOLTAGE PROTECTION	SHOULD BE ABLE TO WITHSTAND 320V FOR MINIMUM 24 HOURS	
28	HIGH – LOW VOLTAGE CUTOFF	IN SIDE LUMINARY OR A DEVICE TO BE INSTALLED ON THE POLE IN AN IP PROTECTED BOX SUSTAINING 270V FOR HIGHER SIDE CUTOFF & 140 V ON LOWER SIDE CUTOFF-BEYOND& BELOW IT SHUT DOWN & RESTORE NORMAL WORKING CONDITION WHEN VOLTAGE	
29	HOUSING WITH SUPPLIER WORD MARK / NAME	ENGRAVED / EMBOSSING ON THE DIE CAST HOUSING/ BODY PART	
30	CONNECTING WIRES & CABLES USED	FRLS THREE CORE COPPER WIRE OF 2.5 MTR OUTSIDE LUMINARIE	
31	IMPACT RESISTANCE OF COMPLETE LUMINARIE	IK 05 OR ABOVE	

32	REPLACEMENT GUARANTEE OF COMPLETE LUMINARY	5 YEARS AGAINST ANY DEFECTS/FAULTS (IN CASE OF LUMEN DEPRECIATION BEYOND LIMIT OF L70, NON-WORKING ANY LED, DISCOLORATION IN LENS OR GLASS OR POLYCARBONATE COVER RESULTING INTO DEPRECIATION IN LUX LEVEL WITH RESPECT TO L70)	
33	FINISH	AESTHETICALLY DESIGNED HOUSING WITH POWDER COATED CORROSION RESISTANT HOUSING	
34	WORKING TEMPERATURE	-20 DEGREE TO 50 DEGREE	
35	WORKING HUMIDITY	10% TO 90% RH	

36	HOUSING	THE FIXTURE SHOULD COMPRISE OF A TOP CANOPY MADE OF DI-CAST HIGH PRESSURE ALUMINUM ALLOY OF ADEQUATE THICKNESS AND A LOWER PART COMPRISES OF UV RESISTANT ACRYLIC BOWL TOP FROSTED FOR VISUAL COMFORT	
37	CONSTRUCTION	LED'S ARE MOUNTED ON A CIRCULAR/ ARRAY MCPCB WHICH IS THERMALLY GLUED TO AN ALUMINUM SHEET PROVIDED WITH ALUMINUM FINS FIRMLY CONNECTED TO THE HOUSING FOR EXCELLENT HEAT DISSIPATION.	

TECHNICAL SPECIFICATIONS – BIDDER TO FILL

FOR

IBMS & IT SYSTEM

6. DATA SHEET FOR BUILDING MANAGEMENT SYSTEM

6.1. Direct Digital Control (DDC) Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to Specify	
2.	Model No	Bidder to Specify	
B.	**FEATURES**		
1.	Type	Microprocessor based fully programmable with onboard real time clock	
2.	Local display with DDC	Required ☐ Not Required ☒	
3.	Communication port	Required ☒ Not Required ☐	
4.	Memory	Non volatile memory	
5.	Network capability	Required ☒ Not Required ☐	
6.	Management function as alarm management, trending functions, remote management, access protection levels, time scheduling, data processing etc	Required ☒ Not Required ☐	
7.	Communication between DDC to DDC	Peer to Peer communication	
8.	Network interface	TCP/ IP	

Sr. No.	Description	Requirement	Bidder Comments
9.	Inputs to DDC	Digital inputs, Analog inputs	
10.	Outputs to DDC	Digital outputs, Analog outputs and PFC to drive auxiliary contactor	
11.	Numbers of I/O module	Refer I/O table sheet	
12.	Facility to expand I/O channels in each DDC	Required ☒ Not Required ☐	
13.	LED status for each I/O channel	Required ☒ Not Required ☐	
14.	Power supply	230VAC from UPS	
15.	Data back-up in case of power failure	Required ☒ Not Required ☐	
16.	Location of the DDC	Please refer floor layout	
17.	Final paint colour (Exterior)	RAL-7032	
18.	Final paint colour (Interior)	Glossy white	
19.	Heat dissipation	Bidder to Specify	
20.	Rating of relay contact	Bidder to Specify	
21.	Analog input/ output	Refer I/O table sheet	
22.	Digital input/ output	Refer I/O table sheet	
C.	**CONSTRUCTIONAL FEATURES**		
1.	Sheet material	CRCA-cold rolled prefabricated	
2.	Sheet material thickness	2mm	
3.	Gland plate thickness	3mm	

Sr. No.	Description	Requirement	Bidder Comments
4.	Neoprene gaskets for doors / covers	Required ☒ Not Required ☐	
5.	Cable entry	Bottom ☒ Top ☐ Side ☐	
6.	Lighting	Fluorescent (Fluorescent lamp of 40w shall be provided from one end of the panel to the other end at continuous length and shall be operated by the door switches as well as by manual switches.)	
7.	Name plates	Required ☒ Not Required ☐	
8.	SS metal tags for all instruments (to be tagged at all hardware inside panel)	Required ☒ Not Required ☐	
9.	Receptacle with fuse switch	Bidder to Specify (Note: Each section of the panels shall be provided with one each 3 pin receptacles for 230V,1P,50C/S)	
10.	Adequate maintenance space	Required ☒ Not Required ☐	
11.	Weight of the panel (total)	Bidder to Specify	
12.	Panel shall be powder coated with thickness of coating of min. 60 microns	Required ☒ Not Required ☐	
D.	**ENVIRONMENTAL CHARCTERISTICS**		

Sr. No.	Description	Requirement	Bidder Comments
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Weather protection class	Min. IP52 for indoor panels	
E.	**SPARE**		
1.	Quantity	Required	

6.2. FIRE DETECTION AND ALARM SYSTEM

6.2.1. Fire Alarm Control Panel Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Type	Microprocessor Based	
2.	Panel Location	1. Fire Command Centre, Ground Floor, Administration Building 2. Reception Area, Ground Floor, Training & Production Building 3. Ground Floor, Canteen Building	
B.	**DISPLAY ON PANEL**		
1.	Type	Backlit LCD	
2.	Lines X Characters	LCD, Alphanumeric, display of addresses, Minimum 80/160 characters	
3.	Parameters to be	1. Addresses	

Sr. No.	Description	Requirement	Bidder Comments
	displayed	2. Fire situation 3. Fire progression 4. Evacuation details 5. Fault Conditions	
4.	LED indication for:	1. Power ON 2. Fire alarm 3. Maintenance 4. Fault conditions	
5.	Programming facility	1. Keypad 2. Touch screen	
6.	Password and selectable access level	Required	
7.	Switches / Push buttons	Acknowledge, Silence and System reset	
C.	**PANEL CHARACTERISTICS**		
1.	Audio indication on alarm	Required	
2.	Fault isolation capability	Required	
3.	Alarm verification capability	Required	
4.	Sensitivity adjustment	Required	
5.	Sensor self test capability	Required	

Sr. No.	Description	Requirement	Bidder Comments
6.	Zone wise grouping	Required	
7.	Response time	10 Seconds (Max) for full loaded panel. Note: The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds.	
8.	Fault tolerant wiring capability	Required	
9.	No. of loops / Panel	4 Nos. Loops (Working + Spares for future) Spare cards shall be mounted inside the panel along with working cards	
10.	Expansion capability	Required	
11.	Minimum addressable points per loop	Each loop shall be loaded upto 80% of its capacity. However 20% spare shall be considered in each loop for future additional detectors / devices.	
12.	SLC loop cabling type	Style 6, class ‘A’ as per NFPA 72	
13.	Loop length supported	Upto 1.5 Km	
14.	Memory	NON-Volatile, NON-Erasable and NON-Rewritable	
15.	Networking	1. Panel to Panel 2. Panel to Repeater Panel 3. Panel to Graphical User Interface (GUI)	5.

Sr. No.	Description	Requirement	Bidder Comments
		4. PC to printer	
16.	Networking protocol	RS-485 or Ethernet	
17.	Degraded mode operation	Required	
18.	Redundancy for controller	Not Required	
19.	Event recorder	Required	
D.	**POWER**		
1.	Supply voltage to panel	230V - 10%, 50Hz, UPS mains supply	
2.	Operating current	Bidder to specify	
3.	Output voltage	Bidder to specify	
4.	Wattage consumption	Bidder to specify	
5.	Types of batteries	Sealed Maintenance Free (SMF) Note:- Battery shall be supplied having manufacturing date nearer to the supply date of battery.	
6.	Battery capacity	As per NFPA 72 Note:- Battery shall have sufficient capacity to power the fire alarm system under non alarm condition for a minimum of 24 hours and shall be capable of operating the system during emergency condition for a period of 15 minutes at maximum connected load, upon normal AC power failure. The full load shall consist of simultaneous operation of all sounders, operation	

Sr. No.	Description	Requirement	Bidder Comments
		of detectors at least 25% of zones (with minimum of two zones) and the operation of fault indicators.	
7.	Terminal blocks for mains supply	Required	
8.	Isolated earth bar for shield grounding	Required	
E.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Mounting	Wall ☒ Surface ☐ Flush ☐ Semi Flush ☐	
4.	Sheet thickness	1.6mm	
5.	Colour shade	Bidder to specify	
6.	Housing material	CRCA	
F.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Weather protection class	Min. IP 20 for indoor panels located in air condition space	
G.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	

Sr. No.	Description	Requirement	Bidder Comments
2.	Make	Bidder to specify	
3.	Model No	Bidder to specify	

6.2.2. Fire Alarm Repeater Panel Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**DISPLAY ON PANEL**		
1.	Type	Backlit LCD	
2.	Lines X Characters	Alpha-numeric, LCD display with minimum 80 character, with LED indications	
3.	Parameters to be displayed	1. Addresses 2. Fire situation 3. Fire progression 4. Evacuation details 5. Fault Conditions	
4.	LED indication for:	1. Power ON 2. Fire alarm 3. Maintenance 4. Fault conditions	
5.	Programming	1. Keypad	

Sr. No.	Description	Requirement	Bidder Comments
	facility	2. Touch screen	
6.	Password and selectable access level	Required	
7.	Switches / Push buttons	Acknowledge, Silence and System reset	
C.	**PANEL CHARACTERISTICS**		
1.	Audio indication on alarm	Required	
2.	Alarm verification capability	Required	
3.	Response time	10 Seconds (Max) for full loaded panel. Note: The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds.	
4.	Memory	NON-Volatile, NON-Erasable and NON-Rewritable	
5.	Networking	Required	
6.	Networking protocol	RS-485 or Ethernet	
D.	**POWER**		
1.	Supply voltage to panel	230V - 10%, 50Hz, UPS mains supply	
2.	Operating current	Bidder to specify	
3.	Output voltage	Bidder to specify	

Sr. No.	Description	Requirement	Bidder Comments
4.	Wattage consumption	Bidder to specify	
5.	Types of batteries	Sealed Maintenance Free (SMF) Note:- Battery shall be supplied having manufacturing date nearer to the supply date of battery.	
6.	Battery capacity	As per NFPA 72 Note:- Battery shall have sufficient capacity to power the fire alarm system under non alarm condition for a minimum of 24 hours and shall be capable of operating the system during emergency condition for a period of 15 minutes at maximum connected load, upon normal AC power failure. The full load shall consist of simultaneous operation of all sounders, operation of detectors at least 25% of zones (with minimum of two zones) and the operation of fault indicators.	
7.	Terminal blocks for mains supply	Required	
8.	Isolated earth bar for shield grounding	Required	
E.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Mounting	Wall ☒ Surface ☐ Flush ☐ Semi Flush ☐	

Sr. No.	Description	Requirement	Bidder Comments
4.	Sheet thickness	1.6mm	
5.	Colour shade	Bidder to specify	
6.	Housing material	CRCA	
F.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Weather protection class	Min. IP20 for indoor panels located in air condition space	
G.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	
2.	Make	Bidder to specify	
3.	Model No	Bidder to specify	

6.2.3. Fire Alarm Control Relay Module Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**MODULE CHARACTERISTICS**		
1.	Application	Activating conventional Sounder cum Strobe ☒	

Sr. No.	Description	Requirement	Bidder Comments
		To operate the dry contact for third party application ☐	
2.	Type	Microprocessor Based	
3.	Addressable	Required	
4.	Number of relay outputs in each module	1 No. ☒ 2 No. ☐ 4 No. ☐ 8 No. ☐	
5.	Type of relay contact / contact rating	Bidder to specify	
6.	Cabling	Two wire signal line circuit style 6, class 'A' as per NFPA-72	
7.	Built-in isolator	Not Required Note: In case of built-in isolator requirement the approval/ certification shall be VDS/ EN-54/ LPCB else UL/ FM approval/ certification shall be applicable.	
C.	**POWER**		
1.	Operating voltage	24 VDC (Loop powered)	
2.	Operating current	Bidder to specify	
3.	Wattage consumption	Bidder to specify	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	

Sr. No.	Description	Requirement	Bidder Comments
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Enclosure weather protection class	For Indoor IP54 For Outdoor IP65	
4.	Explosion proof enclosure		
5.	Hazardous area classification		
F.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	

6.2.4. Fire Alarm Heat Detector Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**DETECTOR CHARACTERISTICS**		
1.	Type	Microprocessor Based-Combination of Fixed ☒	

Sr. No.	Description	Requirement	Bidder Comments
		Temperature and Rate of Rise of Temperature ☐ Microprocessor Based-Fixed Temperature ☐ Microprocessor Based-Rate of Rise of Temperature	
2.	Addressable	Required	
3.	LED Status	Multi colored, multi status LED	
4.	Response Time	The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds	
5.	Terminals for connecting response indicator	Required (Bidder to consider fault isolator module after every 10 Nos. detectors/ devices for UL/ FM offered panel or inbuilt fault isolator base shall be provided for EN-54/ VDS/ LPCB offered panel. Bidder to provide necessary provision to connect the response indicator for any type of fire detectors.)	
6.	Sensor Coverage	Bidder to specify	
7.	Alarm set point for Heat	For fixed temperature type - $55^{O}C$ For rate of rise of temp.	

Sr. No.	Description	Requirement	Bidder Comments
		type 7^{O}C / Minutes	
8.	Sensitivity Adjustment	Required	
9.	Immune to false alarm	Required	
10.	Cabling	Two wire signal line circuit style 6, class 'A' as per NFPA-72	
11.	Built-in isolator	Not Required Note: In case of built-in isolator requirement the approval/ certification shall be VDS/ EN-54/ LPCB else UL/ FM approval/ certification shall be applicable.	
C.	**POWER**		
1.	Operating voltage	24 VDC (Loop powered)	
2.	Operating current	Bidder to specify	
3.	Wattage consumption	Bidder to specify	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
4.	Colour	Bidder to specify	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	

Sr. No.	Description	Requirement	Bidder Comments
F.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	

6.2.5. Fire Alarm Multi-Sensor Detector Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**DETECTOR CHARACTERISTICS**		
1.	Type	Microprocessor based, combination of smoke and heat detector (Fixed and Rate of Rise of Temperature type)	
2.	Addressable	Required	
3.	LED Status	Multi colored, multi status LED	
4.	Remote / Local Test Capability	Required	
5.	Response Time	The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds	
6.	Terminals for connecting	Required	

Sr. No.	Description	Requirement	Bidder Comments
	response indicator	(Bidder to consider fault isolator module after every 10 Nos. detectors/ devices for UL/ FM offered panel or inbuilt fault isolator base shall be provided for EN-54/ VDS/ LPCB offered panel. Bidder to provide necessary provision to connect the response indicator for any type of fire detectors.)	
7.	Sensor Coverage	Bidder to specify	
8.	Alarm set point for Heat	For fixed temperature type - $55^{O}C$ For rate of rise of temp. type $7^{O}C$ / Minutes	
9.	Sensitivity Adjustment	Required	
10.	Immune to false alarm	Required	
11.	Cabling	Two wire signal line circuit style 6, class 'A' as per NFPA-72	
12.	Built-in isolator	Not Required Note: In case of built-in isolator requirement the approval/ certification shall be VDS/ EN-54/ LPCB else UL/ FM approval/ certification shall be applicable.	
C.	**POWER**		
1.	Operating voltage	24 VDC (Loop powered)	
2.	Operating current	Bidder to specify	

Sr. No.	Description	Requirement	Bidder Comments
3.	Wattage consumption	Bidder to specify	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
4.	Colour	Bidder to specify	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
F.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	

6.2.6. Fire Alarm Beam Type Smoke Detector Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**DETECTOR CHARACTERISTICS**		
1.	Type	Reflective beam type smoke detector ☒ Projected beam ☐	

Sr. No.	Description	Requirement	Bidder Comments
		type smoke detector	
2.	Addressable	Required Note: In case bidders offers conventional beam detector, same shall be made addressable by providing addressable monitor module.	
3.	LED Status	Multi colored, multi status LED	
4.	Remote / Local Test Capability	Required	
5.	Response Time	The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds	
6.	Sensor Coverage	Bidder to specify	
7.	Alarm set point for Heat	Bidder to specify	
8.	Sensitivity Adjustment	Required	
9.	Immune to false alarm	Required	
10.	Cabling	Two wire signal line circuit style 6, class 'A' as per NFPA-72	
C.	**POWER**		
1.	Operating voltage	24 VDC	

Sr. No.	Description	Requirement	Bidder Comments
2.	Operating current	Bidder to specify	
3.	Wattage consumption	Bidder to specify	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
4.	Colour	Bidder to specify	
5.	Spacing & mounting	As per the norms of NFPA 72,2010 edition & as per manufacturer's instructions	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Weather protection class	For indoor application: IP 54	
F.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	

6.2.7. Fire Alarm Smoke Detector Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**DETECTOR CHARACTERISTICS**		
1.	Type	Microprocessor Base-Photoelectric Type	
2.	Addressable	Required	
3.	LED Status	Multi colored, multi status LED	
4.	Remote / Local Test Capability	Required	
5.	Response Time	10 Seconds Max. For Full Loaded Panel. Detectors Response Time Shall Be Suitable For The Same. Note: The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds.	
6.	Terminals for Connecting Response Indicator	Required	
7.	Sensor Coverage	Bidder to specify	
8.	Sensitivity Adjustment	Required	
9.	Immune to false alarm	Required	

Sr. No.	Description	Requirement	Bidder Comments
10.	Cabling	Two wire signal line circuit style 6, class 'A' as per NFPA-72	
11.	Detector Mounting Base	With Isolator ☐ Without Isolator ☒	
C.	**POWER**		
1.	Operating voltage	Bidder to specify	
2.	Operating current	Bidder to specify	
3.	Wattage consumption	Bidder to specify	
4.	Loop Powered	Required	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
4.	Colour	Bidder to specify	
5.	Spacing & mounting	As per the norms of NFPA 72,2010 edition & as per manufacturer's instructions	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Weather protection class	For indoor application: IP 65	
F.	**APPROVAL / CERTIFICATE**		

Sr. No.	Description	Requirement	Bidder Comments
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	

6.2.8. Fire Alarm Monitor Module Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**MODULE CHARACTERISTICS**		
1.	Application	To normally open dry-contact alarm activation devices	
2.	Type	Microprocessor Based	
3.	Addressable	Required	
4.	Number of relay outputs in each module	1 No. ☒ 2 No. ☐ 4 No. ☐ 8 No. ☐	
5.	Response time	The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds	
6.	Cabling	Two wire signal line circuit style 6, class ‘A’ as per NFPA-72	
7.	Built-in isolator	Not Required	

Sr. No.	Description	Requirement	Bidder Comments
		Note: In case of built-in isolator requirement the approval/ certification shall be VDS/ EN-54/ LPCB else UL/ FM approval/ certification shall be applicable.	
C.	**POWER**		
1.	Operating voltage	24 VDC (Loop powered)	
2.	Operating current	Bidder to specify	
3.	Wattage consumption	Bidder to specify	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Enclosure weather protection class	For Indoor IP54 For Outdoor IP65	
4.	Explosion proof enclosure	Bidder to specify	
5.	Hazardous area classification	Bidder to specify	
F.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-	Required	

Sr. No.	Description	Requirement	Bidder Comments
	54/ LPCB		

6.2.9. Manual Call Point (MCP) Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**MCP CHARACTERISTICS**		
1.	Type	Break glass type ☒ Push and pull type ☒ Lift and pull type ☒	
2.	Clear and visible operating instructions on the body	Required	
3.	The word "FIRE" indication on the front of MCP in raised letters, 1.75 inches (44 mm) or larger	Required	
4.	Response Time	The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds	
5.	Cabling	Two wire signal line circuit style 6, class ‘A’	

Sr. No.	Description	Requirement	Bidder Comments
		as per NFPA-72	
6.	Built-in isolator	Not Required Note: In case of built-in isolator requirement the approval/ certification shall be VDS/ EN-54/ LPCB else UL/ FM approval/ certification shall be applicable.	
C.	**POWER**		
1.	Operating voltage	24 VDC (Loop powered)	
2.	Operating current	Bidder to specify	
3.	Wattage consumption	Bidder to specify	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
4.	Colour	Bidder to specify	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Enclosure weather protection class	For Indoor IP54 For Outdoor IP65	
4.	Explosion proof enclosure	Bidder to specify	
5.	Hazardous area classification	Bidder to specify	

Sr. No.	Description	Requirement	Bidder Comments
F.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	
2.	ATEX/ CCOE	Not Required (For Explosion Proof type)	

6.2.10. SOUNDER cum STROBE Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**SOUNDER/ STROBE CHARACTERISTICS**		
1.	Type	Loop Powered ☐ Externally Powered ☒ Note: Externally powered through FACP.	
2.	Addressable	Required	
3.	Response time	The maximum allowable response delay from activation of an initiating device to receipt and display by the receiver/ fire alarm control unit shall be 10 seconds	
4.	dB level	90 db at 10 Feet from device	
5.	Light intensity	15/30/75/110 cd	
6.	Number of selectable tones	Minimum 4	

Sr. No.	Description	Requirement	Bidder Comments
7.	Cabling	Two wire signal line circuit style 6, class 'A' as per NFPA-72	
8.	Built-in isolator	Not Required Note: In case of built-in isolator requirement the approval/ certification shall be VDS/ EN-54/ LPCB else UL/ FM approval/ certification shall be applicable.	
C.	**POWER**		
1.	Operating voltage	24 VDC	
2.	Operating current	Bidder to specify	
3.	Wattage consumption	Bidder to specify	
4.	Power Supply	Bidder to specify	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
4.	Mounting	Wall ☒ Surface ☐ Structure beam ☐ Note: - All accessories shall be supplied and erected as applicable	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	

Sr. No.	Description	Requirement	Bidder Comments
2.	Humidity range	95%	
3.	Weather protection class	IP 65	
F.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS/ EN-54/ LPCB	Required	
2.	ATEX/ CCOE	Not Required (For explosion proof type)	

6.2.11. Fire Alarm Fault Isolator Module Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**MODULE CHARACTERISTICS**		
1.	Type	Microprocessor Based	
2.	Addressable	Required	
3.	After every numbers of detector/devices	10 nos.	
4.	Automatically resets on correction of short	Required	
5.	Wide viewing angle of LED	Required	
6.	Cabling	Two wire signal line circuit style 6, class ‘A’ as per NFPA-72	

Sr. No.	Description	Requirement	Bidder Comments
C.	**POWER**		
1.	Operating voltage	24 VDC (Loop powered)	
2.	Operating current	Bidder to specify	
3.	Wattage consumption	Bidder to specify	
D.	**MECHANICAL CHARACTERISTICS**		
1.	Dimensions	Bidder to specify	
2.	Weight	Bidder to specify	
3.	Material of Enclosure	Non Corrosive	
E.	**ENVIRONMENTAL CHARCTERISTICS**		
1.	Ambient temperature range	0-50°C	
2.	Humidity range	95%	
3.	Enclosure Weather protection class	For Indoor IP54 For Outdoor IP65	
F.	**APPROVAL / CERTIFICATE**		
1.	UL/ FM/ VDS	Required	

6.3. PUBLIC ADDRESS SYSTEM

6.3.1. Microphone Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
3.	Frequency range	100 Hz to 15 kHz	
4.	Sensitivity (mV)	Bidder to specify	
5.	Impedance: ≤ 600 Ohm	Bidder to specify	
6.	Dimensions	Bidder to specify	
7.	Weight	Bidder to specify	
8.	Colour	Bidder to specify	
9.	On/off switch	Required	
10.	Cable length	2 meter minimum	
11.	Connector	Lockable	
12.	Voltage range & current consumption for condenser type microphone	Bidder to specify	
13.	Operating temperature	0° to 50° C	
14.	Relative humidity	< 95%	
15.	Certificate	CE	
16.	Accessories	Bidder shall provide appropriate mounting accessories like microphone holder,	

Sr. No.	Description	Requirement	Bidder Comments
		extension cable, mounting bracket, table stand, floor stand to suit the site requirement and same shall be submitted to purchaser's approval	

6.3.2. Loudspeaker Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
3.	Maximum power (W)		
4.	Rated power/ wattage tapping (W)		
5.	Power tapping/ Rated voltage	100V & 70V	
6.	Sound Pressure Level (SPL)		
7.	Frequency Response		
8.	Colour		
9.	Rated impedance	Bidder to specify	
10.	Dimensions	Bidder to specify	
11.	Weight	Bidder to specify	
12.	Colour	Bidder to specify	
13.	Material	Aluminium/ ABS	
14.	Standards	CE, EN60065	
15.	Operating Temperature	0° to 50° C	

Sr. No.	Description	Requirement	Bidder Comments
16.	Related Humidity	<95%	
17.	IP rating	IP54	
18.	Ex-proof rating		

6.3.3. Desktop Call Station

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
3.	Microphone		
a)	Frequency Response: 100 Hz to 15 kHz		
b)	Sensitivity (mV)	Bidder to specify	
c)	Impedance: <600 Ohm		
d)	Type: Uni-directional Condenser Gooseneck		
e)	Signal to Noise Ratio: >60 dB		
f)	Load	Bidder to specify	
4.	Loudspeaker		
a)	Rated power	Bidder to specify	
b)	Signal to Noise Ratio: >60dB		
c)	Sound Pressure Level: 85 dB		
d)	Frequency Response: 100 Hz to 15 kHz		

Sr. No.	Description	Requirement	Bidder Comments
e)	Rated impedance	Bidder to specify	
5.	Material	Bidder to specify	
6.	Standards: CE, EN60065		
7.	Operating Temperature : 0° to 50° C		
8.	Related Humidity: <95%		
9.	Input voltage	Bidder to specify	
10.	Load (W)	Bidder to specify	
11.	Multi colour multi status LED: Required (for indication of active zones, emergency massages, power ON, error signals)		
12.	Attachment for add-on keypads : Required (No. of keypads shall be decided as per requirement considering no. of zones and multiprogramming key requirement)		
13.	Key station/ keypad: Required (keys shall be used for assigning zones and for multipurpose use)		
14.	Dimensions	Bidder to specify	
15.	Weight	Bidder to specify	
16.	Colour	Bidder to specify	
17.	Mounting: Desk mountable type		
18.	Mute button: Required (for inbuilt loudspeaker)		

Sr. No.	Description	Requirement	Bidder Comments
19.	3.5mm jack for headphone & microphone: Required		

6.4. CLOSED CIRCUIT TELEVISION SYSTEMS

6.4.1. CCTV Camera Specification

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
3.	Camera details	Colour - Day/ Night camera	
4.	Image sensor	1/3" CCD ☐ 1/3" CMOS ☒	
5.	Lens type	Fixed lens Varifocal lens IR corrected lens Motorized zoom lens	☒ ☒ ☒ ☐
6.	Lens format	Minimum 1/3", shall be compatible with image sensor	
7.	IR cut filter ☒ or IR corrected lens ☐	Required	
8.	IRIS	Automatic	
9.	F-STOP Range	F/1.4 to F/16	
10.	Sensitivity for usable video	Minimum 0.1 Lux @(F1.2,AGC ON), 0 Lux with IR	
11.	Resolution	WD1 (960×480)	

Sr. No.	Description	Requirement	Bidder Comments
12.	Automatic shutter	Required	
13.	Backlight compensation	Required	
14.	Wide dynamic range (WDR)	Required	
15.	Signal to noise ratio (SNR)	> 50dB (minimum)	
16.	Auto contrast adjustment	Required	
17.	Horizontal & vertical angle of view	70^0 Horizontal Minimum	
18.	White balance	Required	
19.	Video compression H.264 ☒ Motion JPEG ☐	Bidder to specify	
20.	Video data rate range	Bidder to specify	
21.	Frames per second for viewing	25 FPS	
22.	Frames per second for recording	15 FPS Minimum	
23.	Automatic gain control (AGC) 20 dB Minimum	Bidder to specify	
24.	Power supply	UPS Power	
25.	Housing	Box camera housing for indoor and outdoor use shall be vandal proof, rugged, durable, industrial grade, M.O.C is cast aluminium, with in-built heater /blower & sunshield.	
26.	IP Rating for indoor camera	IP52	

Sr. No.	Description	Requirement	Bidder Comments
27.	IP Rating for outdoor camera	IP66	
28.	Operating temperature	-10^0C to 60^0C For Outdoor camera -10^0C to 50^0C For Indoor camera	
29.	Operating humidity	95 RH	
30.	Mounting accessories	All necessary accessories are required	
31.	Tampering alarm	Required (tampering such as dis-focus/ move viewing direction/ masking)	
32.	Spares	10% or 1 no. (whichever is higher) shall be provided for each type of camera	
33.	Standards UL, CE	Required	

6.4.2. CCTV MONITOR SPECIFICATION

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
3.	Display size	32”	
4.	Resolution	1920 X 1080	
5.	Dynamic contrast ratio	Required	
6.	Wide colour enhancer	Required	

Sr. No.	Description	Requirement	Bidder Comments
7.	Aspect ratio	16:9	
8.	Audio	Not required	
9.	Connectivity: VGA HDMI : 2 ports (Minimum)	Required	
10.	Mounting	Wall ☒ Desk ☐	
11.	Power supply	110 V AC ☐ 230 V AC ☒	
12.	Power consumption	Bidder to specify	
13.	Dimensions : (W x H x D)	Bidder to specify	
14.	Weight	Bidder to specify	
15.	Accessories	As required for proper operation	

6.4.3. DVR (Digital Video Recorder) SPECIFICATION

Sr. No.	Description	Requirement	Bidder Comments
A.	**GENERAL**		
1.	Make	Bidder to specify	
2.	Model No	Bidder to specify	
B.	**Video Input**		
1.	Video Compression	H.264	
2.	Video Input	4 Channel 8 Channel 16 Channel	

Sr. No.	Description	Requirement	Bidder Comments
C.	**Video Output**		
1.	HDMI/VGA Output	1920 X 1080	
2.	Encoding Resolution	WD1	
3.	Frame Rate	25 FPS or better	
D.	**Hard Disk**		
1.	SATA	2 SATA Interface	
2.	Capacity	Minimum 30 Days	
E.	**External Interface**		
1.	Network Interface	RJ45	
2.	Serial Interface	RS-485	
3.	USB Interface	USB 2.0	
F.	**Power**		
1.	Power Supply	12 VDC	
2.	Consumption	20 W	
G.	**Mechanical Properties**		
1.	Dimensions	Bidder to Specify	
2.	Weight	Bidder to Specify	
H.	**Environmental Properties**		
1.	Temperature	-10^0C to 50^0C	
2.	Humidity	95 RH	

TECHNICAL SPECIFICATIONS – BIDDER TO FILL

FOR

EXTERNAL SERVICES

7. DATA SHEET FOR EXTERNAL SERVICES

7.1. DATA SHEET FOR HORIZONTAL CENTRIFUGAL PUMP

7.1.1. DATA SHEETS B

1.	DESIGNATION		
2.	NUMBER OFFERED		
3.	TAG NUMBERS		
4.	PUMP MAKE AND MODEL NUMBER		
5.	DESIGN CAPACITY	M^3/Hr	
6.	DIFFERENTIAL HEAD	MLC	
7.	SHUT-OFF HEAD	MLC	
8.	HYDROSTATIC TEST PRESSURE	$Kg/cm^2(g)$	
9.	NUMBER OF STAGES		
10.	PUMP EFFICIENCY AT DUTY POINT	%	
11.	PUMP SPEED	RPM	
12.	PUMP BKW	KW	
13.	MAXIMUM PUMP POWER REQUIREMENT	KW	
14.	POWER INPUT TO DRIVER AT DUTY POINT	KW	
15.	METHOD OF LUBRICATION		
17.	NPSH REQUIRED	MLC	
18.	DRIVER RATING	KW	
19.	DRIVER SPEED	RPM	
20.	DRIVER EFFICIENCY	%	
21.	SUCTION NOZZLE		

21.1	ORIENTATION		
21.2	SIZE	mm NB	
22.	DISCHARGE NOZZLE		
22.1	ORIENTATION		
22.2	SIZE	mm NB	
23.	TYPE AND MAKE OF MECHANICAL SEAL		
24.	TYPE OF COUPLING		
25.	MINIMUM CAPACITY FOR CONTINUOUS	M^3/Hr	
	OPERATION		
26.	MAXIMUM ALLOWABLE SIZE OF SOLIDS	mm	
27.	EXTERNAL WATER REQUIREMENT FOR		
	COOLING		
27.1	FLOW RATE	M^3/Hr	
27.2	PRESSURE	$Kg/cm^2(g)$	
28.	EXTERNAL WATER REQUIREMENT FOR		
	SEALING		
28.1	FLOW RATE	M^3/Hr	
28.2	PRESSURE	$Kg/cm^2(g)$	
29.	WEIGHT OF BARE PUMP	Kg	
30.	WEIGHT OF DRIVER	Kg	
31.	WEIGHT OF COMMON BASE PLATE	Kg	
32.	MOMENT OF INERTIA OF PUMP ROTOR	$Kg\text{-}M^2$	
33.	ACCESSORIES AS PER DATA SHEET		WHETHER INCLUDED

	A TO		
	BE INCLUDED		YES NO
34.	OUTLINE DIMENSIONAL DRAWING TO BE		WHETHER ENCLOSED
	ENCLOSED		YES/NO
35.	FOUNDATION DRAWING WITH STATIC		WHETHER ENCLOSED
	AND DYNAMIC LOADS TO BE ENCLOSED		YES/NO
36.	CROSS-SECTION DRAWING OF PUMP		
	WITH PART LIST AND MATERIALS OF		WHETHER ENCLOSED
	CONSTRUCTION AND RELEVANT		YES/NO
	STANDARDS TO BE ENCLOSED		
37.	PERFORMANCE CURVES FLOW RATE Vs		
	HEAD, BKW, EFFICIENCY, NPSHR AND		WHETHER ENCLOSED
	TORQUE-SPEED CURVE TO BE ENCLOSED		YES/NO
38.	PERFORMANCE GUARANTEE		
38.1	CAPACITY	M^3/Hr	(+) (-)
38.2	DIFFERENTIAL HEAD	MLC	(+) (-)
38.3	POWER CONSUMPTION	KW	(+) (-)

7.1.2. DATA SHEETS C

Data to be furnished by the vendor after the issue of purchase order

1. List of drawings and documents to be submitted for review, approval and information with scheduled submission dates

2. Quality Assurance Plan (QAP)

3. Detailed dimensioned general arrangement drawing of pump and driver. This drawing shall indicate all the design data and information furnished in data sheets B.

4. Foundation drawing of pump and driver with static and dynamic loads, details of fixing, grouting and all relevant data required for design of foundation

5. Cross-section drawing of the pump with complete part list, materials of construction and relevant standards for each part

6. Pump performance curves flow rate Vs head, BKW, efficiency, NPSHR from zero flow to maximum flow and torque-speed curve

7. Scheme for pump sealing, lubrication and cooling

8. Driver dimensional drawing

9. Surface preparation and painting procedures

10. Catalogues, data sheets and drawings for instruments

11. Installation, operation and maintenance manual along with lubrication schedule.

7.2. DATA SHEET FOR DOSING PUMP

7.2.1. DATA SHEETS B

1.	SYSTEM DESIGNATION		
2.	TAG NUMBERS		
3.	PUMP MAKE AS PER APPROVED SUB-VENDOR LIST/ MODEL NUMBER		

4.	PUMP DESIGN/ MAXIMUM CAPACITY	LPM/LPH	/
5.	MAXIMUM DISCHARGE PRESSURE	$Kg/cm^2(g)$	
6.	PUMP SPEED - MAXIMUM	RPM OR STROKE S/Hr	
7.	MOTOR RATING	KW	
8.	MOTOR SPEED	RPM	
9.	MOTOR MAKE - AS PER APPROVED SUB-VENDOR LIST		
10.	WEIGHT OF COMPLETE PUMP AND MOTOR ASSEMBLY	Kg	
11.	OUTLINE DIMENSIONAL DRAWING WITH DETAILS OF PUMP AND MOTOR TO BE ENCLOSED		WHETHER ENCLOSED YES/ NO
12.	CROSS-SECTION DRAWING OF PUMP WITH PART LIST AND MOC TO BE ENCLOSED		WHETHER ENCLOSED YES/ NO

7.2.2. DATA SHEETS C

Data to be furnished by the vendor after the issue of purchase order

1. List of drawings and documents to be submitted for review, approval and information with scheduled submission dates

2. Quality Assurance Plan (QAP)

3. Detailed dimensioned general arrangement drawing of pump and driver. This drawing shall indicate all the design data and information furnished in data sheets B.

4. Foundation drawing of pump and driver with static and dynamic loads, details of fixing, grouting and all relevant data required for design of foundation

5. Cross-section drawing of the pump with complete part list, materials of construction and relevant standards for each part

6. Pump performance curves flow rate Vs head, BKW, efficiency, NPSHR from zero flow to maximum flow and torque-speed curve

7. Scheme for pump sealing, lubrication and cooling

8. Driver dimensional drawing

9. Surface preparation and painting procedures

10. Catalogues, data sheets and drawings for instruments

11. Installation, operation and maintenance manual along with lubrication schedule.

7.3. DATA SHEET FOR SUBMERSIBLE PUMP (Raw Sewage from Equalisation Tank)

7.3.1. DATA SHEETS B

	DATA TO BE FURNISHED BY BIDDER		
1.0	GENERAL		
1.1	Make		
1.2	Model		
2.0	PUMP		
2.1	Capacity	M^3 / hr.	
2.2	Total head	MLC	
2.3	Shut - off head	MLC	
2.4	Speed	RPM	
2.5	Combined pump and motor efficiency	%	

2.6	Solid handling capacity	mm	
3.0	MOTOR		
3.1	Motor type		
3.2	Motor rating		
3.3	Motor Cooling Arrangement		
3.4	Class of insulation		
3.5	Output of Motor	kW	
3.6	Power factor		
3.6.1	Full load		
3.6.2	3/4 load		
3.7	Starting current	Amp.	
3.8	Degree of protection		
3.9	Cable size		
3.10	Voltage drop per 10 metre cable length		
4.0	CONSTRUCTION DETAILS		
4.1	Impeller type		

4.2	Number of impeller vanes		
4.4	Moment of inertia with entrained sewage	kg - m^2	
4.5	Weight of pump, motor, and cables	kg	

7.3.2. DATA SHEETS C

Data to be furnished by the vendor after the award of contract

1. Final overall dimensional assembly drawings for the pump set. These shall show all the major parameters of the pump set.
2. Civil drawings, with the details of fixing, grouting, sealing, net weights, clearances and any other relevant data required for the design of civil structure.
3. Cross sectional drawings for pump set with the complete bill of materials.
4. Motor drawings with details of cable entry, grounding etc.
5. Operation and maintenance manual.

Only the drawing listed under item 3 above will be reviewed and approved by PURCHASER. All other data/ drawings are for PURCHASER's reference only.

7.4. DATA SHEET FOR AIR BLOWER

7.4.1. DATA SHEETS B

A.	GENERAL		
1.	DESIGNATION		AIR BLOWER FOR
2.	NUMBER OFFERED		(W + S)
3.	TAG NUMBERS		
4.	MAKE AND MODEL NUMBER		
5.	AMCA ARRANGEMENT NUMBER		

B.	DESIGN AND PERFORMANCE		
6.	CAPACITY (FAD) NORMAL/ MAXIMUM	M^3/Hr	/
7.	VACUUM CREATED		cm Hg VACUUM
8.	DISCHARGE PRESSURE	Kg/cm^2g	
9.	SELECTED SPEED OF BLOWER	RPM	
10.	CASING MATERIAL/THICKNESS		/ mm
11.	IMPELLER OR ROTOR DIAMETER	mm	
12.	IMPELLER OR ROTOR MATERIAL/ THICKNESS		/ mm
13.	SHAFT MATERIAL/DIAMETER		/ mm
C.	ACCESSORIES		
14.	MATERIAL OF CONSTRUCTION/ EFFICIENCY OF AIR FILTER		/
15.	PRESSURE DROP ACROSS AIR FILTER	mm WC	MAXIMUM
16.	SIZE/MATERIAL OF CONSTRUCTION OF CASING DRAIN VALVE		mm NB/
17.	SIZE/MATERIAL OF CONSTRUCTION OF RELIEF VALVE		INLET___INCH, OUTLET___ INCH ORIFICE_____ /
18.	SIZE/MATERIAL OF CONSTRUCTION OF OUTLET DAMPER		mm/
19.	VIBRATION DAMPENING PADS		CUSHYFOOT(DUNLOP)/

D.	DRIVE DATA		MOTOR	COUPLING	V-BELT
20.	TYPE				
21.	MAKE				
22.	MODEL NUMBER				

23.	ABSORBED POWER AT SHAFT	KW		NA	NA
24.	POWER INPUT AT DUTY POINT	KW		NA	NA
25.	RATING	KW			
26.	SPEED	RPM			
27.	REDUCTION RATIO		NA	NA	
28.	EFFICIENCY	%		NA	
29.	SERVICE FACTOR		NA		
E.	MISCELLANEOUS				
30.	NOISE LEVEL AT 1.5 M DISTANCE FROM BLOWER	dBA			
31.	WEIGHT OF ENTIRE UNIT MOUNTED ON COMMON BASE PLATE	Kg			
32.	TOTAL DYNAMIC LOAD	Kg			
33.	DOCUMENTS TO BE ENCLOSED		WHETHER ENCLOSED		
34.	GENERAL ARRANGEMENT DRAWING WITH MAJOR DIMENSIONS		YES/NO		
34.1	PART LIST WITH CODES AND MATERIALS OF CONSTRUCTION		YES/NO		
34.2	PERFORMANCE CURVE WITH DUTY POINT MARKED		YES/NO		
34.3	SELECTION CHARTS OR CURVES		YES/NO		
34.4	LIST OF START-UP SPARES		YES/NO		
34.5	LIST OF RECOMMENDED SPARES FOR 2 YEARS NORMAL OPERATION		YES/NO		
F.	PERFORMANCE GUARANTEES				
35.	CAPACITY (FAD)	M^3/Hr	(+) (-)		
36.	DISCHARGE PRESSURE	Kg/cm^2g	(+) (-)		
37.	POWER CONSUMPTION	KW	(+) (-)		

7.4.2. DATA SHEETS C

Data to be furnished by the vendor after the issue of purchase order

1.0 List of drawings and documents to be submitted for review, approval or information with scheduled submission dates.

2.0 Quality Assurance Plan (QAP)

3.0 Drawings showing outline dimensions, clearance dimensions for disassembly, weight, part numbers, materials of construction, test pressures, statutory and any special requirements, sizes, tag numbers and quantities. All information covered in data sheets A and B shall be incorporated in this drawing. The PURCHASER'S identifying tag numbers shall be shown on each drawing or on a sheet attached to the drawing with proper cross-references.

4.0 Operation and maintenance manuals