		20. All areas under contractor scope of supply shall be interconnected together by minimum two parallel conductors. The Contractor shall furnish the detailed design and calculations for Employer's approval. 21. Contractor shall obtain all necessary statutory approvals for the system. 22. All the columns shall be earthed by nearby risers and earthmat grid spacing shall be minimum 10 mts. Minimum two no's of risers shall be provided for each equipment. A separate dedicated riser shall be provided for C&I earthing purposes and also for Lightning down conductor connection purpose. Sufficient no's of risers near the equipment shall be provided as per the system. 23. All acceptance and routine tests as per the relevant standards shall be carried out.	
16	**MV Switchgear**	Applicable Standards	IEC 62271-100/200 & IS-13118-1991
		Type	For 33kV system VCB-2000A, Draw out type switchboard. For 11kV system VCB-1250A, Draw out type switchboard.
		Classification	Metal Clad, Metal Enclosed, Floor mounted, Indoor type VCB Panel
		Degree of Protection	VT & Relay IP5X as per IS/IEC 60947 Remaining compartments IP 4X
		Assembly	Type tested assembly
		Voltage and Insulation	
		Rated Voltage	33kV 11kV
		Power Frequency withstand Voltage	70kV 28kV
		Impulse withstand Voltage	170kV 75kVp
		IAC FLR	11kV 40KA, 1 sec
		Current and Temperature Rise	
		Rated Current	For 33kV system 2000A for Incomer, Outgoing & Bus coupler. For 11kV system 1250A for Incomer, Outgoing & Bus coupler.
		Rated short circuit withstand current	21kA 1sec for 33kV & 50kA 1sec for 11kV
		Rated Making Current	Within limits as specified in IS/IEC
		Temperature rise at rated current	Within limits as specified in IS/IEC

		Bus Bar Compartment (IS-375)	
		Bus Bar Material	Aluminium
		Bus Bar Current Rating	For 33kV 2000A & For 11kV 1250A
		Bus Bar Sleeving	Heat shrinkable sleeve
		Current Transformer (IS-2705(1992), IEC 60185)	
		Type	Epoxy Resin Cast
		Potential Transformer—for Incomer (IS- 3156(1992), IEC 60186)	
		Type	Resin Cast, Dry Draw Out Type
		1. The Sizing criteria for MV Switchgears shall be the short time fault withstand levels, impulse withstand levels, Continuous Current rating for the MV Switchboards and Modules. 2. The switchgear boards shall have a single front, single tier, fully compartmentalized, metal enclosed construction complying with clause No. 3.102 of IEC 62271-200, comprising of a row of free-standing floor mounted panels. The Service Class Continuity of Switchgears shall be LSC 2B-PM (as per IEC 622771-200). The Circuit Breakers / Contactors / Bus VTs shall be mounted on withdraw able trucks which shall roll out horizontally from service position to isolated position. 3. Standard control cable sizes shall preferably be 3CX1.5, 5CX1.5, 7CX1.5 & 10CX1.5 mm2, Cable size for motor space heater application shall be 2CX2.5 mm2, Interconnections for Current Transformer terminals shall use two cores of 1.5mm2 size per phase, Core identification shall be using core color for up to 5-core cable and core number for cable with more cores, Separate control cables shall be used for current transformers, At least one spare core shall be made available in each of the control cable. 4. All panels shall be of unitized construction providing facility for extensions on both sides. 5. 33kV system short time rating for bus bars, ckt. breakers, current transformers and swgr. assembly is 21kA for 1 second. 6. 33kV system dynamic withstand rating 52.5kA. 7. 11kV system short time rating for bus bars, ckt. breakers, current transformers and swgr. assembly is 50kA for 1 second. 8. 11kV system dynamic withstand rating 125kA. 9. Circuit Breakers used shall be VCBs of specified rating for the various types. The design of the breaker truck shall be such that there will be flexibility of interchanging between incomer, bus-	

<table>
<tr><td></td><td></td><td colspan="2">section, and feeder trucks, where similar rated breakers are offered.
10. The surge arrestors shall be provided for all motor feeders and shall be metal oxide, gapless type generally in accordance with IEC 60099-4 and suitable for indoor duty.
11. Temperature sensor shall be mounted in bus-bar chamber.
12. MFM shall be with communication on Ethernet port.
13. Relevant IS/IEC standards shall be applicable for MV switchgear and type test report to be submitted for MV switchgear for approval.
14. The basic control scheme shall be developed as per the schematic logics in the relay. Schematics shall be developed in soft inside relay.
15. Relays (IS- 3231(1987), IEC 60255, 61850) shall be front draw out type.
16. MV feeders shall be categorized into standard Modules. The module defines the feeder type, Protections, Feeder schematics and metering and monitoring requirements. Standard Modules are listed below:</td></tr>
<tr><td></td><td></td><td>Application</td><td>Applicability</td></tr>
<tr><td></td><td></td><td>Motor Feeder (DA)</td><td>MV Motor Feeders < 2 MW</td></tr>
<tr><td></td><td></td><td>Motor Feeder with Differential Protections (DAF)</td><td>MV Motor Feeders > 2 MW</td></tr>
<tr><td></td><td></td><td>Transformer Feeder (DB)</td><td>Transformer feeder < 5 MVA</td></tr>
<tr><td></td><td></td><td>Transformer Feeder with Differential Protections (DBF)</td><td>Transformer feeder > 5 MVA</td></tr>
<tr><td></td><td></td><td>Incomer Feeder (DC)</td><td>MV Incomer Module</td></tr>
<tr><td></td><td></td><td>Bus Coupler Feeder (DD)</td><td>Bus Coupler Module for MV Boards</td></tr>
<tr><td></td><td></td><td>Contactor controlled Motor / Transformer (CC/CCT)</td><td>CHP MV Drives / Transformers</td></tr>
<tr><td rowspan="11">17</td><td rowspan="11">LT Switchgear</td><td>System Parameter</td><td>Values</td></tr>
<tr><td>Rating</td><td>415V +/-10%, 4000A, 50Hz +5%, -5%</td></tr>
<tr><td>Phases</td><td>3Phase, 4Wire</td></tr>
<tr><td>Fault level (KA)</td><td>50KA for 1Sec.</td></tr>
<tr><td>Momentary peak current (KA)</td><td>105KA</td></tr>
<tr><td>Busbar material</td><td>Aluminium</td></tr>
<tr><td>Earthing system</td><td>Solidly Earthed</td></tr>
<tr><td>Ambient temp (C’)</td><td>50 deg C</td></tr>
<tr><td>Temperature rise</td><td>As per IEC61439, over ambient 50 deg C</td></tr>
<tr><td>Insulation level</td><td>1100V</td></tr>
<tr><td>Busbar Insulation</td><td>PVC sleeve insulated</td></tr>
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