TECHNICAL SCHEDULES

TO BE FILLED BY BIDDER

Refer ITB 11.1 (b)

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

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TECHNICAL SPECIFICATIONS – BIDDER TO FILL

FOR

PLUMBING SYSTEM

PURCHASER : MINISTRY OF MICRO, SMALL AND MEDIUM ENTERPRISES, MUMBAI

PROJECT : MSME TECHNOLOGY CENTER, MUMBAI

LOCATION : MUMBAI, MAHARASHTRA

CONSULTANT : TATA CONSULTING ENGINEERS LIMITED

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 : ℃
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
51.	
52.	
53.	
54.	
55.	
56.	
57.	
58.	
59.	
60.	
61.	
62.	
63.	
64.	
65.	
66.	
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. 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

PURCHASER : MINISTRY OF MICRO, SMALL AND MEDIUM ENTERPRISES, MUMBAI

PROJECT : MSME TECHNOLOGY CENTER, MUMBAI

LOCATION : MUMBAI, MAHARASHTRA

CONSULTANT : TATA CONSULTING ENGINEERS LIMITED

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. JUNCTION BOXES

Sr. No.	Description	Qty.	Bidder	
	GENERAL			
1.	Manufacturer			
2.	Model No.			
	FEATURE			

Sr. No.	Description	Qty.	Bidder	
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			
	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 SHEET 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 SHEET FOR HYDRANT VALVE

2.3.1. DATA SHEET B

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

2.3.2. DATA SHEET 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

2.4. DATA SHEET FOR BRANCH PIPES AND NOZZLES

2.4.1. DATA SHEET 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.			

	Sl.no.	Item	Unit	Bidder:
	13.			
	14.			
	15.			
	16.			

2.4.2. DATA SHEET 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

2.5. DATA SHEET FOR FIRE HOSES WITH COUPLING

2.5.1. DATA SHEET 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.			

2.5.2. DATA SHEET 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

2.6. DATA SHEET FOR FIRE HOSES CABINETS

2.6.1. DATA SHEET 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.			

2.6.2. DATA SHEET 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

2.7. DATA SHEET FOR FIRE HOSES REELS

2.7.1. DATA SHEET 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

2.7.2. DATA SHEET 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

2.8. DATA SHEETS FOR PORTABLE FIRE EXTINGUISHERS

2.8.1. DATA SHEET 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					

2.8.2. DATA SHEET 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

2.9. VALVES AND SPECIALITIES GENERAL REQUIREMENTS

2.9.1. 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.

2.9.2. 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.

2.9.3. 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.

2.9.4. 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.			
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				

Sl. No.	Item	Unit	
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 / 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		

Sl. No.	Item	Unit	
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		
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.

2.9.5. 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

2.10. FIRE WATER PIPING GENERAL REQUIREMENTS

2.10.1. DATA SHEET B

op	1. Supply of pipes and fittings:	sig n	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.

2.11. FIRE UNDERGROUND PROTECTION FOR PIPING

2.11.1. (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	

2.12. LOW VOLTAGE INDUCTION MOTORS

2.12.1. 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			

2.12.2. 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

PURCHASER : MINISTRY OF MICRO, SMALL AND MEDIUM ENTERPRISES, MUMBAI

PROJECT : MSME TECHNOLOGY CENTER, MUMBAI

LOCATION : MUMBAI, MAHARASHTRA

CONSULTANT : TATA CONSULTING ENGINEERS LIMITED

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)	Ducatble -
	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	Dakin/ 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. AIR WASHER DATA SHEET for BIDDER:

	SL. NO.	ITEM		
GENERAL	1.	DESIGNATION		AIR WASHER FOR
	2.	NUMBERS OFFERED		(W + S)
	3.	TAG NUMBERS		
	4.	MAKE, MODEL NUMBER AND PLACE OF		
		MANUFACTURE		
	5.	OVERALL SIZE L x B x H	mm	x x
	6.	EPOXY PAINTING OF CS MATERIALS		YES / NO
DESIGN DATA	7.	TYPE OF AIR WASHER		SPRAY TYPE / RIGID MEDIA PAD TYPE
	8.	AIR HANDLING CAPACITY	M^3/Hr	
	9.	SATURATION EFFICIENCY	%	
	10.	MAXIMUM FACE AIR VELOCITY	M/Sec	
	11.	AIR SIDE PRESSURE DROP	mmWC	
	12.	RECIRCULATING WATER FLOW RATE	M^3/Hr	
	13.	MAKE-UP WATER FLOW RATE	M^3/Hr	
	14.	SPRAY TYPE		
	14.1	NUMBER OF SPRAY BANKS		
	14.2	NUMBER OF SPRAY NOZZLES PER SPRAY BANK		
	14.3	NUMBER OF FLOODING NOZZLES		
	14.4	CAPACITY OF EACH SPRAY NOZZLE	M^3/Hr	
	14.5	CAPACITY OF EACH FLOODING NOZZLE	M^3/Hr	
	14.6	PRESSURE DROP THROUGH SPRAY NOZZLE	Kg/cm^2	
	14.7	PRESSURE DROP THROUGH FLOODING		
		NOZZLE	Kg/cm^2	

	14.8	PRESSURE REQUIRED AT INLET OF SPRAY		
		HEADER	Kg/cm^2 g	
	SL. NO.	ITEM		
DESIGN DATA (CONTINUED)	14.9	PRESSURE REQUIRED AT INLET OF		
		FLOODING NOZZLE HEADER	Kg/cm^2 g	
	14.10	NUMBER OF SUCTION SCREENS		
	14.11	SIZE OF EACH SUCTION SCREEN L x B	mm	x
	15.	RIGID MEDIA PAD TYPE		
	15.1	DEPTH OF PAD	mm	
	15.2	OVERALL SIZE OF PAD L x B	mm	x
	15.3	METHOD OF CLEANING		
	15.4	FREQUENCY OF CLEANING	DAYS	
MATERIALS OF CONSTRUCTION	16.	TANK		
	17.	CATWALK		
	18.	AIR DISTRIBUTION PLATES		
	19.	SPRAY NOZZLES		
	20.	FLOODING NOZZLES		
	21.	INSPECTION DOOR		
	22.	ELIMINATOR PLATES		
	23.	SUCTION SCREEN		
	24.	PAD FOR RIGID MEDIA PAD TYPE		
ACCESSORIES		TO BE INCLUDED		YES / NO
	25.	MAKE-UP WITH FLOAT VALVE AND		
		QUICK-FILL CONNECTIONS WITH ISOLATING		YES / NO
		VALVE, ETC.		
	26.	DRAIN WITH ISOLATING VALVE AND		
		OVERFLOW CONNECTION, ETC.		YES / NO
	27.	MARINE LIGHTS		YES / NO
	28.	INSPECTION DOOR		YES / NO
	29.	SUPPORTING FRAME WORK FOR ITEMS AT		
		SL. NO. 16 TO 24 AND 27 ABOVE		YES / NO

	SL. NO.	ITEM		
		TO BE INCLUDED		YES / NO
	30.	WATER LEVEL SWITCH WITH ALARM AND INTERLOCKING WITH PUMP		YES / NO
	31.	ACCESS LADDERS WITH HANDRAILS AND MONKEY LADDERS		YES / NO
	32.	SUCTION SUMP COVER		YES / NO

3.6. 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	

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 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	45
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)	25/ 16 52.5/ 33.6
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 SPECIFICATION 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 50 x10 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.		25/ 16 52.5/ 33.6
4.5	SHORT CIRCUIT WITHSTAND CURRENT FOR 1 SEC. DURATION	kA	25/ 16
4.6	RATED MAKING CURRENT	kA(PEAK	
4.7	RATED CURRENT AT SITE REFERENCE AMBIENT TEMPERATURE	A	REFER 415V SLD TCE-10106A-4000-AU-40101.
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			

5.2. 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: ☑	

5.3. 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		ONE
1.4	RATED CAPACITY	KVAR	250
1.5	RATED VOLTAGE	VOLTS	415
1.6	FREQUENCY	Hz	50
1.7	NO OF PHASES		3
1.8	EXPECTED POWER FACTOR		0.99 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	45
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-40101
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 PERCENTAGE		7%
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		

5.4. 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		

5.5. 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	200
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)	25
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-40101
2.9	PHASE TRANSPOSITION CHAMBER		BY BIDDER
2.10	NEUTRAL BUS		REFER SLD DWG NO. TCE-10106A-4000-AU-40101
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 25KA.
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.		

5.6. 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

5.7. 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

5.8. 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

5.9. DATA SHEET A2 CABLING ACCESSORIES, 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 ☐

5.10. 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		40 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)		45^0 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
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

5.11. 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

5.12. 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	45
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**		

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

5.13. 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

5.14. 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	45 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

5.15. 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.

5.16. DATASHEET-A1 LIFT

SL. NO.	DESCRIPTION	SPECIFICATION REQUIREMENT
1 GENERAL	1. LIFT CATEGORY	A) PASSENGER LIFT
		B) GOODS LIFT
	2. QUANTITY	1 NO EACH
	3. INSTALLATION	
		I INDOOR
		~~O OUTDOOR~~
	4. HAZARDOUS AREA CLASSIFICATION (IS 5572)	*
	5. CORROSIVE LOCATION	*
	6. SEISMIC ACCELERATION FACTOR	*
	7. POWER SUPPLY	415V, 3 PH, 3 WIRE SUPPLY
	8. OVERHEAD HEIGHT AVAILABLE	*
	9. PIT DEPTH AVAILABLE	*
2 LIFT PARTICULARS	1. MAKE	*
	2. RATED LOAD	
		A) SINGLE POINT LOAD (KG)
		B) UNIFORMLY DISTRIBUTED LOAD (KG)
	3. CAPACITY (IN KG.)	*
	4. CAPACITY (NO OF PERSON)	*
	5. RATED SPEED M/SEC	1.5 M/SEC FOR PASSENGER LIFT 0.75 M/SEC FOR GOODS LIFT
	6. TOTAL RISE M	*
	7. NO OF FLOORS SERVED	*
	8. LIFT WELL DRAWING NUMBER (ENCLOSED)	*
	9. LIFT WELL DIMENSIONS MM X MM	*
	10. LIFT CAR DIMENSIONS MM X MM	*
	11. LEVELLING ZONE	*

	12. NO. OF DOORS IN THE CAR	*
3 LIFT CONTROL OPERATION	1.CONTROL TYPE	~~A) SINGLE SPEED AC~~
		~~B) TWO SPEED AC~~
		C) VARIABLE VOLTAGE MOTOR CONTROL
		D) VARIABLE VOLTAGE VARIABLE FREQENCY (VVVF)
	2. OPERATION	A) NON AUTOMATIC
		B) SEMI AUTOMATIC
		C) AUTOMATIC WITH ATTENDANT (WITH OR WITHOUT KEY)
		D) AUTOMATIC WITHOUT ATTENDANT
	3. AUTOMATIC OPERATION TYPE	A) NON SELECTIVE COLLECTIVE
		B) SELECTIVE COLLECTIVE
		C) SINGLE AUTOMATIC
		D) GROUP AUTOMATIC
		E) CAR SWITCH OPERATION
		F) SIGNAL OPERATION
		G) SINGLE/DOUBLE BUTTON OPERATION
	4. LEVELLING DEVICE	A) LIFT CAR
		B) ONE WAY AUTOMATIC
		C) TWO WAY AUTOMATIC MAINTAINING
		C) TWO WAY AUTOMATIC NON MAINTAINING
4 OPERATING DEVICES	1. IN THE CAR(YES/NO)	A) UP PUSH BUTTON
		B) DOWN PUSH BUTTON
		C) NUMBER PUSHBUTTONS FOR EACH LANDING
		D) NON STOP PUSH BUTTON
		E) DOOR OPEN PUSH BUTTON
		F) DOOR CLOSE PUSH BUTTON
		G) ALARM PUSH BUTTON

		H) EMERGENCY STOP PUSH-BUTTON
		I) KEY OPERATED SELECTOR FOR ATTENDANT OPERATION
	2. IN THE LANDING (YES/NO)	A) UP PUSH BUTTON
		B) DOWN PUSH BUTTON
		C) LIFT PUSH BUTTON
		D) BELL PUSH BUTTON
	3. IN THE MACHINE ROOM (YES/NO)	A) UP PUSH BUTTON
		B) DOWN PUSH BUTTON
		C) HAND CRANKING DEVICE
		D) STOP PUSH BUTTON
		E) SLOW SPEED OPERATION SELECTOR
	4. ON THE TOP OF THE CAR (YES/NO)	A) UP PUSH BUTTON
		B) DOWN PUSH BUTTON
		C) STOP PUSH BUTTON
		D) 240 V 1F RECEPTACLE
5 INDICATING DEVICES	1. IN THE CAR (YES/NO)	A) UP DIRECTION OF TRAVEL
		B) DOWN DIRECTION OF TRAVEL.
		C) FLOOR POSITION INDICATOR (ILLUMINATED NUMERAL FOR EACH LANDING)
		D) LANDING CALL REGISTERING UNIT (WITH BUZZER & REGISTRATION CANCELLING UNIT & LAMP TEST PUSH BUTTON)
		E) BUILDING NAME DISPLAY :
		F) CAPACITY INDICATOR
		G) OVERLOAD WARNING INDICATOR
		H) DIGITAL TEMPERATURE INDICATOR

	2. IN THE LANDING (YES/NO)	A) UP DIRECTION OF TRAVEL
		B) DOWN DIRECTION OF TRAVEL
		C) LOCATION OF DIRECTION INDICATOR
		D) CAR POSITION INDICA-TOR (ILLUMINATED NUM-ERALS FOR EACH LANDING)
		E) LOCATION OF THE POSITION INDICATOR
		F) CALL REGISTERED INDICATOR
		G) LIFT ENGAGED INDICATOR
		H) CALL REGISTERED UP INDICATOR
		I) CALL REGISTERED DOWN INDICATOR
		J) LIFT OUT OF ORDER
6 CAR AND LANDING DOORS	1.TYPE OF DOORS	A) CENTRE OPENING SLIDING
		B) MID BAR COLLAPSIBLE
		C) SINGLE SLIDE
		~~D) SWING~~
		~~E) VERTICAL BIPARTING~~
		~~F) TWO SPEED SLIDING~~
		~~G) VERTICAL LIFTING~~
	2. DOOR OPERATOR	
	3. VISION PANELS IN DOORS	
	4. COLOUR SHADE FOR OUTSIDE LANDING DOORS	
	5. COLOUR SHADE FOR CAR DOOR	
	6. MATERIAL OF THE DOOR	
	7. CAR INSIDE PANELS FINISH	
	8. CAR & LANDING DOOR PANELS FINISH	
	9. FLOORING MATERIAL	
	10. FALSE CEILING	
	11. ENTERANCE DOOR MINIMUM DIMENSIONS	
	12. INFRA RED DOOR PROTECTION DEVICE	
	13. CAR SAFETY	
	14. OVER SPEED PROTECTION	
	15. DOOR FIRE PROTECTION IN HOURS	

	16. SAFETY BUFFERS TYPE	
	17. HAND RAILS	
	18. LANDING DOOR LOCK TYPE	
	19. LANDING DOOR LOCK SAFETY	
7 MISCELLANEOUS DETAILS	1. CAR LIGHTING	A) LED
		~~B) FLUORESCENT TUBE FITTINGS~~
		~~C) INDIRECT LIGHTING~~
	2. CAR VENTILATION FAN WITH SWITCH (YES/NO)	
	3. DÉCOR INSIDE THE CAR	
	4. HOIST MACHINE	*
	5. LEVELING ACCURACY	*
	6. SPEED VARIATION	*
	7. ENCLOSURE FOR ELECT. EQUIP. LOCATED OUTSIDE THE M/C ROOM	A) DUST TIGHT
		B) WATER TIGHT
		C) CORROSION PROOF
	8. EMERGENCY EXIT (YES / NO)	
	9. PROVISION FOR OPENING THE LANDING DOOR IN CASE OF EMERGENCY	
8 SPECIAL REQUIREMENTS AND NOTES	1. CAR ACCESSORIES	~~A) INTERCOM TELEPHONE SET (*)~~
		~~B) PUBLIC ADDRESS SYSTEM HANDSET (*)~~
		C) LOUD SPEAKER
		A) CHANNELED MUSIC SPEAKER
		B) AUDIBLE FLOOR POSITION ANNOUNCEMENT
		~~C) MIRROR~~
		D) HAND RAIL
		E) OPERATING DEVICE & INDICATION
		F) PANEL ON TWO SIDES
		G) FLOORING DETAILS

		H) BLOW OUT PANELS
		I) FACILITY FOR RECEIVING
		FIRE ALARM SIGNAL
		J) PROVISION OF RS 232 / RS 485 FOR CONNECTING TO BUILDING AUTOMATION SYSTEM.
	2. INCHING CONTROL	
	3. STOP BLOCKED IN FLOORS	
	4. FIRE EXTINGUISHER	
	5. FACIA PLATES	
	6. PURCHASER'S CABLE	
	7. MATERIAL OF THE LIFT ROPE : STEEL/ STAINLESS STEEL	
	8. AUTOMATIC RESCUE DEVICE INCLUDED YES/NO	
	(*) THESE EQUIPMENT WILL BE SUPPLIED BY THE PURCHASER. VENDOR SHALL SUPPLY NECESSARY CORES IN TRAILING CABLES AND MOUNTING BRACKETS FOR THE SAME.	

DATASHEET-B

TO BE FILLED BY BIDDER

5.17. 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 G) MATERIAL OF BUSBAR SUPPORTS H) CLEARANCE IN AIR : I) BETWEEN PHASES II) BETWEEN PHASES	 SQ.MM A °C MM MM	 AL/CU PH : N: YES/NO

	EARTH I) SHORT TIME RATING (ONE SEC.) J) MOMENTARY RATING (PEAK)	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 II) CONTROL WIRING	 SQ.MM SQ.MM	
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	

5.18. 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	MM	

	PERPENDICULAR TO THE DUCT		
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,		YES/NO REFERENCE OF DEVIATION

	IT IS BROUGHT OUT SEPARATELY IN DEVIATION SCHEDULE		SCHEDULE

5.19. 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		

5.20. 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/MM^2 SWG/MM^2 SWG/MM^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	YES/NO	

	B) MINIMUM SIZE / GUAGE		
3.3	REQUIRED CONTROL SWITCHES	YES/NO	
3.4	REQUIRED SWITCHES AND RECEPTACLES	YES/NO	
3.5	EARTHING SYSTEM	YES/NO	

5.21. 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. CL. 4 AND CL. 10 OF WIRTE-UP)	Yes / No	
15.0	LIST OF DEVIATION ENCLOSED	Yes / No	

5.22. 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	

5.23. 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.	

5.24. DATASHEET-B LIFT

ENQUIRY/SPECIFICATION NO.						
SR.NO.	ITEM	UNIT	BIDDER			
1	MAKE					
2	TYPE - STANDARDS					
3	CAPACITY	KG				
4	RATED SPEED	M/SEC.				
5	CONTRACT SPEED	M/SEC				
6	CAR DIMENSIONS (L X B X H)	MM				
7	OVERALL WEIGHT	KG.				
8	TOTAL RISE	M				
9	NO. OF LANDINGS & LOCATIONS					
10	LIFT CONTROL TYPE					
11	OPERATION					
12	LEVELLING DEVICE					
13	TYPE OF CAR AND LANDING DOORS					
14	SIZE OF DOORS	MM X MM				
15	DOOR OPERATOR					
16	VISION PANEL IN DOORS					
17	OPERATING DEVICES IN CAR					
18	OPERATING DEVICES IN LANDINGS					
19	INDICATING DEVICES IN CAR					
20	INDICATING DEVICES IN LANDINGS					
21	DETAILS OF CAR LIGHTING					
22	DETAILS OF CAR VENTILATION					
23	DETAILS OF PAINTING					
24	PIT HEIGHT FROM BOTTOM LANDING	MM				
25	CLEARANCE BETWEEN TOP LANDING AND MACHINE ROOM	MM				
26	MACHINE ROOM DIMENSIONS (L X B X H)	MM				
27	**MACHINE**					

27.1	TYPE		GENERATOR		MACHINE	
27.2	ENCLOSURE & VENTILATION					
27.3	RATED VOLTAGE	V				
27.4	WINDING INSULATION CLASS					
27.5	OUTPUT					
27.6	TORQUE/SPEED CHARACTERISTICS ENCLOSED	YES/NO.				
27.7	TEMPERATURE RISE AT FULL LOAD	°C				
28	**ROPE**					
28.1	MATERIAL					
28.2	NO. & DIAMETER OF STRANDS					
28.3	CROSS SECTIONAL AREA	MM^2				
28.4	OUTSIDE DIAMETER	MM				
28.5	ULTIMATE STRENGTH	KG				
28.6	WORKING STRESS	KG/CM^2				
29	ENCLOSURE FOR ELECTRICAL EQUIPMENT					
30	**SHEAVES AND PULLEYS**					
30.1	MATERIAL FOR CONSTRUCTION					
30.2	DIA AND GROOVES					
31	TYPE OF BRAKE					
32	HAND CRANKING DEVICE					
33	SAFETY TYPE					
34	GOVERNOR TYPE					
35	COUNTERWEIGHT	KG.				
36	**CABLES**					
36.1	STANDARD					
36.2	SIZE	MM2				
36.3	CORES					
36.4	NO. OF CABLES					
36.5	NO. OF CABLE GROUPS					

NOTES :

1	ITEMS WHICH DEVIATE FROM THE SPECIFICATION SHOULD BE MARKED WITHIN ASTERISK (*) (DETAILS TO BE GIVEN IN SCHEDULE OF DEVIATIONS)	SIGNATURE OF THE BIDDER	

2	THIS DATASHEET SHALL BE FILLED UP COMPLETELY AND A COPY SHALL BE ENCLOSED WITH EACH COPY OF THE BID.	DATE	

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	Reception Area, Ground Floor, Administration 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 displayed	1. Addresses 2. Fire situation 3. Fire progression 4. Evacuation details	

Sr. No.	Description	Requirement	Bidder Comments
		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	
6.	Zone wise grouping	Required	
7.	Response time	10 Seconds (Max) for full loaded panel.	

Sr. No.	Description	Requirement	Bidder Comments
		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	2 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) 4. PC to printer	5.
16.	Networking protocol	RS-485 or Ethernet	
17.	Degraded mode	Required	

Sr. No.	Description	Requirement	Bidder Comments
	operation		
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 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	

Sr. No.	Description	Requirement	Bidder Comments
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	
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 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**		

Sr. No.	Description	Requirement	Bidder Comments
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	
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	

Sr. No.	Description	Requirement	Bidder Comments
		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 ☐	
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	

Sr. No.	Description	Requirement	Bidder Comments
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 ☒ 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. ☐	

Sr. No.	Description	Requirement	Bidder Comments
		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	
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%	

Sr. No.	Description	Requirement	Bidder Comments
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 Temperature and Rate of Rise of Temperature ☒ Microprocessor Based-Fixed Temperature ☐ Microprocessor Based-Rate of Rise of Temperature ☐	

Sr. No.	Description	Requirement	Bidder Comments
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. 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	

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	
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	

6.2.5. 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 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.)	

Sr. No.	Description	Requirement	Bidder Comments
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	
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**		

Sr. No.	Description	Requirement	Bidder Comments
	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 type smoke detector ☐	
2.	Addressable	Required Note: In case bidders offers conventional beam detector, same shall be made addressable by providing addressable monitor module.	

Sr. No.	Description	Requirement	Bidder Comments
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	
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	

Sr. No.	Description	Requirement	Bidder Comments
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	18 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. CLOSED CIRCUIT TELEVISION SYSTEMS

6.3.1. 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	

Sr. No.	Description	Requirement	Bidder Comments
11.	Resolution	WD1 (960×480)	
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.	

Sr. No.	Description	Requirement	Bidder Comments
26.	IP Rating for indoor camera	IP52	
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	

6.3.2. 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	

Sr. No.	Description	Requirement	Bidder Comments
6.	Wide colour enhancer	Required	
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	

6.3.3. 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	☐

Sr. No.	Description	Requirement	Bidder Comments
		8 Channel 16 Channel	
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	