TECHNICAL SPECIFICATION FOR 850 kVAR, 440Volts CAPACITOR BANK

Scope: Design, Manufacture and Supply of LT Detuned APFC Panels.

The 850 kVAR automatic/manual Power Factor Correction Panel shall be fabricated out of 2mm CRCA Sheets Modular, compartmentalized, Free Standing, Floor Mounting, Front hinged doors for indoor use, removable bottom gland plates for incoming cables, dust and vrmin proof (IP: 42 protection) with TP Aluminium Busbars, complete with busbar connection, internal wiring, name plates, painting etc. generally as per details furnished below:

Sl.No.	Item	Particulars
1	Rating of APFC Panel	850 kVAr
2	Rated Voltage of the Panel	440 V AC
3	Frequency	50 Hz
4	No.of Phases	3 Phase
5	Enclosure details:	Free Standing, Floor mounted, Compartmentalized Design.
	Material	CRCA
	Thickness of Sheet Steel Used:	Frame-2.0mm Doors-2.0mm Partitions-1.6mm
	Dimensions	3000 (L) x 2200 (H) x 800 (D) (approx)
	Protection	IP-42
	Application	Indoor
	Cable Entry	Bottom
	Painting	Shade Siemens grey RAL 7032
6.	Busbar Detail	
	Material	Aluminium
	Cross Sectoin	2 x 60 x 10 mm
	Busbar support	SMC
7	Capacitors	
	Type	MD-XL,500 V, 3 ph, 50 Hz (Cylindrical)
	No.of Steps	12
	Configuration	2x25kVAr + 4 x 50 kVAr + 6 x 100 kVAr (The capacitors are rates for 500 V due to the effect of detuned reactor and each 25 kVAr, 440 V unit would be designed for 3x10 kVAr, 500V)
8	Switchgear Details	
	Incomer	ACB
	Steps Outgoing	SDFs, contactors (Refer Bill of Material for further details)
9	APFC Relays	12 Stage Microprocessor based
10	Bill of Materials	As per Annexure

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ANNEXURE

BILL OF MATERIALS

(For 850 kVAR, 440 V, 3Ph, 50 Hz, DETUNED APFC Panel)

Sl.No.	DESCRIPTION	QTY.	MAKE
	INCOMER		
1.	ACB Type C-Power, 1000A, MDO type with DN1 releases	1 No.	L&T/Siemens/ABB
2	Analog Ammeter (0-1000A)	1 No.	RISHAB
3	Analog Voltmeter (0-600 V)	1 No.	RISHAB
4	Phase Indicating Lamps	3 Nos.	ESBEE/TEKNIC
5	Ammeter S/S / Voltmeter S/S	1 Each	SALZER
6	Auto/Off/Manual Switch	1 No.	SALZER
7	Current Transformer (1000/5A)	3 Nos.	PRECISE/KALPA
8	APFC Relay (12-Stage)	1 No.	BELUK
9	Timer	1 No.	GIC
10	Cooling Fans	1 Lot	NADI/REPUTED
	OUTGOING		
1	Indicating Lamps (ON.OFF)	24 Nos.	ESBEE/TEKNIC
2	Push Bottons (ON/OFF)	24 Nos.	ESBEE/TEKNIC
	FOR 25 kVAr – 2 STEPS		
1	SDF type FN 63	2 Nos.	L&T/ABB/Siemens
2	Contactor MNX-45	2 Nos.	L&T/ABB/Siemens
3	7% reactor for 25 kVAr filter	2 Nos.	MEHER/ABB/OEM
	FOR 50 kVAr – 4 STEPS		
1	SDF type FN 125	4 Nos.	L&T/ABB/Siemens
2	Contactor MNX-95	4 Nos.	L&T/ABB/Siemens
3	7% reactor for 50 kVAr filter	4 Nos.	MEHER/ABB/OEM
	FOR 100 kVAr – 6 STEPS		
1	SDF type FN 250	6 Nos.	L&T/ABB/Siemens
2	Contactor MNX-185	6 Nos.	L&T/ABB/Siemens
3	7% reactor for 100 kVAr filter	6 Nos.	MEHER/ABB/OEM

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Annexure- I

GUARANTEED TECHNICAL PARTICULARS FOR 11 kV CAPACITOR BANKS – 2+1 MVAr

1	Manufacturer's Name	
2	Maker's Type Designation	All Polypropylene
	Standard Followed	IS: 13925 –1 (1998)
4	Purpose	Power Factor Improvement
5	Location	Outdoor
6	System Specification	
	Voltage	11 kV
	Frequency	50 Hz
7	Ambient Temperature: Maximum Temperature Minimum Temperature	 +50°C - 10 °C
8	Capacitor Bank	
8.1	Rated Output (Installed) kV KVAR	12.65 kV 2645 kVAr+1322.5kVAr
8.2	Rated Output (Effective) kV KVAR	11 kV 2000 kVAr+1000kVAr
8.3	No of Phases	Three
8.4	Type of Connection	Double Star
8.5	No of Units per bank	To be specified
8.6	Power frequency withstand voltage KV(RMS)	
8.7	Impulse withstand Voltage KV (PEAK)	
8.8	Type of mounting	
8.9 8.9.1 8.9.2	Terminal Arrangement Incoming Outgoing	
9.0	Capacitor Unit	
9.1	Rated Output (kVAr)	
9.2	Rated Voltage (KV)	
9.3	Rated Current (A)	
9.4	No. of Bushings	
9.5	Unit Protection	
9.6	Losses (watts / kVAr)	0.2 W/kVAr (after stabilization)
9.7	Dielectric type	Hazy Polypropylene
9.8	Insulation level	
9.8.1	Power Frequency Withstand Voltage KV (RMS)	
9.9	Permissible load	
9.9.1	Voltage	As per IS: 13925 –1998.
9.9.2	Current	As per IS: 13925 –1998.
9.9.3	Output	As per IS: 13925 –1998.
9.10	Discharge device to discharge capacitor to 50Vor less in 300 secs after disconnection from supply	
9.10.1	Directly connected internal discharge resistor	
10	Creepage distances (mm/KV)	25mm/kV

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ANNEXURE – II

(A) SCHEDULE OF GUARANTEED PERFORMANCE AND OTHER PARTICULARS FOR 2 MVAr + 1 MVAr CAPACITOR BANKS

Item No.	Description	Remarks
1.	Type make of Capacitors	
2.	Rated voltage of each capacitor units	
3.	Rated frequency	
4.	KVAr (at rated voltage and frequency of each unit	
5.	No. of phases and No. of terminals in each unit	
6.	Type of bushing terminals	
7.	No. of capacitor units in each phase of each star/ unit rating	
8.	Total number of capacitor units for each bank / bank rating	
9.	Connection of capacitor units	
10.	Maximum permissible over voltage and duration corresponding to the same	
11.	Maximum permissible operative over voltage (continuous)	
12.	Temperature rise under max. voltage	
13.	Limiting ambient temperature	
14.	Watt loss (maximum) per phase	
15.	Voltage withstand tests (capacitor units) a) Terminal to terminal 50 c/s 1 min. dry b) Terminal to casa 50 c/s 1 min. dry	
16.	Impulse withstand voltage	
17.	Individual fuse rating and characteristics	
18.	Physical and electrical properties of capacitor a) Nominal thickness of poly propylene b) Tensile strength of poly propylene i) Lengthwise ii) Cross wise c) Percentage elongation i) Lengthwise ii) Crosswise d) Shrinkage i) Lengthwise ii) Crosswise e) Dielectric breakdown voltage	
19.	Capacitor oil used in the container tank	
20.	Protection schemes for capacitor bank (recommended) a) Under Voltage	

	b) Over Voltage c) Neutral unbalance d) Whether timer required for switching operation e) Earth fault f) Schematic drawing enclosed g) Breaker switching time interval h) Minimum and maximum voltage and PF setting	
21.	Maximum difference of capacitance between capacitor units in bank	
22.	Capacitor bank output a) Rated output of capacitor unit and voltage b) Capacitance of each phase of each star c) bank capacitance d) Units in parallel per series group e) Output of capacitor if one element fails, 2 elements fails etc.	
23.	Whether the neutral capacitor bank floated or earthed	
24.	Voltage and current rating of capacitor bushing (of units)	
25.	Percentage of over voltage due to failure of each bank for different ratings	
26.	Maximum ambient temperature capacitor can withstand	
27.	Whether fuse current Vs time curve indicated in the tender and if so, how it is coordinated with capacitor bank protection.	

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(B) SCHEDULE OF GUARANTEED PERFORMANCE AND OTHER PARTICULARS OF 11 KV SERIES REACTORS FOR CAPACITORS

Sl.No.	Description	Remarks
1	Type and Make	
2	Insulation Level	
3	Rated current and voltage	
4	Rated capacity / inductance	
5	Rated frequency	
6	Compensation percent of series reactors	
7	Number of phases	
8	Dimensions (Overall)	
9	Total weight / weight of coil and assembly unit	
10	Rated short time current and specified duration	
11	Reactance at rated current	
12	Type of cooling	
13	Load losses	
14	Winding resistance (cold /hot)	
15	Voltage and current rating of reactor bushing	
16	Rated KVAR	
17	Terminal arrangement	
18	Maximum system voltage for which reactor is designed	
19	Choke voltage/phase at rated current	
20	Conforming to IS	5553, Part III
21	Whether reactor designed for a) Harmonics b) Inrush current	
22	Type of Shielding adopted in the reactor	

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(C) SCHEDULE OF GUARANTEED PARTICULARS AND OTHER PARTICULARS OF 11 kV NEUTRAL CT FOR CAPACITOR.

Sl.No.	Description	Remarks
1	Manufacture's Name	
2	Type	
3	Rated voltage	
4	CT Ratio	
5	Accuracy Class	
6	Accuracy Limit Factor	
7	Rated VA (Burden)	
8	Power Frequency withstand Voltage	
9	1.2/50 micro second impulse withstand test voltage	
10	One minute power frequency withstand test voltage on secondaries	
11	Type Outdoor / Indoor	
12	Temp. rise over ambient Temp of 50 deg C	
13	Over current factor for 1 sec	
14	Creepage distance	
15	Weight	
16	Over all dimensions	

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(D) SCHEDULE OF GUARANTEED PERFORMANCE AND OTHER PARTICULARS OF 11 KV OFF – LOAD ISOLATOR FOR CAPACITORS BANKS

Sl.No.	Description	Remarks
1	Name of the Manufacturer	
2	Type	
3	Reference standard	
4	Rated Voltage (kV)	
5	Rated frequency	
6	No. of Poles	
7	Whether Single Break or Double Break	
8	Rated Normal Current (A)	
9	Rated Peak withstand current (kA)	
10	Rated short time current at specified duration	
10.1	1.2/50 micron second impulse withstand voltage with +ve and –ve polarity i) Across the isolating distance (kV rms) ii) To earth and between Poles (kVP)	
10.2	One minute power frequency with stand voltage i) Across the isolating distance (kV rms) ii) To earth and between Poles (kVP)	
11	Type of Insulator	
12	Creepage distance	
13	Contacts are silver coated or tin coated	
14	Materials of Contacts	
15	Whether mechanical interlock has been provided for arcing switches	
16	Type of operating mechanism	
17	No. of Auxiliary contacts	
18	Weight of complete Isolator	
19	Dimensions (Overall)	

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(E) SCHEDULE OF GUARANTEED PERFORMANCE AND OTHER PARTICULARS OF 11 kV LIGHTNING ARRESTORES FOR CAPACITORS BANKS

Sl.No.	Description	Remarks
1	Name of the Manufacturer	
2	Type & Model	
3	Reference standard	
4	System Voltage (kV)	11kV
5	Rated Voltage (kV)	
6	MCOV kV (RMS)	
7	Discharge Current (kA)	
8	Line Discharge Class	
9	Rated Frequency (Hz)	
10	Ir & Ic at MCOV	
11	a) Reference Current (mA) b) Reference Volt at reference current	
12	Max. RDA (kVp) at 10kA & 20kA	
13	Max. Switch Imp. R.V (kVp) 500A	
14	Max. Steep Current Impulse RDV (kVp)	
15	High Current Impulse withstand, kAp	
16	T.O.V (kAp) for 1sec & 100 sec.	
17	Insulation Withstand	
18	Partial Discharge P.D.	
19	PR Relief Class	
20	PR Relief Class kA (RMS)	
21	Total Creepage Distance	
22	Max. Cant. Strength of the Arrester KGM.	
23	Weight of the complete Unit	
24	Min. recommended spacing between arresters centre to centre	
25	Clearance required from ground to arresters units	

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ANNEXURE-III

Deviation on Tender Specification

Sl. No.	Clause No.	Description	Deviation
1			
2			
3			
4			

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