2X800MW NTPC LARA STPS STAGE – II

TECHNICAL SPECIFICATION
FOR
LT SWITCHGEAR

SPECIFICATION No. **PE-TS-508-506-E002**
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BHARAT HEAVY ELECTRICALS LIMITED
POWER SECTOR
PROJECT ENGINEERING MANAGEMENT
NOIDA, INDIA

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SCOPE

SCOPE OF THIS PACKAGE COVERS THE FOLLOWING:

SL.NO	PARAMETERS	REQUIREMENT	REMARKS
1	SUPPLY INCLUDING DESIGN, ENGINEERING, MANUFACTURING OF	YES	
a)	MAIN SUPPLY	YES	
b)	COMISSIONING SPARES	YES	
3	PAINTING	YES	
2	INSPECTION & TESTING	YES	
4	PACKING	YES	
5	TRANSPORTATION & DELIVERY TO SITE	YES	
6	ERECTION & COMISSIONING	YES	Comissioning of Numerical Relay, Ethernet Switch, IMCC, Y-Link, Wireless Temp. Monitoring System & HMI only
7	SUPERVISION OF ERECTION & COMISSIONING	NO	
8	MANDATORY SPARES	YES	
9	O & M SERVICE	NO	
10	O & M SPARES	NO	

GENERAL TECHNICAL REQUIREMENT	
1.0	It is not the intent to specify herein all the details of design and manufacturing. Bidder shall ensure that the offered equipment confirms in all respects to high standards of design, engineering and workmanship.
2.0	Bidder shall also ensure that the offered equipment shall comply with all applicable statutory and regulatory requirements.
3.0	In the event of any conflict between the requirements of two clauses of this specification, documents or requirements of different codes and standards specified, the more stringent requirement as per the interpretation of the owner shall apply.
4.0	Drawing/document submission shall be through web based Document Management System(DMS) of BHEL. Bidder would be provided access to the DMS for drawing/document submission. Bidder to ensure internet connectivity of min speed of 2Mbps at their end.
5.0	Drawings/ documents submitted by vendor at any stage shall be complete in all respects. Any incomplete drawing submitted shall be treated as non- submission with delays attributable to vendor. For any clarification/ discussion required to complete the drawings, the bidder shall depute his personnel to BHEL / Customer's Office as per the requirement for across the table submission/ finalizations of drawings.
7.0	Latest codes and standards shall be complied with.
8.0	Successful Bidder shall submit Quality Plan (PE-QP-999-506-E002) on compliance route for BHEL/ End customer's approval during contract stage. Inspection / testing shall be witnessed as per the quality plan apart from review of various test certificates/ Inspection records etc. There shall be no techno-commercial implication to BHEL on account of Quality plan approval.
9.0	Successful bidder shall furnish their sub-vendor list as annexure to quality plan which shall be subject to BHEL / Customer approval without any techno-commercial implication to BHEL.
10.0	In case, the bidder is sourcing the item/any component from outside India, the third party inspection shall be arranged by bidder at their cost and shall be deemed to be considered by the bidder in their offer.
11.0	Nameplates shall be manufactured from stainless steel or aluminium with a matte or satin finish, and engraved with black lettering of a minimum 6 mm height or as per equipment standard whichever is higher.
12.0	Equipment must be safe, reliable and easy to maintain at all operating condition.
13.0	**SWITCHBOARDS**
13.1	All switchboards shall be divided into distinct vertical sections (panels), each comprising of the following compartments:
a)	**BUSBAR COMPARTMENT -** A completely enclosed bus bar compartment shall be provided for the horizontal and vertical bus bars. Bolted covers shall be provided for access to horizontal and vertical busbars and all joints for repair and maintenance, which shall be feasible without disturbing any feeder compartment. Auxiliary and power bus bars shall be in separate compartments. Two separate sets of vertical busbars shall be provided in each panel of double front MCCs / DBs. Interleaving arrangement for busbars shall be adopted for switchboards with a rating of more than 1600A.
b)	**SWITCHGEAR / FEEDER COMPARTMENT -** All equipment associated with an incomer or outgoing feeder shall be housed in a separate compartment of the vertical section. Two-tier breaker arrangement in a vertical section shall be offered for outgoing breaker feeders of rating up to 1600A. Fixed part of vertical busbar and moving part of draw-out modules for power connection shall be of Silver/Tinned plated Copper only. No live parts shall be accessible with equipment drawn out. The Module compartment door shall have external padlocking facility with MCC frame/fixed structure. The MCC module will have a hole with a grommet on side plate of the module truck for taking Profibus DP connector with 2 nos. armoured profibus DP cables from Cable alley to IMC's profibus DP port for making daisy chain connection of IMCs. Alternatively, good quality Secondary Isolating Contacts (SICs) can be offered for Profibus DP communication port connection & isolation between moving & fixed parts of MCC. A separate compartment shall be provided for relays and other control devices associated with a circuit breaker. For breaker controlled motor feeders, an aux. relay shall be provided for taking Local push button station (EPB) "normally open (NO)" contact input from field and provide potential free output to DDCMIS to avoid probable mixing of switchgear control voltage with DDCMIS 24V DC voltage. This aux. relay shall have 2NO+2NC contacts.
13.2	Wherever two breaker compartments are provided in the same vertical section, separate vertical busbar chamber alongwith form 4B separation shall be provided. For Incomer panel suitable interlock shall be provided to prevent opening of rear cover, in case incoming supply is ON/Line is live and for Bus-coupler panel suitable interlock shall be provided to prevent opening of rear cover, in case either of the bus-section is in charged condition.
13.3	For modules of size more than 300 mm, symmetric guides not less than 4 nos shall be provided for smooth removal or insertion of module. All identical module chassis of same size shall be fully interchangeable without having to carry out any modifications.
13.4	Suitable interlock to be provided between incomer and bus coupler for non-breaker boards including DCDBs for prevention of opening of Incomer when the bus coupler is open and vice-versa.

GENERAL TECHNICAL REQUIREMENT	
13.5	All 415V air circuit breaker switchgear panels shall be of single-front type. All 415V Circuit breaker modules and other MCC modules shall be fully draw out type (Except module in ACDB & DCDB). All draw-out modules & Circuit Braker modules shall be provided with “Closed door operation” feature wherein movement of the module from “Isolated” position to “Test” position and to “Service” position & vice-versa and power ON / OFF operation of the module shall be possible only with the module door closed condition. All phases/neutral and control contact shall be intact while in service position. Degree of protection of the panel shall be maintained in both “ Service”, “Test” and “Isolated” positions. Module door shall open only when module is in “Isolated” position and “Power off” condition. Interlock shall be provided to prevent the change of module state from “Isolated” to “Test” position and to “Service” position or vice- versa, if Main Switch/MCCB/MPCB of the module is kept in ON condition. All the modules shall be of standard width only and no half width, quarter width etc sized modules shall be acceptable. It shall be possible to pad lock the module door irrespective of state of module i.e. “Service”, “Test” or “Isolated”. Module Operated Automatic safety shutter shall be provided to cover all the live power terminals, in case the module is taken out from the panel. 2 nos of Dummy modules of each size to fill in module being taken out for maintenance purpose shall be provided in each switchgear room, in case module door is part of module. These Dummy Modules shall be fitted in switchboard as vacant modules having no cut out on back side and cable alley side. In case door is hinged to the panel, 2 nos of blanking plates of each size need to be provided. Minimum 10mm of gap shall be ensured between busbar and moving power contact tips while module is in “Test” position to ensure user safety. It shall not be possible to open the rear door of incomer and buscoupler breaker modules when the incoming power source are in live condition.
13.6	Circuit-breaker cubicles shall be provided with safety shutters operated automatically by the movement of the circuit breaker carriage, to cover the stationary isolated contacts when the breaker is withdrawn.
13.7	The compartment door of fixed type modules shall be interlocked to prevent opening while the MCCB/MPCB in “ON” condition.
13.8	The Bidder shall provide adopter panel required to meet various configuration / arrangement of busbars.
13.9	Cable alley door should be hinged at minimum 3 position.
13.10	All power and control cable inside the modules shall be neatly dressed.
13.11	Control and communication cables inside the modules shall be separate and should be terminated at separate terminal blocks.
13.12	Power contactors/ Isolators should be securely mounted inside panel to prevent its vibration during operation.
13.13	All components mounted in switchborad shall be accessible and shall not obstruct access to wiring, terminals or components. Maintenance and inspection shall be possible in any individual unit without affecting other units.
13.14	Negative Bus of DCDB between two bus section should be shorted to avoid double voltage formation.
13.15	Each cubicle shall be provided with suitable base channels for direct bolting to the foundation at site. All necessary galvanized bolts, nuts, washers etc. shall be supplied by the Supplier for installation of Cubicle at site.
13.16	Wireless temperature monitoring system to be provided and same shall be integrated to DDCMIS/ separate HMI. Temperature sensors shall be installed in all relevant joints, contact joints etc. as per the standard OEM Practice, however Position of such sensors shall be decided at the time of detailed engineering. This shall be provided for the following switchgears: USS, BMCC, TMCC and EMCC. Bidder to consider complete monitoring system with transmitter, receiver and its connection upto Unitised HMI for LT Switchgear.
14.0	**PROTOTYPE PANELS**
	In order to establish the compliance with the requirements of this technical specification, prototype panels shall be made and offered for the BHEL/End Customer inspection and approval before the start of bulk manufacturing of panels for this project. The exact configuration of such prototype panels shall be finalized during detailed engineering. The switchgear shall be modified complying the observation marked during Prototype inspection (if any).
15.0	**INTELLIGENT MOTOR CONTROLLER (IMC)**
15.1	Profibus DP based IMC is envisaged which is to be interfaced to DDCMIS on Profibus DP protocol. The complete monitoring and control along with detailed diagnostics of IMC shall be provided by the bidder. For interface with DDCMIS, IMC modules in a Profibus DP segment shall be connected to Y link with single cable in daisy chain fashion using PG/PG connectors. All the Profibus DP cables (the looping cables from the Y-links to the IMC modules) are in the scope of bidder. The Profibus cables shall be neatly dressed & connected on MCC Modules in MCC/SWGR rooms. Necessary support along with required software and hardware accessories shall be provided by the bidder to BHEL while integration of IMCs with DDCMIS. The connection/looping/ interface of IMC with DDCMIS shall be as per Compliance Drawings_ Annexure-2 (Typical IMC Network Architecture).
15.2	The IMC shall be able to perform its functions without fail inside MCC modules which are kept in non-AC normal ventilated Switchgear rooms of the power plant.
15.3	Electronic modules of IMCs and other associated electronic modules shall be G3 / GX compliant with Conformal protective coating (in line with ISA S71.1) / Class 3C3 (3C4) (in line with IEC 60721-3-3) for protection against air pollution and harsh environments. The conformal coating version shall be a standard product from the manufacturer’s factory. The hardware that is being conformal coated locally shall not be acceptable.
15.4	Intelligent Motor Controller (IMC) shall provide protection, metering, control, monitoring and historical logging for 1ϕ and 3ϕ AC induction motors using integral current transformers (CTs) or external CTs and line-line voltages (415V).

GENERAL TECHNICAL REQUIREMENT				
15.5	In case 230V AC UPS supply shall be used as control supply during detailed engineering, then BHEL will provide two 240V AC UPS supply only for IMC at each Switchboard. The bidder will be responsible for the subsequent distribution of the UPS feeder within switchboard through UPS Bus.			
15.6	All active electronic components / modules like OLMs / Y-links etc. required for the interface of Profibus based IMCs with DDCMIS system to be installed in the CER / MCC /RIO room, shall be powered by redundant 24V DC feeders. Bidder to consider necessary arrangement to derive 24V DC from available 220V DC within designated room.			
15.7	The loss / power supply failure of any IMC shall not disrupt the network including the last IMC module in the segment. To meet this functional requirement any additional component / power supply shall be provided by the bidder.			
15.8	Voltage measurement input of IMC shall be capable of taking 415V directly from line & no voltage transformer (VT) should be required.			
15.9	The IMC shall be pre-programmed with basic software based on all type of feeders in bidder's scope. The fine tuning/ limit values shall be done at the time of commissioning of the MCC panels.			
15.10	The IMC shall have following protection functions, control functions and other operation & diagnostic features but not limited to these:			
	a) PROTECTION FUNCTIONS i) Overload (I^2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running	**b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter	**c) The IMC will have standard function control blocks for various functions:** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset	**d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local / remote)- a) For DK2/DN1/HTR module: i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence b) For DK21 module: In addition to the above for DK2 module, following measurement data shall also be provided. x) 3 Phase Voltages xi) 3 Phase Power xii) 3 phase Energy
15.11	Supplier shall provide complete list of data items available for cyclic and acyclic data communication on Profibus DP for DDCMIS interface and diagnostics.			
15.12	**Configuration / programming:** i) IMC shall be programmable from IMC's HMI, PC (laptop) and DDCMIS. ii) IMC shall be configurable to operate as an overload relay iii) Digital outputs shall be potential free and independent, each output shall be connectable to different field voltages iv) All licensed software required for configuration / programming / parameterization / fault diagnostics of IMCs along with software licenses shall be supplied as a part of the package. v) All interface files like DTM & GSD files shall be provided for interfacing IMCs with DDCMIS.			

GENERAL TECHNICAL REQUIREMENT	
15.13	**User Interface:** i) Local HMI shall be provided with each IMC. The HMI shall be mounted on front of the MCC module for easy access to the operator to view measurement parameters & fault/trip status. ii) HMI shall have the capability of uploading / downloading parameters to IMC. iii) The address & other communication parameters shall be configurable from HMI. iv) HMI shall be internally powered by IMC and no additional power supply shall be required. Simple cables with RJ45 connectors or RS232 connector or USB cable shall be sufficient for connection to IMC. IMC shall have dedicated port for connection to IMC's HMI/PC(laptop). v) HMI shall have the simple text display in English. vi) HMI shall have operate / reset buttons. vii) HMI shall display the operating data, status, faults, counters & warnings information.
15.14	The total no. of IMC modules in one Profibus DP segment and their response time shall be governed by Process requirement. The same shall be finalized during detailed engineering and submitted to the customer for prior approval before implementation.
15.15	Profibus cable shall be routed in a separate pre-fitted closed PVC tray inside MCC panels. The tray shall be located in such way that interference due to 220V DC/110V AC/240V AC available in Switchgear/MCC panels can be minimized on Profibus cables.
15.16	Bidder to provide one no. of each type of IMC module along with Y-Link to BHEL on returnable basis & coordinate with BHEL for conducting FAT for IMC as per customer satisfaction.
16.0	**NUMERICAL RELAY**
16.1	**PROVEN TRACK RECORD FOR NUMERICAL RELAYS & NETWORKING**
	a) Bidder/ Sub Vendor should have manufactured, supplied and successfully configured at least one hundred (100) numbers of Numerical Relays with IEC 61850 used for application in Feeder Protections/Transformer Protections/Motor protections. These relays should have been in successful operation for at least two (2) years. **And** b) Bidder/ Sub Vendor should have manufactured/ integrated and successfully done Site Acceptance Test (SAT) for a network on IEC 61850 with at least one hundred (100) numbers of Communicable Numerical Relays.
16.2	**SWITCHGEAR NUMERICAL RELAY NETWORKING**
	The typical configuration of such a proposed system is as per the enclosed Compliance Drawings_Annexure-1 (Typical Switchgear Relay Network Architecture). The numerical relay network shall include relays on all LV switchgears being supplied under this package. Each ring network shall consist of switchgear level Ethernet switches connected through Fibre Optic cable and subsequently connected to Network Level Ethernet Switches (L3 Level) placed in main plant control equipment room (CER). Port requirement in Network Level ethernet switch (L3 Level) for DDCMIS interface shall be furnished by Customer during detail engineering.
16.3	**SYSTEM PERFORMANCE REQUIREMENTS**
a)	**Latency:** The system shall be so designed and implemented as to provide data transfer speeds prescribed by IEC 61850-5.
b)	**Reliability:** All components shall be designed and configured to make the system highly reliable. Failure of any component shall be immediately announced and wherever possible, the system shall be made self-healing.
c)	**Diagnostic tools:** The system shall have necessary diagnostic tools to continuously monitor the system performance and provide feedback to the operator / engineer. Necessary software tools to track changes in the system shall be provided.
16.4	**GENERAL REQUIREMENTS**
a)	Numerical Relays shall have appropriate setting ranges, accuracy, resetting ratio, transient overreach and other characteristics to provide required sensitivity for the intended application.
b)	All numerical relays shall be capable of satisfactory continuous operation between 80-120% of the rated voltage.
c)	Threshold voltage for binary inputs shall be suitably selected to ensure avoidance of mal operation due to stray voltages and preferably shall be more than 70% of the rated control supply voltage.
d)	All IEDs shall have freely programmable optically isolated binary inputs (BI) and potential free binary output (BO) contacts, the quantity of which shall be adequate to realize the associated interlocks / feedbacks. At least 2 binary inputs (BI) & 2 binary outputs (BO) shall be kept as Spares for End Customer's future use & the required no of IO's can be achieved through external I/O device of same make.
e)	The supplier shall be responsible for providing adequate and co-ordinated scheme of protection in his equipment. The protective devices shall be selectively co-ordinated and range and settings so selected to have a good down stream discrimination as well as quickest possible circuit isolation in case of fault.
g)	All the numerical relays shall have communications on three ports, one local front port communication to laptop and two rear port on IEC 61850 to communicate with the DDCMIS through LAN.

GENERAL TECHNICAL REQUIREMENT

h) All Numerical relays shall have features for electrical measurements including voltage, current, power (active & reactive), frequency, power-factor and energy parameters. All numerical relays shall have provision of both current (CT) and voltage (VT) inputs. Relays shall be suitable for both residually connected neutral CT input as well as CBCT input. All CT terminals on the relays shall be of fixed type suitable for connection of ring-type lugs to avoid any hazard due to loose connection leading to CT open-circuit. In no circumstances Plug In type connectors shall be used for CT / VT connections.

DAET (LT Incomer)	5CT	3-Ph, 1 REF, 1 Spare	
DAE (Buscoupler, Tie)	4CT	3-Ph, 1 Spare	
DM (ACB Controlled Motor)	4CT	3Ph, 1 Spare	

i) Relays used in incomers, ties and bus couplers shall have provision of two sets of voltage inputs (3 Nos for bus voltage & 1 No. for line voltage) for the purpose of synchronization.

j) All numerical relays shall have key pad / keys to allow relay setting from relay front. Pre-programmed or programmable key for Master trip (86) reset shall be provided on the relay front.

k) Relays shall have suitable output contact for circuit breaker failure protection (CBFP). Relays shall have self diagnostic feature with continuous self check for power failure, program routines, memory and main CPU failures and a separate output contact for indication of any failure.

l) Relays shall have at least two sets or groups of two different sets of adaptable settings. Relays shall have multiple IEC / ANSI / user-programmable characteristics. Design of the relay must be immune to any kind of electromagnetic interference. All cards/ hardware of numerical relays shall be suitable for operation in Harsh environmental conditions with respect to high temperature, humidity & dust. Relays of each type / model shall be supplied with same Firmware / Software version for the complete package.

m) Supplier to prepare & submit Relay Network Scheme and Mimic document for Relay Network architecture for helping DDCMIS supplier (i.e. BHEL) to create the dynamic/static mimic in DDCMIS for Network monitoring.

n) The IP address for the Numerical Relays & SNTP address shall be furnished by customer during detail engineering. The required .ICD / .CID files of the Numerical relays configured with unique IP address, SNTP address & unique logic device name under LV Switchgears for the integration with the DDCMIS shall be provided by supplier along with necessary engineering support as and when required during detail engineering.

o) The integration of Switchgear Relay Network with Switchgear DDCMIS (supplied by customer) shall be finalized in consultation with the Switchgear DDCMIS supplier i.e. BHEL EDN Bangalore and the same shall be tested as a part of Major Design Feature testing with a prototype system of the offered Switchgear relay Network system, at the works of the DDCMIS supplier i.e. EDN Bangalore or any other place approved by customer.

p) During the Factory Acceptance Test (FAT) of the DDCMIS, Relay & Ethernet Switch supplier will arrange a prototype ring with at least three ethernet switches at switchgear level (L2) with one numerical relay of each type and L3 Switches network, at the works of the DDCMIS supplier along with the relay configuration engineer and necessary engineering support. Exact test setup shall be finalized during detailed engineering.

q) Numerical relays are to be configured with two datasets. One dataset for Analog data & the other dataset for Binary data. Analog dataset shall be assigned for two no's of un buffered Report Control Block and Binary dataset shall be assigned for two no's of Buffered Report Control Block.

r) Numerical relay configuration for all relays being supplied under the package shall be carried out in line with the approved schematics and shall be submitted for approval. Setting calculations and relay settings configured in relay software for all relays shall be submitted for approval. Approved relay configuration / settings files shall be loaded in all the relays prior to dispatch to site.

s) Relay shall be immune to capacitance effect due to long length of connected control cables. Any external hardware, if required for avoiding mal operation of the relay due to cable capacitance shall be included as a standard feature.

16.5 **PROTECTION & CONTROL FEATURES**

a) Control of breakers shall be carried out from DDCMIS through hardwired control commands in the form of 24V DC signal. All close and trip commands from DDCMIS shall be hardwired through separate coupling relays to BI of numerical relays in form of 220 V DC signal.

b) Trip circuit supervision shall be provided for all feeders to monitor the circuit breaker / contactor trip circuit both in pre-trip and post-trip conditions.

c) Schematics requiring auxiliary relays / timers for protection function shall be a part of numerical relay. The number of auxiliary relay and timer functions shall be as required for the application. Timer functions shall be configurable for on & off delays as per requirement.

d) The numerical relay shall be able to provide supervisory functions such as trip circuit monitoring, circuit breaker status monitoring, VT and CT supervision.

e) The numerical processor shall be capable of measuring and storing values of a wide range of quantities, all events, faults and disturbance recordings with a time stamping using the internal real time clock. Battery backup for real time clock in the event of power supply failure shall be provided.

f) At least 200 time tagged events / records shall be stored with time stamping. Details of at least 5 previous faults including the type of protection operated, operating time, all currents & voltages and time of fault.

GENERAL TECHNICAL REQUIREMENT	
g)	Diagnostics Automatic testing, power on diagnostics with continuous monitoring to ensure high degree of reliability shall be provided. The results of the self reset functions shall be stored in battery back memory. Test features such as examination of input quantities, status of digital inputs and relay outputs shall be shall available on the user interface.
h)	20 Signals (both Analog & Digital) from each relay shall be communicated to DDCMIS on IEC 61850 protocol. Supplier to furnish mapping details of each relay for all signals. Mapping document (IO list) shall be furnished by customer during detail engineering.
i)	Sequence of events shall have 1ms resolution at device level.
j)	It shall be possible to carryout open / close operation of breakers from a laptop by interfacing from the relay front port during initial commissioning.
k)	All motor feeders(>30KW) shall have 4-20 mA analog output (current signal) for use in control logics in DDCMIS or for information in DDCMIS.
l)	GOOSE Controls shall be configured in the Numerical Relays for following functions. The response time of GOOSE interlocks shall be 10 ms. (GOOSE Performance Class P1, Message Type 1A) - (a) Inter tripping, (b) Reverse Blocking including Hard wiring (c) Earthing Interlocks
17.0	**ETHERNET SWTICHES**
17.1	Ethernet switches shall be ‘substation hardened‘,19” rack mounted and shall comply with IEC61850 for communications and environment requirements. The Ethernet switches shall be of Layer 2 & managed type with four (4) Nos of Fibre Optic ports fully populated with SFP modules and Sixteen(16) / Eight(8) Copper ports to achieve the LAN configuration indicated in the drawing. These switches shall be mounted inside the switchgear panels and shall be suitable for accepting dual redundant power supplies. The FO ports shall be Singlemode 1000Mbps ports. Copper ports shall be 10/100Mbps ports. The switch shall support RSTP/MSTP. The Ethernet Switch shall have feature of MAC binding per port and IEEE 801.1X radius Authentication for Port Security. Switch shall have feature to monitor the Port status over Modbus/SNMP Protocol & Port Configuration through Web Interface. Power supply arrangement for all the ethernet switches shall be in Supplier's scope.
17.2	Necessary software for configuration and real-time network monitoring shall be provided along with the Ethernet switches. Stabilized network ring architecture should be established in all aspects considering network redundancy as per project requirement. Suitable software for Network monitoring shall be integrated with the HMI (Switchgear EWS) to provide complete network status.
17.3	Cat5e/Cat6 Ethernet cable / FO cable shall be used for connecting the Numerical Relays to Ethernet switches in all Switchgears. If FO cable are used then numerical relays & Ethernet switches shall also have suitable FO ports. Further, additional FO patch cords of maximum length (quantity – 10% of total quantity of IEDs) shall be supplied to facilitate maintenance. Optical Fibre Cable termination equipment such as LIU, patch cord, etc. for the seamless network shall be provided by bidder. Minimum FO ports quantity on Ethernet switch shall be as per clause 17.1 above.
17.4	The Fibre Optic cable shall be armoured, Single-mode, graded index OMI (ISO/IEC 11801) of Diameter 125µm core / cladding with max attenuation of 1.52 dB/km at 1310nm wavelength & 1.0 dB/km at 1550nm wavelength. The cable should be suitable for operation at 1310/1550nm. The outer Sheath / Jacket of the FO Cable shall be Fire retardant.
17.5	The numerical relays & Ethernet switches being installed at switchboard shall be suitable for auxiliary power supply 220V DC with tolerance of 80% to 120 % of rated voltage & shall be finalized during detailed engineering. Ethernet switches shall have provision to receive dual redundant power supplies.
17.6	IEC 61850 Ethernet switches in Switchgear panels – Sufficient quantity of Ethernet switches as per requirement for all boards under bidder’s scope. At least 2 ports per switch shall be kept as spare ports.
17.7	All the ethernet switch (at L2 & L3 level) shall be rack mounted. The racks shall be supplied by supplier.
18.0	**PROTECTION CO-ORDINATION**
	Each motor/heater feeder shall consist of MPCB/MCCB (with S/C release only), Power contactor & intelligent motor controller (IMC) to ensure Type-2 Co-ordination.
19.0	**HMI (SWITCHGEAR ENGINEERING WORK STATION) AND LAPTOP**
19.1	All the HMI PCs being offered in the system shall be industrial grade PC and as per the latest available configurations as on the date of bid opening. The minimum storage capacity shall be 1 TB, minimum RAM shall be 16GB and processor shall be I7/ equivalent or higher. Screen size shall be minimum 24 inches. Anti-virus software, etc shall be installed in all HMI. All HMI shall be provided with other required accessories like Keyboard, mouse etc.
19.2	Switchgear Engineering Work Station will be provided with Laser printer connected to the relay network through Network level switches for online configuration/setting change of relays & ethernet switches. Automatic downloading and saving of the disturbance records & event files from relays through automatic DR download software tools provided by the relay vendors shall also happen in this HMI.
19.3	Licensed software for automatic downloading & saving of Disturbance records and Event records from Numerical relay to Switchgear Engineering works stations (EWS) shall also be provided & installed in HMI (Switchgear EWS).
19.4	Laptops shall have same hardware configuration and software as for HMI PC except screen size which shall be 14 inches.

GENERAL TECHNICAL REQUIREMENT	
19.5	Laptops shall be supplied complete with following accessories: • carrying case, • 240VAC adaptor, • Communication cord with port converter (if required) for relay communication.
19.6	HMI console (furniture i.e. Table with drawer & chair) shall be provided for each HMI. The console shall have space for keeping an additional PC.
20.0	**SYSTEM SOFTWARE REQUIREMENTS**
	The bidder shall provide all licensed software packages required by the system for meeting the intent, functional and parametric and performance requirements of the specification. All licenses (except anti-virus which shall be valid for 3 years from the date of takeover by the end customer) shall be valid for the continuous service life of the plant.
21.0	**SYSTEM SECURITY**
21.1	Security features shall be provided for Identification and authentication control at each level for safeguarding against unauthorized access. The bidder shall provide software locks / passwords to the Employer's engineers at site for all operating and application software at all levels.
21.2	Security Audit for Switchgear Relay Network shall be done as defined in Security Policies/Procedures and Security Audits mentioned below. Suitable actions based on the findings of the security audit shall be carried out by the relay/ Ethernet switch/ LT switchgear supplier.
22.0	**SECURITY POLICIES/PROCEDURES AND SECURITY AUDITS**
22.1	In order to enforce network security in the Switchgear Relay network integrated to the Switchgear DDCMIS, security policies and procedures are to be followed by the bidder. For checking compliance to the above security policies & procedures, periodic security audit by a certified auditor (as per CERT-IN panel or CERT of country of origin of DDCMIS supplier (BHEL)) will be arranged during ATST, at the time of trial operation and every year during AMS period. However only during ATST, the security audit for Switchgear Relay network integrated to the Switchgear DDCMIS shall be done on prototype ring during Station LAN FAT. At the time of trial operation package and every year during AMS period the security audit for Switchgear Relay network shall be carried out on the actual installation at site. This shall include vulnerability assessment of the workstations/ servers and penetration testing of the Station LAN through the firewall from a node outside the network. It may be noted that following policies/procedures are only the operation guidelines and advisory steps to ensure maximum data security. The following security policies shall be followed. Details of the same shall be provided during detailed engg. 1. Information Security Policy a) Information Security Team Policy b) Firewall Policy c) Information Identification and Classification Policy d) Security Policy Review Policy e) Information Labelling and Handling Policy f) System Planning and Acceptance Policy g) Capacity Management Policy h) Media Handling Policy i) Information Security Awareness Policy j) Third Party Access Policy k) Change Control Policy l) Anti Virus Policy m) System Access Policy n) Monitoring Policy o) Incident Handling Policy p) Information Backup and Restoration Policy q) Network Access Policy r) User Access Management Policy All the above is in the scope of BHEL and included in the specification for system clarity only. However, based on the findings of the security audit, any material (i.e. cards/ modules/ peripherals/ cables/ components etc.) required for the above which is part of supply of vendor will be part of AMC. The security policies/procedures envisages formation of an Information Security team which shall comprise of Supplier's personnel deputed at site during tenure of the contract. All the responsibilities of information security team have to be discharged by supplier's team during tenure of the contract.
23.0	**TIME SYNCHRONIZATION**
	RTC of Numerical relays, Ethernet Switches, HMI, etc shall be time synchronized with plant clock of upstream system on SNTP or IRIG-B (to be decided during detailed engineering).

GENERAL TECHNICAL REQUIREMENT	
24.0	**CABLE TERMINATION**
24.1	Cable termination compartment and arrangement for power cables shall be suitable for heavy duty, 1.1 kV grade, stranded Aluminium conductor, PVC/ XLPE insulated, armored / unarmoured and PVC sheathed cables. All necessary cable terminating accessories such as Lugs, Glands, supporting clamps and brackets, hardware etc. for cables shall be provided by the supplier to suit the final cable sizes.
24.2	Double compression, nickel chrome plated(Min 10mm) brass cable glands & heavy duty lugs of BHEL approved make for external power & control cable connection and termination at supplier supplied equipment's end shall be in the scope of supplier . Further grounding bolts for connection to earth flat shall be in the scope of supplier.
24.3	It shall be preferred to follow a standardization of Terminal Numbers across all LV Modules for ease of Interconnection and maintenance as per Compliance Drawings_Annexure-4 (Scheme).
24.4	Terminal Points of Supply:
a)	Cable/Busduct termination compartment of PCC/PMCC/MCC
b)	Termination at multi-way terminal board for control cables.
c)	Scope and terminal points for interface between Numerical Relays and DDCMIS shall be as per Compliance Drawings_ Annexure-1 (Typical Switchgear Relay Network Architecture). All necessary hardware and software required to ensure the successful installation, testing, and commissioning of the supplier's supplied system will be the responsibility of the supplier. The supplier is required to provide the necessary support to establish seamless communication on IEC 61850 between the DDCMIS and network level (L3) ethernet switch as and when required.
d)	Scope and terminal points for interface between IMC and DDCMIS shall be as per Compliance Drawings_ Annexure-2 (Typical IMC Network Architecture). All necessary hardware and software required to ensure the successful installation, testing, and commissioning of the supplier's supplied system will be the responsibility of the supplier. The supplier is required to provide the necessary support to establish seamless communication between the DDCMIS and the Y-Link as and when required.
25.0	**DERATING OF EQUIPMENTS**
	The supplier shall ensure that the equipment offered will carry the required load current at site ambient conditions specified and perform the operating duties without exceeding the permissible temperature as per Indian Standards / Specification. Continuous current rating at 50°C ambient in no case shall be less than 90% of the normal rating specified. The supplier shall indicate clearly the derating factors if any employed for each component and furnish the basis for arriving at these derating factors duly considering the specified current ratings and ambient temperature of 50°C.
26.0	**RELAY TEST EQUIPMENT**
26.1	The required relay test equipment shall comprise the following: (a) One 3 phase (4 Voltage and 6 current sources) dynamic portable relay test system for allowing dynamic and steady state testing. (b) Any other auxiliary items required for comprehensive protection testing all types of the protection relays supplied under this contract.
26.2	It shall have the capability to replay the Disturbance / Fault records acquired by the numerical relays in IEEE / COMTRADE format or EMTP simulations, to facilitate dynamic testing of all the numerical relays supplied under this contract. The required software for steady state/dynamic testing of all the numerical protection relays along with a laptop dedicated for the testing shall also be supplied. The relay test set shall be suitable for IEC 61850 compliance testing with required no. of RJ45, FO and USB Ports. The test set shall have min 8 nos. (GI) binary inputs and 4 nos. (GI) binary outputs. The associated software for automated relay testing and IEC61850 GOOSE/GSSE Configuration shall also be supplied.
27.0	**SPARE MODULE REQUIREMENT**
	All Switchgears, Motor Control Centers (MCCs) & AC/DC distribution boards, etc. shall have at least twenty per cent (20%) or minimum two (whichever is higher) fully equipped MCCB (less than 100 A) of each rating as spares, uniformly distributed over different vertical sections." In addition, all Switchgears, MCCs and AC distribution boards shall have as spares at least twenty per cent (20%) of starter modules/MCCB modules (100 A to 400 A)/ACB outgoing modules (DM & DAE-OG) or at least one module (whichever is higher) of each rating range. However the same is already considered in the Board wise BOM (Annexure-A.1 part of technical data Part-A).

GENERAL TECHNICAL REQUIREMENT	
28.0	**TRAINING**
	The Supplier shall arrange for training on system design, engineering, operation and maintenance of Numerical relays & Numerical relay Network system at the principal's facility and at site as follows:
28.1	Training at principals works (Relay Manufacturer) in the following areas:
a)	Basics of Feeder, Transformer and Motor Protection for IEC 61850 Numerical relay and detail discussion on functions available in the relays.
b)	Relay configurations and hands on practice of preparation of logic & settings, .CID files through relay software tools and relay GOOSE Logics.
c)	Interfacing / communication of relay with software: uploading / downloading of logic.
b)	Secondary injection testing of provided function blocks and guidelines for relay settings. DR downloading and analysis for Fault diagnostics.
e)	Common problems faced and trouble shooting.
	The Scope shall include providing training in the areas stated above for five (5) No Executives from Engineering, Site Erection and O & M for a duration of five (5) days. The cost of training including boarding & lodging and local transportation shall be in the Supplier's scope.
28.2	Training Workshop at Site:
a)	Workshop Training at site shall aim for familiarization of Site Engineers for commissioning and day to day O & M of Numerical Relays and Numerical Relay Network and trouble shooting.
b)	The scope shall include Two No's of Numerical Relay and Numerical Relay Network workshops and Training for a batch of 20 Engineers at Project Site. One such Workshop shall be organized before the commissioning of First LV Switchboard and the Second workshop shall be conducted before Unit Commissioning. Customer shall provide the required Infrastructure such as Training Conference room, Projection systems etc.
29.0	**RESPONSIBILITY OF THE ASSOCIATE/COLLABORATOR (APPLICABLE IF LTSWITHCHGEAR IS SUPPLIED THROUGH PRE QUALIFICATION REQUIREMENT: ROUTE-2):**
	The Associate/Collaborator (as applicable) for sourcing of LT Air Circuit Breaker shall be fully responsible and accountable for the item supplied and its compliance to the specification requirements. The Associate/Collaborator (with respect to his manufactured and supplied LT Air Circuit Breaker) shall: i) Participate in the Inspection of the LT Switchgears at Switchgear Supplier's Works, if required by End Customer. ii) Participate in Technical Co-ordination Meetings (TCMs) from time to time during detailed engineering, if required. iii) Participate in Site Testing and Commissioning of LT Switchgears, if required. iv) Participate/address/resolve the issues raised during Contract Execution Period.
30.0	Painting shade on exterior shall be RAL 9002 for complete panel except RAL 5012 for extreme ends and RAL 9002 for Mounting Plate & Trolley. Paint finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns).
31.0	Four (4) Nos. lifting lugs shall be provided for each shipping section, two (2) nos. on either end of the section. For each shipping section, the bus conductor shall be supported at minimum two positions.

TECHNICAL DATA PART - A

SL.NO	DESCRIPTION	UOM	DETAIL
1.0	**DESIGN CODES & STANDARDS**		
1.1	Low-Voltage Switchgear and Controlgear Assemblies General Rules		IEC: 61439
1.2	Colours for ready-mixed paints and enamels.		IS: 5
1.3	PVC insulated cables for working voltages up to and including 1100V		IS: 694
1.4	AC static watthour meters		IS: 13010
1.5	Electrical Indicating instruments		IS: 1248
1.6	Air-Break Switches, air break disconnectors, air break disconnector and fuse combination units for voltages not exceeding 1000V AC or 1200 V DC.		IS/IEC: 60947
1.7	Danger Notice Plates		IS: 2551
1.8	Hot dip galvanising		IS: 2629
1.9	Current Transformers		IS: 2705
1.1	Code of practice for earthing		IS: 3043
1.11	Instrument transformers		IS: 16227
1.12	Wrought Aluminium and Aluminium alloys for electrical purposes		IS: 5082
1.13	Code of practice of phosphating of iron and steel		IS: 6005
1.14	Static Relays		IS: 8686
1.15	Specification of control transformers for switchgear and Control gear for voltage not exceeding 1000V AC		IS - 12021
1.16	Electrical Relays		IEC: 60255
1.17	Communication networks and systems in substations		IEC: 61850
1.18	Guide for uniform system of marking and identification of conductors and apparatus terminals		IS: 11353
1.19	Cold Rolled Low Carbon Steel Sheets and Strips		IS :513
1.20	Cable glands		BS:6121
1.21	Compression lugs and Connectors		DIN 46239
2.0	**DESIGN /SYSTEM PARAMETERS**		
2.1	Max. System Voltage for continuous operations Max. System Frequency for continuous operations		415 Volt (+/- 10%) 50Hz (+3/- 5%), Combined (10% absolute sum)
2.2	One minute power frequency withstand voltage		
a)	Main circuit	KV	2.5 rms.
b)	Aux. Circuit	KV	2.0 rms.
2.3	Internal arc classification		50 KA for 0.5 Sec
2.4	Draw out type modules		Complete Closed Door Operation
2.5	Cable alley compartment		Form-IVB Type 7 as per IEC-61439
2.6	**Busbars & connections**		
2.6.1	Fault level		
a)	ACB		50 KA r.m.s for 1 sec.
b)	MCCB		50 KA r.m.s for MCCB clearing time
2.6.2	Dynamic Rating for ACB & MCCB	KA	105 (peak)
2.6.3	Temperature rise above ambient temperature (50 Deg C)		
a)	Busbar (when carrying 90% of the rated current)		
i.	Silver plated joints	Deg C	55
ii.	Non-silver plated joints	Deg C	40
b)	Accessible parts/external enclosures	Deg C	20
c)	Manual operating means		
i	For Metallic	Deg C	10
ii	For Insulating material	Deg C	15
2.6.4	PVC sleeving for horizontal busbar		(UL224)CE/UL (CERTIFIED)
2.6.5	Colour coding for conductor & terminals		Applicable as per IS 11353
2.6.6	Busbar clearances in air (minimum)		
a)	Phase-phase	mm	25 (Insulation Sleeves / Barriers shall be provided for clearance less than 25 mm)
b)	Phase-earth	mm	25 (Insulation Sleeves / Barriers shall be provided for clearance less than 25 mm)
c)	Incomer Rear Door and Busbar	mm	400
2.7	Secondary wiring		FRLS Copper Wire
2.7.1	Colour code of wires		
a)	CT Circuit		R,Y,B,Black
b)	Space Heater Circuit		Black
c)	PT Circuit		R,Y,B
d)	AC Control Circuit		Black
e)	DC Control Circuit		Grey
f)	Door Earthing		Green
2.7.2	Sizes of wires (minimum)		
a)	CT leads	Sqmm	2.5
b)	Other wires	Sqmm	1.5

TECHNICAL DATA PART - A			
2.8	Auxiliary buses provision		
a)	AC control bus	V	110 (With Neutral solidly earthed)
b)	DC control bus	V	220
c)	AC space heater bus	V	240 (with Neutral solidly earthed)
d)	Controls, indications & alarms		To be provided
2.9	**Switchgear main assemblies**		
2.9.1	**Air circuit breakers**		
a)	Rated Voltage, Frequency, No of Poles		415 Volts, 50 Hz, 3 (three) Poles
b)	Symmetrical (rms) interrupting capacity at rated voltage	KA	50
c)	Momentary making current	KA	105 (peak)
d)	Short Circuit Breaking Current - AC Component		50 KA(RMS) for 1 Sec
e)	Short Circuit Breaking Current - DC Component		As per IS/IEC 60947
f)	Operating mechanism		Air break spring charged stored energy type
g)	Auxiliary voltage		
i	Spring charging motor	V	220 DC
ii	Closing coil	V	220 DC
iii	Shunt trip coil	V	220 DC
h)	Operating duty		O-3 min-CO-3 min-CO
i)	Auxiliary contacts		Minimum 10 NO + 10 NC
			(6NO+6NC Auxiliary Contact directly operated from breaker operated Mechanism)
j)	Anti-pumping feature		Both Mechanical & Electrical
2.9.2	**Moulded case circuit breakers (MCCB) & Motor protection circuit breakers (MPCB)**		Thermal Magnetic based with in built front adjustable releases
a)	Type		Thermal Magnetic based with in built front adjustable releases
b)	For Motors Below 30kW		MPCB to be provided
c)	For Motors From 30kW and below 90kW		MCCB to be provided
d)	Rated voltage	V	415 AC
e)	Rated Insulation level	V	690 AC
f)	Rated short circuit breaking capacity	KA	50
g)	Rated making capacity	KA	105
h)	Utilization category		A of IS / IEC 60947
i)	Type of releases required		
i	Overload		No
ii	Under voltage		No
iii	Short circuit		Yes
iv	Shunt trip		No
j)	Auxiliary contacts		
	Numbers (Minimum)		1 NO + 1 NC
2.10	**Switchgear components**		
2.10.1	**Intelligent motor controller (IMC/IMCC)**		Applicable (For drives less than 90KW)
a)	Power supply voltage & frequency		110 V & 50 Hz (For basic and expansion module both)
b)	Degree of protection		IP20 for IMC and IP54 for HMI
c)	Current sensing module		For motors & heaters both below 90 KW
d)	Voltage sensing module		For motors & heaters both from 30 KW & below 90 KW
e)	Resetting		Manual on panel facia
f)	Digital input & output		6 Digital Inputs & 3 programmable potential free Digital Outputs (inbuilt with basic module or with add-on expansion modules)
g)	Binary input interrogation voltage		230 V AC, 50 Hz
h)	Binary output		Rated for 6A, 230 V AC
i)	Protocol		Profibus DP
j)	Profibus connector		One PG/PG port connector for each IMC, fast-connect type
k)	Over Load protection		As per IEC 60947-4-1 & 60947-8
l)	LED indications on IMC		Required for: i) Controller healthy ii) Controller fault iii) Controller power supply healthy
2.10.2	**Power Contactors**		Air break electro magnetic
a)	Coil voltage (nominal)	V	110/230 AC & 220 DC
b)	No. of poles for contactor		Three
c)	Permissible supply voltage variation w.r.t. Nominal coil voltage	%	85 – 110 (Drop out voltage-less than 70%, Guaranteed Drop out at 20% of rated voltage)
d)	Utilization category		
i)	AC Reversible motor		AC4 of IS/IEC 60947
ii)	AC Non-reversible motor		AC3 of IS/IEC 60947
iii)	DC contactor		DC3
iv)	Aux contact		1 NO + 1 NC (Minimum)
2.10.3	**Auxiliary Contactors**		
a)	Coil voltage (nominal)	V	110 AC / 230AC / 220 DC
b)	No. of poles for contactor		Three
c)	Permissible supply voltage variation w.r.t. Nominal coil voltage	%	85 – 110
d)	Aux Relay contact		2 NO + 2 NC (Minimum)

TECHNICAL DATA PART - A			
2.10.4	**High rupturing capacity (HRC) fuses**		
a)	Voltage Class	V	650
b)	Rupturing Capacity		
i)	AC	KA	80
ii)	DC	KA	20
2.10.5	**Instruments, meters & transducers**		
a)	Indicating instruments		
i)	Accuracy class		2
ii)	One min. power frequency withstand test voltage	kV	2 (RMS)
b)	Current Transducers		
i	Input	A	0-1
ii	Output	mA	4 - 20
iii	Number of outputs	Nos.	2 (decoupled)
iv	Minimum Overcurrent reach for motor current ammeters		6 x CT sec. current of 1A for a minimum period of 30sec.
v	Accuracy Class		1.0
c)	Voltage Transducers		
i	Input		(i) 500V / 50 Hz (for AC) (ii) 250 V (for DC)
ii	Output	mA	4-20
iii	Number of outputs	Nos.	2 (decoupled)
iv	Accuracy Class		1.0
2.10.6	**Relays**		
a)	Type		Numerical Relay
b)	Coil rating		
i)	Current coil	A	1
ii)	Coil Voltage	V	220 DC
c)	Aux. Voltage	V	220 DC with variation of 80% to 120%
d)	One minute power frequency withstand voltage (rms)	kV	2
e)	Measurement Accuracy for rated RMS Current and voltage	%	2
f)	Power frequency withstand test voltage	kV	2.5 for 1 sec
2.10.7	**Current transformers**		
a)	Type		Cast Resin Bar Primary / Nylon Casing (Class E or Better)
b)	Voltage class and frequency		650 V, 50 HZ
c)	Secondary rating	A	1
d)	Accuracy class (metering) & Burden		Cl. 1.0(5VA Minimum) (Refer Annexure-A.2_Modulewise BOM for details)
e)	Accuracy class (protection) & Burden		5P20, 5VA or better, PS Class for REF
f)	Instrument security factor for metering CT		5
g)	Short time withstand capability (RMS)		
i	Associated with circuit breaker protected feeders	KA	50 KA for 1 Sec
ii	Associated with MCCB protected feeders		Prospective current of 50 KA for the MCCB clearing time
h)	Dynamic withstand capability (peak)		
i	Associated with circuit breaker protected feeders	KA	105
ii	Associated with MCCB protected feeders		Prospective current of 105 kA as Limited by MCCB
2.10.8	**Voltage transformers**		
a)	Type		Cast Resin, Class E or better
b)	System earthing		EFFECTIVE
c)	Voltage Ratio		
i	Line PT		415 / 110 V
ii	Bus PT		415/√3 / 110/√3 V
d)	Accuracy class		Cl. 0.5 / Cl. 0.2 (Refer Annexure-A.2_Modulewise BOM for details)
e)	Method of Construction		V-V
f)	Rated Voltage factor		1.1 continuous, 1.5 for 30 sec.
g)	One minute power frequency withstand voltage (rms)	KV	2.5
2.10.9	**Control transformers (for contactor operation)**		
a)	Type		Dry / Cast Resin, Class B or better
b)	Voltage Ratio		415 / 110 V with taps + 5% in steps of 2.5%
c)	One minute power frequency withstand voltage (rms)	KV	2.5
d)	Rating		1.5 X Adequate for application (VA).
2.10.10	**Miniature circuit breaker**		
a)	Rated Voltage		415V/240V/110V AC/220V DC
b)	Current breaking Capacity	KA	10
c)	Characteristic Curve		C or above
2.10.11	**Control and selector switch**		
a)	Application		As per Annexure-A.2_Modulewise BOM
b)	Type		
i)	Control switch		Pistol Grip & Spring return
ii)	Selector switch		Stay Put
2.10.13	**Indication Lamp**		LED type (Refer Annexure-A.2_Modulewise BOM for details)
2.10.14	**Panel Space heaters**		
a)	Voltage	V	240 AC
b)	Thermostat required		Yes

	TECHNICAL DATA PART - A		
2.10.15	**General purpose timers**		
a)	Type		Electronic
b)	No. of contacts		As per requirements
2.10.16	**Terminal block**		
a)	Rating		
i	voltage grade	V	650
ii	current	A	10
b)	Material of construction		6.6 polyamide as per UL 94
c)	Type		Screw less, push in technology (IEC 60947-7-1 and UL certified)
d)	Spare TB		20%
e)	CT Terminals		(i) With shorting and disconnecting facility
			(ii) Stud type terminals
			(iii) Suitable for ring type lugs
2.11	DC MCCB Box		
a)	Construction		(i)Metal Enclosed Fixed Type CRCA: 2mm structure & 1.6mm enclosure Or (ii)Poly Corbonate (a) Halogen Free,flame Retardant(UL-94,V0) (b) Thickness:4mm
b)	Incomer		63A DP MCCB
c)	Busbars		100 A fully insulated (PVC sleeved,UL224) busbars.
d)	Outgoing		8 nos. 16A outgoing DP MCCB
e)	Other Components		1 no. Auxiliary Contactor & 1 no. Led lamp (Blue color) for supply monitoring
f)	Paint Shade		RAL 9002
2.12	AC MCCB Box		
a)	Construction		(i)Metal Enclosed Fixed Type CRCA: 2mm structure & 1.6mm enclosure Or (ii)Poly Corbonate (a) Halogen Free,flame Retardant(UL-94,V0) (b) Thickness:4mm
b)	Incomer		63A TPN MCCB
c)	Busbars		100 A, 3-phase, 4-wire, fully insulated (PVC sleeved,UL224) busbars.
d)	Outgoing		9 nos. 16 A DP MCCB and 3 nos. 16 A TPN MCCB
e)	Other Components		3 nos. Led lamp (R,Y,B) for supply monitoring
f)	Paint Shade		RAL 9002
3.0	**CONSTRUCTION FEATURES**		
3.1	General		
3.1.1	Operational fronts		Both Single & Double Front (Refer Annexure-A.1_Boardwise BOM for details)
3.1.2	Type of Module operation		PCC/PMCC/MCC - Drawout type ACDB/DCDB - Fixed Type
3.1.3	Enclosure		
a)	Material		Sheet steel
b)	Type		Cold Rolled
c)	Sheet metal thickness (minimum)		
i	Non-load bearing - covers, doors, partition etc.	mm	1.6
ii	Load bearing - structures & frame etc.	mm	2
iii	Gland plates		3mm for CRCA/HR, 4mm for Non-Magnetic –Single Core Cable Entry
3.1.4	Glands		Double compression, nickel chrome plated brass
3.1.5	Lugs		Heavy duty solderless crimping type (copper lugs for copper cables, aluminium lugs for aluminium cables and Bimetallic washers or bimetallic type lugs shall be used for bimetallic connections) as per the DIN 46239
3.1.6	Degree of protection of switchboards with modules in service and all doors closed		
a)	Without louvers (<1600 A)		IP-52
b)	With louvers (= > 1600 A)		IP-42
c)	Outdoor panels with stainless steel enclosure (SWITCHYARD OIL FILTERATION ACDB, OIL FILTERATION ACDB-1, OIL FILTERATION ACDB-2)		IP 55
3.1.7	Facility for functional testing of withdrawable		
a)	Incomer & Bus Coupler units		Yes
b)	Outgoing contactor starters		Yes
3.1.8	Gasket		Steel Reinforced EPDM /PU Foam / Neoprene gaskets
3.1.9	Panel Height	mm	2450 (max.)

TECHNICAL DATA PART - A

3.2	**Busbars & connections**		
3.2.1	Busbar material		
a)	Horizontal & Jumper connection		High Conductivity Aluminium Alloy/Copper
b)	Vertical		Copper
c)	Earth BusBar		
i.	For all switchboards except ACBD and DCDB		GS (65 mm X 8 mm)
ii.	For ACDB and DCDB		GS (50 mm x 6 mm)
iii.	Electronic earthing for IMC		Separate Copper Earth bus (25 mmx 3 mm)
d)	Hardware for busbars		High Tensile steels (Bolts/Nuts/Spring Washer)
e)	Type of cover for busbar compartment		Bolted Type
f)	Additional Requirement		(i) Separate compartments for Auxiliary and Power Busbars (ii) Two separate sets of vertical busbars in each panel of double front MCC / DB (iii) Interleaving arrangement for busbar for switchboards of rating >1600 Amps.
3.3	Cabling and terminations		
a)	Cable entry		Bottom
b)	Incoming connections from transformer/DG for PCC/PMCC 1600A and above		Busduct
c)	Incoming connections from transformer for PCC/PMCC below 1600A		Cable

4.0	**INSPECTION/TESTING**	
4.1	The following type test certificates of LT Switchgear and MCC panels with 10 years validity from 03.03.2023 shall be submitted.	
a)	Circuit breaker of each rating i) Test sequence 1 ii) Combined test sequence (With Circuit breakers mounted inside the Switchgear panel)	
b)	Complete design verification of Switchgear/MCC Panels as per IEC 61439 Part- 1, Annexure-D	
c)	Internal arc test for Personnel and Assembly Protection as per IEC/TR 61641. Test shall be conducted for breaker compartment, busbar chamber, incoming side of smallest sized module, outgoing terminals of module in cable allay.	
d)	MCC modules of any three ratings, as selected by the Employer, for class - II protection Co-ordination as per IS 13947-4-1 / IEC 60947-4-1.	
e)	MCCB	
f)	Intelligent Motor Controller (IMC) for Electromagnetic Compatibility (EMC) & other requirements as per applicable standards.	
4.2	Type test reports conducted within last 10 years from 03.03.2013 for the following tests on the model of the relays & Ethernet switches being offered shall be submitted for customer's review. Type Tests of Ethernet Switches shall have been conducted at NABL accredited Lab.	
4.3	**TEST ITEMS**	**Standard**
a)	Dimensions of structure and visual inspection	IEC 60297-3-101
b)	Functional requirements:	Relevant IEC 60255-100 series
	– Steady-state simulation	
	– Dynamic simulation	
c)	Product safety requirements (including the dielectric tests and thermal short time rating)	IEC 60255-27
d)	EMC requirements:	IEC 60255-26
	– Emission	
	– Immunity	
e)	Energizing quantities:	IEC 60255-11
	– Burden	
	– Change of auxiliary energizing quantity	
f)	Communication requirements	Relevant IEC protocol standards
g)	Climatic environmental requirements:	IEC 60068-2-14, IEC 60068-2-1, IEC 60068-2-2, IEC 60068-2-78, IEC 60068-2-30, IEC 60255-27
	– Cold	
	– Dry heat	
	– Change of temperature	
	– Damp heat	
h)	Mechanical requirements:	IEC 60255-21-1, IEC 60255-21-2, IEC 60255-21-3
	– Shock	
	– Vibration	
	– Bump	
	– Seismic	
i)	Enclosure protection	IEC 60529, IEC 60255-27
4.4	In absence of type tests reports or in case reports are not found to be meeting the specification/standards requirements, supplier shall conduct all such type tests without any commercial/delivery implication to BHEL according to the relevant standards and reports shall be submitted to the customer for approval.	
4.5	The tests shall be carried out as per QP (QP NO.: PE-QP-999-506-E002).	

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (PMCC) ⟶			0DA	0DB	3DA	3DB	4DA	4DB	3DP	4DP
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
4000	A	DAET(I/C)	2	2	2	2	2	2	2	2
4000	A	DAET(B/C)	1	1	1	1	1	1	2	2
3000	A	DAET(I/C)	0	0	0	0	0	0	0	0
3000	A	DAET(B/C)	0	0	0	0	0	0	0	0
630	A	DAE(O/G)	6	6	3	4	3	4	3	3
800	A	DAE(O/G)	3	3	0	0	0	0	0	0
1000	A	DAE(O/G)	3	3	0	0	0	0	3	3
1600	A	DAE(O/G)	3	3	0	0	0	0	0	
2500	A	DAE(TIE)	0	0	0	1	0	1	0	0
3000	A	DAE(TIE)	1	1	0	3	0	3	0	0
16	A	E3 (O/G)	6	6	16	10	16	10	38	38
32	A	E3 (O/G)	8	8	8	0	8	0	25	25
63	A	E3 (O/G)	14	14	8	9	8	9	10	10
125	A	E3 (O/G)	6	6	6	3	6	3	6	6
160	A	E3 (O/G)	4	4	4	2	4	2	0	0
250	A	E3 (O/G)	10	10	8	9	8	9	5	5
400	A	E3 (O/G)	3	3	4	3	4	3	5	5
0.0 – 5.5	KW	DK2 / PK2 / AK2	3	3	32	18	32	18	10	10
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	2	2
7.1 – 13.0	KW	DK2 / PK2 / AK2	0	0	30	6	30	6	14	14
13.1 – 24.0	KW	DK2 / PK2 / AK2	3	3	15	12	15	12	2	2

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (PMCC) ⟶			0DA	0DB	3DA	3DB	4DA	4DB	3DP	4DP
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	0	0	2	0	2	8	8
30.0 – 37.0	KW	DK21 / PK21 / AK21	0	0	4	3	4	3	10	10
37.1 – 55.0	KW	DK21 / PK21 / AK21	3	0	0	4	0	4	6	6
55.1 – 80.0	KW	DK21 / PK21 / AK21	4	0	5	2	5	2	4	4
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	2	2
90 – 200.0	KW	DM / PM	6	6	11	6	11	6	8	8
Up to 32A		E1	0	0	0	0	0	0	4	4
Up to 16A		EA3	0	0	15	0	15	0	0	0
32	A	EA3	0	0	0	0	0	0	2	2
63	A	EA3	0	0	0	2	0	2	2	2
125	A	EA3	0	0	0	0	0	0	0	0
400	A	ES3	4	4	0	0	0	0	0	0
		G1 (BUS PT)	2	2	2	2	2	2	2	2
		CS (Control Supply)	2	2	2	2	2	2	2	2
		WTS1 (Wireless Temp. Sensor Module 1)	4	4	4	4	4	4	0	0
		WTS2 (Wireless Temp. Sensor Module 2)	11	11	7	7	7	7	0	0
		Dummy Panel	2	2	2	2	2	2	2	2
		Y-link	2	1	13	7	13	7	8	8

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (PMCC) ⟶			0WB	0DC	0DD	0DE	0DF	0DP
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
4000	A	DAET(I/C)	0	0	0	0	0	2
4000	A	DAET(B/C)	0	0	0	0	0	2
3000	A	DAET(I/C)	0	0	2	0	0	0
3000	A	DAET(B/C)	0	0	1	0	0	0
2500	A	DAET(I/C)	2	0	0	2	2	0
2500	A	DAET(B/C)	1	0	0	1	1	0
1000	A	DAET(I/C)	0	2	0	0	0	0
1000	A	DAET(B/C)	0	1	0	0	0	0
630	A	DAE(I/C)	0	0	0	0	0	1
630	A	DAE(O/G)	0	0	3	0	0	3
1000	A	DAE(O/G)	0	0	0	0	0	0
1600	A	DAE(O/G)	3	0	0	0	0	0
16	A	E3 (O/G)	18	12	25	22	30	24
32	A	E3 (O/G)	0	7	4	0	6	79
63	A	E3 (O/G)	4	8	6	4	8	13
125	A	E3 (O/G)	3	6	3	7	3	3
160	A	E3 (O/G)	3	0	0	0	2	3
250	A	E3 (O/G)	3	5	3	3	4	3
400	A	E3 (O/G)	2	0	2	0	0	2
0.0 – 5.5	KW	DK2 / PK2 / AK2	5	66	4	36	39	29

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (PMCC) ⟶			0WB	0DC	0DD	0DE	0DF	0DP
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	3	0	0	0	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	6	12	5	6	10	5
13.1 – 24.0	KW	DK2 / PK2 / AK2	0	0	4	9	10	38
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	3	0	3	0	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	3	0	3	0	8	3
37.1 – 55.0	KW	DK21 / PK21 / AK21	0	6	0	13	0	14
55.1 – 80.0	KW	DK21 / PK21 / AK21	5	0	7	0	3	5
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0	0	0	0	0
90 – 200.0	KW	DM / PM	0	0	6	0	0	8
Up to 32A		E1	4	4	4	4	4	4
32	A	EA3	0	0	0	0	0	0
63	A	EA3	0	0	0	0	0	0
250	A	ES3	2	0	0	2	0	0
		G1 (BUS PT)	2	2	2	2	2	2
		CS (Control Supply)	2	2	2	2	2	2
		Dummy Panel	2	2	2	2	2	2
		Y-link	3	12	3	9	9	12

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (PMCC) ⟶			3DK	3DN	3DQ	3DS	4DK	4DN	4DQ	4DS
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
3000	A	DAET(I/C)	2	2	2	2	2	2	2	2
3000	A	DAET(B/C)	0	0	0	0	0	0	0	0
630	A	DAE(O/G)	0	0	0	0	0	0	0	0
800	A	DAE(O/G)	0	0	0	0	0	0	0	0
1000	A	DAE(O/G)	0	0	0	0	0	0	0	0
1600	A	DAE(O/G)	0	0	0	0	0	0	0	0
16	A	E3 (O/G)	0	0	0	0	0	0	0	0
32	A	E3 (O/G)	0	0	0	0	0	0	0	0
63	A	E3 (O/G)	5	0	5	0	4	0	4	0
125	A	E3 (O/G)	2	0	2	0	2	0	2	0
160	A	E3 (O/G)	0	0	0	0	0	0	0	0
250	A	E3 (O/G)	0	4	0	4	0	4	0	4
400	A	E3 (O/G)	0	2	0	2	0	2	0	2
0.0 – 5.5	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0
13.1 – 24.0	KW	DK2 / PK2 / AK2	3	0	3	0	3	0	3	0
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (PMCC) ⟶			3DK	3DN	3DQ	3DS	4DK	4DN	4DQ	4DS
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
37.1 – 55.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0
55.1 – 80.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0
90 – 200.0	KW	DM / PM	10	9	10	9	10	9	10	9
Up to 32A		E1	4	0	4	0	4	0	4	0
32	A	EA3	0	0	0	0	0	0	0	0
63	A	EA3	0	0	0	0	0	0	0	0
		G1 (BUS PT)	2	2	2	2	2	2	2	2
		CS (Control Supply)	2	2	2	2	2	2	2	2
		Dummy Panel	2	2	2	2	2	2	2	2
		Y-link	1	0	1	0	1	0	1	0

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (ESP PMCC) ⟶			3DC	3DD	3DE	3DF	3DH	3DJ	4DC	4DD	4DE	4DF	4DH	4DJ
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
4000	A	DAET(I/C)	1	1	1	1	1	1	1	1	1	1	1	1
4000	A	DAE(TIE)	1	1	1	1	1	1	1	1	1	1	1	1
630	A	DAE(O/G)	0	2	2	2	0	0	0	2	2	2	0	0
800	A	DAE(O/G)	0	0	0	0	0	0	0	0	0	0	0	0
1000	A	DAE(O/G)	0	0	0	0	0	0	0	0	0	0	0	0
1250	A	DAE(O/G)	0	0	0	0	0	0	0	0	0	0	0	0
32	A	E3 (O/G)	2	2	2	2	2	2	2	2	2	2	2	2
400	A	E3 (O/G)	2	2	2	2	2	2	2	2	2	2	2	2
400	A	E2 (O/G)	24	24	24	24	24	24	24	24	24	24	24	24
6	A	ALI	6	6	6	6	6	6	6	6	6	6	6	6
6	A	WLT	4	4	4	4	4	4	4	4	4	4	4	4
6	A	ARECA	2	2	2	2	2	2	2	2	2	2	2	2
6	A	MM	2	2	2	2	2	2	2	2	2	2	2	2
0.37	KW	RM1	26	26	26	26	26	26	26	26	26	26	26	26
0.37	KW	RM2	25	25	25	25	25	25	25	25	25	25	25	25
15	KW	HH (HOPPER HEATER)	24	24	24	24	24	24	24	24	24	24	24	24
32	KW	HI	4	4	4	4	4	4	4	4	4	4	4	4
8	KW	HS	4	4	4	4	4	4	4	4	4	4	4	4
1.1	KW	DDM	8	8	8	8	8	8	8	8	8	8	8	8
Up to 32A		E1	2	2	2	2	2	2	2	2	2	2	2	2
		G1 (BUS PT)	1	1	1	1	1	1	1	1	1	1	1	1
		CS (Control Supply)	1	1	1	1	1	1	1	1	1	1	1	1
		Dummy Panel	2	2	2	2	2	2	2	2	2	2	2	2
		Y-link	6	6	6	6	6	6	6	6	6	6	6	6

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (ESP Standby PMCC) ⟶			3DL	3DM	4DL	4DM
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
4000	A	DAET(I/C)	1	1	1	1
4000	A	DAE(B/C)	0	0	0	0
630	A	DAE(O/G)	0	0	0	0
800	A	DAE(O/G)	0	0	0	0
1000	A	DAE(O/G)	0	0	0	0
4000	A	DAE(TIE)	2	2	2	2
16	A	E3 (O/G)	0	0	0	0
32	A	E3 (O/G)	0	0	0	0
63	A	E3 (O/G)	0	0	0	0
125	A	E3 (O/G)	0	0	0	0
160	A	E3 (O/G)	0	0	0	0
250	A	E3 (O/G)	0	0	0	0
400	A	E3 (O/G)	0	0	0	0
0.0 – 5.5	KW	DK2 / PK2 / AK2	0	0	0	0
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	0	0	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	0	0	0	0
13.1 – 24.0	KW	DK2 / PK2 / AK2	0	0	0	0
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	0	0	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	0	0	0	0
37.1 – 55.0	KW	DK21 / PK21 / AK21	0	0	0	0

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (ESP Standby PMCC) ⟶			3DL	3DM	4DL	4DM
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
55.1 – 80.0	KW	DK21 / PK21 / AK21	0	0	0	0
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0	0	0
90 – 200.0	KW	DM / PM	0	0	0	0
Up to 32A		E1	0	0	0	0
		G1 (BUS PT)	1	1	1	1
		CS (Control Supply)	0	0	0	0
		Dummy Panel	2	2	2	2
		Y-link	0	0	0	0

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board →			CHP Crusher House PMCC-I (SEC-A & B)	LHP/GHP MCC	CHP MISC PMCC-2	CHP Bunker PMCC-3
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
2500	A	DAET(I/C)	0	0	0	2
2500	A	DAET(B/C)	0	0	0	1
3000	A	DAET(I/C)	4	0	0	0
3000	A	DAET(B/C)	0	0	0	0
4000	A	DAET(I/C)	0	2	2	0
4000	A	DAET(B/C)	0	1	1	0
1000	A	DAE(O/G)	0	3	0	0
90 – 200	KW	DM / PM	3	6	0	0
16	A	E3 (O/G)	8	9	9	7
32	A	E3 (O/G)	21	29	22	9
63	A	E3 (O/G)	34	26	20	23
125	A	E3 (O/G)	14	17	16	5
160	A	E3 (O/G)	2	4	2	8
250	A	E3 (O/G)	9	8	8	4
400	A	E3 (O/G)	7	2	3	4
0.0 – 5.5	KW	DK2 / PK2 / AK2	0	10	12	10
7.1 – 13.0	KW	DK2 / PK2 / AK2	14	0	4	0
13.1 – 24.0	KW	DK2 / PK2 / AK2	16	11	8	3

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board →			CHP Crusher House PMCC-I (SEC-A & B)	LHP/GHP MCC	CHP MISC PMCC-2	CHP Bunker PMCC-3
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
30.0 – 37.0	KW	DK21 / PK21 / AK21	17	4	8	2
37.1 – 55.0	KW	DK21 / PK21 / AK21	4	0	11	5
55.1 – 80.0	KW	DK21 / PK21 / AK21	5	4	0	3
0.0 – 5.5	KW	DN1 / PN1 / AN1	0	0	0	0
7.1 – 13.0	KW	DN1 / PN1 / AN1	0	0	0	0
13.1 – 24.0	KW	DN1 / PN1 / AN1	2	2	0	0
30.0 – 37.0	KW	DN1 / PN1 / AN1	0	0	2	0
Upto 32	A	E1 (O/G)	10	12	8	8
32	A	EA3	5	4	3	0
250	A	ES3	2	0	0	2
		G1 (BUS PT)	4	2	2	2
		CS (Control Supply)	4	2	2	2
		Dummy Panel	4	2	2	2
		Y-link	8	5	6	3

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : TOP/SIDE BUSDUCT ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board ⟶			**SWITCHYARD SWITCHBOARD**
RATING	**UNIT**	**MODULE TYPE**	**QTY.**
2500	A	DAE(I/C)	2
2500	A	DAE(B/C)	1
630	A	DAE(O/G)	3
800	A	DAE(O/G)	0
1000	A	DAE(O/G)	0
1250	A	DAE(O/G)	0
16	A	E3 (O/G)	16
32	A	E3 (O/G)	24
63	A	E3 (O/G)	39
125	A	E3 (O/G)	8
160	A	E3 (O/G)	8
250	A	E3 (O/G)	10
400	A	E3 (O/G)	5
0.0 – 5.5	KW	DK2 / PK2 / AK2	0
5.6 – 7.0	KW	DK2 / PK2 / AK2	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	0
13.1 – 24.0	KW	DK2 / PK2 / AK2	0
24.1 – 29.9	KW	DK2 / PK2 / AK2	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	0
37.1 – 55.0	KW	DK21 / PK21 / AK21	0
55.1 – 80.0	KW	DK21 / PK21 / AK21	0
80.1 – 89.9	KW	DK21 / PK21 / AK21	0
90 – 200.0	KW	DM / PM	0
Up to 32A		E1	24
250	A	ES3	2
		G1 (BUS PT)	2
		CS (Control Supply)	0
		Dummy Panel	2

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (MCC) →			0SA	0SB	0WA	0WC	0WD	0QA	0QB	3HD	4HD
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
250	A	E3 (I/C)	0	0	0	0	0	0	0	0	0
250	A	E3 (B/C)	0	0	0	0	0	0	0	0	0
400	A	E3 (I/C)	0	0	0	0	0	0	0	0	0
400	A	CC (I/C)	0	0	0	0	0	0	0	2	2
400	A	E3 (B/C)	0	0	0	0	0	0	0	0	0
630	A	DAE(I/C)	0	0	2	2	0	2	2	0	0
630	A	DAE(B/C)	0	0	1	1	0	1	1	0	0
800	A	DAE(I/C)	2	2	0	0	0	0	0	0	0
800	A	DAE(B/C)	1	1	0	0	0	0	0	0	0
1000	A	DAE(I/C)	0	0	0	0	2	0	0	0	0
1000	A	DAE(B/C)	0	0	0	0	1	0	0	0	0
630	A	DAE(O/G)	0	0	0	0	0	0	0	0	0
16	A	E3 (O/G)	8	8	107	8	51	48	44	51	51
32	A	E3 (O/G)	4	4	12	4	8	7	7	0	0
63	A	E3 (O/G)	6	6	8	7	9	9	9	7	7
125	A	E3 (O/G)	0	0	3	3	3	28	28	2	2
160	A	E3 (O/G)	3	3	0	0	0	0	0	0	0
250	A	E3 (O/G)	0	0	0	0	0	0	0	0	0
400	A	E3 (O/G)	0	0	0	0	0	0	0	0	0
0.0 – 5.5	KW	DK2 / PK2 / AK2	3	3	57	27	40	48	48	8	8
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	0	4	0	0	0	0	0	0

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

Name of the Board (MCC) →			0SA	0SB	0WA	0WC	0WD	0QA	0QB	3HD	4HD
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
7.1 – 13.0	KW	DK2 / PK2 / AK2	0	0	12	7	9	14	14	4	4
13.1 – 24.0	KW	DK2 / PK2 / AK2	14	14	5	9	0	9	9	0	0
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	14	14	7	0	0	3	3	0	0
37.1 – 55.0	KW	DK21 / PK21 / AK21	0	0	5	5	0	0	0	3	3
55.1 – 80.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0	0
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0	0
90 – 200.0	KW	DM / PM	0	0	0	0	6	0	0	0	0
Up to 32A		E1	3	3	2	2	2	8	8	0	0
125		EA3	0	0	0	0	0	0	0	3	3
		VM (BUS PT)	2	2	2	2	2	2	2	1	1
		CS (Control Supply)	2	2	2	2	2	2	2	2	2
		Dummy Panel	2	2	0	2	2	2	2	2	2
		Y-link	4	4	12	6	7	10	10	3	3

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY
DOUBLE FRONT D/O TYPE
FLOOR MOUNTED

Name of the Board (MCC) →			3TA	4TA	3TC	0TA	SWYD ACVS	0SC	3TB	4TB
RATING	UNIT	MODULE TYPE	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.	QTY.
1600	A	DAE(I/C)	0	0	0	2	0	0	0	0
1600	A	DAE(B/C)	0	0	0	1	0	0	0	0
1000	A	DAE(I/C)	0	0	0	0	0	0	0	0
1000	A	DAE(B/C)	0	0	0	0	0	0	0	0
630	A	DAE(I/C)	2	2	0	0	0	2	0	0
630	A	DAE(B/C)	1	1	0	0	0	1	0	0
400	A	E3 (I/C)	0	0	2	0	0	0	2	2
400	A	E3 (B/C)	0	0	1	0	0	0	1	1
250	A	E3 (I/C)	0	0	0	0	2	0	0	0
250	A	E3 (B/C)	0	0	0	0	1	0	0	0
16	A	E3 (O/G)	10	10	6	9	0	10	6	5
32	A	E3 (O/G)	0	0	0	0	0	3	5	4
63	A	E3 (O/G)	5	5	8	5	3	6	4	5
125	A	E3 (O/G)	0	0	0	13	3	4	0	0
160	A	E3 (O/G)	0	0	0	0	4	0	0	0
250	A	E3 (O/G)	0	0	0	0	0	0	0	0
400	A	E3 (O/G)	0	0	0	3	0	3	0	0
0.0 – 5.5	KW	DK2 / PK2 / AK2	56	56	7	12	14	15	5	5
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	0	0	0	22	5	4	0	0
13.1 – 24.0	KW	DK2 / PK2 / AK2	8	8	4	4	0	0	7	7

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY
DOUBLE FRONT D/O TYPE
FLOOR MOUNTED

Name of the Board (MCC) →			3TA	4TA	3TC	0TA	SWYD ACVS	0SC	3TB	4TB
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	0	0	5	0	5	0	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	8	8	8	14	0	0	5	5
37.1 – 55.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0
55.1 – 80.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	3	3
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0
90 – 200.0	KW	DM / PM	0	0	0	0	0	4	0	0
Up to 32A		E1	4	4	0	4	9	4	4	0
32	A	EA3	0	0	6	14	0	0	0	0
							0			
		VM (BUS PT)	2	2	2	2	0	2	2	2
		CS (Control Supply)	2	2	2	2	0	2	2	2
		Dummy Panel	2	2	2	2	0	0	2	2
		Y-link	9	9	4	9	0	3	3	3
		Alarm Module	0	0	0	0	1	0	0	0

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY
DOUBLE FRONT D/O TYPE
FLOOR MOUNTED

Name of the Board (MCC) ⟶			SOOT BLOWER-1	SOOT BLOWER-2
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**
63	A	CC (I/C)	2	2
0.0 – 5.5	KW	WB	231	231
0.0 – 5.5	KW	LR	70	70
0.0 – 5.5	KW	AH	4	4
		VM (BUS PT)	1	1
		CS (Control Supply)	1	1
		Dummy Panel	4	4
		Y-link	76	76

Note: The quantity mentioned above includes the requirement for engineering contractual spares.
Refer Compliance Drawings Annexure-6_SBMCC SLDattached with specification for further information.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY

DOUBLE FRONT FIXED TYPE

FLOOR MOUNTED

Name of the Board (ACDB) →			3HA	3KA	4HA	4KA	3HB	3QA	4HB	4QA	OUTDOOR SWGR # 3	OUTDOOR SWGR # 4
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
630	A	DAE(I/C)	0	0	0	0	2	2	2	2	0	0
630	A	DAE(B/C)	0	0	0	0	1	1	1	1	0	0
250	A	CC (I/C)	2	2	2	2	0	0	0	0	0	0
250	A	E3 (B/C)	0	0	0	0	0	0	0	0	0	0
400	A	E3 (I/C)	0	0	0	0	0	0	0	0	1	1
400	A	E3 (B/C)	0	0	0	0	0	0	0	0	0	0
630	A	DAE(O/G)	0	0	0	0	0	0	0	0	0	0
800	A	DAE(O/G)	0	0	0	0	0	0	0	0	0	0
1000	A	DAE(O/G)	0	0	0	0	0	0	0	0	0	0
1250	A	DAE(O/G)	0	0	0	0	0	0	0	0	0	0
16	A	E3 (O/G)	202	302	202	302	67	56	67	56	0	0
32	A	E3 (O/G)	13	33	13	33	30	10	30	10	0	0
63	A	E3 (O/G)	5	8	6	8	23	14	23	14	0	0
125	A	E3 (O/G)	0	0	0	0	34	30	34	30	0	0
160	A	E3 (O/G)	0	0	0	0	0	4	0	4	0	0
250	A	E3 (O/G)	0	0	0	0	0	0	0	0	0	0
400	A	E3 (O/G)	0	0	0	0	0	0	0	0	2	2
0.0 – 5.5	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0	0	0
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0	0	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0	0	0
13.1 – 24.0	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0	0	0
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	0	0	0	0	0	0	0	0	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0	0	0
37.1 – 55.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0	0	0
55.1 – 80.0	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0	0	0

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY

DOUBLE FRONT FIXED TYPE

FLOOR MOUNTED

Name of the Board (ACDB) →			3HA	3KA	4HA	4KA	3HB	3QA	4HB	4QA	OUTDOOR SWGR # 3	OUTDOOR SWGR # 4
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0	0	0	0	0	0	0	0	0
90 – 200.0	KW	DM / PM	0	0	0	0	0	0	0	0	0	0
Up to 32A		E1	3	4	3	4	8	7	8	7	0	0
Up to 16A		EA3	0	0	0	0	0	0	0	0	0	0
		VM (BUS PT)	1	1	1	1	2	2	2	2	2	2
		CS (Control Supply)	0	0	0	0	0	0	0	0	0	0
		Dummy Panel	2	2	2	2	2	2	2	2	2	2
		Y-link	0	0	0	0	0	0	0	0	0	0

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Name of the Board : 0DG - FGD EMERGENCY PCC

Type of Connection : SANDWICH BUSDUCT

SINGLE FRONT D/O TYPE

FLOOR MOUNTED

RATING	UNIT	MODULE TYPE	QTY.
2000	A	DAE(TIE)	0
2000	A	DG(I/C)	1
2000	A	DAE(B/C)	0
630	A	DAE(O/G)	4
800	A	DAE(O/G)	0
1000	A	DAE(O/G)	0
1250	A	DAE(O/G)	0
16	A	E3 (O/G)	0
32	A	E3 (O/G)	0
63	A	E3 (O/G)	0
125	A	E3 (O/G)	0
250	A	E3 (O/G)	0
400	A	E3 (O/G)	0
0.0 – 5.5	KW	DK2 / PK2 / AK2	0
5.6 – 7.0	KW	DK2 / PK2 / AK2	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	0
13.1 – 24.0	KW	DK2 / PK2 / AK2	0
24.1 – 29.9	KW	DK2 / PK2 / AK2	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	0
37.1 – 55.0	KW	DK21 / PK21 / AK21	0
55.1 – 80.0	KW	DK21 / PK21 / AK21	0
80.1 – 89.9	KW	DK21 / PK21 / AK21	0
90 – 200.0	KW	DM / PM	0
Up to 32A		E1	
		G2 (BUS PT)	1
		CS (Control Supply)	2
		Dummy Panel	1
		Y-link	0

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : SANDWICH BUSDUCT

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

→

Name of the Board (EMERGENCY MCC)			3DG	4DG
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**
3000	A	DG(I/C)	2	2
3000	A	DAE(TIE)	2	2
3000	A	DAE(B/C)	1	1
630	A	DAE(O/G)	2	2
800	A	DAE(O/G)	0	0
1000	A	DAE(O/G)	1	1
1250	A	DAE(O/G)	0	0
16	A	E3 (O/G)	28	28
32	A	E3 (O/G)	11	11
63	A	E3 (O/G)	5	5
125	A	E3 (O/G)	6	6
250	A	E3 (O/G)	5	5
400	A	E3 (O/G)	6	6
0.0 – 5.5	KW	DK2 / PK2 / AK2	38	38
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	12	12
13.1 – 24.0	KW	DK2 / PK2 / AK2	16	16
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	11	11
37.1 – 55.0	KW	DK21 / PK21 / AK21	0	0
55.1 – 80.0	KW	DK21 / PK21 / AK21	2	2
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0
90 – 200.0	KW	DM / PM	9	9
Up to 32A		E1	0	0
		G2 (BUS PT)	2	2
		CS (Control Supply)	2	2
		WTS1 (Wireless Temp. Sensor Module 1)	5	5
		WTS2 (Wireless Temp. Sensor Module 2)	6	6
		Dummy Panel	2	2
		Y-link	10	10

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY
DOUBLE FRONT FIXED TYPE
FLOOR MOUNTED

→

Name of the Board (DCDB)			3FA	4FA	0FA	0FB
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**	**QTY.**
125	A	DB	0	0	2	2
125	A	DC	0	0	1	1
125	A	CH	0	0	2	2
125	A	HD	0	0	2	2
1600	A	DB	2	2	0	0
1600	A	DC	1	1	0	0
1600	A	CH	2	2	0	0
1600	A	HD	2	2	0	0
UP TO 32A	A	MCCB TYPE (X)	108	108	30	20
63	A	MCCB TYPE (X)	20	20	10	5
100	A	MCCB TYPE (X)	4	4	0	0
125	A	MCCB TYPE (X)	3	3	2	2
250	A	MCCB TYPE (X)	3	3	0	0
400	A	MCCB TYPE (X)	3	3	0	0
600	A	MCCB TYPE (X)	3	3	0	0
		S (BUS PT)	2	2	2	2
		CS (Control Supply)	0	0	0	0
		Dummy Panel	2	2	2	2

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY

DOUBLE FRONT FIXED TYPE

FLOOR MOUNTED

Name of the Board (DCDB) ⟶			CHP MAIN DCDB	AHP DCDB
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**
125	A	DB	2	2
125	A	DC	2	2
125	A	CH	2	2
125	A	HD	1	1
63	A	DB	0	0
63	A	DC	0	0
63	A	CH	0	0
63	A	HD	0	0
UP TO 32A	A	MCCB TYPE (X)	16	12
63	A	MCCB TYPE (X)	6	3
		S (BUS PT)	2	2
		CS (Control Supply)		
		Dummy Panel	2	2

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY
DOUBLE FRONT FIXED TYPE
FLOOR MOUNTED

Name of the Board →			SWITCHYARD EPDB	SWITCHYARD ACDB EXTN.	SWITCHYARD OIL FILTERATION
RATING	**UNIT**	**MODULE TYPE**	**QTY.**	**QTY.**	**QTY.**
400	A	E3 (I/C)	0	0	1
400	A	E3 (B/C)	0	0	0
250	A	E3 (I/C)	4	2	0
250	A	E3 (B/C)	0	1	0
630	A	DAE(O/G)	0	0	0
800	A	DAE(O/G)	0	0	0
1000	A	DAE(O/G)	0	0	0
1250	A	DAE(O/G)	0	0	0
16	A	E3 (O/G)	0	0	0
32	A	E3 (O/G)	0	0	0
63	A	E3 (O/G)	4	6	0
125	A	E3 (O/G)	4	5	0
160	A	E3 (O/G)	3	0	0
250	A	E3 (O/G)	0	0	0
300	A	E3 (O/G)	0	0	2
0.0 – 5.5	KW	DK2 / PK2 / AK2	0	0	0
5.6 – 7.0	KW	DK2 / PK2 / AK2	0	0	0
7.1 – 13.0	KW	DK2 / PK2 / AK2	0	0	0
13.1 – 24.0	KW	DK2 / PK2 / AK2	0	0	0
24.1 – 29.9	KW	DK2 / PK2 / AK2	0	0	0
30.0 – 37.0	KW	DK21 / PK21 / AK21	0	0	0
37.1 – 55.0	KW	DK21 / PK21 / AK21	0	0	0
55.1 – 80.0	KW	DK21 / PK21 / AK21	0	0	0
80.1 – 89.9	KW	DK21 / PK21 / AK21	0	0	0
90 – 200.0	KW	DM / PM	0	0	0
Up to 32A		E1	0	4	0
		VM (BUS PT)	2	2	1
		CS (Control Supply)	0	0	0
		Dummy Panel	2	2	2

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.1

BOARDWISE BOM

Type of Connection : CABLE ENTRY
DOUBLE FRONT FIXED TYPE
FLOOR MOUNTED
→

Name of the Board (SWITCHYARD DCDB)			220V SWYD DCDB	220V SWYD DCDB EXTN	48V DCDB
RATING	UNIT	MODULE TYPE	QTY.	QTY.	QTY.
200	A	DB	0	0	
200	A	DC	0	1	
200	A	CH	0	2	
200	A	HD	0	0	
300	A	DB	2	0	2
300	A	DC	1	0	1
300	A	CH	2	0	2
300	A	HD	2	0	2
125	A	Discharge Feeder	3	0	3
UP TO 32A	A	MCCB TYPE (X)	22	0	24
63	A	MCCB TYPE (X)	50	15	0
100	A	MCCB TYPE (X)	0	0	0
125	A	MCCB TYPE (X)	0	0	3
250	A	MCCB TYPE (X)	0	0	0
400	A	MCCB TYPE (X)	0	0	0
		S (BUS PT)	2	2	2
		CS (Control Supply)	0	0	0
		Dummy Panel	2	2	2

Note: The quantity mentioned above includes the requirement for engineering contractual spares.

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

S. No.	Module Type	Item Description	Qty.	Remarks
1	DAET (I/C)*	**PMCC INCOMER BREAKER OF RATING 1600A & ABOVE**		
		ACB 3P, ELECTRICALLY OPERATED D/O TYPE, WITHOUT RELEASES, CONTROL SUPPLY VOLTAGE 220V DC, MIN. 10NO+10NC (6NO+6NC AUX. CONTACT DIRECTLY OPERATED FROM BKR. OPERATED MECHANISM). SPRING CHARGE LIMIT SWITCH WITH MIN. 2NO+2NC CONTACTS	1	
		CONTROL MCB SP 6A	10	
		NETURAL LINK	2	
		INDICATING LAMP	5	
		CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER	3	
		CURRENT TRANSFORMER (PROTECTION) WITH VDR, 5VA or better, CL-PS, INSL CL-E OR BETTER	3	
		POTENTIAL TRANSFORMER - 415/110V, 50 VA CL-0.5, INSL CL-E OR BETTER	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (FIXED)	As required	
		POWER TERMINALS	As required	
		220 V DC DP MCB 10A	2	
		2 POLE BREAKER CONTROL SWITCH (TNC), 16A, 220VDC	1	
		2 POLE, 2 POSI., LOCAL/ REMOTE SWITCH	1	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 220 V DC	2	
		NUMERICAL RELAY WITH COMMUNICATION FACILITY (LOCAL FRONT PORT FOR COMMUNICATION WITH LAPTOP & RJ REAR PORT AS PER IEC-61850) FOR FOLLOWING FUNCTIONS: • PHASE OVER CURRENT PROTECTION (50/51) • EARTH FAULT PROTECTION (50N/51N) • STAND BY EARTH FAULT PROTECTION (51NS) • RESTRICTED EARTH FAULT PROTECTION (64R) • BUS NO VOLT • FAULT LOCKOUT FUNCTION (86) • UNDER VOLTAGE WITH TIMER (27M) • SYNCHRONISING CHECK FUNCTION (25) • CIRCUIT BREAKER FAILURE (50BF) • RELAY SELF SUPERVISION • CIRCUIT BREAKER CONDITION MONITORING • TRIP CIRCUIT SUPERVISION (95) • CURRENT TRANFORMER SUPERVISION • VOLTAGE TRANFORMER SUPERVISION • BREAKER CONTROL with I/L • DISTURBANCE RECORDING • FAULT RECORDING • EVENT RECORDING • MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF) • NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT • ALL THE BINARY INPUTS SHALL BE CAPABLE OF TAKING THE 220V DC, HOWEVER THE THERSHOLD VALUE FOR BINARY INPUTS SHALL BE MORE THAN 70% OF RATED CONTROL SUPPLY VOLTAGE • CT INPUT 5 NOs. (3-Ph, 1 for REF and 1 SPARE) • PT INPUT 4 NOs.	1	
	* : Provision for measurement and display of harmonic content of Voltage & Current will be provided in PCC incomer of Station PMCC (i.e. Board No. 0DA & 0DB) only.			

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

2	**DAE (I/C)**	**MCC INCOMER BREAKER OF RATING 630A & ABOVE**		
		ACB 3P, ELECTRICALLY OPERATED D/O TYPE, WITHOUT RELEASES, CONTROL SUPPLY VOLTAGE 220V DC, MIN. 10NO+10NC (6NO+6NC AUX. CONTACT DIRECTLY OPERATED FROM BKR. OPERATED MECHANISM). SPRING CHARGE LIMIT SWITCH WITH MIN. 2NO+2NC CONTACTS	1	
		CONTROL MCB SP 6A	6	
		NETURAL LINK	2	
		INDICATING LAMP	5	
		CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER	3	
		POTENTIAL TRANSFORMER - 415/110V, 50 VA CL-0.5, INSL CL-E OR BETTER	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (FIXED)	As required	
		POWER TERMINALS	As required	
		220 V DC DP MCB 10A	4	
		2 POLE BREAKER CONTROL SWITCH (TNC), 16A, 220VDC	1	
		2 POLE, 2 POSI., LOCAL/ REMOTE SWITCH	1	
		LIMIT SWITCH	2	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 220 V DC	2	
		NUMERICAL RELAY WITH COMMUNICATION FACILITY (LOCAL FRONT PORT FOR COMMUNICATIONWITH LAPTOP & RJ REAR PORT AS PER IEC-61850) FOR FOLLOWING FUNCTIONS: • PHASE OVER CURRENT PROTECTION (50/51) • EARTH FAULT PROTECTION (50N/51N) • BUS NO VOLT • FAULT LOCKOUT FUNCTION (86) • UNDER VOLTAGE WITH TIMER (27M) • SYNCHRONISING CHECK FUNCTION (25) • CIRCUIT BREAKER FAILURE (50BF) • RELAY SELF SUPERVISION • CIRCUIT BREAKER CONDITION MONITORING • TRIP CIRCUIT SUPERVISION (95) • CURRENT TRANFORMER SUPERVISION • VOLTAGE TRANFORMER SUPERVISION • BREAKER CONTROL FUNCTION • DISTURBANCE RECORDING • FAULT RECORDING • EVENT RECORDING • MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF) • NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT • ALL THE BINARY INPUTS SHALL BE CAPABLE OF TAKING THE 220V DC, HOWEVER THE THERSHOLD VALUE FOR BINARY INPUTS SHALL BE MORE THAN 70% OF RATED CONTROL SUPPLY VOLTAGE • CT INPUT 4 NOs. (3 FOR CURRENT PROTECTION, 1 SPARE) • PT INPUT 4 NOs.	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

3	**DAET/DAE (B/C)**	**PMCC/ MCC BUSCOUPLER BREAKER OF RATING 630A & ABOVE**		
		ACB 3P, ELECTRICALLY OPERATED D/O TYPE, WITHOUT RELEASES, CONTROL SUPPLY VOLTAGE 220V DC, MIN. 10NO+10NC (6NO+6NC AUX. CONTACT DIRECTLY OPERATED FROM BKR. OPERATED MECHANISM). SPRING CHARGE LIMIT SWITCH WITH MIN. 2NO+2NC CONTACTS	1	
		CONTROL MCB SP 6A	10	
		NETURAL LINK	1	
		INDICATING LAMP	2	
		CURRENT TRANSFORMER (PROTECTION) WITH VDR, 5VA or better, CL-PS, INSL CL-E OR BETTER	3	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (FIXED)	As required	
		POWER TERMINALS	As required	
		220 V DC DP MCB 10A	2	
		2 POLE BREAKER CONTROL SWITCH (TNC), 16A, 220VDC	1	
		2 POLE, 2 POSI., LOCAL/ REMOTE SWITCH	1	
		LIMIT SWITCH	2	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 220 V DC	2	
		NUMERICAL RELAY WITH COMMUNICATION FACILITY (LOCAL FRONT PORT FOR COMMUNICATIONWITH LAPTOP & RJ REAR PORT AS PER IEC-61850) FOR FOLLOWING FUNCTIONS: • PHASE OVER CURRENT PROTECTION (50/51) • EARTH FAULT PROTECTION (50N/51N) • BUS NO VOLT • FAULT LOCKOUT FUNCTION (86) • UNDER VOLTAGE WITH TIMER (27M) • SYNCHRONISING CHECK FUNCTION (25) • CIRCUIT BREAKER FAILURE (50BF) • RELAY SELF SUPERVISION • CIRCUIT BREAKER CONDITION MONITORING • TRIP CIRCUIT SUPERVISION (95) • CURRENT TRANFORMER SUPERVISION • VOLTAGE TRANFORMER SUPERVISION • BREAKER CONTROL FUNCTION • DISTURBANCE RECORDING • FAULT RECORDING • EVENT RECORDING • MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF) • NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT • ALL THE BINARY INPUTS SHALL BE CAPABLE OF TAKING THE 220V DC, HOWEVER THE THERSHOLD VALUE FOR BINARY INPUTS SHALL BE MORE THAN 70% OF RATED CONTROL SUPPLY VOLTAGE • PT INPUT 4 NOs.	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

4	**DG (I/C)**	**EMERGENCY BOARD INCOMER BREAKER FROM DG OF RATING 630A & ABOVE**		
		ACB TP, ELECTRICALLY OPERATED D/O TYPE, WITHOUT RELEASES, CONTROL SUPPLY VOLTAGE 220V DC, MIN. 10NO+10NC (6NO+6NC AUX. CONTACT DIRECTLY OPERATED FROM BKR. OPERATED MECHANISM). SPRING CHARGE LIMIT SWITCH WITH MIN. 2NO+2NC CONTACTS	1	
		CONTROL MCB SP 6A	10	
		NETURAL LINK	2	
		INDICATING LAMP	5	
		CURRENT TRANSFORMER (METERING), 5VA (Min.), CL-1, INSL CL-E OR BETTER	1	
		CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER	3	
		CURRENT TRANSFORMER (PROTECTION) WITH VDR, 5VA or better, CL-PS, INSL CL-E OR BETTER	3	
		POTENTIAL TRANSFORMER - 415/110V, 50 VA CL-0.5, INSL CL-E OR BETTER	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (FIXED)	As required	
		POWER TERMINALS	As required	
		220 V DC DP MCB 6A	4	
		2 POLE BREAKER CONTROL SWITCH (TNC), 16A, 220VDC	1	
		2 POLE, 2 POSI., LOCAL/ REMOTE SWITCH	1	
		LIMIT SWITCH	2	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 220 V DC	2	
		NUMERICAL RELAY WITH COMMUNICATION FACILITY (LOCAL FRONT PORT FOR COMMUNICATIONWITH LAPTOP & RJ REAR PORT AS PER IEC-61850) FOR FOLLOWING FUNCTIONS: • PHASE OVER CURRENT PROTECTION (50/51) • EARTH FAULT PROTECTION (50N/51N) • RESTRICTED EARTH FAULT PROTECTION (64R) • BUS NO VOLT • FAULT LOCKOUT FUNCTION (86) • UNDER VOLTAGE WITH TIMER (27M) • SYNCHRONISING CHECK FUNCTION (25) • CIRCUIT BREAKER FAILURE (50BF) • DIFFERENTIAL PROTECTION (87) (HIGH IMPEDANCE) • REVERSE POWER PROTECTION • DG NEUTRAL DISPLACEMENT (59) • DG MONITORING • RELAY SELF SUPERVISION • CIRCUIT BREAKER CONDITION MONITORING • TRIP CIRCUIT SUPERVISION (95) • CURRENT TRANFORMER SUPERVISION • VOLTAGE TRANFORMER SUPERVISION • BREAKER CONTROL FUNCTION • DISTURBANCE RECORDING • FAULT RECORDING • EVENT RECORDING • MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF) • NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT • ALL THE BINARY INPUTS SHALL BE CAPABLE OF TAKING THE 220V DC, HOWEVER THE THERSHOLD VALUE FOR BINARY INPUTS SHALL BE MORE THAN 70% OF RATED CONTROL SUPPLY VOLTAGE • CT INPUT 4 NOs. (3 FOR CURRENT PROTECTION, 1 SPARE) • PT INPUT 4 NOs.	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

5	**DAE(O/G) / DAE-TIE**	**OUTGOING/ TIE BREAKER FEEDER OF RATING 630A & ABOVE**		
		ACB 3P, ELECTRICALLY OPERATED D/O TYPE, WITHOUT RELEASES, CONTROL SUPPLY VOLTAGE 220V DC, MIN. 10NO+10NC (6NO+6NC AUX. CONTACT DIRECTLY OPERATED FROM BKR. OPERATED MECHANISM). SPRING CHARGE LIMIT SWITCH WITH MIN. 2NO+2NC CONTACTS	1	
		CONTROL MCB SP 6A	4	
		NETURAL LINK	1	
		INDICATING LAMP	2	
		CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER	3	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (FIXED)	As required	
		POWER TERMINALS	As required	
		220 V DC DP MCB 10A	2	
		2 POLE BREAKER CONTROL SWITCH (TNC), 16A, 220VDC	1	
		2 POLE, 2 POSI., LOCAL/ REMOTE SWITCH	1	
		LIMIT SWITCH	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 220 V DC	2	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		NUMERICAL RELAY WITH COMMUNICATION FACILITY (LOCAL FRONT PORT FOR COMMUNICATIONWITH LAPTOP & RJ REAR PORT AS PER IEC-61850) FOR FOLLOWING FUNCTIONS: • PHASE OVER CURRENT PROTECTION (50/51) • EARTH FAULT PROTECTION (50N/51N) • BUS NO VOLT • FAULT LOCKOUT FUNCTION (86) • UNDER VOLTAGE WITH TIMER (27M) • SYNCHRONISING CHECK FUNCTION (25) • CIRCUIT BREAKER FAILURE (50BF) • RELAY SELF SUPERVISION • CIRCUIT BREAKER CONDITION MONITORING • TRIP CIRCUIT SUPERVISION (95) • CURRENT TRANFORMER SUPERVISION • VOLTAGE TRANFORMER SUPERVISION • BREAKER CONTROL FUNCTION • DISTURBANCE RECORDING • FAULT RECORDING • EVENT RECORDING • MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF) • NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT • ALL THE BINARY INPUTS SHALL BE CAPABLE OF TAKING THE 220V DC, HOWEVER THE THERSHOLD VALUE FOR BINARY INPUTS SHALL BE MORE THAN 70% OF RATED CONTROL SUPPLY VOLTAGE • CT INPUT 4 NOs. (3 FOR CURRENT PROTECTION, 1 SPARE) • PT INPUT 4 NOs.	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

6	**DM/PM/AM**	**BREAKER CONTROLLED MOTOR FEEDER RATED 90KW & ABOVE (CONTROLLED FROM DDCMIS/PLC/ATRS)**		
		ACB TP, ELECTRICALLY OPERATED D/O TYPE, WITHOUT RELEASES, CONTROL SUPPLY VOLTAGE 220V DC, MIN. 10NO+10NC (6NO+6NC AUX. CONTACT DIRECTLY OPERATED FROM BKR. OPERATED MECHANISM). SPRING CHARGE LIMIT SWITCH WITH MIN. 2NO+2NC CONTACTS	1	
		CONTROL MCB	5	
		NETURAL LINK	1	
		INDICATING LAMP	3	
		CURRENT TRANSFORMER (METERING), 5VA (Min.), CL-1, INSL CL-E OR BETTER	1	
		CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER	3	
		CURRENT TRANSDUCER (DC), 4-20 mA, DUAL O/P	1	
		DIGITAL AMMETER	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (FIXED)	As required	
		POWER TERMINALS	As required	
		SP ON/ OFF SWITCH FOR MOTOR SPACE HEATER OF BREAKER MOTOR FDR, 10A, 240V AC	1	
		220 V DC DP MCB 6A	4	
		2 POLE BREAKER CONTROL SWITCH (TNC), 16A, 220VDC	1	
		2 POLE, 2 POSI., LOCAL/ REMOTE SWITCH	1	
		LIMIT SWITCH	2	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		NUMERICAL RELAY WITH COMMUNICATION FACILITY (LOCAL FRONT PORT FOR COMMUNICATIONWITH LAPTOP & RJ REAR PORT AS PER IEC-61850) FOR FOLLOWING FUNCTIONS: • PHASE OVER CURRENT PROTECTION (50/51) • EARTH FAULT PROTECTION (50N/51N) • STALLING/ LOCKED ROTOR PROTECTION (50L/R) • THERMAL OVERLAOD PROTECTION (49) • NEGATIVE PHASE SEQUENCE PROTECTION (46) • BUS NO VOLT • REPETATIVE START PROTECTION (66) • FAULT LOCKOUT FUNCTION (86) • UNDER VOLTAGE WITH TIMER (27M) • MOTOR DIFFERENTIAL PROTECTION (87M) • CIRCUIT BREAKER FAILURE (50BF) • PHASE REVERSAL PROTECTION (46R) • CURRENT UNBALANCE PROTECTION • RELAY SELF SUPERVISION • CIRCUIT BREAKER CONDITION MONITORING • TRIP CIRCUIT SUPERVISION (95) • CURRENT TRANFORMER SUPERVISION • VOLTAGE TRANFORMER SUPERVISION • BREAKER CONTROL FUNCTION • DISTURBANCE RECORDING • FAULT RECORDING • EVENT RECORDING • MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF, H, 27U) • NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT • ALL THE BINARY INPUTS SHALL BE CAPABLE OF TAKING THE 220V DC, HOWEVER THE THERSHOLD VALUE FOR BINARY INPUTS SHALL BE MORE THAN 70% OF RATED CONTROL SUPPLY VOLTAGE • CT INPUT 4 NOs. (3 FOR CURRENT PROTECTION, 1 SPARE) • PT INPUT 4 NOs.	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

7	**G1**	**BUS PT MODULE FOR PCC/ PMCC**		
		TRIPLE POLE MCCB	1	
		4 POLE MCB WITH 1NO AUX. CONTACT	1	
		NEUTRAL LINK	2	
		POTENTIAL TRANSFORMER - 415/√3 / 110/√3, 50 VA CL-0.5, INSL CL-E OR BETTER	3	
		CONTROL TERMINALS (FIXED)	As required	
8	**G2**	**BUS PT MODULE FOR EMERGENCY MCC**		
		TRIPLE POLE MCCB	1	
		3 POLE MCB WITH 1NO AUX. CONTACT	1	
		NEUTRAL LINK	2	
		POTENTIAL TRANSFORMER - 415/√3 / 110/√3, 50 VA CL-0.5, INSL CL-E OR BETTER	3	
		CONTROL TERMINALS (FIXED)	As required	
9	**VM**	**BUS PT MODULE FOR MCC/ ACDB**		
		MCCB WITH 1NO+1NC AUX. CONTACT	3	
		CONTROL DP MCB	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 415 V AC	1	
		AC VOLTMETER (0-500V)	1	
		VOLTMETER SELECTOR SWITCH	1	
		VOLTAGE TRANSDUCER (AC), 4-20 mA, DUAL O/P	1	
		CONTROL TERMINALS (FIXED)	As required	
10	**CS**	**EACH CONTROL SUPPLY MODULE**		
		MCCB	2	
		CONTROL MCB	4	
		NEUTRAL LINK	6	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC (AS AC MONITORING RELAY)	4	
		CONTROL TRANSFORMER, DRY TYPE, CAST RESIN, 415/110V, INS. CL-B OR BETTER	2	
		2 POLE, 2 POSI., SELECTOR SWITCH FOR CONTROL TRF., 110V AC	2	
		CONTROL TERMINALS (FIXED)	As required	
11	**DB**	**220V/ 48V DC INCOMER OF DCDB FROM BATTERY**		
		DC AMMETER WITH SHUNT AND CENTER ZERO	1	
		CONTROL TERMINALS (FIXED)	As required	
12	**DC**	**220V/ 48V DC BUS COUPLER (NORMALLY CLOSED)**		
		250V DC ISOLATING SWITCH WITH 2NO+2NC AUXILIARY CONTACTS	1	
		CONTROL TERMINALS (FIXED)	As required	
13	**CH**	**220V/ 48V DC INCOMER OF DCDB FROM CHARGER**		
		TP, 250V DC MCCB/ CIRCUIT BREAKER (WITH S/C RELEASE FOR RATING>400A) WITH 2NO+2NC AUXILIARY CONTACTS	1	
		CONTROL TERMINALS (FIXED)	As required	
14	**HD**	**220V/ 48V DC BUS COUPLER (NORMALLY OPEN)**		
		TP, 250V DC ISOLATING SWITCH WITH 2NO+2NC AUXILIARY CONTACTS	1	
		LINK/ ISOLATION (FOR SWITCHYARD)	1	
		CONTROL TERMINALS (FIXED)	As required	
	NOTE: MODULE TYPE HD SHALL HAVE KEY INTERLOCK WITH MODULE TYPE DC ON BOTH SECTION IN SUCH A WAY THAT WHEN SWITCH 'HD' IS IN OPEN CONDITION THE KEY SHALL BE TRAPPED. ON CLOSING MODULE 'HD' THE KEY SHALL BE RELEASED. MODULE TYPE DC CAN ONLY BE OPENED ON INSERTING THE ABOVE KEY IN ANY ONE OF THE SECTION.			
15	**S**	**220V/ 48V DCDB BUS MODULE FOR METERING & PROTECTION**		
		250V DC MCCB	1	
		UNDERVOLTAGE RELAY (INSTANTANEOUS WITH SETTING OF 80% OF 220VDC. THE RESETTING OF RELAY SHOULD NOT BE MORE THAN 1.05)	1	
		OVERVOLTAGE RELAY (INSTANTANEOUS WHICH SHALL OPERATE AT 110% OF 220V DC. THE RESETTING SHOULD NOT BE LESS THAN .95)	1	
		EARTHFAULT RELAY (CAEM21 OR EQV.)	1	
		INDICATING LAMP	3	
		CONTROL MCB	2	
		NEUTRAL LINK	1	
		DC VOLTMETER (0-300V)	1	
		VOLTMETER SELECTOR SWITCH	1	
		VOLTAGE TRANSDUCER (DC), 4-20mA, DUAL O/P	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 220/48 V DC	2	
		PUSH BUTTON - SPRING RETURN WITH 1NO+1NC AUX. CONTACT	2	
		CONTROL TERMINALS (FIXED)	As required	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

16	**X**	**220V/ 48V DC OUTGOING FEEDER**		
		250V DC MCCB	1	
		CONTROL TERMINALS (FIXED)	As required	
17	**CC**	**MCC/ ACDB INCOMER WITH CONTACTOR (FOR ONE OUT OF TWO LOGIC) OF RATING UP TO 400A**		
		TP MCCB ADJ. O/L, S/C & E/F RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		CONTROL MCB 6A, 10KA	7	
		INDICATING LAMP	3	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		CONTROL TERMINALS (DRAWOUT)	25	
18	**E3 (I/C)**	**MCC/ ACDB INCOMER OF RATING UP TO 400A**		
		TP MCCB ADJ. O/L, S/C & E/F RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		NETURAL LINK EQUIVALENT TO MCCB RATING	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	3	
		NEUTRAL CT	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
19	**E3 (B/C)**	**MCC/ ACDB BUSCOUPLER OF RATING UP TO 400A**		
		TP MCCB ADJ. O/L, S/C & E/F RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		NETURAL LINK EQUIVALENT TO MCCB RATING	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	3	
		NEUTRAL CT	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
20(A)	**E3**	**TPN AC OUTGOING MCCB OPERATED FEEDER FOR RATING UP TO 400A**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		NETURAL LINK EQUIVALENT TO MCCB RATING	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
20(B)	**E3'**	**TP AC OUTGOING MCCB OPERATED FEEDER FOR RATING UP TO 400A (FOR 3PHASE, 3WIRE SYSTEM)**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
21	**E2**	**2 PHASE AC OUTGOING MCCB OPERATED FEEDER**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
22	**E1**	**SINGLE PHASE AC OUTGOING MCCB OPERATED FEEDER**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		NETURAL LINK EQUIVALENT TO MCCB RATING	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
23	**ES3**	**TPN AC OUTGOING FOR SOLAR, MCCB OPERATED FEEDER FOR RATING UP TO 400A**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		NETURAL LINK EQUIVALENT TO MCCB RATING	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		CURRENT TRANSFORMER (METERING), 10VA, CL-0.5, INSL CL-E OR BETTER	3	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (DRAWOUT)	As required	
		POTENTIAL TRANSFORMER - 415/√3 / 110/√3, 25 VA CL-0.5, INSL CL-E OR BETTER	3	
		CONTROL 4P MCB 6A, 10KA	2	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		MULTIFUNCTION DIGITAL ENERGY METER WITH RS485 PORT (0.5 ACC. CLASS)	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

24	**DK2/PK2/AK2**	**UNIDIRECTIONAL MOTOR FEEDER BELOW 30KW (CONTROLLED FROM DDCMIS/PLC/ATRS)**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	25	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

25	**DK21/PK21/ AK21**	**UNIDIRECTIONAL MOTOR FEEDER RATED 30KW & BELOW 90KW (CONTROLLED FROM DDCMIS/PLC/ATRS)**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT & VOLTAGE SENSING MODULE AND BOTH CT & VT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local /remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence x) 3 Phase Voltages xi) 3 Phase Power xii) 3 phase Energy **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	2	
		NETURAL LINK-16A	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		CURRENT TRANSFORMER , 5VA, CL-1, INSL CL-E OR BETTER	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CURRENT TRANSDUCER (DC), 4-20 mA, DUAL O/P	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	25	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		SP ON/ OFF SWITCH FOR MOTOR SPACE HEATER OF MOTOR FDR, 10A, 240V AC	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

26	**DK2E/PK2E/AK2E**	**UNIDIRECTIONAL MOTOR FEEDER (REACCELERATION) BELOW 30KW (CONTROLLED FROM DDCMIS/PLC/ATRS)**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	25	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		POWER OFF DELAY TIMER	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

27	**DK21E/PK21E/ AK21E**	**UNIDIRECTIONAL MOTOR FEEDER (REACCELERATION) RATED 30KW & BELOW 90KW (CONTROLLED FROM DDCMIS/PLC/ATRS)**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT & VOLTAGE SENSING MODULE AND BOTH CT & VT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local /remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence x) 3 Phase Voltages xi) 3 Phase Power xii) 3 phase Energy **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	2	
		NETURAL LINK-16A	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		INDICATING LAMP	3	
		CURRENT TRANSFORMER , 5VA, CL-1, INSL CL-E OR BETTER	1	
		CURRENT TRANSDUCER (DC), 4-20 mA, DUAL O/P	1	
		CONTROL TERMINALS (DRAWOUT)	25	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
		SP ON/ OFF SWITCH FOR MOTOR SPACE HEATER OF MOTOR FDR, 10A, 240V AC	1	
		POWER OFF DELAY TIMER	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

28	**K2**	**UNIDIRECTIONAL MOTOR FEEDER BELOW 30KW (CONTROLLED FROM LCP)**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	30	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

29	**K21**	**UNIDIRECTIONAL MOTOR FEEDER RATED 30KW & BELOW 90KW (CONTROLLED FROM LCP)**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT & VOLTAGE SENSING MODULE AND BOTH CT & VT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local /remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence x) 3 Phase Voltages xi) 3 Phase Power xii) 3 phase Energy **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	2	
		NETURAL LINK-16A	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	25	
		SP ON/ OFF SWITCH FOR MOTOR SPACE HEATER OF MOTOR FDR, 10A, 240V AC	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

30	**K3**	**UNIDIRECTIONAL MOTOR FEEDER BELOW 30KW (CONTROLLED FROM LPBS)**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	30	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

31	**K31**	**UNIDIRECTIONAL MOTOR FEEDER RATED 30KW & BELOW 90KW (CONTROLLED FROM LPBS)**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT & VOLTAGE SENSING MODULE AND BOTH CT & VT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local /remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence x) 3 Phase Voltages xi) 3 Phase Power xii) 3 phase Energy **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	2	
		NETURAL LINK-16A	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	25	
		SP ON/ OFF SWITCH FOR MOTOR SPACE HEATER OF MOTOR FDR, 10A, 240V AC	1	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

32	**DN1/PN1/AN1**	**BIDIRECTIONAL MOTOR FEEDER (CONTROLLED FROM DDCMIS/PLC/ATRS)**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	2	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	2	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	3	
		INDICATING LAMP	4	
		CONTROL TERMINALS (DRAWOUT)	25	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	3	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

33	**EA3**	**3 PHASE MCCB CONTACTOR CONTROLLED FEEDER (CONTROLLED FROM DDCMIS)**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	30	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

34	**EA1**	**1 PHASE MCCB CONTACTOR CONTROLLED FEEDER (CONTROLLED FROM DDCMIS)**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	30	
		INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE	2	
35	**SHS**	**240V AC SPACE HEATER SUPPLY MODULE**		
		CONTROL MCB	4	
		NETURAL LINK	4	
		POWER CONTACTOR(AC) COIL VOLTAGE 240V AC	1	
		4 POLE, 2 POSI., SELECTOR SWITCH	1	
		CONTROL TERMINALS (FIXED)	As required	
36	**PNL SP HTR**	**PANEL SPACE HEATER AND PLUGS & SOCKETS (IN CABLE ALLEY OF EACH VERTICAL)**		
		DP MCB	1	
		NETURAL LINK	1	
		SWITCH	1	
		THERMOSTAT 30-110 DEG C	1	
		SPACE HEATER 60W, 240V AC	1	
		3 PIN INDUSTRIAL SOCKET & PLUG	1	
		DOOR SWITCH	1	
		LED LAMP	1	
		CONTROL TERMINALS (FIXED)	As required	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

37	**RM1**	**RAPPING MOTOR FEEDER WITH IMC**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		INDICATING LAMP	3	
		2 POLE, 2 POSI., SELECTOR SWITCH (AUTO/ MANUAL), 110V AC	1	
		PUSH BUTTON	2	
		CONTROL TERMINALS (DRAWOUT)	25	
38	**RM2**	**RAPPING MOTOR FEEDER WITH OLR**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		OVERLOAD RELAY,BUILT IN SPPR FEATURE 1NO+1NC	1	
		AUX. & INDEPENDENT MOUNTING TYPE MOUNTING KIT FOR O/L RELAY	1	
		RESET CORD ACTUATOR	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		INDICATING LAMP	3	
		2 POLE, 2 POSI., SELECTOR SWITCH (AUTO/ MANUAL), 110V AC	1	
		PUSH BUTTON	2	
		CONTROL TERMINALS (DRAWOUT)	25	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

39	**DDM**	**DUST DENSITY MONITOR FEEDER**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	2	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	2	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	2	
		CONTROL MCB 6A, 10KA	2	
		NETURAL LINK-16A	2	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	2	
		INDICATING LAMP	5	
		ROTARY ON/OFF SWITCH	1	
		CONTROL TERMINALS (DRAWOUT)	25	
40	**HH**	**HOPPER HEATER FEEDER**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	1	
		INDICATING LAMP	2	
		CURRENT TRANSFORMER (METERING), 10VA, CL-1, INSL CL-E OR BETTER	3	
		AC AMMETER	1	
		AMMETER SELECTOR SWITCH	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (DRAWOUT)	As required	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

41	**HS**	**SHAFT INSULATOR HEATER FEEDER**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		INDICATING LAMP	2	
		CURRENT TRANSFORMER (METERING), 10VA, CL-1, INSL CL-E OR BETTER	3	
		AC AMMETER	1	
		AMMETER SELECTOR SWITCH	1	
		ROTARY ON/OFF SWITCH	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (DRAWOUT)	As required	
42	**HI**	**SUPPORT INSULATOR HEATER FEEDER**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	1	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		INDICATING LAMP	2	
		CURRENT TRANSFORMER (METERING), 10VA, CL-1, INSL CL-E OR BETTER	3	
		AC AMMETER	1	
		AMMETER SELECTOR SWITCH	1	
		ROTARY ON/OFF SWITCH	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (DRAWOUT)	As required	
43	**ALI(H)**	**ASH LEVEL INDICATOR (HIGH) FEEDER**		
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	10	
		INDICATING LAMP	11	
		TIMER WITH 2C/O	10	
		PUSH BUTTON WITH 1NC	1	
		DOUBLE POLE ON/OFF SWITCH, 32 A, 110 V AC	1	
		CONTROL TERMINALS (FIXED)	As required	
44	**ALI(L)**	**ASH LEVEL INDICATOR (LOW) FEEDER**		
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	10	
		INDICATING LAMP	11	
		TIMER WITH 2C/O	10	
		PUSH BUTTON WITH 1NC	1	
		DOUBLE POLE ON/OFF SWITCH, 32 A, 110 V AC	1	
		CONTROL TERMINALS (FIXED)	As required	
45	**ARECA**	**ARECA MARSHALING MODULE FEEDER**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		CONTROL TRANSFORMER, DRY TYPE, CAST RESIN, 415/24V, INS. CL-B OR BETTER	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (FIXED)	As required	
46	**WLT**	**WAVE LEVEL TRANSMITTER FEEDER**		
		TP MCCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MCCB 1C/O	1	
		CONTROL TRANSFORMER, DRY TYPE, CAST RESIN, 415/24V, INS. CL-B OR BETTER	1	
		RECTIFIER	1	
		CT SHORTING TERMINAL - STUD TYPE	As required	
		CONTROL TERMINALS (FIXED)	As required	
47	**MM**	**MARSHALING MODULE FOR SSPB OF RAPPING MOTOR AND HOPPER HEATER FEEDBACK**		
		CONTROL TERMINALS (FIXED)	As required	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

48	**WB**	**WALL BLOWER FEEDER**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	3	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	2	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	2	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	As required	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

49	**LR**	**LR BLOWER FEEDER**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	3	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	2	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	2	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	As required	

TECHNICAL DATA PART - A

ANNEXURE-A.2

MODULE WISE BOM

50	**AH**	**AH BLOWER FEEDER**		
		TP MPCB ADJ. S/C RELEASE	1	
		EXTENDED ROTORY HANDLE	1	
		AUXILIARY CONTACT FOR MPCB 1C/O	1	
		TP POWER CONTACTOR(AC) COIL VOLTAGE 110V AC	2	
		ADD ON AUX. CONTACTOR BLOCK 2NO+2NC	2	
		INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS: **a) PROTECTION FUNCTIONS** i) Overload (I2t) Protection with site selectable Trip class 5 to 30 ii) Current imbalance iii) No. of starts/hr limitation iv) Stall Protection during start v) Load Jam protection during running **b) CONTROL FUNCTIONS** i) Close / Trip Command ii) Reversing starter **c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS** i) Watch dog facility ii) Ready to start iii) External wiring iv) Emergency stop v) External check-back signal vi) DP fault vii) Test 1 with shut-down viii) Test 2 without shut-down ix) Reset **d) OPERATING AND DIAGNOSTICS DATA** The IMC shall continuously monitor and provide the following data for display (local/ remote) i) 3-Phase currents ii) Motor ON / OFF status iii) Motor Fault / Switchgear Disturbance iv) Overload trip status v) Overload alarm status vi) Operating hours vii) Number of switching operations viii) Number of overload trips ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence **e) LED INDICATIONS** i) Controller healthy ii) Controller fault iii) Controller power supply healthy.	1	
		CONTROL MCB 6A, 10KA	1	
		NETURAL LINK-16A	1	
		AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC	1	
		INDICATING LAMP	3	
		CONTROL TERMINALS (DRAWOUT)	As required	
51	**WTS1**	**WIRELESS TEMPERATURE SENSOR (WTS1) MODULE (IN ONE ACB/PCC PANEL WITH SINGLE ACB)**		
		TEMPERATURE SENSORS	As required	Quantity shall be finalised during detailed engineering
		TRANSMITTER	As required	
		RECEIVER	As required	
		ADDITIONAL COMPONENTS (EXCEPT NETWORKING HARDWARE & CABLE i.e. ANNEXURE B2) REQUIRED FOR COMPLETENESS	As required	
52	**WTS2**	**WIRELESS TEMPERATURE SENSOR (WTS2) MODULE (IN ONE ACB/PCC PANEL WITH DOUBLE ACB)**		
		TEMPERATURE SENSORS	As required	Quantity shall be finalised during detailed engineering
		TRANSMITTER	As required	
		RECEIVER	As required	
		ADDITIONAL COMPONENTS (EXCEPT NETWORKING HARDWARE & CABLE i.e. ANNEXURE B2) REQUIRED FOR COMPLETENESS	As required	
53	**WTS3**	**WIRELESS TEMPERATURE SENSOR (WTS3) MODULE (IN ONE MCC PANEL)**		
		TEMPERATURE SENSORS	As required	Quantity shall be finalised during detailed engineering
		TRANSMITTER	As required	
		RECEIVER	As required	
		ADDITIONAL COMPONENTS (EXCEPT NETWORKING HARDWARE & CABLE i.e. ANNEXURE B2) REQUIRED FOR COMPLETENESS	As required	

CLAUSE NO.	SUPPLIER SPECIFIC INFORMATION (To be filled by Supplier)
	LT Switchgears
1.00.00	**SWITCHGEAR & MCC**
	a) General
	i) Manufacturer's Name .....
	ii) Type designation .....
	iii) Country of origin .....
	b) Rated voltage .....
	c) Symmetrical short circuit withstand current at rated voltage of switchgear /MCC cubicle. .....
	d) Peak short circuit withstand current .....
	e) Rated current at ambient .....
	f) Degree of protection as per IS:13947
	i) Breaker / MCC cubicles .....
	ii) Busbar chamber .....
	g) Cubicle sheet metal details
	i) Cold rolled / hot rolled .....
	ii) Thickness, structural & load bearing members .....
	iii) Thickness, front & rear .....
	iv) Thickness, Sides & top .....
	v) Thickness of gland plates .....
	h) Painting shade & Thickness as per IS :5
	i) External surfaces(front & rear) .....
	ii) Extreme end covers .....
	i) Minimum Clearance in air for Busbars
	i) Between phases .....
	ii) Between phase & earth .....
	j) Standard height, width & depth of typical panel
	i) Circuit breaker panel .....
	ii) MCC panels (S.F./D.F.) .....

CLAUSE NO.	DATA REQUIREMENTS	
	iii) Circuit breaker panel with Bus trunking /Bus Duct Termination	.....
	iv) ACDB/DCDB	.....
	v) AC/DC Fuse boards	.....
	k) Width of cable alley	.....
	l) Shrouding arrangement in cable alley provided or not	YES/NO
	m) Earth busbar size & material	.....
	n) Approx. Weight of one panel With circuit breaker	.....
	o) Recommended dynamic loading for foundation design	.....
	p) Approx. weight of one MCC panel	.....
	q) Form of Internal Separation as per IEC-61439-2	.....
2.00.00	**POWER BUSBARS & INSULATORS**	
	a) Material & applicable standards	.....
	b) Bare/painted / epoxy insulated/sleeved	.....
	c) Continuous current rating at an ambient temp. of 50^0C	.....
	d) Temperature rise over design ambient temperature for continuous current rating deg. C	.....
	e) Material of the support insulators	.....
	f) One second current rating (kA)	.....
3.00.00	**CONTROL SUPPLY TRANSFORMER**	
	a) Make	.....
	b) Type	.....
	c) Material & class of insulation	.....
	d) Voltage rating & taps	.....
	e) Continuous rating (VA)	.....
4.00.00	**CIRCUIT BREAKER**	
	a) Manufacturer's name and country of manufacturer	.....
	b) Manufacture's type and designation	.....
	c) Rated Voltage	.....
	d) Rated operating duty	.....

CLAUSE NO.	DATA REQUIREMENTS	
	e) Design ambient temperature	.....
	f) Rated current at design ambient temperature	.....
	g) Derating factor for site operating conditions inside panel	.....
	h) Continuous current at ambient temp.	.....
	i) Rated symmetrical breaking current	.....
	j) Rated peak making current	.....
	k) Rated short time rating (for 1 sec.)	.....
	l) Rated peak momentary rating	.....
	m) Number of openings, the circuit breaker is capable of performing without inspection, replacement of contacts or other parts at 100% rated breaking current	.....
	n) No. of breaker auxiliary contacts provided on fixed portion of breaker & their rating	.....
	o) Trip free and anti pumping features have been provided (Furnish description)	YES/NO
	p) Power operating mechanism	.....
	q) Spring charging motor details	
	i) Type	.....
	ii) Rating Watts	.....
	iii) Rated voltage	.....
	iv) Class of insulation	.....
	v) Time for fully charging the closing spring	.....
	r) Emergency Manual charging facility provided	YES/NO
	s) Limits of voltage for satisfactory operation of the following devices as percentage of normal voltage	
	i) Motor	.....
	ii) Closing coil	.....
	iii) Tripping coil	.....
	t) Manual operating mechanism	.....
	u) i) Type of Releases provided	.....
	ii) Available range of following parameters for each type of release offered	.....

CLAUSE NO.	DATA REQUIREMENTS
	v) i) Maximum Tripping Time .....
	ii) Maximum Closing time .....
	w) i) Closing coil VA .....
	ii) Tripping coil VA .....
	x) Telescopic trolley
	i) Make .....
	ii) Type designation .....
	iii) Dimensions .....
5.00.00	**AIR BREAK SWITCHES**
	(The following details shall be furnished for each type & rating)
	a) Make .....
	b) Type .....
	c) Applicable standards .....
	d) Rated current at design ambient temperature (Amps) .....
	e) Design ambient temperature Deg C .....
	f) Rated breaking current (kA) .....
	g) Maximum through fault current withstand kA .....
	h) Door interlock as specified has been provided ? YES/NO
	i) No. of auxiliary contacts and its rating .....
6.00.00	**CONTROL/SELECTOR SWITCH**
	a) Make .....
	b) Type Designation .....
	c) Voltage grade .....
7.00.00	**CONTACTOR**
	(The following details shall be furnished for each type and rating)
	a) Make .....
	b) Type & applicable standards .....
	c) Rated voltage of main and auxiliary contacts .....

CLAUSE NO.	DATA REQUIREMENTS
	d) Rated voltage of coils .....
	e) Limits of operation
	i) Supply voltage variation +/-% .....
	ii) Supply frequency variation for closing (+/-)% .....
	iii) Drop out voltage % .....
	f) Rated (thermal) current A .....
	g) Rated duty .....
	h) Rated utilisation category as per IS:13947 .....
	i) Rated breaking capacity kA .....
	j) Rated making capacity - kA .....
	k) Coil VA burden .....
8.00.00	**AUXILIARY CONTACTOR**
	a) Make .....
	b) Type .....
	c) Catalogue attached as Annexure No. .....
9.00.00	**FUSES**
	a) Make .....
	b) Type .....
	c) Category .....
10.00.00	**CURRENT TRANSFORMERS**
	(The following details shall be provided for each type & rating)
	a) Make .....
	b) Applicable standards .....
	c) Ratio .....
	d) VA Rating .....
	e) Accuracy class .....
	f) Class & type of insulation .....
11.00.00	**VOLTAGE TRANSFORMERS**

CLAUSE NO.	DATA REQUIREMENTS	
	a) Make	.....
	b) Ratio	.....
	c) VA Rating	.....
	d) Accuracy class	.....
	e) Over voltage factor	.....
	f) Class & type of insulation	.....
12.00.00	**Numerical relays**	
	a) General Technical Details and Drawings Enclosed	.....
	b) Make/Model No	.....
	c) Place of Manufacture	.....
	d) Hardware version number	.....
	e) Firmware version number	.....
	f) Rated Voltage Vn (phase-to-neutral)	.....
	g) Rated Current In	.....
	h) Rated Frequency	.....
	i) Over voltage capability - continuous	.....
	j) Over voltage capability – 3s	.....
	k) Burden on voltage transformers (VA per phase)	.....
	l) Over current capability - continuous	.....
	m) Over current capability – 1s	.....
	n) Burden on current transformers (VA per phase)	.....
	o) Reference standards	.....
	p) Operating principle	.....
	q) No Of communication Ports	.....
	r) Compliance to IEC-61850	.....
	s) Built-in functions provided in the relay (list out)	.....
	t) Protection Functions	.....
	u) Measurements	.....

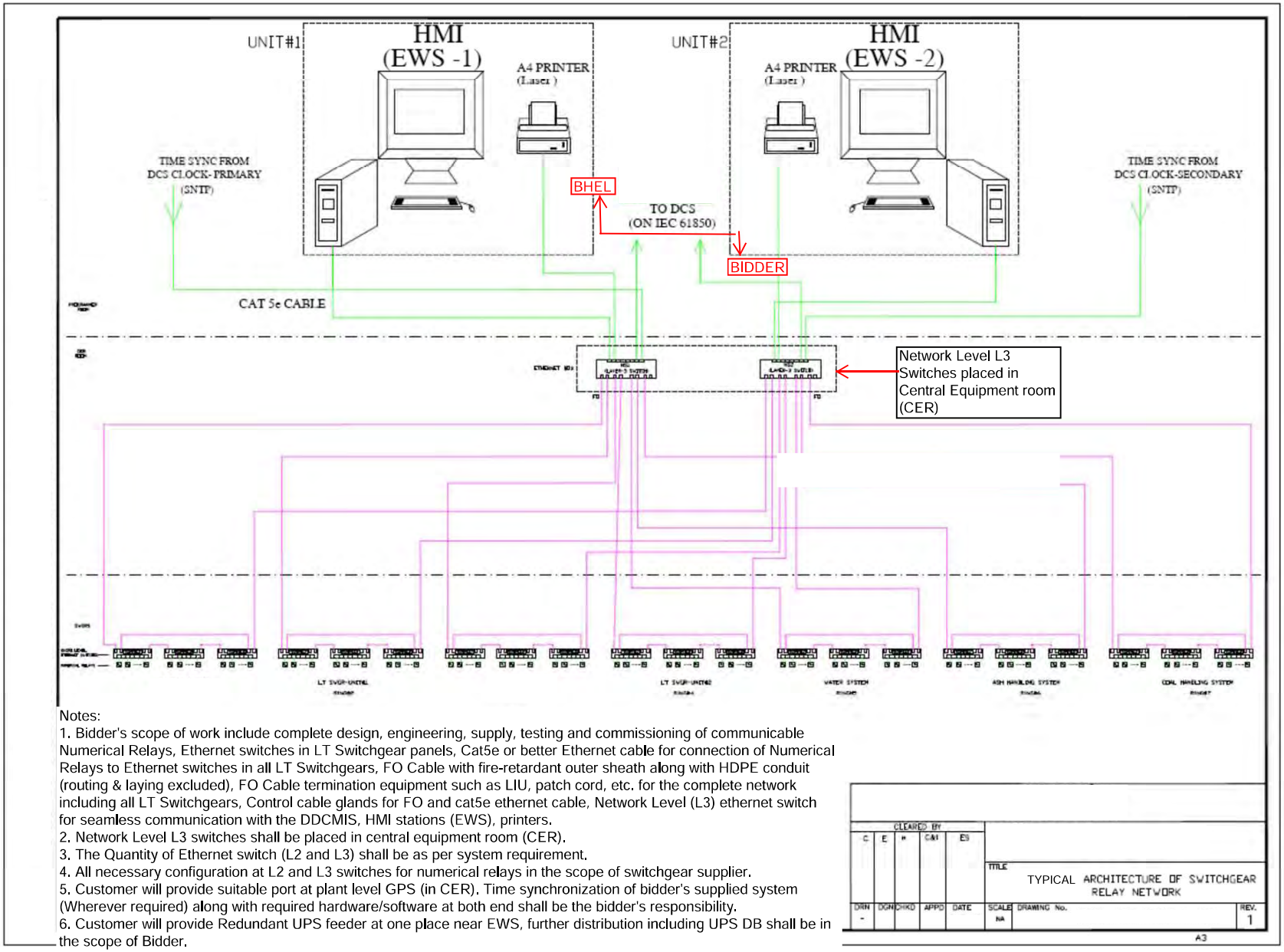
CLAUSE NO.	DATA REQUIREMENTS
	v) Monitoring Functions .....
	w) Control functions .....
	x) Detailed Technical Catalogue for offered Relays enclosed .....
	y) Spares and Repairs
	a) State availability of spares in country and spares holding in country of origin .....
	b) Maximum repair turnaround time .....
	c) Define the proposed repair strategy .....
	d) Recommended spares list .....
	z) List of reference sites in operation for more than 1 year .....
13.00.00	**THERMAL OVERLOAD RELAY & SINGLE PHASING PREVENTER**
	(The following details shall be furnished for each type & rating)
	a) Make & type designation .....
	b) Catalogue .....
14.00.00	**VOLTMETER**
	a) Make .....
	b) Type .....
	c) Catalogue .....
15.00.00	**AMMETER**
	a) Make .....
	b) Type .....
	c) Catalogue .....
16.00.00	**PUSH BUTTONS**
	a) Make .....
	b) Type designation .....
	c) Catalogue .....
17.00.00	**INDICATING LAMPS**
	a) Make .....
	b) Type .....

CLAUSE NO.	DATA REQUIREMENTS
	c) Catalogue .....

CLAUSE NO.	DATA REQUIREMENTS
21.00.00	**MCCB**
	a) Rated voltage
	b) Rated insulation level .....
	c) Rated ultimate &Service S.C.breaking capacity .....
	d) Rated making capacity .....
	e) Utilization category .....
22.00.00	**Ethernet switches (For Networking of Numerical Relays)**
	a) Compliance to IEC 61850 .....
	b) No of Ports .....
	c) Power supply to Ethernet Switches .....

List of Compliance Drawings:

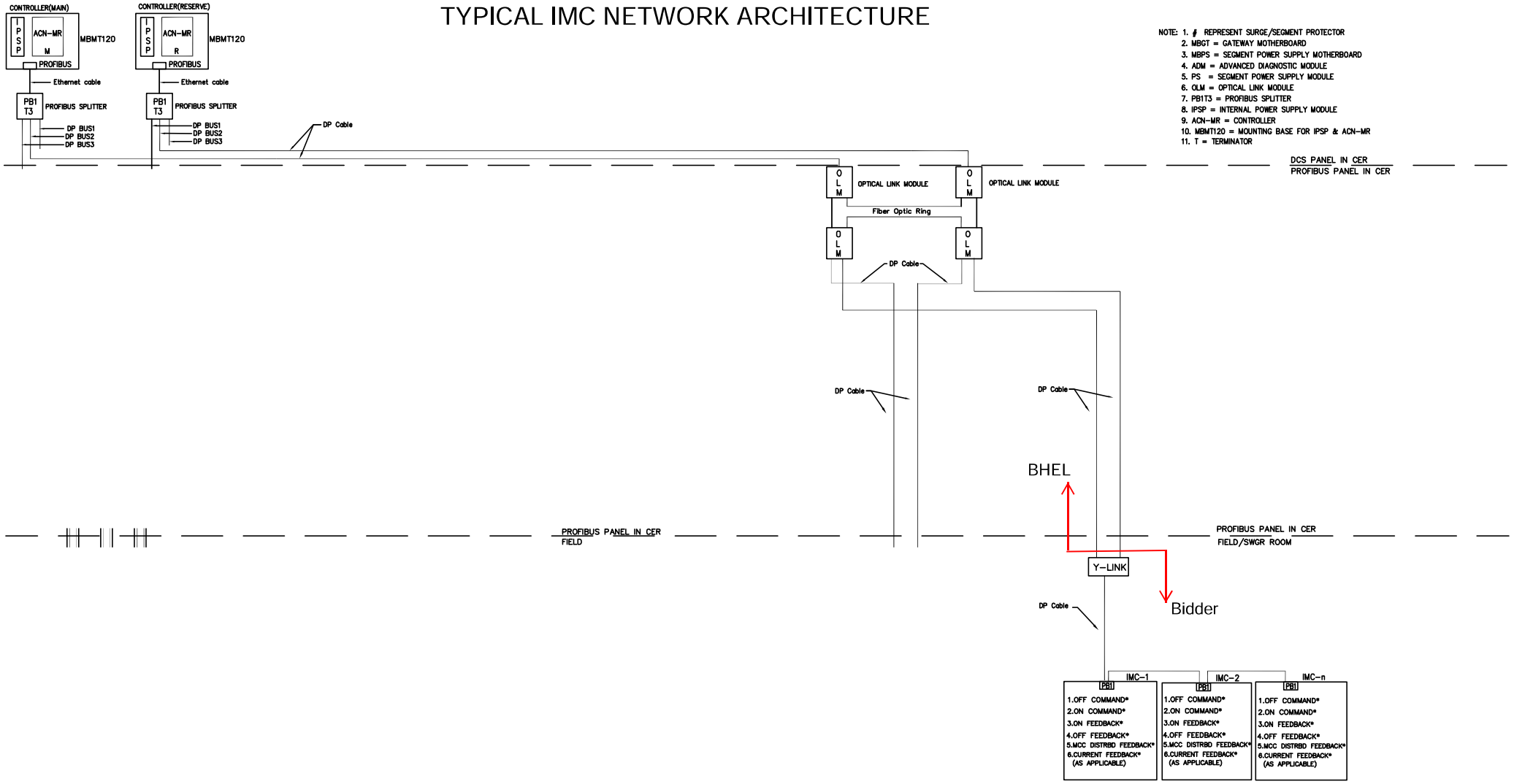
SL.NO	DESCRIPTION	REMARKS
1	Typical Switchgear Relay Network Architecture	Annexure-1
2	Typical IMC Network Architecture	Annexure-2
3	Tentative Switchgear board location	Annexure-3
4	Scheme	Annexure-4
5	Soot Blower MCC SLD	Annexure-5



Notes:

1. Bidder's scope of work include complete design, engineering, supply, testing and commissioning of communicable Numerical Relays, Ethernet switches in LT Switchgear panels, Cat5e or better Ethernet cable for connection of Numerical Relays to Ethernet switches in all LT Switchgears, FO Cable with fire-retardant outer sheath along with HDPE conduit (routing & laying excluded), FO Cable termination equipment such as LIU, patch cord, etc. for the complete network including all LT Switchgears, Control cable glands for FO and cat5e ethernet cable, Network Level (L3) ethernet switch for seamless communication with the DDCMIS, HMI stations (EWS), printers.
2. Network Level L3 switches shall be placed in central equipment room (CER).
3. The Quantity of Ethernet switch (L2 and L3) shall be as per system requirement.
4. All necessary configuration at L2 and L3 switches for numerical relays in the scope of switchgear supplier.
5. Customer will provide suitable port at plant level GPS (in CER). Time synchronization of bidder's supplied system (Wherever required) along with required hardware/software at both end shall be the bidder's responsibility.
6. Customer will provide Redundant UPS feeder at one place near EWS, further distribution including UPS DB shall be in the scope of Bidder.
7. Refer Technical specification (Specification No.: PE-TS-508-506-E002) for additional details about system requirement.

TYPICAL IMC NETWORK ARCHITECTURE



Notes:

1.Bidder's scope of work include complete design, engineering, supply, testing and commissioning of IMC network along with Y-Link.

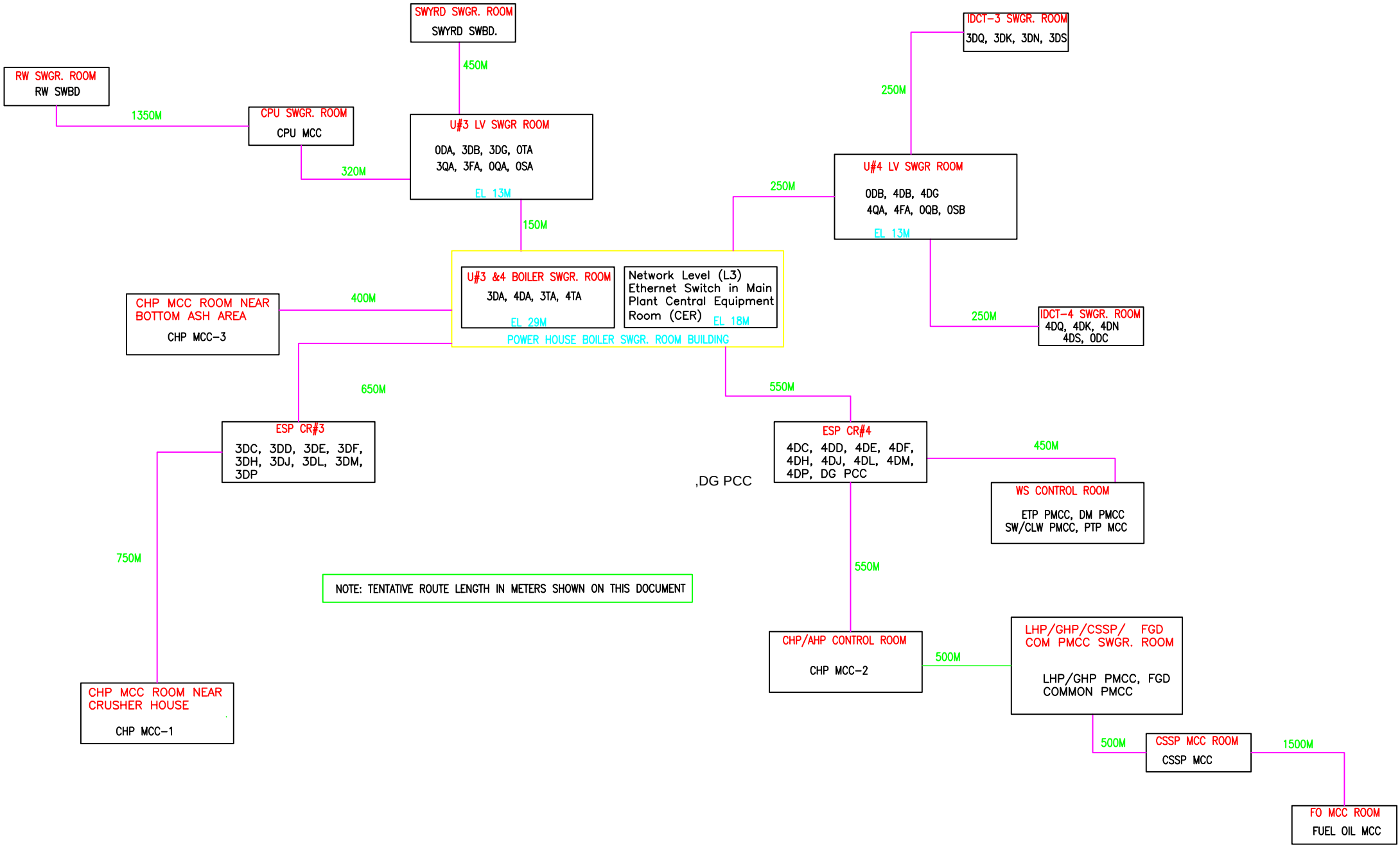
2. Bidder to provide suitable port along with termination accessories at Y-link end for connection with DDCMIS through profibus DP Cable /FO cable (Depending on distance, shall be decided during detail engineering)

3. The Bidder is required to provide the necessary support to establish seamless communication between DDCMIS and Y-Link.

BHEL	DDCMIS INTERFACE WITH PROFIBUS BASED IMCs,ACTUATORS,CONTROL VALVES & INSTRUMENTS(TYPICAL SCHEME)	DRG.NO.	
		SHT	30A OF 30

TENTATIVE SWITCHBOARD LOCATION DETAILS

ANNEXURE–3



CLAUSE NO.	TECHNICAL REQUIREMENT	ANNEXURE 4

LEGEND DESCRIPTION

52	CIRCUIT BREAKER
42	CONTACTOR
SA	SURGE ARRESTOR
	CURRENT TRANSFORMER
	CORE BALANCE CURRENT TRANSFORMER
	VOLTAGE TRANSFORMER
50	TRIPLE POLE IDMTL/DMT O/C PROTECTION
51	TRIPLE POLE INSTANTENIOUS O/C PROTECTION
50N	IDMTL/DMT SENSITIVE/F PROTECTION
51N	INSTATENIOUS E/F PROTECTION
49	THREE PHASE THERMAL O/L PROTN.WITH O/L ALARM & RESTART INHIBITE FUNCTION
50/27	STALLING/LOCKED ROTOR PROTECTION
46	THREE PHASE NEGATIVE PHASE SEQUENCE PROTECTION
66	NUMBER OF START LIMITATION /REPATETIVE START PROTECTION
T	THE DELAY PROTECTION
60	FUSE FAILURE PROTECTION
87M	3 PHASE MOTOR DIFFERENTIAL PROTECTION
	MCB
	MPCB

LEGEND DESCRIPTION

64R	RESTRICTED EARTH FAULT PROTECTION
51G	STAND BY EARTH FAULT PROTECTION
87T	3 PHASE UNDER VOLTAGE TRANSFORMER DIFFERENTIAL PROTECTION
27M	3 PHASE UNDER VOLTAGE TRANSFORMER FOR MOTOR TRIPPING
27U	3 PHASE BUS UNDER VOLTAGE
27N	NO VOLT PROTECTION FOR BUS
50BF	CIRCUIT BREAKER FAILURE PROTECTION
86	LOCKOUT FUNCTION
3I	3 PHASE CURRENT MEASUREMENT
In	NEUTRAL CURRENT MEASUREMENT
3U	3 PHASE VOLTAGE MEASUREMENT
Un	RESIDUAL VOLTAGE MEASUREMENT
P	ACTIVE POWER MEASUREMENT
Q	REACTIVE POWER MEASUREMENT
E	ENERGY MEASUREMENT
PF	POWER FACTOR MEASUREMENT
HZ	FREQUENCY MEASUREMENT
HR	HOUR RUN METER
	MCCB

FOR TENDER PURPOSE ONLY

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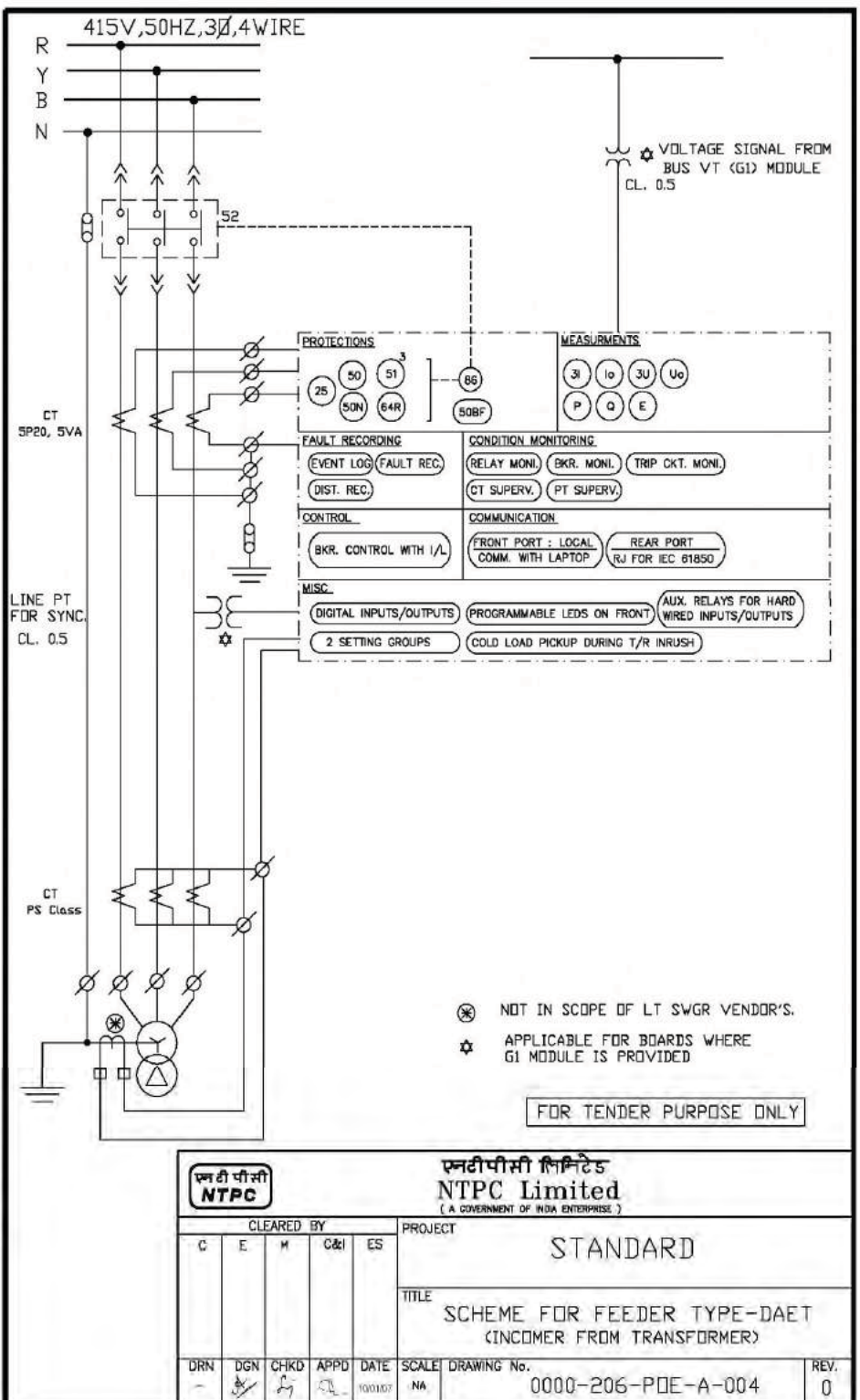
NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)

CLEARED BY					PROJECT
C	E	M	C&I	ES	STANDARD
					TITLE: LEGEND DETAIL

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV
				18/05/18		0000-206-PDE-A-003	A

LEGEND DRAWING

A3 420X297



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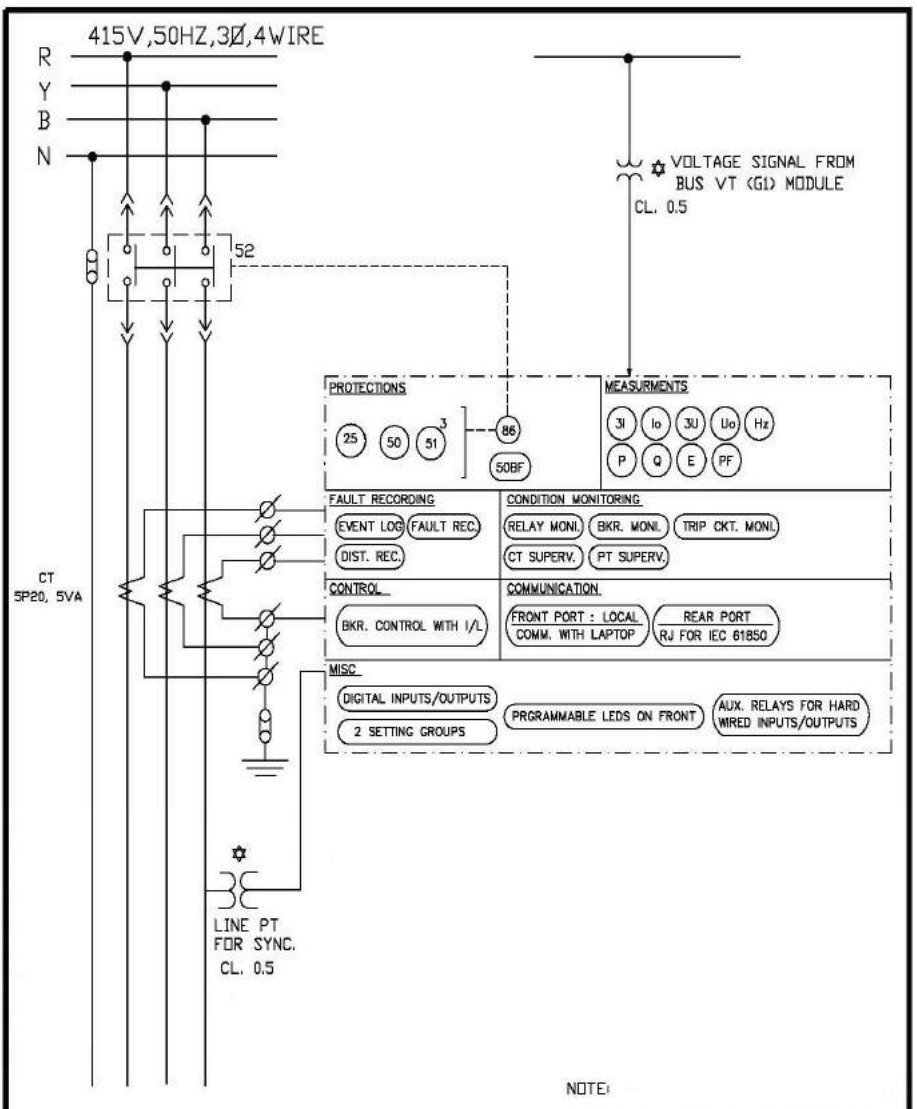
CLEARED BY				
C	E	M	C&I	ES

PROJECT: STANDARD

TITLE: SCHEME FOR FEEDER TYPE-DAET (INCOMER FROM TRANSFORMER)

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
–				10.01.07	NA	0000-206-POE-A-004	0

A4 210X297



NOTE:

✡ APPLICABLE ONLY FOR INCOMERS OF BOARDS WHERE G1 MODULE IS PROVIDED

FOR TENDER PURPOSE ONLY

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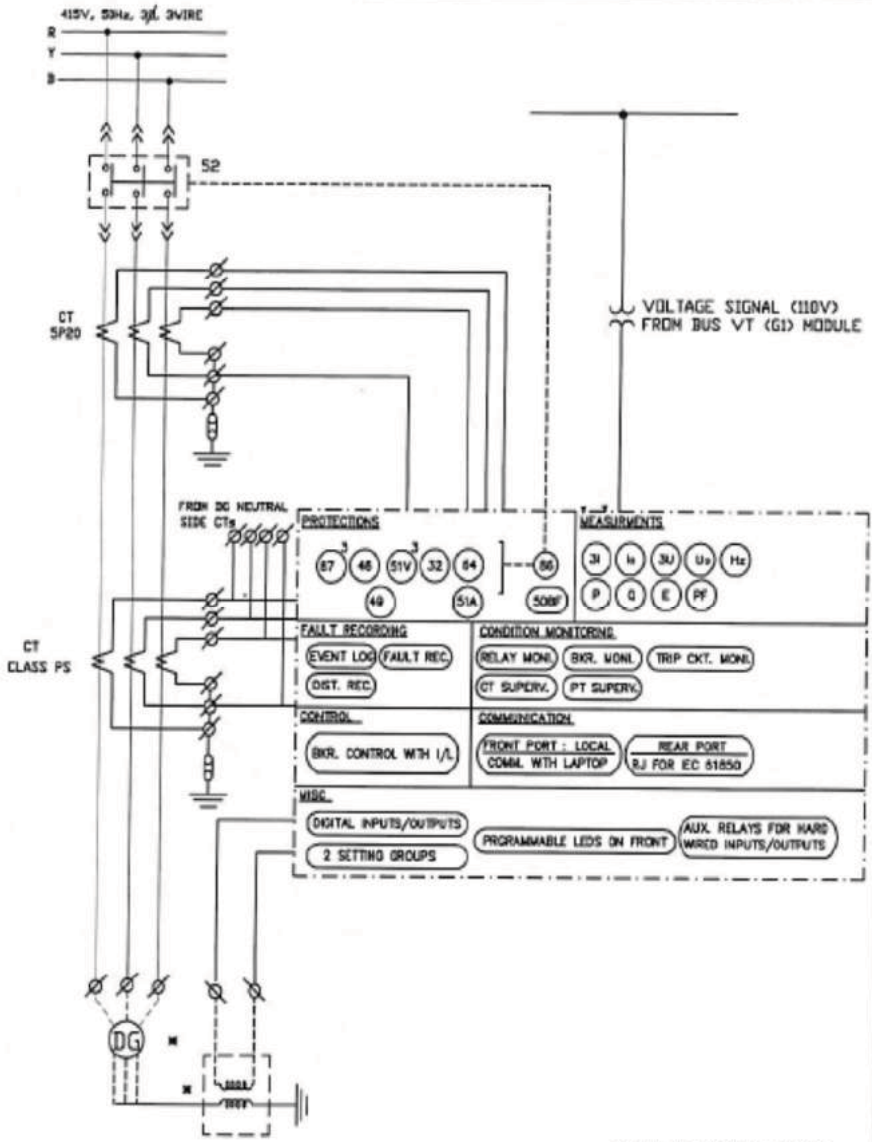
CLEARED BY					PROJECT
C	E	M	C&I	ES	STANDARD

TITLE: SCHEME FOR FEEDER TYPE-DAE (INCOMER / OUTGOING / BUS COUPLER)

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
-					NA	0000-206-PDE-A-005	0



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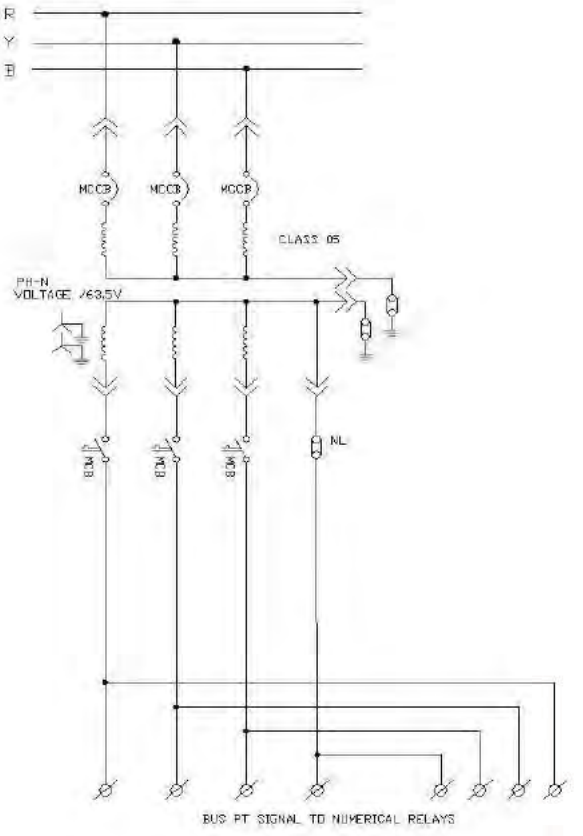
CLEARED BY					PROJECT
C	E	M	C&I	ES	STANDARD

TITLE
SCHEME FOR FEEDER TYPE-DG
(INCOMER FROM DG)

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
-					NA	0000-206-POE-A-006	0

A4 210X297



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CLEARED BY				
C	E	M	C&I	ES

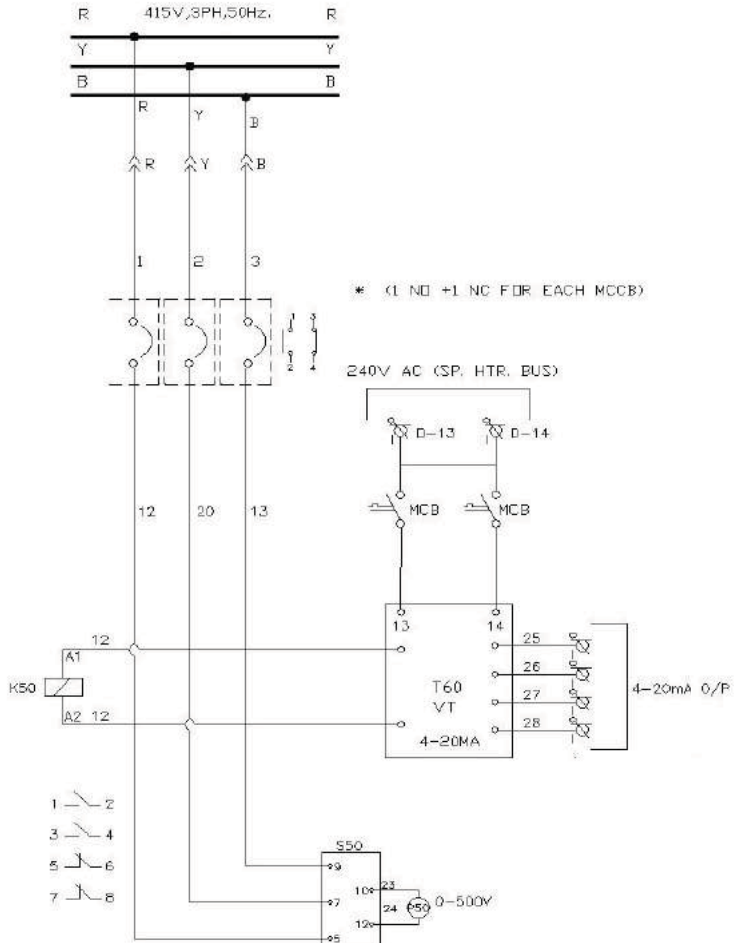
PROJECT: STANDARD

TITLE: SCHEME FOR MODULE TYPE-G1 (BUS PT)

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
				30/04/10		0000-206-POE-A-007	A

LT017.DWG

A3 420X297



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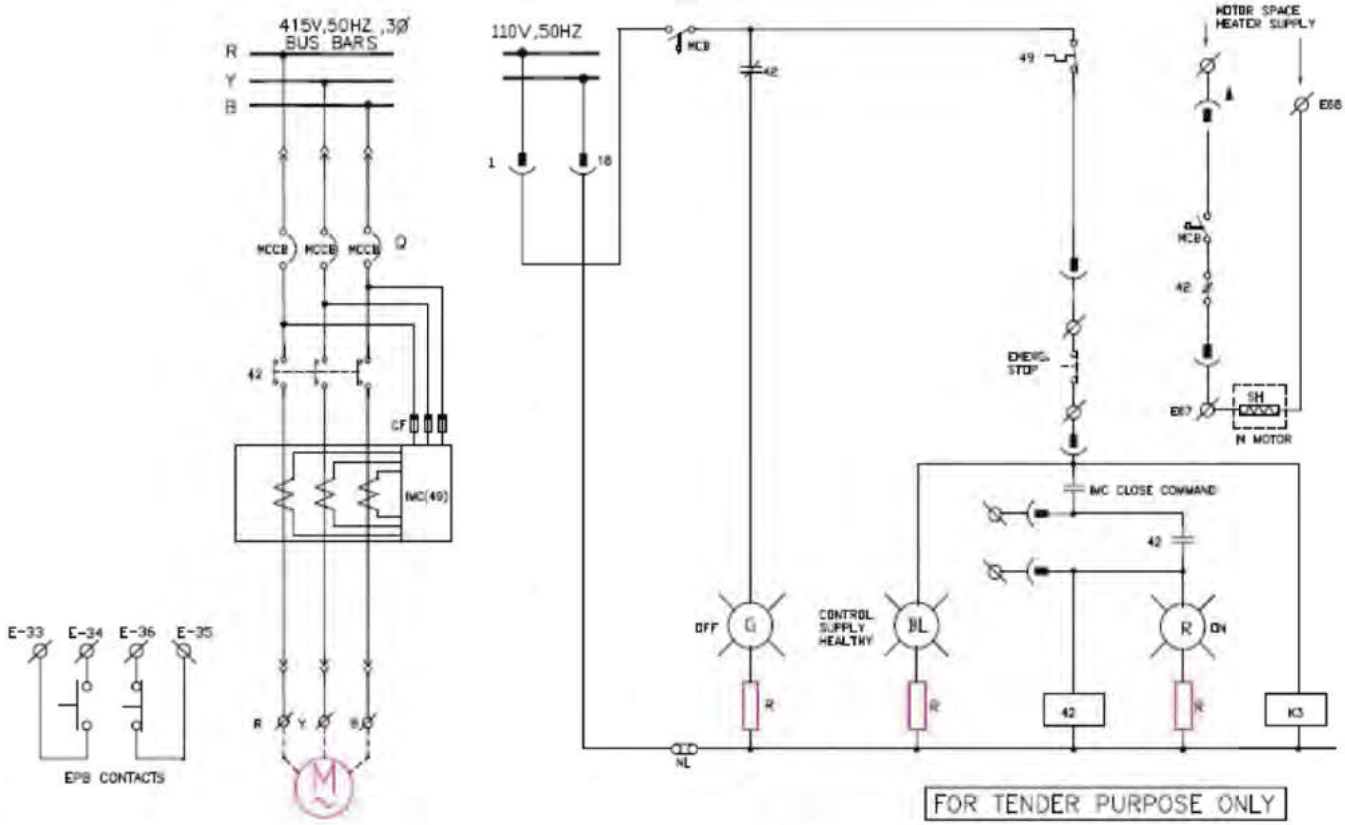
CLEARED BY					PROJECT
C	E	M	C&I	ES	STANDARD

TITLE: TYPICAL SCHEMATIC FOR VM TYPE

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
				18.05.18		0000-206-PDE-A-020	A

LT016.DWG

A3 420X297



FOR TENDER PURPOSE ONLY

TYPICAL FOR DDC/PLC CONTROLLED MOTORS

LEGEND

- POWER DRAW OUT CONTACT
- CONTROL DRAW OUT CONTACT
- FIXED TERMINAL ON MCC

NOTES:-

1. MOTOR SHALL BE CONTROLLED FROM DCS/PLC THROUGH IMC ON PROFIBUS PROTOCOL COMMUNICATION.
2. EPB WIRING FROM FIELD TO IMC INPUT AND CONTACTOR CONTROL HARDWIRED CKT TO BE DONE.

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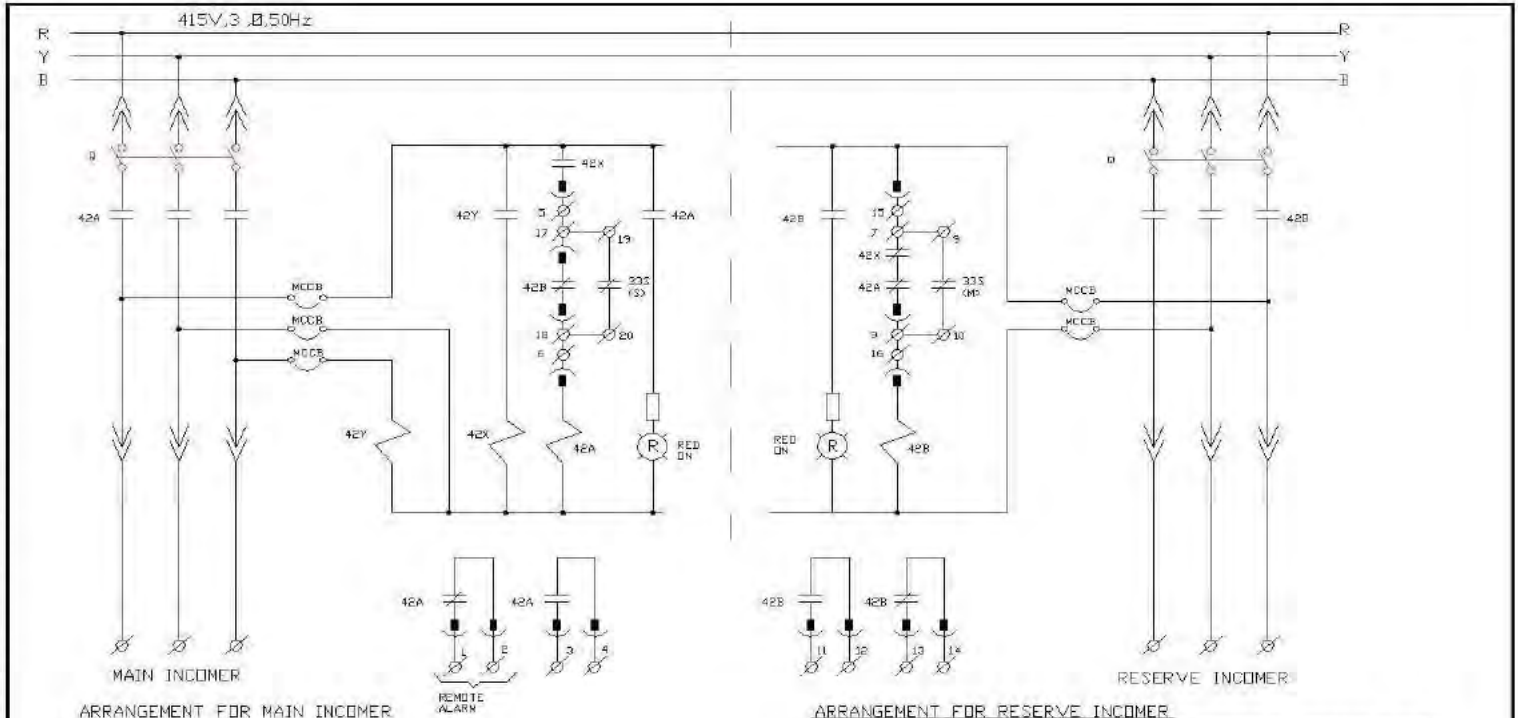
CLEARED BY					PROJECT
C	E	M	C&I	ES	STANDARD

TITLE
SCHEME FOR MODULE TYPE-DK21
(CONTACTOR CONTROLLED MOTOR)

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
				25.06.19		0000-206-PDE-A-008B	A



ARRANGEMENT FOR MAIN INCOMER

ARRANGEMENT FOR RESERVE INCOMER

FOR TENDER PURPOSE ONLY

LEGEND

42A,42B-415V AC TRIPLE POLE CONTACTORS
42X,42Y-415V AC AUXILIARY CONTACTORS

NOTES

1. 33S(MAIN) & 33S(STANDBY) ARE SERVICE POSITION LIMIT SWITCH IN MAIN & RESERVE CUBICAL RESPECTIVELY.
2. THE ARRANGEMENT FOR MAIN AND RESERVE INCOMERS SHALL BE MADE IN SEPARATE MODULES AND THESE MODULES SHALL BE LOCATED IN DIFFERENT PANELS.
3. ALL CONTACTORS SHOULD HAVE COILS SUITABLE FOR 415V AC.

LT01L.DWG

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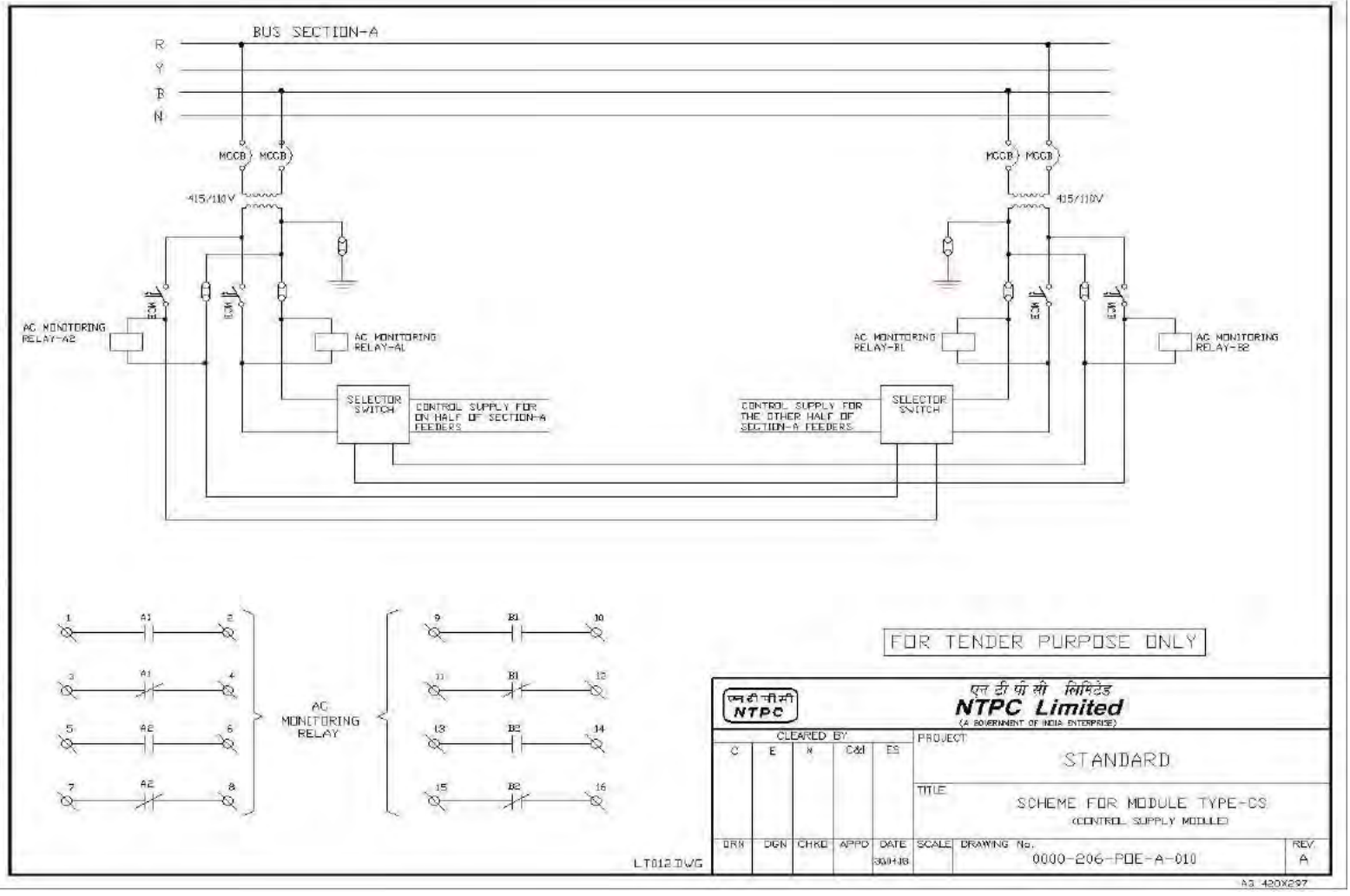
PROJECT: STANDARD

TITLE: SCHEME FOR MODULE TYPE-CC (INCOMER WITH AUTO CHANGEOVER)

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
				30.04.10		0000-206-PDE-A-009	A

A3 420X297



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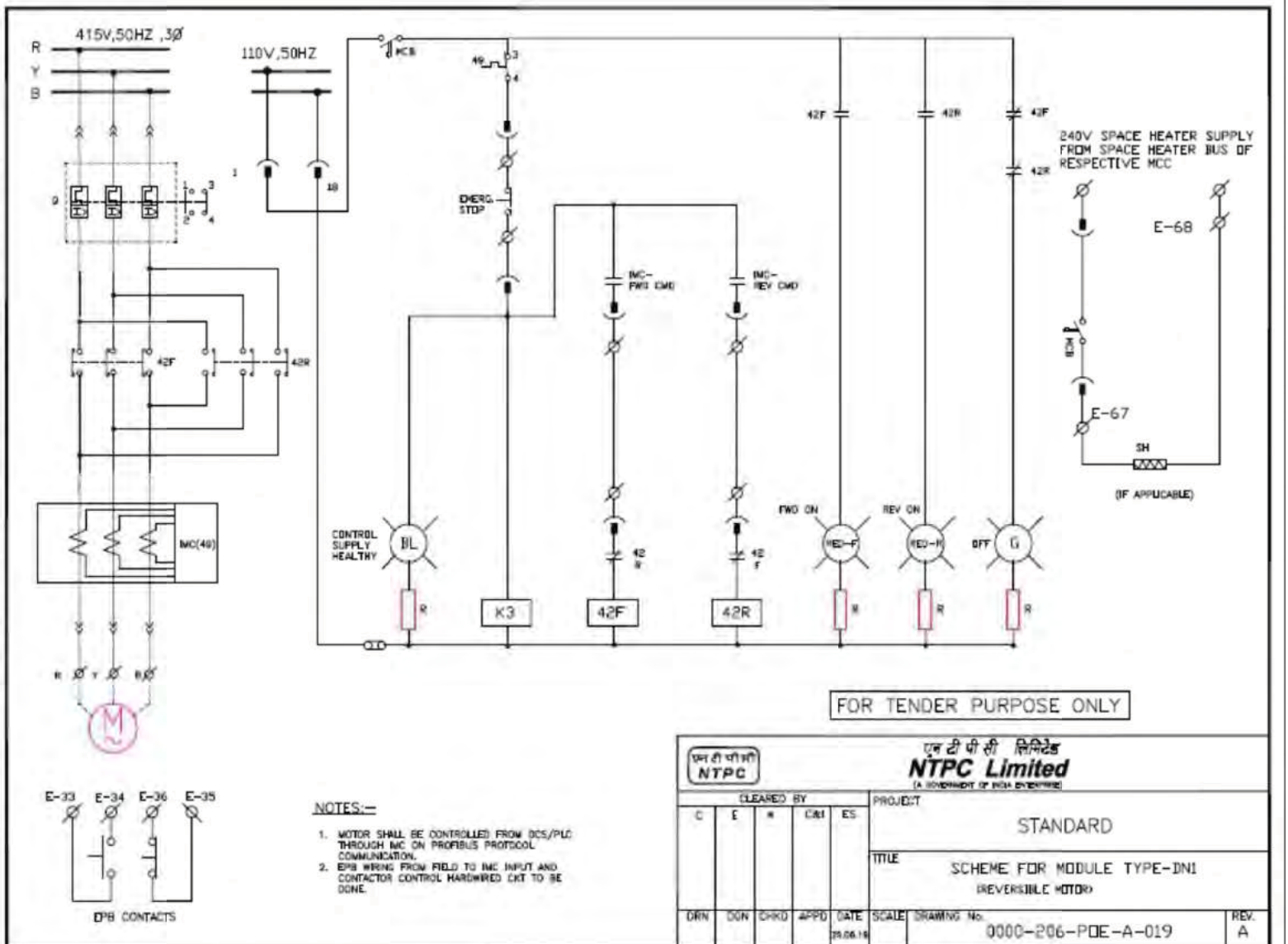
CLEARED BY					PROJECT
C	E	N	C&I	ES	STANDARD

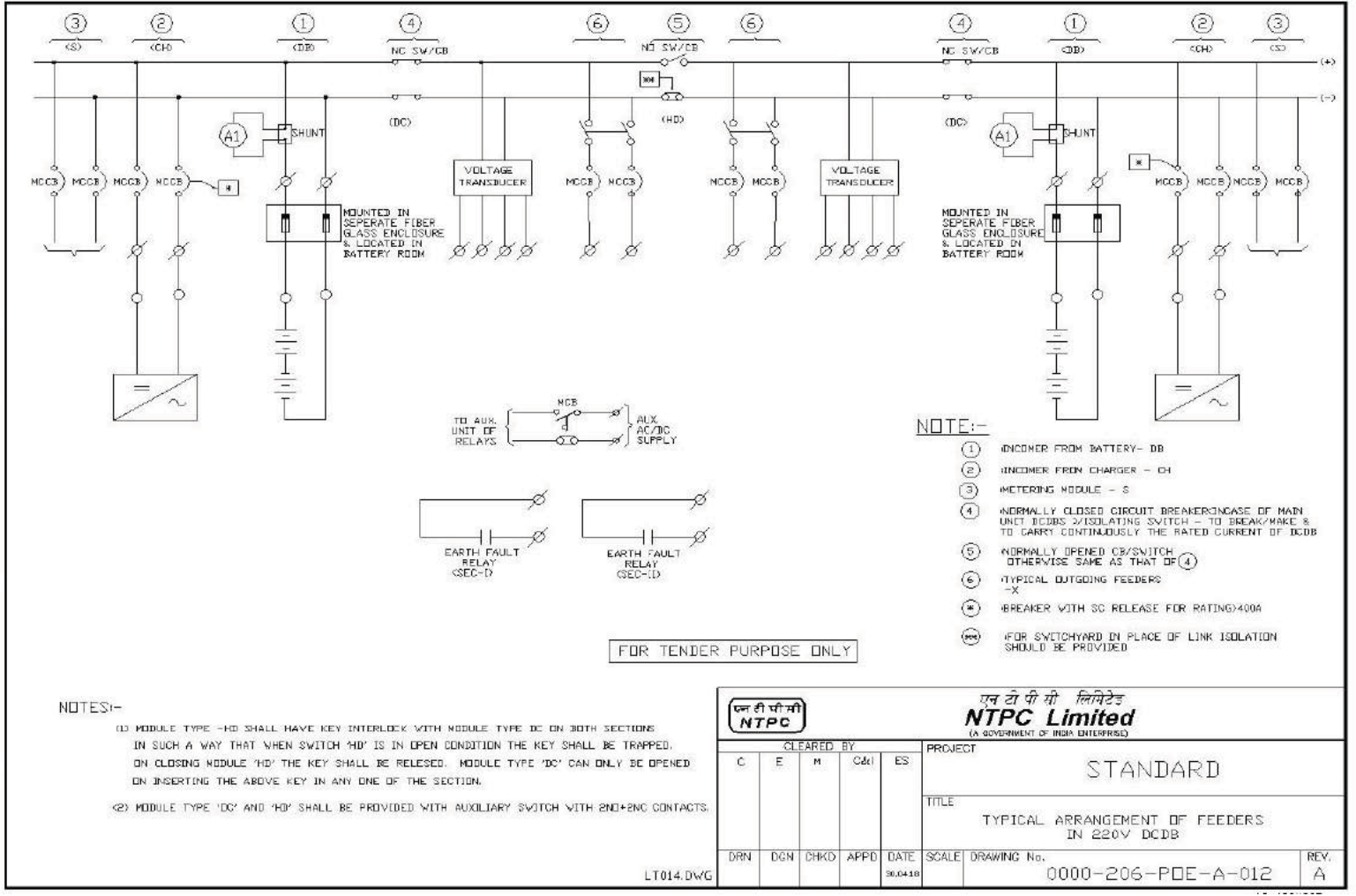
TITLE: SCHEME FOR MODULE TYPE-CS (CONTROL SUPPLY MODULE)

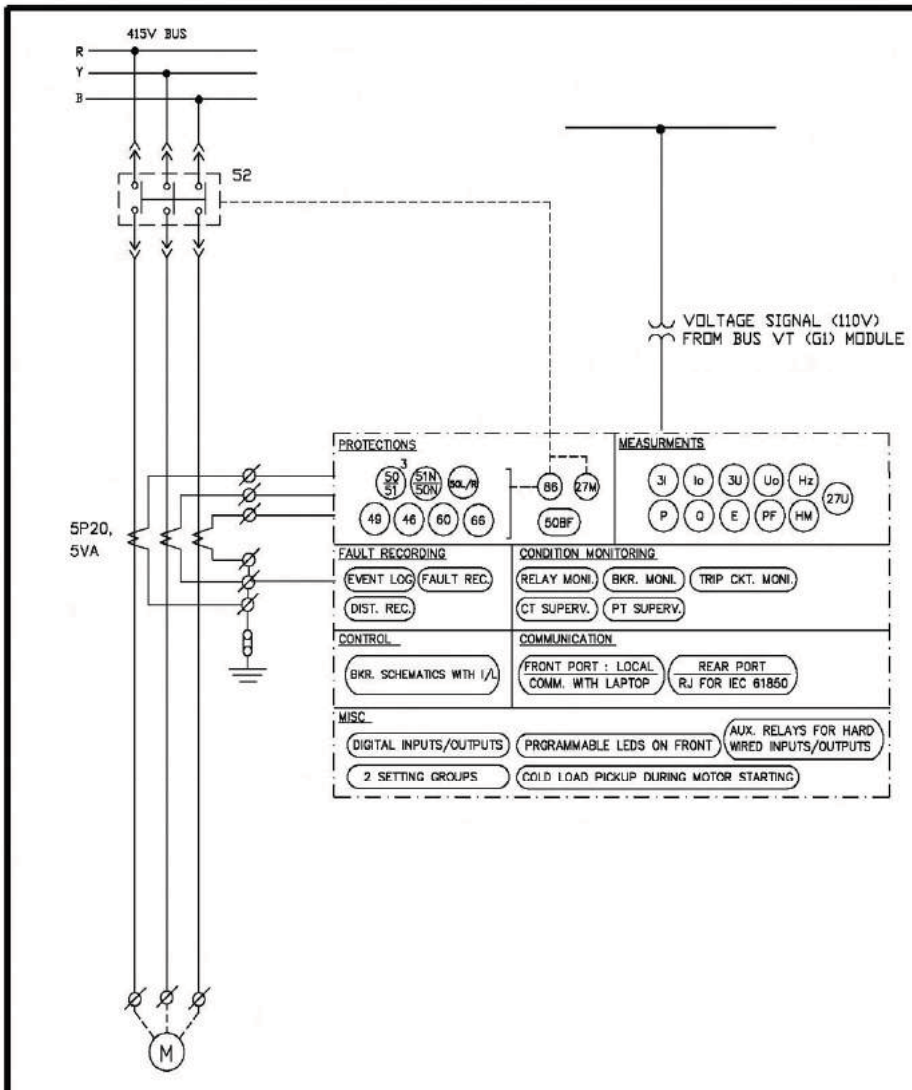
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
				30/4/18		0000-206-PDE-A-010	A

LT012.DWG

A3 420X297







NOTE:
BREAKER OPEN / CLOSE COMMAND FROM OWNER'S DDCMIS (REMOTE) SHALL BE HARD WIRED.

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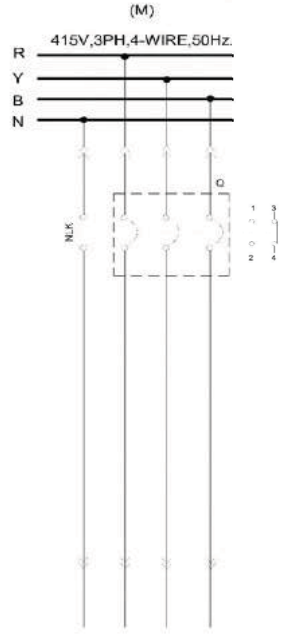
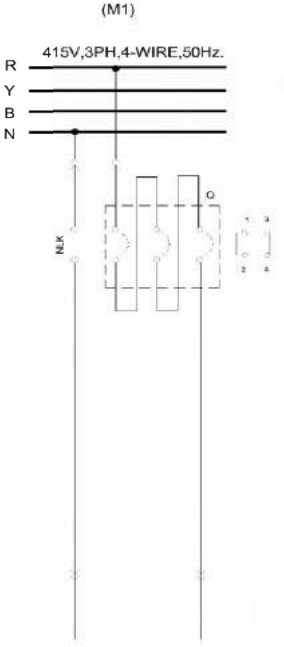
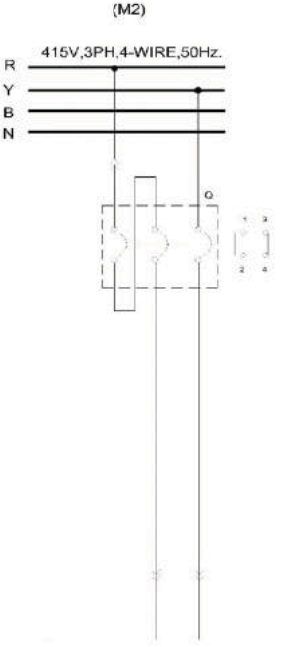
CLEARED BY					PROJECT		
C	E	M	C&I	ES	STANDARD		
					TITLE: SCHEME FOR FEEDER TYPE-DM (MOTOR RATING 110kW AND ABOVE)		
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
-					NA	0000-206-POE-A-014	0

A4 210X297







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CLEARED BY				PROJECT
C	E	M	C&I	ES

STANDARD

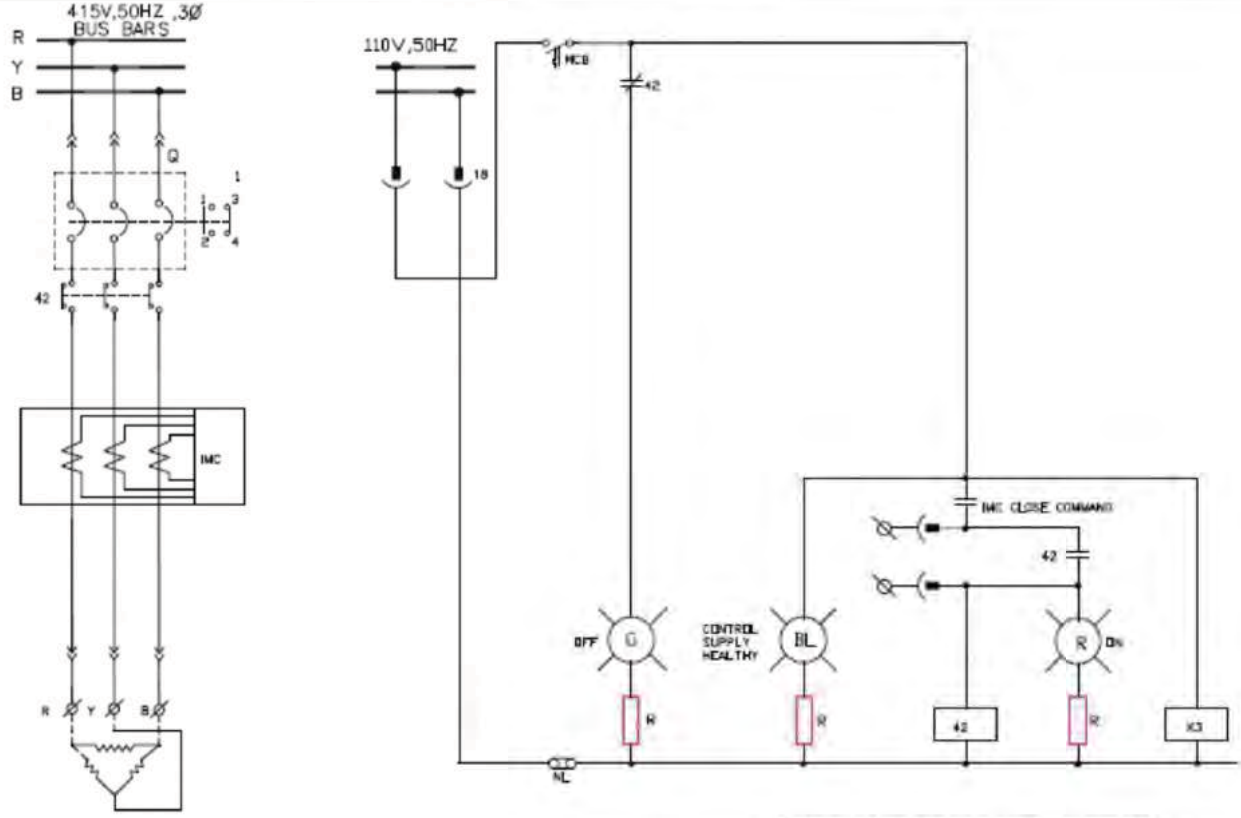
TITLE

TYPICAL SCHEMATIC FOR M/M1/M2

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
				18.06.18		0000-206-POE-A-018	A

LT018.DWG

A3 420X297



FOR TENDER PURPOSE ONLY

LEGEND

- POWER DRAW OUT CONTACT
- CONTROL DRAW OUT CONTACT
- FIXED TERMINAL ON MCC

NOTES:-

1. HEATER SHALL BE CONTROLLED FROM DCS/PLC THROUGH IMC ON PROFIBUS PROTOCOL COMMUNICATION.

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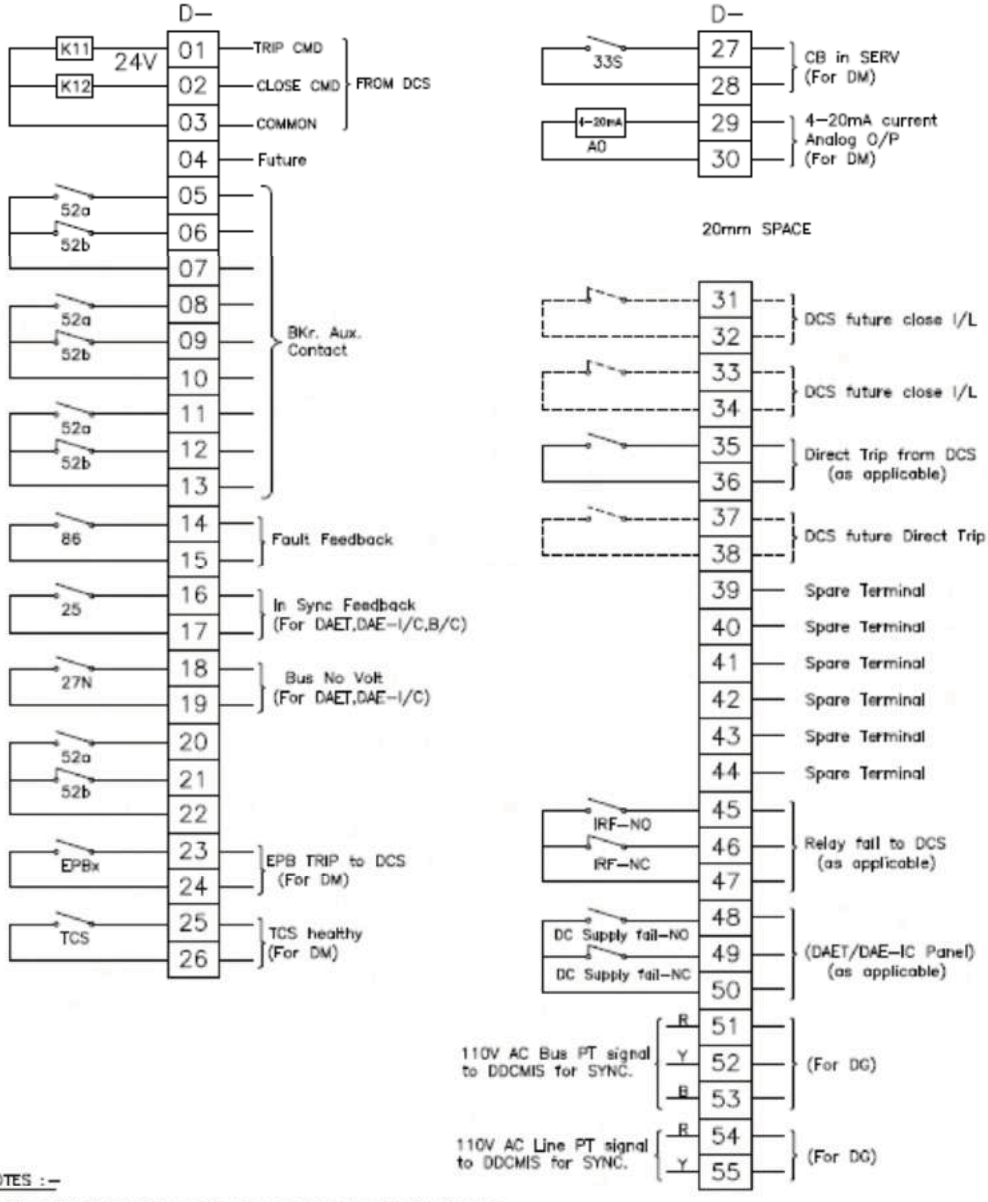
CLEARED BY					PROJECT
C	E	M	C&I	ES	STANDARD

TITLE: SCHEME FOR MODULE TYPE-HTR (CONTRACTOR CONTROLLED HEATER)

DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
				25.06.19		0000-206-POE-A-021	A



NOTES :–

1. 52a &52b shown above are breaker aux. contacts when breaker is in Service position.
2. If any signal (except 52a & 52b signals,future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
3. If any new signal not covered in this list is required to be wired to DCS during detail engg,new terminal nos as per above philosophy shall be assigned.

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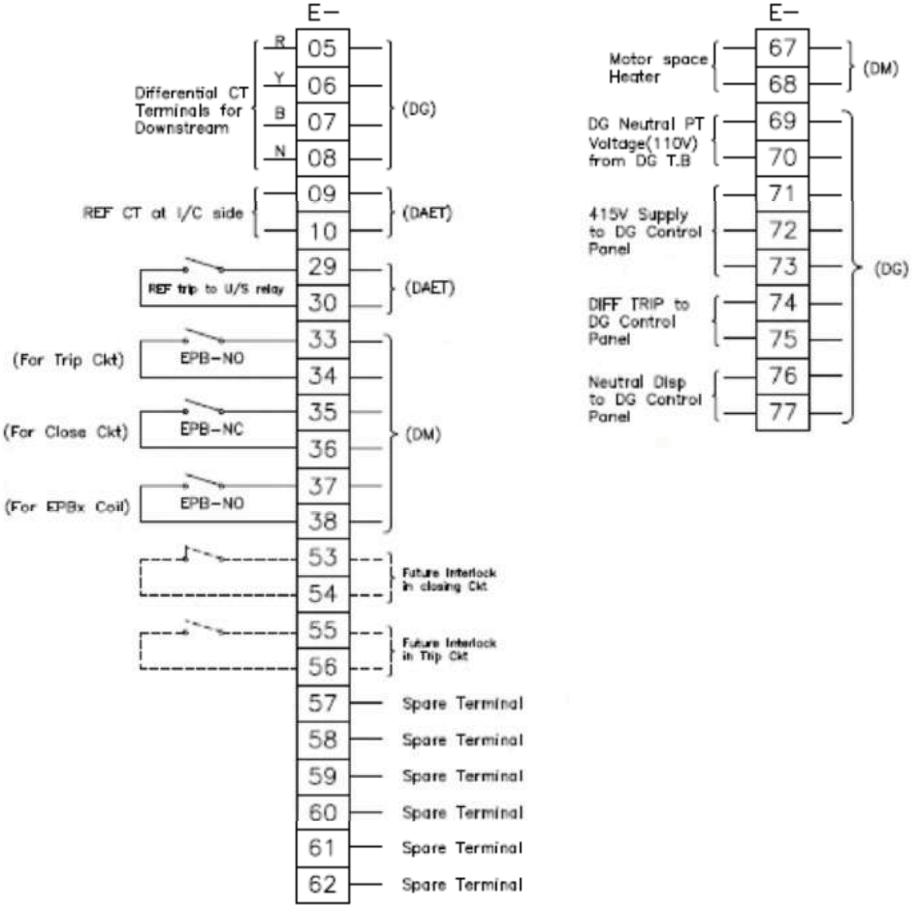
CLEARED BY					PROJECT	STANDARD	
C	E	M	C&I	ES			
					TITLE	STANDARD "D" TERMINALS (FOR CABLING BETWEEN SWGR & DCS) FOR LT SWGR	
DRN -	DGN	CHKD	APPD	DATE 25.06.19	SCALE NA	DRAWING No. 0000–206–POE–A–022	REV. A

A4 210X297



NOTES :–

1. 52a &52b shown above are breaker aux. contacts when breaker is in Service position.
2. If any signal (except 52a & 52b signals,future & Spare terminals marked) is not applicable for a module type, associated terminals/terminal nos. may be absent in the panel.
3. If any new signal not covered in this list is required to be wired to any other external equipment during detail engg,new terminal nos as per above philosophy shall be assigned.

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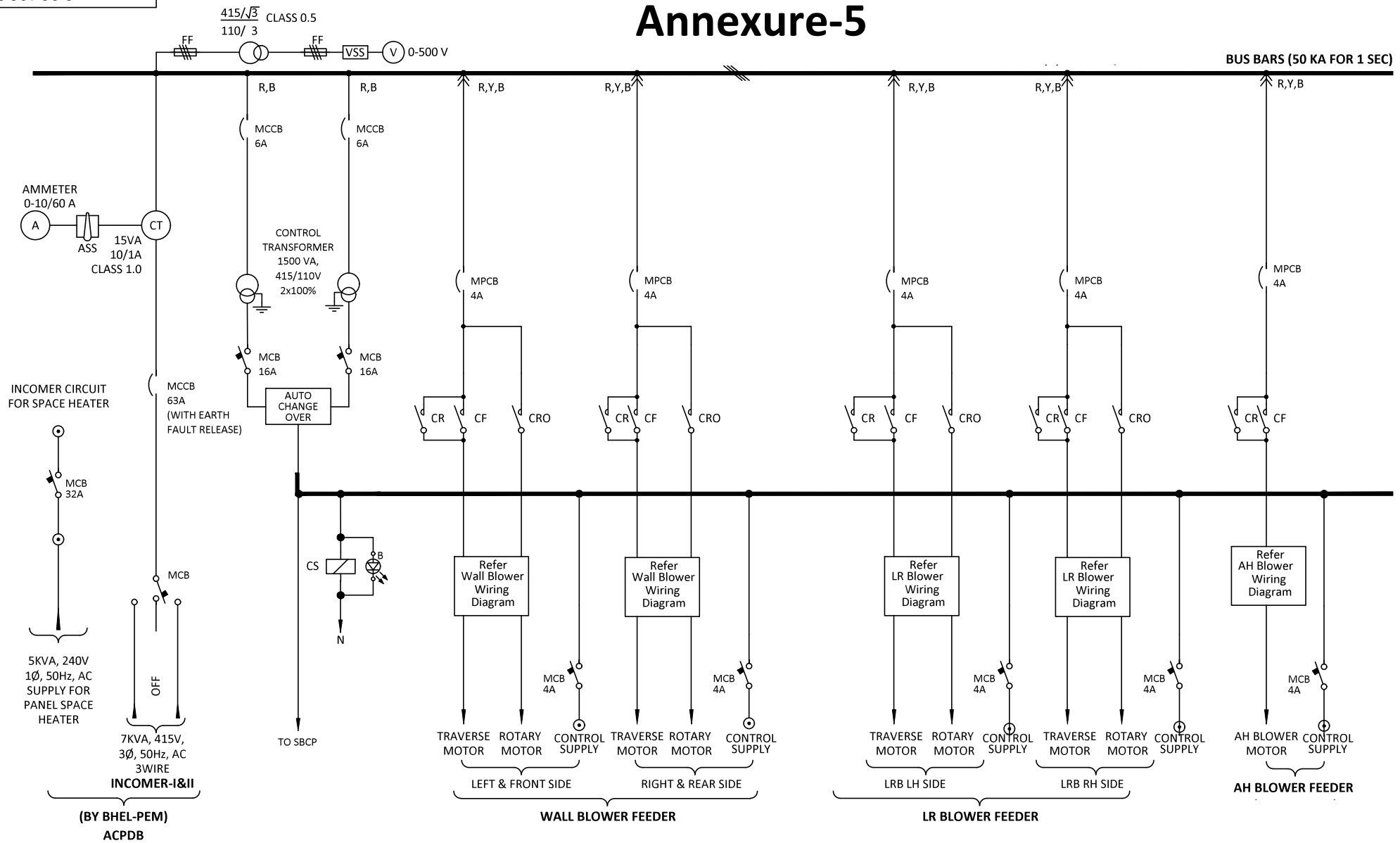
CLEARED BY					PROJECT	STANDARD	
C	E	M	C&I	ES	TITLE	STANDARD "E" TERMINALS (FOR CABLING BETWEEN SWGR TO MOTOR,SWGR TO TRF & INTERBOARD CABLING) FOR LT SWGR	
DRN	DGN	CHKD	APPD	DATE	SCALE	DRAWING No.	REV.
-				25.06.19	NA	0000–206–POE–A–023	A

A4 210X297

DRAWING NO: 3-96-186-90109

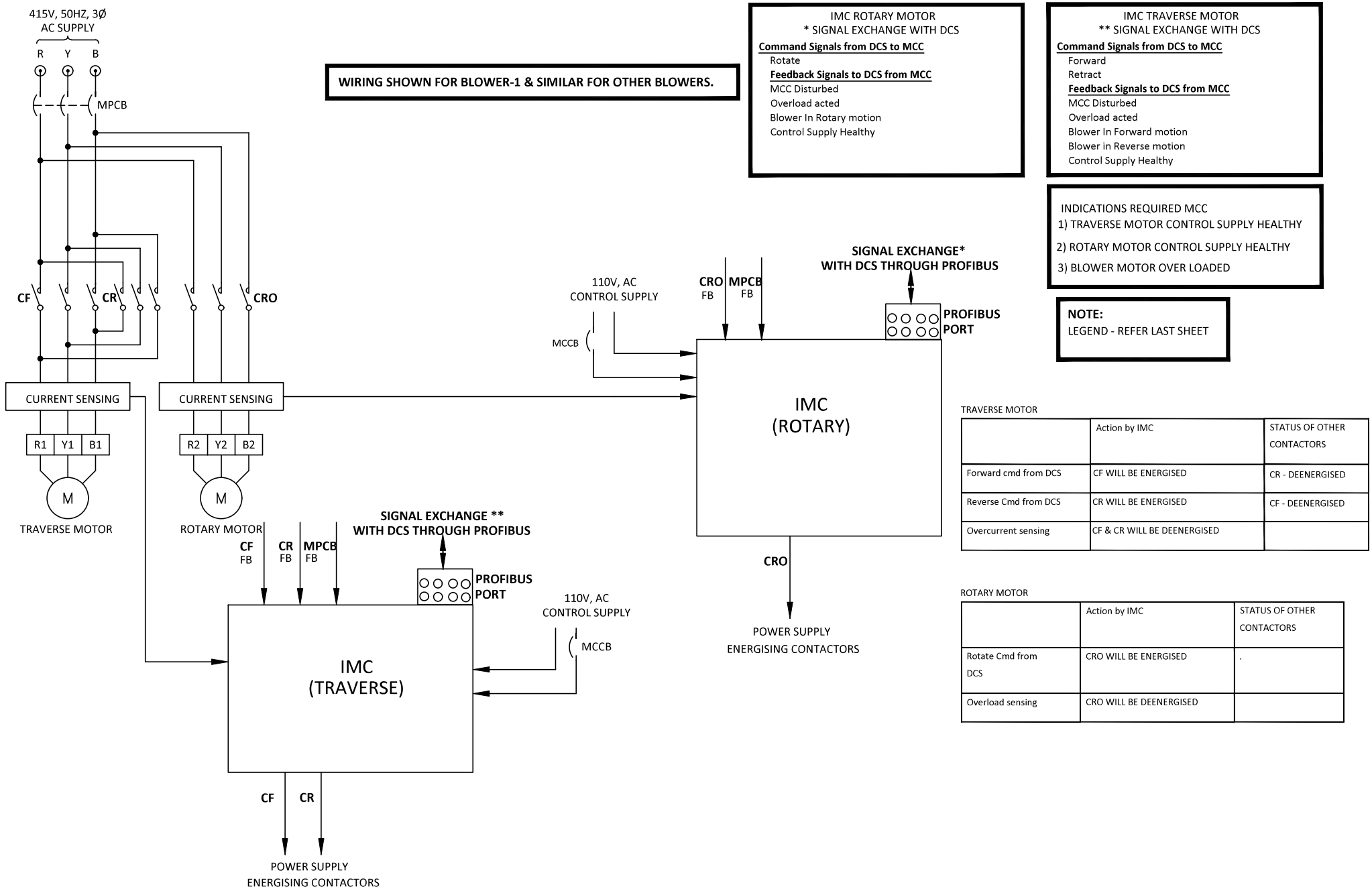
Annexure-5



NOTE:
LEGEND - REFER LAST SHEET

FILE NAME: TALSBS03

DRAWING NO: 3-96-186-90109



TRAVERSE MOTOR

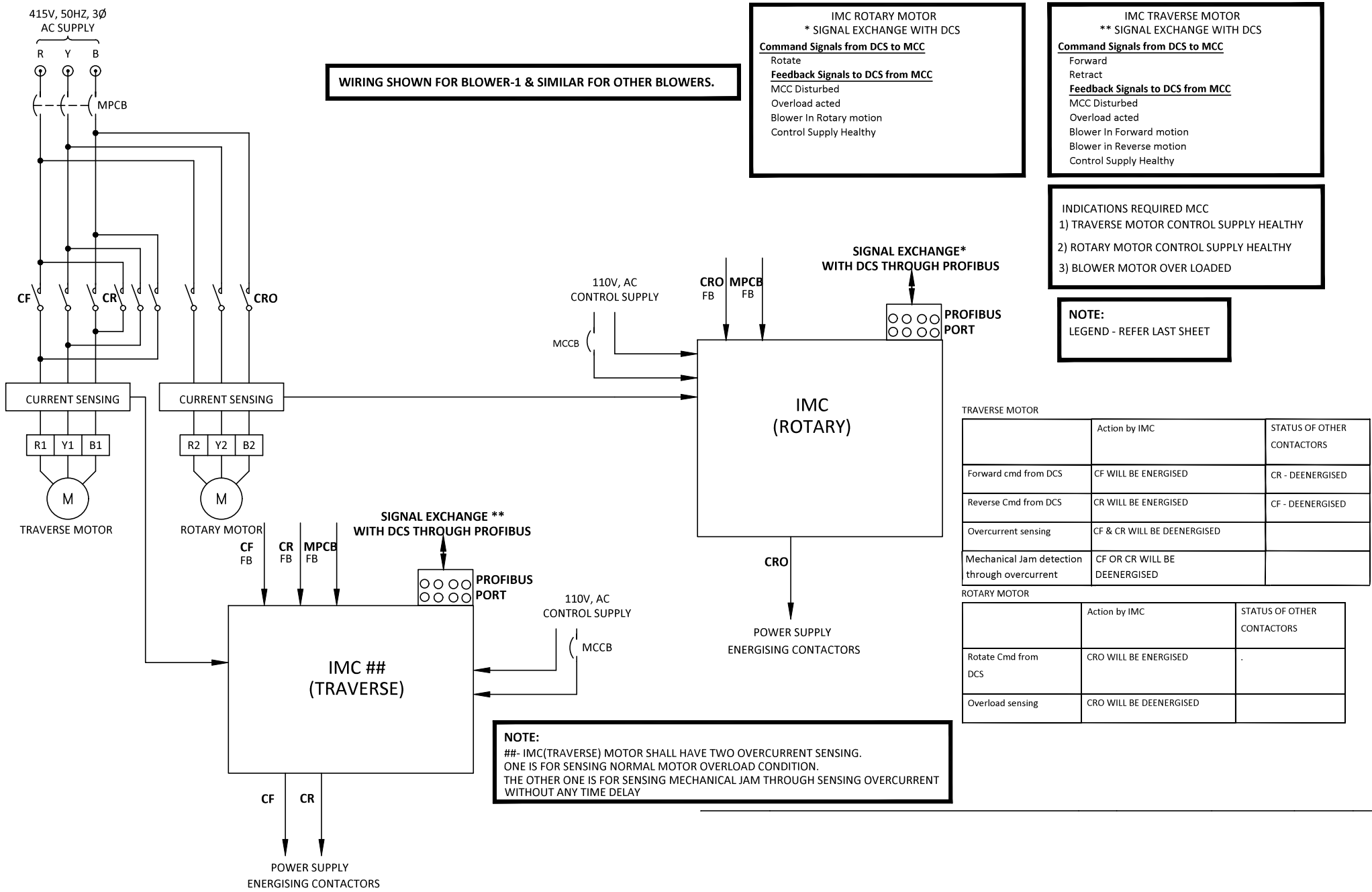
	Action by IMC	STATUS OF OTHER CONTACTORS
Forward cmd from DCS	CF WILL BE ENERGISED	CR - DEENERGISED
Reverse Cmd from DCS	CR WILL BE ENERGISED	CF - DEENERGISED
Overcurrent sensing	CF & CR WILL BE DEENERGISED	

ROTARY MOTOR

	Action by IMC	STATUS OF OTHER CONTACTORS
Rotate Cmd from DCS	CRO WILL BE ENERGISED	.
Overload sensing	CRO WILL BE DEENERGISED	

FILE NAME: TALSBS04

DRAWING NO: 3-96-186-90109



TRAVERSE MOTOR

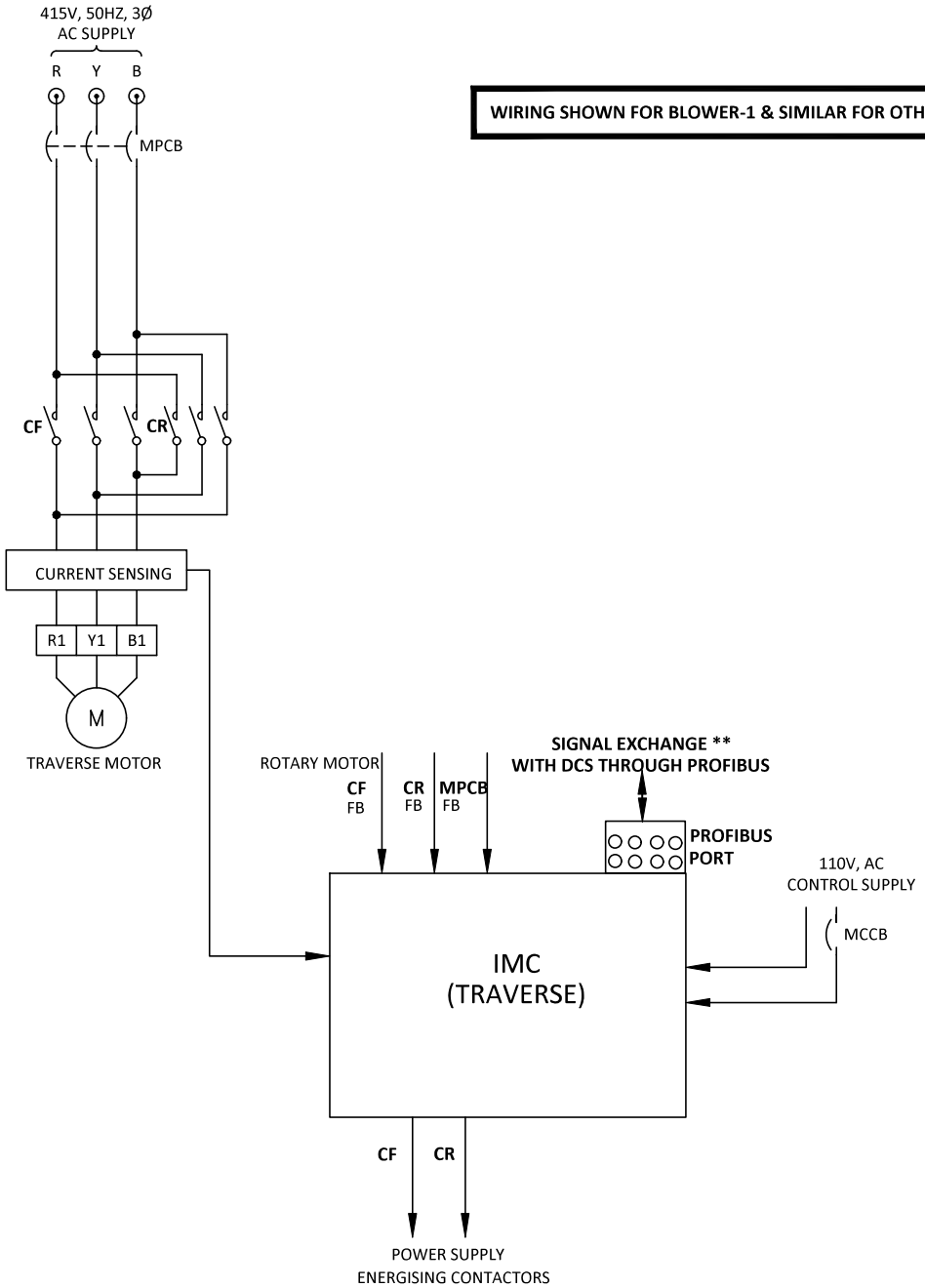
	Action by IMC	STATUS OF OTHER CONTACTORS
Forward cmd from DCS	CF WILL BE ENERGISED	CR - DEENERGISED
Reverse Cmd from DCS	CR WILL BE ENERGISED	CF - DEENERGISED
Overcurrent sensing	CF & CR WILL BE DEENERGISED	
Mechanical Jam detection through overcurrent	CF OR CR WILL BE DEENERGISED	

ROTARY MOTOR

	Action by IMC	STATUS OF OTHER CONTACTORS
Rotate Cmd from DCS	CRO WILL BE ENERGISED	.
Overload sensing	CRO WILL BE DEENERGISED	

FILE NAME: TALSBS04

DRAWING NO: 3-96-186-90109



WIRING SHOWN FOR BLOWER-1 & SIMILAR FOR OTHER BLOWERS.

IMC TRAVERSE MOTOR
** SIGNAL EXCHANGE WITH DCS

Command Signals from DCS to MCC
- Forward
- Retract

Feedback Signals to DCS from MCC
- MCC Disturbed
- Overload acted
- Blower In Forward motion
- Blower in Reverse motion
- Control Supply Healthy

INDICATIONS REQUIRED MCC
1) TRAVERSE MOTOR CONTROL SUPPLY HEALTHY
2) ROTARY MOTOR CONTROL SUPPLY HEALTHY
3) BLOWER MOTOR OVER LOADED

NOTE:
LEGEND - REFER LAST SHEET

TRAVERSE MOTOR

	Action by IMC	STATUS OF OTHER CONTACTORS
Forward cmd from DCS	CF WILL BE ENERGISED	CR - DEENERGISED
Reverse Cmd from DCS	CR WILL BE ENERGISED	CF - DEENERGISED
Overcurrent sensing	CF & CR WILL BE DEENERGISED	

FILE NAME: TALSBS04

LEGEND	
CF	CONTACTOR FOR FORWARD
CR	CONTACTOR FOR REVERSE
CRO	CONTACTOR FOR ROTARY
CT	CURRENT TRANSFORMER
FF	FUSE
KWHT	KILOWATT HOUR TRANSDUCER
MCB	MINIATURE CIRCUIT BREAKER
MCCB	MOULDED CASE CIRCUIT BREAKER
MPCB	MOTOR PROTECTION CIRCUIT BREAKER
CSM	CURRENT SENSING MODULE
FB	FEEDBACK STATUS

LEGEND	
	SB CP TERMINALS
	SB MCC TERMINALS
	LOCAL TERMINALS
	POWER / AUX. CONTACTOR
	"NO" CONTACT OF CONTACTOR
	"NC" CONTACT OF CONTACTOR
	OFF DELAY TIMER
	"NO" CONTACT OF TIMER
	INDICATING LAMP (A-AMBER) (B-BLUE)
	MCCB / MPCB
	MCB
	SWITCH
	DRAWOUT TYPE TERMINALS
	NEUTRAL LINK

QUALITY PLAN

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
		CUSTOMER:		QP NO.: PE-QP-999-506-E002, REV. 0	DATE: 27.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 1 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)				REMARKS
										D *	M **	B	C	
(1)	(2)	(3)	(4)	(5)	M	B/C	(7)	(8)	(9)					(11)
1	**RAW MATERIAL**													
1.1	Angles, Channels & Sheet Steel for Fabrication (CR/HR)	Thickness	MA	Meas.	1 sample of each type & size per Lot	-	Approved Drawing/ IS-513, IS-1079, IS 2062	Approved Drawing/ IS-513, IS-1079, IS 2062	QC record		P	-	-	
		Surface finish & check for waviness / flatness	MA	Visual	-do-	-	IS-513, IS-1079, IS 2062	IS-513, IS-1079, IS 2062	QC record		P	-	-	
		Bending Test	MA	Mech.	Sample	-	Approved Drawing/ IS-513-1994	Approved Drawing/ IS-513-1994	MTC		V	-	-	
1.2	Bus Bar – Copper/ Aluminum	Dimension	MA	Meas.	1 sample of each type & size per Lot	-	IS- 5082 (Al.)/ IS-1897 (CU)/ Approved Drawing	IS- 5082 (Al.)/ IS-1897 (CU)/ Approved Drawing	QC record		P	-	-	
		Surface Finish	MA	Visual	-do-	-	IS- 5082 (Al.)/ IS-1897 (CU)	IS- 5082 (Al.)/ IS-1897 (CU)	QC record		P	-	-	
		Conductivity	MA	Elec.	10% SAMPLE	-	As per IS- 5082/ IS-1897	As per IS- 5082/ IS-1897	MTC		P	-	-	
2	**BOUGHT OUT ITEMS**													
2.1	Air Circuit Breaker	Type & Rating	MA	Visual	100%	-	Approved Drawing/ Data sheet/ IEC-60947-2	Approved Drawing/ Data sheet/ IEC-60947-2	QC RECORD		P	-	-	
		All Routine test	CR	Test	-do-	-	Approved Drawing/ Data sheet/ IEC-60947-2	Approved Drawing/ Data sheet/ IEC-60947-2	MTC	✓	V	V	V	
2.2	CT's	Overall dimensions & mounting arrangement	MA	Meas.	10% of each type & rating per lot	-	Manufacturing Drawing	Manufacturing Drawing	QC Record		P	-	-	
		Make, Type & Rating	MA	Visual	-do-	-	Approved Drawing/ Data sheet	Approved Drawing/ Data sheet	QC Record		P	-	-	
		All routine tests	CR	Elec.	100%	10%	IS-2705	IS-2705	MTC	✓	V	V	V	

BHEL						BIDDER/ SUPPLIER	
ENGINEERING			QUALITY			Sign & Date	
	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:	27/2/24	MEGHA/ NARENDRA NATH JAJWARE	Checked by:	28/2/24	KUNDAN PRASAD		
Reviewed by:		SANDEEP LODH	Reviewed by:	28/2/24	HARISH KUMAR		

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
	Sign & Date	Name	Seal
Reviewed by:			
Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO	DATE:
		CUSTOMER:		QP NO.: PE-QP-999-506-E002, REV. 0	DATE: 27.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 2 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)			REMARKS
					M	B/C				D	M	B	C	
(1)	(2)	(3)	(4)	(5)			(7)	(8)	(9)					(11)
2.3	PT's	Overall dimensions & mounting arrangement	MA	Meas.	10% of each type & rating per lot	-	Manufacturing Drawing	Manufacturing Drawing	QC Record		P	-	-	
		Make, Type & Rating	MA	Visual	-do-	-	Approved Drawing/ Data sheet	Approved Drawing/ Data sheet	QC Record		P	-	-	
		All routine tests	CR	Elec.	100%	10%	IS-3156	IS-3156	MTC	✓	V	V	V	
2.4	Air Break Switch, Fuse, MCCB, MPCB, Push Button, MCB, Control & Selector Switches AC/DC, Power & aux. Contactor, Timers, OLR, Coupling Relays, Indicating Lamp	Make, Type & Rating	MA	Visual	1 sample of each type & rating per lot	-	Approved Drawing/ Data sheet	Approved Drawing/ Data sheet	QC RECORD		P	-	-	
2.5	Indicating Instruments	Make, Type & Rating	MA	Visual	10% of each make, type & rating per lot	-	Approved Drawing/ Data sheet	Approved Drawing/ Data sheet	MTC		P	-	-	
		All routine tests	MA	Elec.	100%	10%	IS-1248	IS-1248	MTC	✓	V	V	V	
2.6	Transducer	Make, Type & Rating	MA	Visual	10% of each make, type & rating per lot	-	Approved Drawing/ Data sheet	Approved Drawing/ Data sheet	QC RECORD		P	-	-	
		All routine tests including calibration & accuracy test reports	MA	Elec.	100%	10%	IEC 60688/ Approved Drawing/ Data sheet	IEC 60688/ Approved Drawing/ Data sheet	MTC	✓	V	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:		MEGHA/ NARENDRA NATH JAJWARE	Checked by:		KUNDAN PRASAD			Reviewed by:			
Reviewed by:		SANDEEP LODH	Reviewed by:		HARISH KUMAR			Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
		CUSTOMER:		QP NO.: PE-QP-999-506-E002, REV. 0	DATE: 27.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 3 of 10

S. NO	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)				REMARKS
(1)	(2)	(3)	(4)	(5)	M	B/C	(7)	(8)	(9)	D	M	B	C	(11)
2.7	MFM & IMC	Make, Type & Rating	MA	Visual	10% of each make, type & rating per lot	-	Approved Drawing/ Data sheet	Approved Drawing/ Data sheet	QC RECORD		P	-	-	
		All routine tests including accuracy test Reports	MA	Elec.	100%	10%	IEC 62052 & IEC 60947/ Approved Drawing/ Data sheet	IEC 62052 & IEC 60947/ Approved Drawing/ Data sheet	MTC	✓	V	V	V	
2.8	Control Transformer	Make, Type & Rating	MA	Visual	100%	-	Approved drawing	Approved drawing	QC RECORD		P	-	-	
		Voltage ratio	MA	Elec.	100%	-	Approved drawing	Approved drawing	QC RECORD		P	-	-	
		All routine tests	MA	Elec.	100%	10%	IS 12021	IS 12021	MTC		V	V	V	
2.9	Numerical Relay	Make, Type & Rating	MA	Visual	100%	-	Approved drawing	Approved drawing	QC RECORD		V	-	-	
		Routine test report	MA	Elec.	100%	100%	IEC-60255/IEC-61850	IEC-60255/IEC-61850	MTC	✓	V	V	V	
		Numerical Relay Testing	MA	Elec.	10% of each type & rating per lot	10% of each type & rating per lot	Approved FAT Test Procedure	Approved Test FAT Procedure		✓	P	W	W	Only for NTPC project
2.10	Synthetic rubber Gasket/ Neoprene rubber gasket	Visual & Dimension, Profile, shore hardness, Elongation at break & ageing & compression Test, Ozone Resistance Test	MA	Review of Document	10%	-	Approved Drawing/ Manufacturer's Standard	Approved Drawing/ Manufacturer's Standard	QC RECORD/ COC		P	V	V	

BHEL						BIDDER/ SUPPLIER		FOR CUSTOMER REVIEW & APPROVAL			
ENGINEERING			QUALITY			Sign & Date		Doc No:			
	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by		MEGHA/ NARENDRA NATH JAJWARE	Checked by:		KUNDAN PRASAD			Reviewed by:			
Reviewed by:		SANDEEP LODH	Reviewed by:		HARISH KUMAR			Approved by:			

भा एच ई एल BHEL	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
		CUSTOMER:		QP NO.: PE-QP-999-506-E002, REV. 0	DATE: 27.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 4 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)			REMARKS
					M	B/C				D *	M **	B	C	
(1)	(2)	(3)	(4)	(5)			(7)	(8)	(9)					(11)
2.11	PVC wire	Verify size, color & properties	MA	Visual	1 sample of each type & size per lot	-	IS-694	IS-694	QC RECORD/ MTC		P	-	-	
2.12	Space heater, Thermostat, 3-pin socket, hooter, terminal block	Make & Type	MA	Visual	1 sample of each type per lot	-	Manufacturer's Standard	Manufacturer's Standard	QC RECORD		P	-	-	
2.13	ACB Handling trolley	Functional Checks	MA	Test	1 sample of each type & rating of first lot	-	Manufacturer's Standard	Manufacturer's Standard	QC RECORD		P	V		Subsequent lots will be cleared based on COC
3	IN PROCESS INSPECTION													
3.1	Panel Fabrication	Cutting, punching, shearing & bending	MA	Meas.	Mfr. Practice	-	Manufacturer's Standard	Manufacturer's Standard	QC RECORD		P	-	-	
		Panel front door cut-outs punching	MA	Meas.	-do-	-	Approved drawing	Approved drawing	QC RECORD		P	-	-	
3.2	Paint Check	Pre- Treatment of sheet	MA	Process	-do-	-	Manufacturer's Standard practice, IS-6005	Manufacturer's Standard practice, IS-6005	QC RECORD		P	-	-	
		Paint Shade	MA	Visual	1 sample per lot	-	Approved drawing	Approved drawing	QC RECORD		P	-	-	
		Paint Thickness & Adhesion	MA	Test	Mfr. Practice	-	Approved drawing	Approved drawing	QC RECORD		P	-	-	Cross hatch method using adhesive tape
3.3	Panel Assembly	Panel shell assembly, Top & back cover assembly, Panel door assembly, hinge fitting & door knob fitting etc.	MA	Process	100%	-	Manufacturer's Internal drawing made to meet Approved drawing	Manufacturer's Internal drawing made to meet Approved drawing	QC Records		P	-	-	

BHEL						BIDDER/ SUPPLIER	
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	Sign & Date	Name		Sign & Date	Name	Seal	
Prepared by:		MEGHA/ NARENDRA NATH JAJWARE	Checked by:		KUNDAN PRASAD		
Reviewed by:		SANDEEP LODH	Reviewed by:		HARISH KUMAR		

FOR CUSTOMER REVIEW & APPROVAL			
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	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
		CUSTOMER:		QP NO.: PE-QP-999-506-E002, REV. 0	DATE: 27.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 5 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)			REMARKS
					M	B/C				D *	M **	B	C	
(1)	(2)	(3)	(4)	(5)			(7)	(8)	(9)					(11)
		Size of busbar & busbar finish	MA	Process	100%	-	-do-	-do-	QC RECORD		P	-	-	
		Colour coding of busbar	MA	Visual	100%	-	-do-	-do-	QC RECORD		P	-	-	
		Insulator type & mounting	MA	Process	100%	-	Manufacturer's Internal drawing made to meet Approved drawing	Manufacturer's Internal drawing made to meet Approved drawing	QC RECORD		P	-	-	
		Busbar support distance & tightness of bolts for Main bus bars and bus bar joints	MA	Process	100%	-	Manufacturer's Standard	Manufacturer's Standard	QC RECORD		P	-	-	
		Main , Control & Auxiliary Busbar Clearances	MA	Process	100%	-	Manufacturer's Internal drawing made to meet Approved drawing	Manufacturer's Internal drawing made to meet Approved drawing	QC Records		P	-	-	
		CT / PT mounting arrangement & tightness	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Termination for power & control circuits	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Lug size & crimping quality	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Earthing busbar size & continuity; Earthing of panel & doors	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Breaker safety shutter operation	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Spring loaded power and control contact alignment	MA	Process	100%	-	-do-	-do-	QC Records		P			

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	Sign & Date	Name		Sign & Date	Name	Seal			Sign & Date	Name	Seal
Prepared by:	27/02/24	MEGHA/ NARENDRA NATH JAJWARE	Checked by:		KUNDAN PRASAD			Reviewed by:			
Reviewed by:		SANDEEP LODH	Reviewed by:	28/2/24	HARISH KUMAR			Approved by:			

	MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
		CUSTOMER:		QP NO.: PE-QP-999-506-F002, REV. 0	DATE: 27.02.2024
		PROJECT:		PO NO.:	DATE:
		ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 6 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)			REMARKS
					M	B/C				D *	M **	B	C	
(1)	(2)	(3)	(4)	(5)			(7)	(8)	(9)					(11)
		Tin / silver plating/ bimetallic strip between Cu & Al joints	MA	Process	100%	_	-do-	-do-	QC Records		P			
3.4	Module assembly	Component identification	MA	Process	100%	-	Manufacturer's Internal drawing made to meet Approved drawing	Manufacturer's Internal drawing made to meet Approved drawing	QC Records		P	-	-	
		Component layout, mounting & dimensions	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Incoming & outgoing power & control contacts assembly & Alignment	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Power circuit wire / strip termination & clearances	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Busbar joints	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
		Functional Checks	MA	Process	100%	-	-do-	-do-	QC Records		P	-	-	
3.5	Control Wiring	Wire Size & lug size & Color of wire	MI	Visual	100%	-	Approved Wiring drawing	Approved Wiring drawing	QC Records		P	-	-	
		Proper wire Clamping & Ferruling	MI	Visual	100%	-	Manufacturer's Standard	Manufacturer's Standard	QC Records		P	-	-	
		Continuity as per wiring drawing	CR	Test	Sample	-	Approved drawing	Approved drawing	QC Records		P	-	-	
		Tightness of termination & crimping check	MA	Test	100%	-	Manufacturer's Standard	Manufacturer's Standard	QC Records		P	-	-	

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Reviewed by:		SANDEEP LODH	Reviewed by:		HARISH KUMAR		

FOR CUSTOMER REVIEW & APPROVAL			
Doc No:			
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Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN	SPEC. NO:	DATE:
	CUSTOMER:	QP NO.: PE-QP-999-506-E002, REV. 0	DATE: 27.02.2024
	PROJECT:	PO NO.:	DATE:
	ITEM: LT SWITCHGEAR / SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 7 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6) M	QUANTUM OF CHECK (6) B/C	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10) D *	AGENCY (10) M **	AGENCY (10) B	AGENCY (10) C	REMARKS
(1)	(2)	(3)	(4)	(5)			(7)	(8)	(9)					(11)
4	FINAL INSPECTION & TESTING													
		1. Overall visual check for aesthetics, verticality of panels and alignment between two transport sections	MA	Visual	100%	10%	Approved GA drawing	Approved GA drawing	QC Records	✓	P	W	W	
		2. Verification of overall dimensions including sheet steel thickness	MA	Meas.	100%	1 sample of each type of panel per lot	Approved GA drawing	Approved GA drawing	QC RECORD	✓	P	W	W	
		3. Busduct interface, phase sequence, flange dimensions & clearances	MA	Visual	100%	100%	Approved GA drawing	Approved GA drawing	QC RECORD	✓	P	W	W	
		4. Busbar (Main horizontal) - clearances, color coding, phase sequence, identification for each transport unit	CR	Meas. & Visual	100%	10%	Approved drawing	Approved drawing	QC RECORD	✓	P	W	W	
		5. Verification of tightness of busbar joints by torque wrench	CR	Mech.	100%	10%	Manufacturer's Standard	Manufacturer's Standard	QC RECORD	✓	P	W	W	
		6. CT /PT fixing & mounting arrangement	MA	Visual	100%	10%	Manufacturer's Standard	Manufacturer's Standard	QC RECORD	✓	P	W	W	
		7. Check shrouding of accessible live parts, Cable supports and tool falling shroud in cable alley and application of PVC sleeves on busbars	MA	Visual	100%	10%	Technical Specification	Technical Specification	QC RECORD	✓	P	W	W	

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Prepared by:		MEGHA/ NARENDRA NATH JAIWARE	Checked by:		KUNDAN PRASAD			Reviewed by:			
Reviewed by:		SANDEEP LODH	Reviewed by:		HARISH KUMAR			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
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	PROJECT:		PO NO.:	DATE:
	ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 8 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)				REMARKS
					M	B/C				D	M	B	C	
(1)	(2)	(3)	(4)	(5)			(7)	(8)	(9)					(11)
		8. Verification of Components for make, type, rating & layout	MA	Visual	100%	10% of each type of module per lot	Approved drawing/ Make's List	Approved drawing/ Make's List	QC RECORD	✓	P	W	W	
		9. Check control wiring / terminal arrangement & ferruling	MA	Visual	100%	10% Same as above	Approved drawing	Approved drawing	QC RECORD	✓	P	W	W	
		10. Safety Shutters operation check	CR	Elec.	100%	10% Same as above	Technical Specification	Technical Specification	QC RECORD	✓	P	W	W	
		11. Check door interlock & defeat interlock feature	MA	Elec.	100%	10% Same as above	Technical Specification	Technical Specification	QC RECORD	✓	P	W	W	
		12. Mech. operation test for ACB	CR	Elec.	100%	10% Same as above	IEC 60947-2	IEC 60947-2	QC RECORD	✓	P	W	W	
		13. Breaker operation at service , test & isolate position	CR	Elec.	100%	100%	Technical Specification	Technical Specification	QC RECORD	✓	P	W	W	
		14. Power & control draw-out contacts alignment check	MA	Elec.	100%	10% of each type of module per lot	Technical Specification	Technical Specification	QC RECORD	✓	P	W	W	
		15. Check for Breaker Anti-pumping & trip free feature	MA	Elec.	100%	100%	Technical Specification	Technical Specification	QC RECORD	✓	P	W	W	
		16. Earthing of ACB Cradle	MA	Visual	100%	100%	Technical Specification	Technical Specification	QC RECORD	✓	P	W	W	
		17. Interlocks & operation check - Elect. / Mech. open, close: under test, service & isolation position	CR	Elec.	100%	10% of each type of module per lot	Approved drawing	Approved drawing	QC RECORD	✓	P	W	W	

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Prepared by:		MEGHA/ NARENDRA NATH JAJWARE	Checked by:		KUNDAN PRASAD			Reviewed by:			
Reviewed by:		SANDEEP LODH	Reviewed by:		HARISH KUMAR			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
	CUSTOMER:		QP NO.: PE-QP-999-506-E002, REV. 0	DATE: 27.02.2024
	PROJECT:		PO NO.:	DATE:
	ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 9 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)				REMARKS
					M	B/C				D	M	B	C	
(1)	(2)	(3)	(4)	(5)			(7)	(8)	(9)					(11)
		18. Interchangeability check for draw-out modules	MA	Mech.	100%	10%	Technical Specification	Technical Specification	QC RECORD	✓	P	W	W	
		19. Earth bus dimensions, Earthing of draw-out modules, door etc.	MA	Elec.	100%	10% of each type of module per lot	Approved drawing	Approved drawing	QC RECORD	✓	P	W	W	
		20. Check Paint shade, thickness, Adhesion & finish	MA	Visual/ Test	100% for shade & finish; 2-3 samples/lot for thickness & adhesion check	2 - 3 samples/ board	Approved drawing	Approved drawing	QC RECORD	✓	P	W	W	
		21. Bus bar support arrangement: centre to centre distance between supports	MA	Meas.	100%	10%	TTR	TTR	QC RECORD	✓	P	W	W	
		22. Overlapping of bus bar joints	MA	Meas.	100%	10%	Approved drawing	Approved drawing	QC RECORD	✓	P	W	W	
		23. Degree of protection check, check profile & fixing of gaskets	MA	Visual	2 - 5 samples at gasketted joints per board	2-5 samples at gasketted joints per board	Approved drawing/ Technical Specification	No insertion possible from openings & gasketted joints	QC RECORD	✓	P	W	W	Paper insertion method - PSX Comp. & 1 mm wire insertion method - P4X Comp.
		24. IR Test before & after the HV Test	MA	Elec.	100%	100%	IS/ IEC 61439	IS/ IEC 61439	QC RECORD	✓	P	W	W	
		25. HV test on Power circuit	CR	Elec.	100%	100%	IS/ IEC 61439	IS/ IEC 61439	QC RECORD	✓	P	W	W	

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Reviewed by:		SANDEEP LODH	Reviewed by:		HARISH KUMAR			Approved by:			

MANUFACTURER/ BIDDER/ SUPPLIER NAME & ADDRESS	STANDARD QUALITY PLAN		SPEC. NO:	DATE:
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	PROJECT:		PO NO.:	DATE:
	ITEM: LT SWITCHGEAR	SYSTEM: LT SWITCHGEAR	SECTION: II	SHEET 10 of 10

S. NO.	COMPONENT & OPERATION	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK (6)		REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	AGENCY (10)				REMARKS
					M	B/C				D *	M **	B	C	
(1)	(2)	(3)	(4)	(5)			(7)	(8)	(9)					(11)
		26. Functional Test of each type of draw-out feeders	MA	Functional	100%	10%	Approved drawing	Approved drawing	QC RECORD	✓	P	W	W	
5	Packing	Soundness of packing, Loading etc.	MA	Verify	100%	100%	Manufacturer's Standard	Manufacturer's Standard			P	-	-	

LEGENDS:

*Records, identified with "Tick"(√) shall be essentially included by supplier in QA documentation.
** **M**: Supplier/ Manufacturer/ Sub-Supplier, **B**: Main Supplier/ BHEL/ Third Party Inspection Agency, **C**: Customer.
P: Perform, **W**: Witness, **V**: Verification, as appropriate.
MA: Major, **MI**: Minor, **CR**: Critical, **D**: Documentation

BHEL					
ENGINEERING			QUALITY		
	Sign & Date	Name		Sign & Date	Name
Prepared by:		MEGHA/ NARENDRA NATH JAJWARE	Checked by:		KUNDAN PRASAD
Reviewed by:		SANDEEP LODH	Reviewed by:		HARISH KUMAR

BIDDER/ SUPPLIER	
Sign & Date	
Seal	

FOR CUSTOMER REVIEW & APPROVAL			
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Approved by:			

SUB VENDOR LIST

S. No.	Item Description	Proposed Vendors
1	AIR CIRCUIT BREAKER (ACB)	
2	MOULDED CASE CIRCUIT BREAKER (MCCB)	
3	MOTOR PROTECTION CIRCUIT BREAKER (MPCB)	
4	MINIATURE CIRCUIT BREAKER (MCB)	
5	AC POWER CONTACTOR	
6	AC AUXILIARY CONTACTOR	
7	DC POWER CONTACTOR	
8	DC AUXILIARY CONTACTOR	
9	INTELLIGENT MOTOR CONTROLLER	
10	CURRENT TRANSFORMER (CT)	
11	VOLTAGE TRANSFORMER (VT/PT)	
12	CONTROL TRANSFORMER (CST)/ WINDING HEATING TRANSFORMER	
13	AMMETER (ANALOG)	
14	AMMETER (DIGITAL)	
15	VOLTMETER (ANALOG)	
16	VOLTMETER (DIGITAL)	
17	ENERGY METER (ANALOG)	
18	ENERGY METER (DIGITAL)	
19	MULTIFUNCTION METER (MFM)	
20	TRANSDUCER	
21	NUMERICAL PROTECTION RELAY	
22	ELECTRONIC MOTOR PROTECTION RELAY (EMPR)	
23	AUXILIARY RELAY	
24	INTERPOSING/COUPLING RELAY	
25	TIMER/TIME DELAY RELAY	
26	INDICATION LAMP	
27	INDUSTRIAL SOCKET	
28	CONTROL SWITCHES/ SELECTOR SWITCH	
29	DC SWITCH	
30	DIODES	
31	PUSH BUTTON	
32	CABLE GLANDS	
33	CABLE LUGS	
34	TERMINAL BLOCK (FIXED/DRAWOUT)	
35	LT SWITCH GEAR (FIXED/DRAWOUT) PANELS	
36	DATA CONCENTRATOR	
37	ETHERNET SWITCHES	
38	Y-LINK	
39	DP CABLE	
40	OPTICAL FIBRE CABLE	
Note:	Bidder may include items alongwith subvendors that are not listed above.	
	Subvendor make shall be subject to Customer/BHEL approval during Contract Engineering. Bidder to accept the approved make list without any commercial implication to BHEL.	

PAINTING REQUIREMNENT

Package	Condition	Surface Preparation	Primer Coat	No. of Coats	DFT (in Microns)	Intermediate Coat (in Microns)	No. of Coats	DFT (in Microns)	Final Coat	No. of Coats	DFT (in Microns)	Total DFT
LT SWITCHGEAR	Plain Area	As per Manufacturer Std.	As per Manufacturer Std.	As per Manufacturer Std.	As per Manufacturer Std.	As per Manufacturer Std.	As per Manufacturer Std.	As per Manufacturer Std.	As per Manufacturer Std.	As per Manufacturer Std.	50	100

Painting shade on exterior shall be RAL 9002 for complete panel except RAL 5012 for extreme ends and RAL 9002 for Mounting Plate & Trolley. Paint finish coat shall be minimum 50 microns (minimum total DFT shall be 100 microns).

PACKING REQUIREMENT

Sl.no	DESCRIPTION
1	**Type of Packing:**
1.1	Item shall be fully covered with multi layered cross laminated colourless polyethylene sheet of at least 100 GSM and shall be packed inside wooden box or crate or fixed on wooden pallet depending upon the size.
1.2	Item shall be firmly fixed to the bottom of the packing box/crate/pallet with the help of supports/blocks to arrest the movement from all sides. The branch pipe ends and all opening shall be protected with polyethylene blind end caps.
1.3	Loose items/accessories like nipples, expander/reducer, root valves etc. shall be separately packed with polyethylene sheet of at least 100 GSM inside the packing box/crate.
2	**Quality of wood:**
2.1	**Quality of wood:** Wood used for packing box shall be Pinewood, Rubber wood, Mango wood, Fir wood, Silver Oak wood or other as per availability with moisture content not exceeding 30%.
3	**Cushioning material and moisture absorber:**
3.1	Suitable cushioning shall be provided by rubberized coir/ thermocol / expanded soft polyethylene foam.
3.2	Adequate quantity of packed desiccant shall be suitably placed inside the packing box.
4	**Packing slip & holder:**
4.1	Packing slip kept in polyethylene bag shall be placed inside the wooden box at appropriate place.
4.2	One copy of packing slip wrapped in polyethylene bag covered in galvanized iron tin sheet/ aluminium packing slip holder shall be fixed on the external surface the packing box.

DOCUMENTATION REQUIREMENT

a)	DRAWINGS & DOCUMENTS TO BE SUBMITTED ALONG WITH THE BID
Sl. No.	DOCUMENT
1	PQR Credentials
2	Compliance Sheet
3	Un-priced Schedule alongwith Annexure-A, B, C, D, E, F, G & H duly stamped and signed by the bidder.
4	Sub QR Data
5	Complete dimensions of all the boards including no of panels (PCC as well as MCC panels)
6	Dimensions of each type of panel
7	Module size of each type of feeder

b)	DRAWINGS & DOCUMENTS TO BE SUBMITTED BY SUCCESSFUL BIDDER AFTER AWARD OF CONTRACT ALONG WITH SUBMISSION SCHEDULE				
Sl. No.	*BHEL Drawing No.*	*Drawing Title*	*Vendor Sub (Days)**	*Vendor Sub (Days)#*	*Remarks*
Primary Documents					
1	PE-V0-508-506-E101	General Notes & Legends Detail	35	7	Refer Remark-1
2	PE-V0-508-506-E102	Technical Data Sheet - LV Switchgear	35	7	Refer Remark-1
3	PE-V0-508-506-E103	Busbar Sizing Calculation for LV Switchgear	35	7	
4	PE-V0-508-506-E104	Type-2 Coordination Chart	35	7	Refer Remark-1
5	PE-V0-508-506-E105	Module Size Selection Chart	35	7	
6	PE-V0-508-506-E902	MQP for LV Switchgear along with Make of Components & Equipment	35	7	Refer Remark-1
7	PE-V0-508-506-E2XX	Control Schemes	35	7	Refer Remark-1
8	PE-V0-508-506-E3XX	GA & SLD FOR LV SWITCHBOARDS	10	5	Refer Remark-2a
Secondary Documents					
1	PE-V0-508-506-E5XX	Module-wise Bill of Material	10	5	After Approval of Scheme
2	PE-V0-508-506-E106	Type Test Reports for LV Switchgear	35	7	
3	PE-V0-508-506-E107	List of Tools & Tackles	35	7	
4	PE-V0-508-506-E108	List of E & C Spares	35	7	
5	PE-V0-508-506-E109	List of Mandatory Spares	35	7	

DOCUMENTATION REQUIREMENT

Remark-1:
Documents for which input is not required from BHEL shall be given by vendor (Schemes, General Notes, Datasheet, QP, Type Test Report, Type-2 coordination Chart etc.) as stipulated in specification.

Remark-2:

a) GA & SLD for LV Swithchboards to be submitted within 10 days from release of Load Data for respective board.
b) Every LT switchboard to be considered independently for drawing submission/re-submission & additional 1 day to be added in submission/re-submission days for each additional switchboard in case load data of more than 1 switchboard has been given on same day.
c) Lot shall be cleared after approval of related drawings including QP.
d) Lot shall be released along with Cat-1 approved drawings/documents applicable for the lot. Delivery time of the lot shall be 120 days from date of issue applicable Cat-1 approved dwgs/docs. Delay by vendor in submission/re-submission of applicable drawing/documents shall be reduced from the given delivery period. However, delay in common drawing/documents shall not be considered for subsequent lots (from 2nd lot onwards).
e) In one lot, maximum 10 nos. LT Switchboards shall be cleared for manufacturing.
f) There shall be minimum 10 days gap between two consecutive lots.
g) PO validity shall be 2 years for supply & 3 years for site modification.

NOTES:
a) * 1st submission within indicated days from date of purchase order.
b) # Re-submission (within indicated days) after incorporating all BHEL comments.
c) Primary documents shall be considered for Delay analysis.
d) Refer Annexure-7 (part of Documentation Requirement) for Tentative documents list to be submitted by Bidder. Final list shall be decided after ordering.

c)	**DRAWINGS & DOCUMENTS TO BE SUBMITTED AS FINAL/AS-BUILT DOCUMENT**
Sl. No.	**DOCUMENT**
1	Approved Documents. All final drawings shall be submitted in both PDF and Autocad (.dwg 2016 or lower version) format. Final SLD FOR LV SWITCHBOARDS to be submitted in Excel format incorporating module Nos.
2	O&M Manual
3	All Test Certificates

ANNEXURE-7

DOCUMENTS TO BE SUBMITTED

S.No.	NTPC Drawing No.	BHEL Drawing No.	Drawing Title	Remarks
1	-	PE-V0-508-506-E101	COMPONENT SELECTION CHART & GENERAL NOTES AND LEGENDS	
2	-	PE-V0-508-506-E102	DATA SHEETS FOR LT SWITCHGEAR	
3	-	PE-V0-508-506-E103	BUSBAR SIZING CALCULATION FOR LV SWITCHGEAR	
4	-	PE-V0-508-506-E104	TYPE-2 COORDINATION CHART	
5	-	PE-V0-508-506-E105	MODULE SIZE SELECTION CHART	
6	-	PE-V0-508-506-E902	MQP FOR LT SWITCHGEAR PANEL ALONGWITH FAT PROCEDURE OF NUMERICAL RELAYS	
7	-	PE-V0-508-506-E201	CONTROL SCHEME FOR 2 INCOMER +1 BUS COUPLER (2 DAET+1 DAE)	
8	-	PE-V0-508-506-E202	CONTROL SCHEME FOR 2 INCOMER (2 DAET)	
9	-	PE-V0-508-506-E203	CONTROL SCHEME FOR 2 INCOMER +1 BUS COUPLER (2 DAE+1 DAE)	
10	-	PE-V0-508-506-E204	CONTROL SCHEME FOR EMERGENCY SWITCH BOARD (2 DG IC+2 TIE IC+1 BC)	
11	-	PE-V0-508-506-E205	CONTROL SCHEME FOR PCC OUTGOING BREAKER FEEDER TYPE DAE	
12	-	PE-V0-508-506-E206	CONTROL SCHEME FOR OUTGOING TIE (DAE) FROM TPMCC TO UES	
13	-	PE-V0-508-506-E207	CONTROL SCHEME FOR ACB CONTROLLED MOTOR FEEDER (90KW & ABOVE) - TYPE DM	
14	-	PE-V0-508-506-E208	CONTROL SCHEME FOR BUS PT MODULE FOR PCC/PMCC (MODULE - G1)	
15	-	PE-V0-508-506-E209	CONTROL SCHEME FOR BUS PT MODULE FOR DG SWGR (MODULE - G2)	
16	-	PE-V0-508-506-E210	CONTROL SCHEME FOR METERING MODULE FOR MCC (MODULE - VM) DO/FIXED	
17	-	PE-V0-508-506-E211	CONTROL SCHEME FOR CONTROL TRAFSORMER MODULE TYPE CS	
18	-	PE-V0-508-506-E212	CONTROL SCHEME FOR 220V DCDB I/C & B/C (TYPE DC + DB + CH + HD)	
19	-	PE-V0-508-506-E213	CONTROL SCHEME FOR 48V DCDB I/C & B/C (TYPE DC + DB + CH + HD)	
20	-	PE-V0-508-506-E214	CONTROL SCHEME FOR DC METERING & PROTECTION MODULE TYPE S	
21	-	PE-V0-508-506-E215	220V/ 48V DC OUTGOING FEEDER TYPE X	
22	-	PE-V0-508-506-E216	CONTROL SCHEME FOR CONTACTOR CHANGEOVER BETWEEN TWO INCOMER MODULE TYPE CC (DO/FIXED)	
23	-	PE-V0-508-506-E217	CONTROL SCHEME FOR INCOMING MCCB (DO+FIXED) (MCCB)	
24	-	PE-V0-508-506-E218	CONTROL SCHEME FOR BUSCOUPLER MODULE TYPE MCCB (DRAWOUT/FIXED)	
25	-	PE-V0-508-506-E219	CONTROL SCHEME FOR 3 PHASE MCCB OUTGOING FEEDER E3 (DRAWOUT/FIXED)	
26	-	PE-V0-508-506-E220	CONTROL SCHEME FOR 2 PHASE MCCB OUTGOING FEEDER TYPE E2 (DRAWOUT/FIXED)	
27	-	PE-V0-508-506-E221	CONTROL SCHEME FOR 1 PHASE MCCB OUTGOING FEEDER TYPE E1 (DRAWOUT/FIXED)	
28	-	PE-V0-508-506-E222	CONTROL SCHEME FOR MOTORS TYPE DK2 (BELOW 30KW)	
29	-	PE-V0-508-506-E223	CONTROL SCHEME FOR MOTORS TYPE DK21 (30KW & BELOW 90KW)	
30	-	PE-V0-508-506-E224	CONTROL SCHEME FOR RE-ACCELARATION MOTORS MODULE TYPE DK2E (UPTO 30KW)	
31	-	PE-V0-508-506-E225	CONTROL SCHEME FOR RE-ACCELARATION MOTORS MODULE TYPE DK21E (ABOVE 30KW & BELOW 90KW)	
32	-	PE-V0-508-506-E226	CONTROL SCHEME FOR MOTORS TYPE K2 (UPTO 30KW)	
33	-	PE-V0-508-506-E227	CONTROL SCHEME FOR MOTORS TYPE K21 (ABOVE 30KW & BELOW 90KW)	
34	-	PE-V0-508-506-E228	CONTROL SCHEME FOR MOTORS TYPE K3 (UPTO 30KW)	
35	-	PE-V0-508-506-E229	CONTROL SCHEME FOR MOTORS TYPE K31 (ABOVE 30KW & BELOW 90KW)	
36	-	PE-V0-508-506-E230	CONTROL SCHEME FOR REVERSIBLE MOTOR TYPE DN1 (BELOW 30KW)	

ANNEXURE-7

DOCUMENTS TO BE SUBMITTED

S.No.	NTPC Drawing No.	BHEL Drawing No.	Drawing Title	Remarks
37	-	PE-V0-508-506-E231	CONTROL SCHEME FOR REVERSIBLE MOTOR TYPE DN11 (30KW AND ABOVE)	
38	-	PE-V0-508-506-E232	CONTROL SCHEME FOR HEATERS TYPE EA3 (BELOW 30KW)	
39	-	PE-V0-508-506-E233	CONTROL SCHEME FOR HEATERS TYPE EA1	
40	-	PE-V0-508-506-E234	CONTROL SCHEME FOR SPACE HEATER SUPPLY	
41	-	PE-V0-508-506-E235	CONTROL SCHEME FOR PANEL SPACE HEATER AND PLUGS & SOCKETS	
42	-	PE-V0-508-506-E236	CONTROL SCHEME FOR RAPING MOTOR (RM)	
43	-	PE-V0-508-506-E237	CONTROL SCHEME FOR DUST DENSITY MONITOR (DDM)	
44	-	PE-V0-508-506-E238	CONTROL SCHEME FOR HOPPER HEATER (HH)	
45	-	PE-V0-508-506-E239	CONTROL SCHEME FOR SHAFT INSULATOR HEATER (HS)	
46	-	PE-V0-508-506-E240	CONTROL SCHEME FOR SUPPORT INSULATOR HEATER (HI)	
47	-	PE-V0-508-506-E241	CONTROL SCHEME FOR ASH LEVEL INDICATOR HIGH (ALI(H))	
48	-	PE-V0-508-506-E242	CONTROL SCHEME FOR ASH LEVEL INDICATOR LOW (ALI(L))	
49	-	PE-V0-508-506-E243	CONTROL SCHEME FOR ARECA MARSHALING MODULE (ARECA)	
50	-	PE-V0-508-506-E244	CONTROL SCHEME FOR WAVE LEVEL TRANSMITTER (WLT)	
51	-	PE-V0-508-506-E245	CONTROL SCHEME FOR MARSHALING MODULE (MM)	
52	-	PE-V0-508-506-E246	CONTROL SCHEME FOR WALL BLOWER	
53	-	PE-V0-508-506-E247	CONTROL SCHEME FOR LR BLOWER	
54	-	PE-V0-508-506-E248	CONTROL SCHEME FOR AH BLOWER	
55	-	PE-V0-508-506-E301	GA & SLD DRAWING FOR UNIT-1 STATION SERVICE PMCC	
56	-	PE-V0-508-506-E302	GA & SLD DRAWING FOR UNIT-2 STATION SERVICE PMCC	
57	-	PE-V0-508-506-E303	GA & SLD DRAWING FOR UNIT#1 BOILER PMCC	
58	-	PE-V0-508-506-E304	GA & SLD DRAWING FOR UNIT-1 TURBINE PMCC	
59	-	PE-V0-508-506-E305	GA & SLD DRAWING FOR UNIT#2 BOILER PMCC	
60	-	PE-V0-508-506-E306	GA & SLD DRAWING FOR UNIT-2 TURBINE PMCC	
61	-	PE-V0-508-506-E307	GA & SLD DRAWING FDRAWING FOR FGD PMCC-1	
62	-	PE-V0-508-506-E308	GA & SLD DRAWING FOR DMP/ SW/ CLW PMCC	
63	-	PE-V0-508-506-E309	GA & SLD DRAWING FOR RAW WATER PMCC	
64	-	PE-V0-508-506-E310	GA & SLD DRAWING FOR FW/ AUX BOILER PMCC	
65	-	PE-V0-508-506-E311	GA & SLD DRAWING FDRAWING FOR FGD PMCC-2	
66	-	PE-V0-508-506-E312	GA & SLD DRAWING FOR LIMESTONE/ GYPSUM PMCC	
67	-	PE-V0-508-506-E313	GA & SLD DRAWIING FOR ADMIN PMCC	
68	-	PE-V0-508-506-E314	GA & SLD DRAWING FOR ETP MCC	
69	-	PE-V0-508-506-E315	GA & SLD DRAWIING FOR WORKSHOP PMCC	
70	-	PE-V0-508-506-E316	GA & SLD DRAWIING FOR FGD CSSP PMCC	
71	-	PE-V0-508-506-E317	GA & SLD DRAWING FOR UNIT#1 ESP PMCC-1	
72	-	PE-V0-508-506-E318	GA & SLD DRAWING FOR UNIT#1 ESP PMCC-2	
73	-	PE-V0-508-506-E319	GA & SLD DRAWING FOR UNIT#1 ESP PMCC-3	
74	-	PE-V0-508-506-E320	GA & SLD DRAWING FOR UNIT#1 ESP PMCC-4	
75	-	PE-V0-508-506-E321	GA & SLD DRAWING FOR UNIT#1 ESP PMCC-5	
76	-	PE-V0-508-506-E322	GA & SLD DRAWING FOR UNIT#1 ESP PMCC-6	
77	-	PE-V0-508-506-E323	GA & SLD DRAWING FOR UNIT#2 ESP PMCC-1	

ANNEXURE-7

DOCUMENTS TO BE SUBMITTED

S.No.	NTPC Drawing No.	BHEL Drawing No.	Drawing Title	Remarks
78	-	PE-V0-508-506-E324	GA & SLD DRAWING FOR UNIT#2 ESP PMCC-2	
79	-	PE-V0-508-506-E325	GA & SLD DRAWING FOR UNIT#2 ESP PMCC-3	
80	-	PE-V0-508-506-E326	GA & SLD DRAWING FOR UNIT#2 ESP PMCC-4	
81	-	PE-V0-508-506-E327	GA & SLD DRAWING FOR UNIT#2 ESP PMCC-5	
82	-	PE-V0-508-506-E328	GA & SLD DRAWING FOR UNIT#2 ESP PMCC-6	
83	-	PE-V0-508-506-E329	GA & SLD DRAWING FOR UNIT#1 ESP STANDBY PMCC-1	
84	-	PE-V0-508-506-E330	GA & SLD DRAWING FOR UNIT#1 ESP STANDBY PMCC-2	
85	-	PE-V0-508-506-E331	GA & SLD DRAWING FOR UNIT#2 ESP STANDBY PMCC-1	
86	-	PE-V0-508-506-E332	GA & SLD DRAWING FOR UNIT#2 ESP STANDBY PMCC-2	
87	-	PE-V0-508-506-E333	GA & SLD DRAWIING FOR SWITCHYARD SERVICE PMCC	
88	-	PE-V0-508-506-E334	GA & SLD DRAWING FOR AIR WASHER MCC UNIT-1	
89	-	PE-V0-508-506-E335	GA & SLD DRAWING FOR AIR WASHER MCC UNIT-2	
90	-	PE-V0-508-506-E336	GA & SLD DRAWING FOR FUEL OIL MCC	
91	-	PE-V0-508-506-E337	GA & SLD DRAWING FOR CHLORINATION PLANT MCC	
92	-	PE-V0-508-506-E338	GA & SLD DRAWING FOR UNIT-1 MISC SERVICE MCC	
93	-	PE-V0-508-506-E339	GA & SLD DRAWING FOR UNIT-2 MISC SERVICE MCC	
94	-	PE-V0-508-506-E340	GA & SLD DRAWIING FOR CPU MCC	
95	-	PE-V0-508-506-E341	GA & SLD DRAWIING FOR FQA LAB PMCC	
96	-	PE-V0-508-506-E342	GA & SLD DRAWING FOR ESP & ID FAN AREA EMERGENCY MCC-U1	
97	-	PE-V0-508-506-E343	GA & SLD DRAWING FOR ESP & ID FAN AREA EMERGENCY MCC-U2	
98	-	PE-V0-508-506-E344	GA & SLD DRAWING FOR UNIT-1 VENTILLATION MCC	
99	-	PE-V0-508-506-E345	GA & SLD DRAWING FOR UNIT-2 VENTILLATION MCC	
100	-	PE-V0-508-506-E346	GA & SLD DRAWING FOR SERVICE BUILDING MCC	
101	-	PE-V0-508-506-E347	GA & SLD FOR PTP MCC	
102	-	PE-V0-508-506-E348	GA & SLD DRAWING FOR CCR AIR CONDITIONING MCC	
103	-	PE-V0-508-506-E349	GA & SLD DRAWIING FOR CWPH MCC-1	
104	-	PE-V0-508-506-E350	GA & SLD DRAWIING FOR CWPH MCC-2	
105	-	PE-V0-508-506-E351	GA & SLD DRAWIING FOR SWITCHYARD EMERGENCY ACDB	
106	-	PE-V0-508-506-E352	GA & SLD DRAWIING FOR SWITCHYARD OIL FILTERATION ACDB	
107	-	PE-V0-508-506-E353	GA & SLD DRAWIING FOR BUNKER U#1 PMCC	
108	-	PE-V0-508-506-E354	GA & SLD DRAWIING FOR LHP/ GHP PMCC	
109	-	PE-V0-508-506-E355	GA & SLD DRAWIING FOR TRACK HOPPER PMCC	
110	-	PE-V0-508-506-E356	GA & SLD DRAWIING FOR CRUSHER HOUSE PMCC	
111	-	PE-V0-508-506-E357	GA & SLD DRAWIING FOR CLASSIFIER PMCC	
112	-	PE-V0-508-506-E358	GA & SLD DRAWIING FOR AHP SILO PMCC	
113	-	PE-V0-508-506-E359	GA & SLD DRAWIING FOR ASH WATER/ ASH SLURRY PMCC	
114	-	PE-V0-508-506-E360	GA & SLD DRAWING FOR U-1 BA & COMP PMCC-2A	
115	-	PE-V0-508-506-E361	GA & SLD DRAWING FOR U-2 BA & COMP PMCC-2B	
116	-	PE-V0-508-506-E362	GA & SLD DRAWING FOR SOOT BLOWER MCC-1	
117	-	PE-V0-508-506-E363	GA & SLD DRAWING FOR SOOT BLOWER MCC-2	
118	-	PE-V0-508-506-E364	GA & SLD DRAWING FOR BOILER VALVE DB U1	
119	-	PE-V0-508-506-E365	GA & SLD DRAWING FOR UNIT-1 TURBINE VLV & DAMPER DB	

ANNEXURE-7

DOCUMENTS TO BE SUBMITTED

S.No.	NTPC Drawing No.	BHEL Drawing No.	Drawing Title	Remarks
120	-	PE-V0-508-506-E366	GA & SLD DRAWING FOR BOILER VALVE DB U2	
121	-	PE-V0-508-506-E367	GA & SLD DRAWING FOR UNIT-2 TURBINE VLV & DAMPER DB	
122	-	PE-V0-508-506-E368	GA & SLD DRAWING FOR BOILER ACDB-1	
123	-	PE-V0-508-506-E369	GA & SLD DRAWING FOR UNIT-1 SERVICE ACDB	
124	-	PE-V0-508-506-E370	GA & SLD DRAWING FOR BOILER ACDB-2	
125	-	PE-V0-508-506-E371	GA & SLD DRAWING FOR UNIT-2 SERVICE ACDB	
126	-	PE-V0-508-506-E372	GA & SLD DRAWING FOR CANTEEN MCC	
127	-	PE-V0-508-506-E373	GA & SLD DRAWING FOR OIL FILTERATION ACDB-1	
128	-	PE-V0-508-506-E374	GA & SLD DRAWING FOR OIL FILTERATION ACDB-2	
129	-	PE-V0-508-506-E375	GA & SLD DRAWING FOR BA ACDB-1	
130	-	PE-V0-508-506-E376	GA & SLD DRAWING FOR BA ACDB-2	
131	-	PE-V0-508-506-E377	GA & SLD DRAWIING FOR FGD EMERGENCY MCC	
132	-	PE-V0-508-506-E378	GA & SLD DRAWING FOR UNIT-1 EMERGENCY SWGR	
133	-	PE-V0-508-506-E379	GA & SLD DRAWING FOR UNIT-2 EMERGENCY SWGR	
134	-	PE-V0-508-506-E380	GA & SLD DRAWING FOR UNIT-1 MAIN DCDB	
135	-	PE-V0-508-506-E381	GA & SLD DRAWING FOR UNIT-2 MAIN DCDB	
136	-	PE-V0-508-506-E382	GA & SLD DRAWING FOR DM/ETP/PTP DCDB	
137	-	PE-V0-508-506-E383	GA & SLD DRAWING FOR RAW WATER DCDB	
138	-	PE-V0-508-506-E384	GA & SLD DRAWIING FOR CHP DCDB	
139	-	PE-V0-508-506-E385	GA & SLD DRAWIING FOR AHP DCDB	
140	-	PE-V0-508-506-E386	GA & SLD DRAWIING FOR SWITCHYARD 220V DCDB	
141	-	PE-V0-508-506-E387	GA & SLD DRAWIING FOR SWITCHYARD 48V DCDB	
142	-	PE-V0-508-506-E501	BILL OF MATERIAL FOR MODULE DAET (I/C)	
143	-	PE-V0-508-506-E502	BILL OF MATERIAL FOR MODULE DAE (I/C)	
144	-	PE-V0-508-506-E503	BILL OF MATERIAL FOR MODULE DAET/DAE (B/C)	
145	-	PE-V0-508-506-E504	BILL OF MATERIAL FOR MODULE DG (I/C)	
146	-	PE-V0-508-506-E505	BILL OF MATERIAL FOR MODULE DAE(O/G)/DAE-TIE	
147	-	PE-V0-508-506-E507	BILL OF MATERIAL FOR MODULE DM/PM/AM	
148	-	PE-V0-508-506-E508	BILL OF MATERIAL FOR MODULE G1	
149	-	PE-V0-508-506-E509	BILL OF MATERIAL FOR MODULE G2	
150	-	PE-V0-508-506-E510	BILL OF MATERIAL FOR MODULE VM	
151	-	PE-V0-508-506-E511	BILL OF MATERIAL FOR MODULE CS	
152	-	PE-V0-508-506-E512	BILL OF MATERIAL FOR MODULE DB/DC/CH/HD	
153	-	PE-V0-508-506-E514	BILL OF MATERIAL FOR MODULE S	
154	-	PE-V0-508-506-E515	BILL OF MATERIAL FOR MODULE X	
155	-	PE-V0-508-506-E516	BILL OF MATERIAL FOR MODULE CC	
156	-	PE-V0-508-506-E517	BILL OF MATERIAL FOR MODULE E3 (I/C)	
157	-	PE-V0-508-506-E518	BILL OF MATERIAL FOR MODULE E3 (B/C)	
158	-	PE-V0-508-506-E519	BILL OF MATERIAL FOR MODULE E3	
159	-	PE-V0-508-506-E520	BILL OF MATERIAL FOR MODULE E2	
160	-	PE-V0-508-506-E521	BILL OF MATERIAL FOR MODULE E1	
161	-	PE-V0-508-506-E522	BILL OF MATERIAL FOR MODULE DK2/PK2/AK2	

ANNEXURE-7

DOCUMENTS TO BE SUBMITTED

S.No.	NTPC Drawing No.	BHEL Drawing No.	Drawing Title	Remarks
162	-	PE-V0-508-506-E523	BILL OF MATERIAL FOR MODULE DK21/PK21/ AK21	
163	-	PE-V0-508-506-E524	BILL OF MATERIAL FOR MODULE DK2E/PK2E/AK2E	
164	-	PE-V0-508-506-E525	BILL OF MATERIAL FOR MODULE DK21E/PK21E/ AK21E	
165	-	PE-V0-508-506-E526	BILL OF MATERIAL FOR MODULE K2	
166	-	PE-V0-508-506-E527	BILL OF MATERIAL FOR MODULE K21	
167	-	PE-V0-508-506-E528	BILL OF MATERIAL FOR MODULE K3	
168	-	PE-V0-508-506-E529	BILL OF MATERIAL FOR MODULE K31	
169	-	PE-V0-508-506-E530	BILL OF MATERIAL FOR MODULE DN1	
170	-	PE-V0-508-506-E532	BILL OF MATERIAL FOR MODULE EA3	
171	-	PE-V0-508-506-E533	BILL OF MATERIAL FOR MODULE EA1	
172	-	PE-V0-508-506-E534	BILL OF MATERIAL FOR MODULE SHS	
173	-	PE-V0-508-506-E535	BILL OF MATERIAL FOR MODULE PNL SP HTR	
174	-	PE-V0-508-506-E536	BILL OF MATERIAL FOR MODULE RM	
175	-	PE-V0-508-506-E537	BILL OF MATERIAL FOR MODULE DDM	
176	-	PE-V0-508-506-E538	BILL OF MATERIAL FOR MODULE HH	
177	-	PE-V0-508-506-E539	BILL OF MATERIAL FOR MODULE HS	
178	-	PE-V0-508-506-E540	BILL OF MATERIAL FOR MODULE HI	
179	-	PE-V0-508-506-E541	BILL OF MATERIAL FOR MODULE ALI (H)	
180	-	PE-V0-508-506-E542	BILL OF MATERIAL FOR MODULE ALI (L)	
181	-	PE-V0-508-506-E543	BILL OF MATERIAL FOR MODULE ARECA	
182	-	PE-V0-508-506-E544	BILL OF MATERIAL FOR MODULE WLT	
183	-	PE-V0-508-506-E545	BILL OF MATERIAL FOR MODULE MM	
184	-	PE-V0-508-506-E546	BILL OF MATERIAL FOR MODULE WB	
185	-	PE-V0-508-506-E547	BILL OF MATERIAL FOR MODULE LR	
186	-	PE-V0-508-506-E548	BILL OF MATERIAL FOR MODULE AH	
187	-	PE-V0-508-506-E106	TYPE TEST REPORT FOR - LT SWITCHGEAR	
188	-	PE-V0-508-506-E110	TYPE TEST REPORT OF ETHERNET SWITCHES	
189	-	PE-V0-508-506-E107	TOOLS & TACKLES FOR LT SWITCHGEAR	
190	-	PE-V0-508-506-E108	E&C SPARE FOR LT SWITCHGEAR	
191	-	PE-V0-508-506-E109	MANDATORY SPARE FOR LT SWITCHGEAR	
192	-	PE-V0-508-506-E111	CROSS SECTIONAL DRWG OF PROTOTYPE PANELS	
193	-	PE-V0-508-506-E112	DATA SHEET FOR DATA CABLE, FO CABLE	
194	-	PE-V0-508-506-E114	OVERALL SYSTEM ARCHITECTURE FOR LT SWITCHGEAR NETWORK	
195	-	PE-V0-508-506-E115	DATA LIST	
196	-	PE-V0-508-506-E116	FUNCTIONAL DESIGN SPECIFICATION	

COMPLAINCE CERTIFICATE	
1	It is hereby confirm that the technical specification (sheet 1 to 164) has been read and we confirm compliance to the tender specification including any clarification and amendments without any deviation.
2	It is hereby declared that any technical submittals which was not specifically asked for in NIT shall stand withdrawn.

Signature of authorised Representative

Name and Designation :

Name & Address of the Bidder

Date

UNPRICED SCHEDULE

BOQ-CUM-PRICE SCHEDULE FOR LT SWITCHGEAR

S.No.	ITEM NO.	ITEM NAME	UOM	TOTAL QTY.	RATING (A)	BOARD NO.	UNIT PRICE (Ex-WORKS) Rs.	TOTAL PRICE (Ex-WORKS) Rs.	NO. OF PCC / ACB PANEL	NO. OF MCC / ACDB / DCDB PANEL	REMARKS
1	506-0110264-00-A	STATION SERVICE SWBD.-1	NOS.	1	4000	0DA					U#3 STATION SERVICE PMCC
2	506-0110265-00-A	STATION SERVICE SWBD.-2	NOS.	1	4000	0DB					U#4 STATION SERVICE PMCC
3	506-0110382-00-A	UNIT BOILER PMCC-1	NOS.	1	4000	3DA					U#3 BOILER SERVICE PMCC
4	506-0110387-00-A	UNIT TURBINE PMCC-1	NOS.	1	4000	3DB					U#3 TURBINE SERVICE PMCC
5	506-0110383-00-A	UNIT BOILER PMCC-2	NOS.	1	4000	4DA					U#4 BOILER SERVICE PMCC
6	506-0110388-00-A	UNIT TURBINE PMCC-2	NOS.	1	4000	4DB					U#4 TURBINE SERVICE PMCC
7	506-0110413-00-A	FGD SWBD -1	NOS.	1	4000	3DP					U#3 FGD PMCC
8	506-0110162-00-A	DM PLANT SWBD.	NOS.	1	2500	0DE					DM PMCC
9	506-0110254-00-A	RAW WATER SWBD.	NOS.	1	2500	0WB					RAW WATER PMCC
10	506-0110414-00-A	FGD SWBD -2	NOS.	1	4000	4DP					U#4 FGD PMCC
11	506-0110971-00-A	FGD COMMON PMCC	NOS.	1	4000	0DP					FGD COMMON PMCC
12	506-0110415-00-A	ETP PMCC	NOS.	1	2500	0DF					ETP PMCC
13	506-0110972-00-A	CSSP MCC	NOS.	1	1000	0WD					CSSP MCC
14	506-0110180-00-A	ESP SWBD-1	NOS.	3	4000	3DD, 3DE, 3DF					U#3 ESP PMCC
15	506-0110181-00-A	ESP SWBD-2	NOS.	3	4000	3DC, 3DH, 3DJ					U#3 ESP PMCC
16	506-0110182-00-A	ESP SWBD-3	NOS.	3	4000	4DD, 4DE, 4DF					U#4 ESP PMCC
17	506-0110183-00-A	ESP SWBD-4	NOS.	3	4000	4DC, 4DH, 4DJ					U#4 ESP PMCC
18	506-0110973-00-A	ESP STANDBY PMCC 1	NOS.	2	4000	3DL, 3DM					U#3 ESP STANDBY PMCC
19	506-0110974-00-A	ESP STANDBY PMCC 2	NOS.	2	4000	4DL, 4DM					U#4 ESP STANDBY PMCC
20	506-0110170-00-A	ESP A/C & VENT MCC-1	NOS.	1	400	3TB					U#3 ESP/FGD HVAC MCC 1
21	506-0110171-00-A	ESP A/C & VENT MCC-2	NOS.	1	400	3TC					U#3 ESP/FGD HVAC MCC 2
22	506-0110172-00-A	ESP A/C & VENT MCC-3	NOS.	1	400	4TB					U#4 ESP/FGD HVAC MCC
23	506-0110138-00-A	COOLING TOWER SWBD.-1	NOS.	2	3000	3DK, 3DQ					U#3 IDCT PMCC 3DK, 3DQ
24	506-0110139-00-A	COOLING TOWER SWBD.-2	NOS.	2	3000	3DN, 3DS					U#3 IDCT PMCC 3DN, 3DS
25	506-0110140-00-A	COOLING TOWER SWBD.-3	NOS.	2	3000	4DK, 4DQ					U#4 IDCT PMCC 4DK, 4DQ
26	506-0110141-00-A	COOLING TOWER SWBD.-4	NOS.	2	3000	4DN, 4DS					U#4 IDCT PMCC 4DN, 4DS
27	506-0110410-00-A	SWITCHYARD SERVICE PMCC	NOS.	1	2500						SWITCHYARD SWITCHBOARD
28	506-0110079-00-A	AIR WASHER MCC-1	NOS.	1	800	0SA					U#3 AIR WASHER MCC
29	506-0110080-00-A	AIR WASHER MCC-2	NOS.	1	800	0SB					U#4 AIR WASHER MCC
30	506-0110189-00-A	FUEL OIL MCC	NOS.	1	630	0SC					FOPH MCC
31	506-0110129-00-A	CLARIFIER WATER P/H SWBD.	NOS.	1	3000	0DD					SW/CLW/PTP PMCC
32	506-0110125-00-A	CHLORINATION PLANT MCC	NOS.	1	1000	0DC					CLO2/CWTP/CW PMCC
33	506-0110241-00-A	MISC. SERVICE MCC-1	NOS.	1	630	0QA					U#3 MISC. SERVICES MCC
34	506-0110242-00-A	MISC. SERVICE MCC-2	NOS.	1	630	0QB					U#4 MISC. SERVICES MCC
35	506-0110142-00-A	CPU MCC	NOS.	1	630	0WC					CPU MCC
36	506-0110165-00-A	ESP & ID FAN AREA MCC-1	NOS.	1	400	3HD					U#3 ESP & ID FAN AREA MCC
37	506-0110166-00-A	ESP & ID FAN AREA MCC-2	NOS.	1	400	4HD					U#4 ESP & ID FAN AREA MCC
38	506-0110331-00-A	VENTILATION MCC-1	NOS.	1	630	3TA					U#3 VENTILATION MCC
39	506-0110332-00-A	VENTILATION MCC-2	NOS.	1	630	4TA					U#4 VENTILATION MCC
40	506-0110251-00-A	PRE-TREATMENT PLANT MCC	NOS.	1	630	0WA					PTP MCC
41	506-0110077-00-A	AIR CONDITIONING MCC	NOS.	1	1600	0TA					AIR CONDITIONING MCC
42	506-0110411-00-A	SWITCHYARD EMERGENCY DB	NOS.	1	250						SWITCHYARD EPDB
43	506-0110118-00-A	BUNKER MCC	NOS.	1	2500	0DT					CHP BUNKER PMCC-3
44	506-0110406-00-A	LHP/GHP MCC	NOS.	1	4000	0DH					LHP/GHP PMCC
45	506-0110975-00-A	CRUSHER HOUSE PMCC	NOS.	1	4000	0DR SEC-A, SEC-B					CHP CRUSHER HOUSE-1 PMCC, 2 BOARDS EACH WITH 2 I/C AND NO B/C
46	506-0110127-00-A	CHP SWBD	NOS.	1	4000	0DS					CHP MISC. PMCC-2
47	506-0110419-00-A	SOOT BLOWER MCC-1	NOS.	1	63						U#3 SOOT BLOWER MCC
48	506-0110420-00-A	SOOT BLOWER MCC-2	NOS.	1	63						U#4 SOOT BLOWER MCC
49	506-0110107-00-A	BOILER V&D ACDB-1	NOS.	1	250	3HA					U#3 BOILER VALVE & DAMPER ACDB
50	506-0110300-00-A	TURBINE VALVE ACDB-1	NOS.	1	250	3KA					U#3 TURBINE VALVE ACDB
51	506-0110108-00-A	BOILER V&D ACDB-2	NOS.	1	250	4HA					U#4 BOILER VALVE & DAMPER ACDB
52	506-0110301-00-A	TURBINE VALVE ACDB-2	NOS.	1	250	4KA					U#4 TURBINE VALVE ACDB
53	506-0110092-00-A	BOILER ACDB-1	NOS.	1	630	3HB					U#3 BOILER ACDB
54	506-0110321-00-A	UNIT SERVICE ACDB-1	NOS.	1	630	3QA					U#3 UNIT SERVICE ACDB
55	506-0110093-00-A	BOILER ACDB-2	NOS.	1	630	4HB					U#4 BOILER ACDB
56	506-0110322-00-A	UNIT SERVICE ACDB-2	NOS.	1	630	4QA					U#4 UNIT SERVICE ACDB
57	506-0110988-00-A	FGD DG PCC	NOS.	1	2000	0DG					FGD DG PCC
58	506-0110311-00-A	UNIT EMERGENCY MCC-1	NOS.	1	3000	3DG					U#3 EMERGENCY MCC
59	506-0110312-00-A	UNIT EMERGENCY MCC-2	NOS.	1	3000	4DG					U#4 EMERGENCY MCC
60	506-0110040-00-A	220V MAIN DCDB-1	NOS.	1	1600	3FA					U#3 220V MAIN DCDB
61	506-0110041-00-A	220V MAIN DCDB-2	NOS.	1	1600	4FA					U#4 220V MAIN DCDB
62	506-0110044-00-A	220V OFFSITE DCDB	NOS.	1	125	0FA					OFFSITE DCDB

BOQ-CUM-PRICE SCHEDULE FOR LT SWITCHGEAR

63	506-0110976-00-A	220V OFFSITE DCDB-1	NOS.	1	125						RAW WATER DCDB
64	506-0110977-00-A	220V SWITCHYARD DCDB 1	NOS.	1	300						220V SWYD DCDB
65	506-0110978-00-A	220V SWITCHYARD DCDB 2	NOS.	1	200						220V SWYD DCDB EXTN
66	506-0110979-00-A	220V CHP DCDB	NOS.	1	125						220V CHP DCDB
67	506-0110980-00-A	220V AHP DCDB	NOS.	1	125						220V AHP DCDB
68	506-0110404-00-A	48V SWITCHYARD DCDB	NOS.	1	300	0FE					48V SWITCHYARD DCDB
69	506-0110981-00-A	SWITCHYARD ACDB	NOS.	1	250						SWITCHYARD ACDB EXTN.
70	506-0110982-00-A	SWITCHYARD ACVS DB	NOS.	1	250						SWITCHYARD ACVS MCC
71	506-0110983-00-A	OUTDOOR SWGR # 1	NOS.	1	400						U#3 OUTDOOR SWGR
72	506-0110984-00-A	OUTDOOR SWGR # 2	NOS.	1	400						U#4 OUTDOOR SWGR
73	506-0110412-00-A	SWITCHYARD OIL FILTERATION SWBD	NOS.	1	400						SWITCHYARD OIL FILTERATION SWBD
74	506-0110985-00-A	AC MCCB BOX	NOS.	110							AC MCCB BOX
75	506-0110986-00-A	DC MCCB BOX	NOS.	25							DC MCCB BOX
76	506-0110417-00-A	HMI SYSTEM	NOS.	1							AS PER ANNEXURE-A
77	506-0110246-00-A	NETWORKING HARDWARE FOR NUMERICAL RELAYS & IMC	LOT	1							AS PER ANNEXURE-B1 & B2
78	506-0110987-00-C	NUMERICAL RELAY, IMCC & TEMP MONITORING SYSTEM COMMISSIONING	SET	1							AS PER ANNEXURE-C_NUMERICAL RELAY AND IMCC COMMISSIONING VISIT
79	506-0110282-00-A	TOOLS & TACKLE	SET	1							AS PER ANNEXURE-D
80	506-0110262-00-A	SITE MODIFICATION	LOT	1							AS PER ANNEXURE-E
81	506-0110163-00-A	E & C SPARES	SET	1							AS PER ANNEXURE-F
82	506-0110000-00-B	MANATORY SPARES	SET	1							AS PER ANNEXURE-G

BOQ-CUM-PRICE SCHEDULE FOR LT SWITCHGEAR

NOTES:

1	TO CALCULATE THE SWITCHBOARD PRICES, REFER DETAILED BOARD WISE BOM AND MODULE WISE BOM, ANNEXURE-A.1 AND ANNEXURE-A.2 OF TECHNICAL DATA PART-A OF TECHNICAL SPECIFICATION (PE-TS-508-506-E002) RESPECTIVELY.
2	BIDDER HAS TO QUOTE FOR THE FOLLOWING ALONG WITH THE BID:
i)	HMI SYSTEM: AS PER LIST IN ANNEXURE–A
ii)	NETWORKING HARDWARE FOR NUMERICAL RELAYS, IMC & TEMPERATURE MONITORING SYSTEM AS PER LIST IN ANNEXURE-B1 & FOR TEMPERATURE MONITORING SYSTEM AS PER LIST IN ANNEXURE-B2
iii)	NUMERICAL RELAY AND IMCC COMMISSIONING VISIT: AS PER ANNEXURE-C
iv)	TOOLS & TACKLES: AS PER ANNEXURE-D
v)	SITE MODIFICATION CHARGES: AS PER ANNEXURE-E
vi)	E & C SPARES: AS PER ANNEXURE-F
vii)	MANDATORY SPARE: AS PER LIST IN ANNEXURE–G
viii)	BIDDER TO PROVIDE A SCHEDULE OF UNIT PRICES IN ACCORDANCE WITH THE LIST PROVIDED IN ANNEXURE-H
3	SUMMATION OF ALL UNIT RATES (ANNEXURE-H OF PRICE SCHEDULE) OF APPLICABLE MODULES SHALL BE EQUIVALENT TO TOTAL BOARD (AS PER ANNEXURE-A.1 OF PART A OF TECHNICAL SPECIFICATION) COST QUOTED. VARIATION OF +/- 5% IS ACCEPTABLE.
4	ADDITION/ DELETION OF QUANTITIES SHALL BE APPLICALBE AT THE QUOTED PRICES. ALLOWABLE VARIATION IN QUANTITY AND PRICE SHALL BE AS PER NIT.
5	ALL LT PCC/ MCC/ DBs SHALL BE SUPPLIED ALONGWITH THE INTEGRAL BASE FRAMES, FOUNDATION BOLTS, CABLE GLANDS & LUGS. PRICES FOR THE SAME SHALL BE BUILT IN THE SWITCHBOARD PRICE.
6	BIDDER IS REQUIRED TO PROVIDE THE QUANTITY OF PANELS CORRESPONDING TO EACH BOARD IN THE TABLE ABOVE WHEN SUBMITTING THEIR TECHNO-COMMERCIAL PROPOSAL.
7	2 NOS OF DUMMY MODULES OF EACH SIZE TO FILL IN MODULE BEING TAKEN OUT FOR MAINTENANCE PURPOSE SHALL BE PROVIDED IN EACH SWITCHGEAR ROOM (REFER ANNEXURE-3_TENTATIVE SWITCHGEAR LOCATION OF TECHNICAL SPECIFICATION PE-TS-508-506-E002), IN CASE MODULE DOOR IS PART OF MODULE. THESE DUMMY MODULES SHALL BE FITTED IN SWITCHBOARD AS VACANT MODULES HAVING NO CUT OUT ON BACK SIDE AND CABLE ALLEY SIDE. IN CASE DOOR IS HINGED TO THE PANEL, 2 NOS OF BLANKING PLATES OF EACH SIZE NEED TO BE PROVIDED. PRICES FOR THE SAME SHALL BE BUILT IN THE SWITCHBOARD PRICE.
8	NO ADDITIONAL PRICES SHALL BE PAID FOR PROTOTYPE PANELS, PRICES QUOTED ABOVE INCLUDES COST OF PROTOTYPE PANELS ALSO.
9	PVC SHALL BE APPLICABLE FOR THIS ENQUIRY FOR PMCC / PCC / MCC / ACBD / DCDB ONLY) AS PER IEEMA CIRCULAR (https://ieema.org/wp-content/uploads/2020/07/lvswgr-jan-2019.pdf) .PRICE VARIATION IS NOT APPLICABLE FOR AC/DC MCCB BOX, NETWORKING HARDWARE FOR NUMERICAL RELAYS/IMC/WTS, HMI COMMISSIONING-VISIT, HMI SYSTEM, TOOLS & TACKLE, SITE MODIFICATION, E & C SPARES & MANATORY SPARES

ANNEXURE-A

HMI SYSTEM

S. No.	Item Description	Quantity	Unit	Unit Price (Ex- Works) Rs.	Total Price (Ex- Works) Rs.	Remarks
	COMPLETE DESIGN, ENGINEERING, SUPPLY, TESTING AND ERECTION & COMMISSIONING FOR THE FOLLOWING ITEMS :					
1	HMI (EWS)	4	NOS.			
2	CONSOLE FOR HMI	4	NOS.			REFER NOTE- 3 & 4
3	LASER PRINTER (A4 SIZE)	4	NOS.			
4	TABLE FOR PRINTER	4	NOS.			REFER NOTE- 4
5	TESTING AND ERECTION & COMMISSIONING CHARGES FOR ITEMS AT SL. NO. 1 - 4 ABOVE	4	LOT			
				TOTAL =		

NOTE:

1	REFER ANNEXURE-1_TYPICAL SWITCHGEAR RELAY NETWORK ARCHITECTURE.
2	BIDDER SHALL QUOTE LUMPSUM FOR SUPPLY, TESTIING AND ERECTION & COMMISSIONING (E&C). HOWEVER % BREAKUP OF SUPPLY AND E&C SHALL BE GOVERNED BY GCC (GENERAL CONDITIONS OF CONTRACT).
3	INDUSTRIAL MODULAR DESIGN CONSOLE (FURNITURE I.E. TABLE WITH DRAWER & SWIVEL COMPUTER CHAIR) SHALL BE PROVIDED. EACH CONSOLE SHALL HAVE SPACE FOR KEEPING AN ADDITIONAL PC.
4	MAKE AND COLOR SHADE OF FURNITURE SHALL BE DECIDED DURING DETAIL ENGINEERING. FURNITURE COLOR SHADE SHOULD MATCH WITH CONTROL ROOM FURNITURE.
5	BHEL WILL PROVIDE UPS REDUNDANT FEEDER AT ONE LOCATION NEAR TO EWS LOCATION. FURTHER DISTRIBUTION OF UPS SUPPLY (FOR HMI, NETWORK SWITCH ETC.) ALONG WITH UPS DB SHALL BE IN THE SCOPE OF BIDDER.

ANNEXURE-B1

NETWORKING HARDWARE FOR NUMERICAL RELAY & IMCC

S. No.	Item Description	Quantity	Unit	Unit Price (Ex- Works) Rs.	Total Price (Ex- Works) Rs.	Remarks
1	ETHERNET SWITCH WITH IEC-61850 PROTOCOL					IT SHALL BE PART OF SWITCHBOARD
2	NETWORK LEVEL ETHERNET SWITCH (OF ADEQUATE PORTS)	2	NOS.			NEAR DDCMIS END, INCLUDING COMPLETE DESIGN, ENGINEERING, SUPPLY, TESTING AND ERECTION & COMMISSIONING
3	CAT CABLE FOR COMMUNICATION BETWEEN NUMERICAL RELAY & NETWORK LEVEL ETHERNET SWITCH	5,000	METERS			
4	SIMPLEX FIBER OPTICAL CABLE FOR COMMUNICATION BETWEEN NUMERICAL RELAY & NETWORK LEVEL ETHERNET SWITCH	40,000	METERS			
5	HDPE CONDUIT (RODENT FREE)	40,000	METERS			USED FOR FIBER OPTICAL CABLE
6	FO TERMINATION ACCESSORIES AT BIDDER'S SUPPLIED EQUIPMENT END UNDER THIS PACKAGE	1	SET			ANNEXURE-1_TYPICAL SWITCHGEAR RELAY NETWORK ARCHITECTURE FOR SCOPE AND TERMINAL POINT
7	LAPTOP PC WITH LICENCED VERSION SOFTWARE, HARDWARE FOR RELAY & IMC PARAMETERISATION	5	NOS.			
8	INTERFACE CABLE WITH SUITABLE CONNECTING PORT AT BOTH END FOR CONNECTION OF NUMERICAL RELAY/IMC FRONT PORT TO THE LAPTOP	20	NOS.			ONE NO. CABLE OF LENGTH ATLEAST 5M PER SWITCHBOARD
9	AMC for 3 years : Numerical Relays (with IEC 61850) in all LV Switchgears IEC 61850 Ethernet switches in Switchgear panels Cat5e Ethernet cable / FO cable Laptops HMI stations (Engineering Work Stations and printers) 1st year 2nd year 3rd year					AMC START DATE: REFER NOTE-2
				TOTAL =		

NOTES:

1	REFER ANNEXURE- 3_TENTATIVE SWITCHBOARD LOACTION DETAIL FOR DISTANCE BETWEEN SWITCHGEAR AND NETWORK LEVEL ETHERNET SWITCH IN MAIN CONTROL ROOM.
2	THE COMMENCEMENT DATE FOR AMC WILL BE THE DATE TAKEN OVER BY THE END CUSTOMER. HOWEVER TENTATIVELY DATE OF AMC SHALL BE 29.12.2027.
3	REFER ANNEXURE- 1_TYPICAL SWITCHGEAR RELAY NETWORK ARCHITECTURE FOR HMI REQUIREMENT.
4	BIDDER TO PROVIDE ONE NO. OF EACH TYPE OF IMCC MODULE ALONG WITH Y-LINK TO BHEL ON RETURNABLE BASIS & COORDINATE WITH BHEL FOR CONDUCTING FAT FOR IMCC AS PER CUSTOMER SATISFACTION.

ANNEXURE-B2

NETWORKING HARDWARE FOR WIRELESS TEMPERATURE MONITORING SENSOR

S. No.	Item Description	Quantity	Unit	Unit Price (Ex- Works) Rs.	Total Price (Ex- Works) Rs.	Remarks
1	COMPLETE NETWORKING HARDWARE(EXCEPT CABLE & TERMINATION ACCESSORIES Sr.No.2) FOR COMMUNICATION BETWEEN WIRELESS TEMPERATURE RECEIVER END & DDCMIS/HMI FOR TEMPERATURE MONITORING SYSTEM	2	SET			INCLUDING COMPLETE DESIGN, ENGINEERING, SUPPLY, TESTING AND COMMISSIONING. 1 SET IS FOR EACH UNIT (CONSISTS OF 4 SWITCHBOARDS)
2	SPECIAL CABLE(TWISTED PAIR/CAT/OPTICAL FIBRE CABLE) INCLUDING TERMINATION ACCESSORIES FOR COMMUNICATION BETWEEN SWITCHGEAR & DDCMIS/HMI FOR TEMPERATURE MONITORING SYSTEM	2	SET			INCLUDING COMPLETE DESIGN, ENGINEERING, SUPPLY, TESTING AND COMMISSIONING. 1 SET IS FOR EACH UNIT (CONSISTS OF 4 SWITCHBOARDS)
				TOTAL =		

NOTES:

1	REFER ANNEXURE- 3_TENTATIVE SWITCHBOARD LOACTION DETAIL FOR DISTANCE BETWEEN SWITCHGEAR AND MAIN CONTROL ROOM.
2	USS(0DA), BMCC(3DA), TMCC (3DB) and EMCC(3DG) OF ONE UNIT IS CONSIDERED AS 1 SET.

ANNEXURE-C

NUMERICAL RELAY, IMCC & WIRELESS TEMPERATURE MONITORING SYSTEM COMMISSIONING CHARGES

S. No.	Item Description	Quantity	Unit	Unit Price (Ex- Works) Rs.	Total Price (Ex- Works) Rs.
1	LUMP SUM ALL INCLUSIVE CHARGES PER NUMERICAL RELAY COMMISSIONING (INCLUDING CONVENCE TO SITE, BOARDING AND LOADGING)	430	NOS.		
2	LUMP SUM ALL INCLUSIVE CHARGES PER IMCC COMMISSIONING (INCLUDING CONVEYANCE TO SITE, BOARDING AND LODGING)	3550	NOS.		
3	LUMP SUM ALL INCLUSIVE CHARGES FOR WIRELESS TEMPERATURE MNITORING SYSTEM COMMISSIONING OF EACH UNIT (INCLUDING CONVEYANCE TO SITE, BOARDING AND LODGING)	2	LOT		

NOTES:

1	AMOUNT PAYABLE FOR NUMERICAL RELAY COMMISSIONING = UNIT PRICE FOR COMMISSIONING CHARGES AS PER SL.NO.1 ABOVE x NO. OF RELAYS COMMISSIONED (SAME TO BE CERTIFIED BY BHEL).
2	AMOUNT PAYABLE FOR IMCC COMMISSIONING = UNIT PRICE FOR COMMISSIONING CHARGES AS PER SL.NO.2 ABOVE x NO. OF IMCC COMMISSIONED (SAME TO BE CERTIFIED BY BHEL).
3	AMOUNT PAYABLE FOR WIRELESS TEMPERATURE MONITORING SYSTEM COMMISSIONING FOR EACH UNIT (USS, BMCC, TMCC and EMCC) = UNIT PRICE FOR COMMISSIONING CHARGES AS PER SL.NO.3 ABOVE (SAME TO BE CERTIFIED BY BHEL).
4	APPROXIMATELY 15 NOs. OF NUMERICAL RELAYS AND/OR 50 NOs. OF IMCS CAN BE CONSIDERED BY BIDDER FOR COMMISSIONING IN EACH VISIT.
5	COMMISSIONING OF TEMPERATURE MONITORING SYSTEM FOR USS(0DA), BMCC(3DA), TMCC (3DB) and EMCC(3DG) OF ONE UNIT IS CONSIDERED AS 1 LOT, SIMILARLY 4 BOARDS OF ANOTHER UNIT FOR 2ND LOT.
6	BIDDER TO NOTE THAT ERECTION OF ABOVE MENTIONED SYSTEM IS NOT ENVISAGED. HOWEVER CONFIGURATION AND NETWORKING SETUP OF RELAY, IMC & TEMPERATURE MONITORING SYSTEM SHALL BE THE BIDDER'S RESPONSIBILITY COMPLETELY.
7	BIDDER TO COORDINATE WITH DCS SUPPPLIER (BHEL EDN) TO ENSURE SMOOTH AND EFFECTIVE COMMUNICATION BETWEEN NUMERICAL RELAY/ Y-LINK AND DCS, AS WELL AS BETWEEN TEMPERATUR MONITORING SYSTEM AND DCS/HMI.

ANNEXURE-D

TOOLS & TACKLES

S. No.	Item Description	Quantity (In Nos.)	Unit Price (Ex- Works) Rs.	Total Price (Ex- Works) Rs.	Remarks
1	ACB RACKING HANDLE	30			
2	TELESCOPIC TROLLY (TROLLEY FOR ACB HANDLING)	20			
3	DOOR KEY	100			
4	RELAY TEST EQUIPMENT	2			
5	MODULE RACKING HANDLE	30			
			TOTAL =		

NOTES:

1	BIDDER HAS TO QUOTE FOR TOOLS AND TACKLES MENTIONED ABOVE. HOWEVER, BIDDER HAS TO INDICATE ANY SPECIAL TOOLS (IF REQURIED).

ANNEXURE-E

SITE MODIFICATION CHARGES

S. No.	Item Description	Quantity	Unit Price Rs.	Total Price Rs.
1	LUMP SUM ALL INCLUSIVE CHARGES PER VISIT FOR SKILLED TECHNICIAN (EXCEPT DAILY CHARGES)	15 VISITS		
2	LUMP SUM ALL INCLUSIVE DAILY CHARGES FOR SKILLED TECHNICIAN	60 DAYS		
3	LUMP SUM ALL INCLUSIVE CHARGES PER VISIT FOR SERVICE ENGINEER (EXCEPT DAILY CHARGES)	15 VISITS		
4	LUMP SUM ALL INCLUSIVE DAILY CHARGES FOR SERVICE ENGINEER	60 DAYS		
5	SITE MODIFICATION MATERIAL @ 1% OF TOTAL BOARD COST (i.e. SUMMATION OF S.NO. 1 TO S.NO. 73 OF BOQ CUM PRICE SCHEDULE)	1 SET		
			TOTAL =	

NOTES:

1	AMOUNT PAYABLE FOR SKILLED TECHNICIAN PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO. 1 ABOVE + (DAILY CHARGES AS PER SL. NO. 2 ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE)
2	AMOUNT PAYABLE FOR SERVICE ENGINEER PER VISIT TO SITE = VISIT CHARGES AS PER SL. NO. 3 ABOVE + (DAILY CHARGES AS PER SL. NO. 4 ABOVE X NO. OF DAYS AT SITE) (TO BE CERTIFIED BY BHEL SITE)
3	AMOUNT PAYABLE FOR SITE MODIFICATION MATERIAL SHALL BE BASED ON THE ACTUAL COST OF THE MATERIALS UTILIZED. (TO BE CERTIFIED BY BHEL SITE). THE COST OF THE ACTUAL MATERIALS USED WILL BE DETERMINED USING THE UNIT RATE PROVIDED BY THE BIDDER IN THE ANNEXURE-H.

ANNEXURE-F

E&C SPARES

S. No.	Item / Component	Unit	Quantity	Unit Price (Ex-Works) Rs.	Total Price (Ex- Works) Rs.
1	**FACTORY BUILT ASSEMBLIES (PCC/MCC/DB)**				
1.1	Busbar supports (Horizontal)	1 set of 3	1		
1.2	Primary isolating contacts (Bus side) of each rating	1 set of 3	1		
1.3	Primary isolating contacts (Load side) of each rating	1 set of 3	1		
1.4	Secondary isolating contacts of each rating	1 set of 3	1		
1.5	Gaskets (each size)	Meter	10		
1.6	Fixed Terminal (1way)	Nos.	20		
1.7	Shrouds (for outgoing modules)	Nos.	one for each physical size of module		
1.8	Wire (for secondary wiring)				
a.	2.5 mm^2	Metres	100		
b.	1.5mm^2	Metres	100		
1.9	Lugs (for secondary wiring)	Nos.	100		
2	**AIR CIRCUIT BREAKER (FOR EACH RATING)**				
2.1	Shunt trip coil	Nos.	5		
2.2	spring charging motor	Nos.	1 motor of each rating		
2.3	closing coil	Nos.	5		
2.4	Auxiliary switch	Nos.	1		
3	**ISOLATING SWITCH**				
3.1	Main contact kit for each rating	1 set of 3 poles	1		
4	**POWER CONTACTORS**				
4.1	Contactor coil of each rating	Nos.	1		
4.2	Contacts kit (main) for each rating	1 set of 3 poles	1		
5	**AUXILIARY CONTACTORS**				
5.1	Complete unit with 2NO + 2NC contacts	Nos.	1 no. of each rating/type		
5.2	Contactor coils				
a.	AC for each rating	Set	1		
b.	DC for each rating	Set	1		
6	MCCB	Nos.	1 no. of each rating/type		
7	MPCB	Nos.	1 no. of each rating/type		
8	MCB	Nos.	1 no. of each rating/type		
7	**PUSH BUTTONS**				
6.1	Actuator contacts	Nos.	5		
6.2	Element	Nos.	5		
8	**INDICATING LAMPS**				
8.1	Complete unit	Nos.	10		
8.2	Lens (assorted)	Nos.	10		
9	**OTHERS**				
9.1	Selector & control switch (each type)	Nos.	1		
9.2	Connecting cable between CT and IMCC of appropriate length	Nos.	50		
9.3	Connecting cable between VT and IMCC of appropriate length	Nos.	50		
9.4	IMC Display HMI cable of Appropriate length	Nos.	50		
				TOTAL =	

ANNEXURE-G

MANDATORY SPARES

S.no.	Item Description	Quantity	Quoted Price Rs.
1	Complete breaker of each rating	10 Nos.	
2	Numerical Relays of each type	5 Nos.	
3	Auxiliary Relays of each type	10 Nos.	
4	Horizontal busbar support Insulators	12 Nos	
5	Vertical busbar dropper support insulators	12 Nos	
6	Current transformer of each type & ratio	3 Nos.	
7	Voltage transformer of each type & ratio	3 Nos.	
8	Control supply transformer of each type & rating	3 Nos.	
9	Power Contactor of each type and rating	10 Nos.	
10	Coil for above contactor for each type and rating	10 Nos.	
11	MCCBs (equally divided for all ratings)	40 Nos.	
12	MPCBs (equally divided for all ratings)	40 Nos.	
13	Closing coil of each type of each rating	10 Nos.	
14	Trip coil of each type of each rating	10 Nos.	
15	Aux contact set of each type and Rating	6 Sets.	
16	Fixed contact set of each type & rating	3 Sets.	
17	Moving contact set of each type & rating	3 Sets.	
18	Maintenance tools and accessories for maintenance of LT MCC	2 Nos.	

NOTES:

1	FOR LINE ITEMS SPECIFIED IN PERCENTAGE TERMS FOR QUANTITY, THE ACTUAL QUANTITY WILL BE DETERMINED DURING THE DETAILED ENGINEERING. IRRESPECTIVE OF THE FINAL QUANTITY, THE BIDDER WILL BE PAID BASED ON THE PRICE THEY QUOTED FOR EACH LINE ITEM.

ANNEXURE-H

MODULE UNIT PRICE

S.No.	Item Description	Model No.	Unit Price (INR)	Remarks
1	**INCOMING FEEDER UNIT**			
a)	ACB Incomer to PCC/PMCC from Trafo. - Module Type DAET (I/C)			
	1000A			
	1600A			
	2000A			
	2500A			
	3000A			
	4000A			
b)	ACB Incomer to MCC - Module Type DAE (I/C)			
	630A			
	800A			
	1000A			
	1250A			
	1600A			
	2000A			
	2500A			
	3000A			
	4000A			
c)	ACB Incomer to Emergency Board - Module Type DG(I/C)			
	800A			
	1000A			
	1250A			
	1600A			
	2000A			
	2500A			
	3000A			
	4000A			
d)	MCCB Incomer for MCC / ACDB – Module Type E3 (I/C)			
	63A – Fixed Type			
	125A – Fixed Type			
	160A – Fixed Type			
	200A – Fixed Type			
	250A – Fixed Type			
	300A – Fixed Type			
	400A – Fixed Type			
	63A – Drawout Type			
	125A – Drawout Type			
	160A – Drawout Type			
	200A – Drawout Type			
	250A – Drawout Type			
	300A – Drawout Type			
	400A – Drawout Type			
e)	MCCB Incomer with contactor changeover – Module Type CC			
	16A – Fixed Type			
	32A – Fixed Type			
	63A – Fixed Type			
	125A – Fixed Type			
	200A – Fixed Type			
	250A – Fixed Type			
	300A – Fixed Type			
	400A – Fixed Type			
	16A – Drawout Type			
	32A – Drawout Type			
	63A – Drawout Type			
	125A – Drawout Type			
	200A – Drawout Type			

ANNEXURE-H

MODULE UNIT PRICE

	250A – Drawout Type			
	300A – Drawout Type			
	400A – Drawout Type			
f)	220V DCDB Incomer from charger - Module type CH (I/C)			
	50A – CH Fixed Type			
	100A – CH Fixed Type			
	125A – CH Fixed Type			
	150A – CH Fixed Type			
	200A – CH Fixed Type			
	300A – CH Fixed Type			
	400A – CH Fixed Type			
	450A – CH Fixed Type			
	500A – CH Fixed Type			
	630A – CH Fixed Type			
	800A – CH Fixed Type			
	1000A – CH Fixed Type			
	1250A – CH Fixed Type			
	1600A – CH Fixed Type			
	50A – CH Drawout Type			
	100A – CH Drawout Type			
	125A – CH Drawout Type			
	150A – CH Drawout Type			
	200A – CH Drawout Type			
	300A – CH Drawout Type			
	400A – CH Drawout Type			
	450A – CH Drawout Type			
	500A – CH Drawout Type			
	630A – CH Drawout Type			
	800A – CH Drawout Type			
	1000A – CH Drawout Type			
	1250A – CH Drawout Type			
	1600A – CH Drawout Type			
g)	220V DCDB Incomer from battery - Module type DB (I/C)			
	50A – DB Fixed Type			
	100A – DB Fixed Type			
	125A – DB Fixed Type			
	150A – DB Fixed Type			
	200A – DB Fixed Type			
	300A – DB Fixed Type			
	400A – DB Fixed Type			
	450A – DB Fixed Type			
	500A – DB Fixed Type			
	630A – DB Fixed Type			
	800A – DB Fixed Type			
	1000A – DB Fixed Type			
	1250A – DB Fixed Type			
	1600A – DB Fixed Type			
	50A – DB Drawout Type			
	100A – DB Drawout Type			
	125A – DB Drawout Type			
	150A – DB Drawout Type			
	200A – DB Drawout Type			
	300A – DB Drawout Type			
	400A – DB Drawout Type			
	450A – DB Drawout Type			
	500A – DB Drawout Type			

ANNEXURE-H

MODULE UNIT PRICE

	630A – DB Drawout Type			
	800A – DB Drawout Type			
	1000A – DB Drawout Type			
	1250A – DB Drawout Type			
	1600A – DB Drawout Type			
2	**BUSCOUPLER UNIT**			
a)	ACB Buscoupler to PCC/PMCC/MCC - Module Type DAET/ DAE (B/C)			
	630A			
	800A			
	1000A			
	1250A			
	1600A			
	2000A			
	2500A			
	3000A			
	4000A			
b)	MCCB Buscoupler for MCC / ACDB – Module Type E3 (B/C)			
	63A – Fixed Type			
	125A – Fixed Type			
	160A – Fixed Type			
	200A – Fixed Type			
	250A – Fixed Type			
	300A – Fixed Type			
	400A – Fixed Type			
	63A – Drawout Type			
	125A – Drawout Type			
	160A – Drawout Type			
	200A – Drawout Type			
	250A – Drawout Type			
	300A – Drawout Type			
	400A – Drawout Type			
c)	220V DCDB buscoupler - Module Type - DC			
	50A – DC Fixed Type			
	100A – DC Fixed Type			
	125A – DC Fixed Type			
	150A – DC Fixed Type			
	200A – DC Fixed Type			
	300A – DC Fixed Type			
	400A – DC Fixed Type			
	450A – DC Fixed Type			
	500A – DC Fixed Type			
	630A – DC Fixed Type			
	800A – DC Fixed Type			
	1000A – DC Fixed Type			
	1250A – DC Fixed Type			
	1600A – DC Fixed Type			
	50A – DC Drawout Type			
	100A – DC Drawout Type			
	125A – DC Drawout Type			
	150A – DC Drawout Type			
	200A – DC Drawout Type			
	300A – DC Drawout Type			
	400A – DC Drawout Type			
	450A – DC Drawout Type			
	500A – DC Drawout Type			
	630A – DC Drawout Type			
	800A – DC Drawout Type			

ANNEXURE-H

MODULE UNIT PRICE

	1000A – DC Drawout Type			
	1250A – DC Drawout Type			
	1600A – DC Drawout Type			
d)	220V DCDB TIE - Module Type - HD			
	50A – HD Fixed Type			
	100A – HD Fixed Type			
	125A – HD Fixed Type			
	150A – HD Fixed Type			
	200A – HD Fixed Type			
	300A – HD Fixed Type			
	400A – HD Fixed Type			
	450A – HD Fixed Type			
	500A – HD Fixed Type			
	630A – HD Fixed Type			
	800A – HD Fixed Type			
	1000A – HD Fixed Type			
	1250A – HD Fixed Type			
	1600A – HD Fixed Type			
	50A – HD Drawout Type			
	100A – HD Drawout Type			
	125A – HD Drawout Type			
	150A – HD Drawout Type			
	200A – HD Drawout Type			
	300A – HD Drawout Type			
	400A – HD Drawout Type			
	450A – HD Drawout Type			
	500A – HD Drawout Type			
	630A – HD Drawout Type			
	800A – HD Drawout Type			
	1000A – HD Drawout Type			
	1250A – HD Drawout Type			
	1600A – HD Drawout Type			
3	**ACB outgoing supply feeder - Module Type DAE (O/G)/DAE-TIE**			
	630A			
	800A			
	1000A			
	1250A			
	1600A			
	2000A			
	2500A			
	3000A			
4	**ACB outgoing motor feeder - Module Type DM/PM/AM (controlled from DDCMIS/PLC/ATRS)**			
	90- 200KW			
5	**MCCB outgoing supply feeders**			
a)	Module Type E3(O/G)			
	16A - Fixed type			
	32A - Fixed type			
	63A - Fixed type			
	100A - Fixed type			
	125A - Fixed type			
	160A - Fixed type			
	200A - Fixed type			
	250A - Fixed type			
	300A - Fixed type			
	400A - Fixed type			
	16A - Drawout Type			
	32A - Drawout Type			

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MODULE UNIT PRICE

	63A - Drawout Type			
	100A - Drawout Type			
	125A - Drawout Type			
	160A - Drawout Type			
	200A - Drawout Type			
	250A - Drawout Type			
	300A - Drawout Type			
	400A - Drawout Type			
b)	2-ph feeder Module Type E2(O/G)			
	160A - Fixed type			
	200A - Fixed type			
	250A - Fixed type			
	300A - Fixed type			
	400A - Fixed type			
	160A - Drawout Type			
	200A - Drawout Type			
	250A - Drawout Type			
	300A - Drawout Type			
	400A - Drawout Type			
c)	Double pole 1-ph feeder Module Type E1(O/G)			
	16A - Fixed type			
	32A - Fixed type			
	63A - Fixed type			
	125A - Fixed type			
	16A - Drawout Type			
	32A - Drawout Type			
	63A - Drawout Type			
	125A - Drawout Type			
d)	3-Ph MCCB controlled outgoing contactor feeder Module Type EA3(O/G)			
	16A - Fixed type			
	32A - Fixed type			
	63A - Fixed type			
	125A - Fixed type			
	200A - Fixed type			
	250A - Fixed type			
	400A - Fixed type			
	16A - Drawout Type			
	32A - Drawout Type			
	63A - Drawout Type			
	125A - Drawout Type			
	200A - Drawout Type			
	250A - Drawout Type			
	400A - Drawout Type			
e)	1-Ph MCCB controlled outgoing contactor feeder Module Type EA1(O/G)			
	16A - Fixed type			
	32A - Fixed type			
	63A - Fixed type			
	16A - Drawout Type			
	32A - Drawout Type			
	63A - Drawout Type			
f)	220V DC Outgoing MCCB feeder (X)			
	16A - Fixed type			
	32A - Fixed type			
	63A - Fixed type			
	100A - Fixed type			
	125A - Fixed type			
	200A - Fixed type			
	250A - Fixed type			
	300A - Fixed type			

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MODULE UNIT PRICE

	400A - Fixed type			
	600A - Fixed type			
	16A - Drawout Type			
	32A - Drawout Type			
	63A - Drawout Type			
	100A - Drawout Type			
	125A - Drawout Type			
	200A - Drawout Type			
	250A - Drawout Type			
	300A - Drawout Type			
	400A - Drawout Type			
6	**DOL Motor Starter - Unidirectional Drive - Drawout Type**			
a)	Module Type DK2 / PK2 / AK2 (controlled from DDCMIS/PLC/ATRS)			
	Upto 5.5KW			
	5.6 - 7.0KW			
	7.1 - 13KW			
	13.1 - 24KW			
	24.1 - 29.9KW			
b)	Module Type DK21 / PK21 / AK21 (controlled from DDCMIS/PLC/ATRS)			
	30.0 - 37.0KW			
	37.1 - 55KW			
	55.1 - 80.0KW			
	80.1 - 89.9KW			
c)	Module Type DK2E/PK2E/AK2E (Reacceleration) (controlled from DDCMIS/PLC/ATRS)			
	Upto 5.5KW			
	5.6 - 7.0KW			
	7.1 - 13KW			
	13.1 - 24KW			
	24.1 – 29.9KW			
d)	Module Type DK21E/PK21E/AK21E (Reacceleration) (controlled from DDCMIS/PLC/ATRS)			
	30.0 - 37.0KW			
	37.1 - 55KW			
	55.1 - 80.0KW			
	80.1 - 89.9KW			
e)	Module Type K2 (Controlled from LCP)			
	Upto 5.5KW			
	5.6 - 7.0KW			
	7.1 - 13KW			
	13.1 - 24KW			
	24.1 - 29.9KW			
f)	Module Type K21 (Controlled from LCP)			
	30.0 - 37.0KW			
	37.1 - 55KW			
	55.1 - 80.0KW			
	80.1 - 89.9KW			
g)	Module Type K3 (Controlled from LPBS)			
	Upto 5.5KW			
	5.6 - 7.0KW			
	7.1 - 13KW			
	13.1 - 24KW			
	24.1 - 29.9KW			

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MODULE UNIT PRICE

h)	Module Type K31 (Controlled from LPBS)			
	30.0 - 37.0KW			
	37.1 - 55KW			
	55.1 - 80.0KW			
	80.1 - 89.9KW			
7	**RDOL Motor Starter - Bidirectional Drive - Drawout Type**			
a)	Module Type DN1/ PN1/ AN1 (controlled from DDCMIS/PLC/ATRS)			
	Upto 5.5KW			
	5.6 - 7.0KW			
	7.1 - 13KW			
	13.1 - 24KW			
	24.1 – 29.9KW			
	30.0 - 37.0KW			
	37.1 - 55KW			
	55.1 - 80.0KW			
	80.1 - 89.9KW			
8	Rapping Motor (RM1) Module with IMC			
9	Rapping Motor (RM2) Module with OLR			
10	DUST DENSITY MONITOR (DDM) Module			
11	HOPPER HEATER (HH) Module			
12	SUPPORT INSULATOR HEATER (HI) Module			
13	SHAFT INSULATOR HEATER (HS) Module			
14	Ash Level Indicator (ALI) Module			
15	ARECA MARSHALING (ARECA) Module			
16	WAVE LEVEL TRANSMITTER (WLT) Module			
17	MARSHALING MODULE FOR SSPB OF RAPPING MOTOR AND HOPPER HEATER FEEDBACK (MM)			
18	WALL BLOWER Module			
19	LR BLOWER Module			
20	AH BLOWER Module			
21	Wireless Temperature Sensor (WTS1) Module (In one ACB/PCC panel with single ACB)			
22	Wireless Temperature Sensor (WTS2) Module (In one ACB panel with double ACB)			
23	Wireless Temperature Sensor (WTS3) Module (In one Double front MCC panel)			
21	**Common Auxiliary Module**			
a)	PT module			
i	Bus PT module for PCC/PMCC - G1 Type			
ii	Bus PT module for Emergency MCC - G2 Type			
iii	Bus PT module for MCC/ACDB - VM Type			
iv	Bus PT DCDB - S Type			
b.1)	110V AC control supply module – Type CS (consisting of 415/110V control Trafo.)			
	1KVA			
	2KVA			
	2.5KVA			
	3KVA			
	5KVA			
	7.5KVA			
	10KVA			
b.2)	240 V AC control supply module – type CS (consisting of 415/240V control Trafo.)			
	1KVA			
	2KVA			
	2.5KVA			
	3KVA			
	5KVA			
	7.5KVA			
	10KVA			

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MODULE UNIT PRICE

b.3)	24V AC control supply module – Type CS (consisting of 415/24V control Trafo.)			
	250VA			
	500VA			
	1KVA			
	2KVA			
	2.5KVA			
	3KVA			
	5KVA			
	7.5KVA			
	10KVA			
c)	240V AC motor space heater module			
d)	220V DC supply module (for receiving 220V DC supply)			
e)	24V DC supply module			
f)	24 V winding heating module			
g)	Alarm module			
h)	Test supply module			
i)	240 V AC Panel Space hetaing supply module – type SH (consisting of 415/240V control Trafo.)			
	1KVA			
	2KVA			
	2.5KVA			
	3KVA			
	5KVA			
	7.5KVA			
	10KVA			
21	**Empty Panel with Horizontal & Vertical Busbar, Support & Auxiliary Busbar (4 Wire System)**			
a)	PCC Panel (Single Front Drawout Type) Without Temperature Sensor			
	1600 / 1600A			
	2000 / 2000A			
	2500 / 2500A			
	3000 / 3000A			
	4000 / 4000A			
b)	MCC Panel (Single Front Fixed Type)			
	63 / 63A			
	250 / 250A			
	400 / 400A			
	630 / 630A			
	800 / 630A			
	1000 / 630A			
	1600 / 630A			
	2000 / 630A			
	2500 / 630A			
	3000 / 630A			
	4000 / 630A			
c)	MCC Panel (Single Front Drawout Type)			
	63 / 63A			
	250 / 250A			
	400 / 400A			
	630 / 630A			
	800 / 630A			
	1000 / 630A			
	1600 / 630A			
	2000 / 630A			
	2500 / 630A			
	3000 / 630A			
	4000 / 630A			
d)	MCC Panel (Double Front Drawout Type)			
	63 / 63A			
	250 / 250A			

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MODULE UNIT PRICE

	400 / 400A			
	630 / 630A			
	800 / 630A			
	1000 / 630A			
	1600 / 630A			
	2000 / 630A			
	2500 / 630A			
	3000 / 630A			
	4000 / 630A			
e)	ACDB Panel (Double Front Fixed Type)			
	250 / 250A			
	400 / 400A			
	630 / 250A			
	630 / 630A			
f)	220V DCDB Panel (Single Front Fixed type)			
	UPTO 125A (with 125A VBB)			
	UPTO 630A (with 630A VBB)			
	1000A (with 630A VBB)			
	1600A (with 630A VBB)			
g)	220V DCDB Panel (Double Front Fixed type)			
	UPTO 125A (with 125A VBB)			
	UPTO 630A (with 630A VBB)			
	1000A (with 630A VBB)			
	1600A (with 630A VBB)			
h)	48V DCDB Panel (Single Front Fixed type)			
	UPTO 630A (with 630A VBB)			
i)	48V DCDB Panel (Double Front Fixed type)			
	UPTO 200A (with 200A VBB)			
	UPTO 630A (with 630A VBB)			
j)	Empty ACB Panel with Horizontal & Vertical Busbar, Support & Auxiliary Busbar			
	630 / 630A			
	800 / 630A			
	800 / 800A			
	1000 / 630A			
	1000 / 800A			
	1000 / 1000A			
	1600 / 630A			
	1600 / 800A			
	1600 / 1000A			
	1600 / 1600A			
	2000 / 630A			
	2000 / 800A			
	2000 / 1000A			
	2000 / 1600A			
	2000 / 2000A			
	2500 / 630A			
	2500 / 800A			
	2500 / 1000A			
	2500 / 1600A			
	2500 / 2000A			
	2500 / 2500A			
	3000 / 630A			
	3000 / 800A			
	3000 / 1000A			
	3000 / 1600A			
	3000 / 2000A			
	3000 / 2500A			
	3000 / 3000A			

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MODULE UNIT PRICE

	4000 / 630A			
	4000 / 800A			
	4000 / 1000A			
	4000 / 1600A			
	4000 / 2000A			
	4000 / 2500A			
	4000 / 3000A			
	4000 / 4000A			
22	**Empty Panel with Horizontal & Vertical Busbar, Support & Auxiliary Busbar (3 Wire System)**			
a)	PCC Panel (Single Front Drawout Type) Without Temperature Sensor			
	2000 / 2000A			
	3000 / 3000A			
b)	MCC Panel (Double Front Drawout Type)			
	2000 / 630A			
	3000 / 630A			
c)	ACDB Panel (Double Front Fixed Type)			
	250 / 250A			
	400 / 400A			
d)	Empty ACB Panel with Horizontal & Vertical Busbar, Support & Auxiliary Busbar			
	2000 / 630A			
	2000 / 800A			
	2000 / 1000A			
	2000 / 1600A			
	2000 / 2000A			
	3000 / 630A			
	3000 / 800A			
	3000 / 1000A			
	3000 / 1600A			
	3000 / 2000A			
	3000 / 2500A			
	3000 / 3000A			
23	**Dummy Panel**			
	UPTO 630A			
	800A			
	1000A			
	1600A			
	2000A			
	2500A			
	3000A			
	4000A			
24	**Unit Prices For Circuit Components**			
a)	Air Circuit Breaker without releases			
	630A ACB, 4P, EDO, AC			
	800A ACB, 4P, EDO, AC			
	1000A ACB, 4P, EDO, AC			
	1250A ACB, 4P, EDO, AC			
	1600A ACB, 4P, EDO, AC			
	2000A ACB, 4P, EDO, AC			
	2500A ACB, 4P, EDO, AC			
	3000A ACB, 4P, EDO, AC			
	4000A ACB, 4P, EDO, AC			
	630A ACB, 3P, EDO, AC			
	800A ACB, 3P, EDO, AC			
	1000A ACB, 3P, EDO, AC			
	1250A ACB, 3P, EDO, AC			
	1600A ACB, 3P, EDO, AC			

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MODULE UNIT PRICE

	2000A ACB, 3P, EDO, AC			
	2500A ACB, 3P, EDO, AC			
	3000A ACB, 3P, EDO, AC			
	4000A ACB, 3P, EDO, AC			
	800A ACB, 2P, MDO, DC			
	1000A ACB, 2P, MDO, DC			
	1250A ACB, 2P, MDO, DC			
b)	MPCB, Short-Circuit Release			
	16A			
	25A			
	32A			
	63A			
	80A			
	115A			
	150A			
c)	MCCB, 2NO+2NC AUX, FSC			
	16A			
	25A			
	32A			
	63A			
	80A			
	115A			
	150A			
	185A			
	265A			
	315A			
	400A			
d)	MCCB, 2NO+2NC AUX, ASC			
	16A			
	25A			
	32A			
	63A			
	80A			
	115A			
	150A			
	185A			
	265A			
	315A			
	400A			
e)	MCCB with LSIG release			
	200A			
	250A			
	300A			
	350A			
	400A			
f)	MCCB - Motorized with LSIG release			
	200A			
	250A			
	300A			
	350A			
	400A			
g)	Power contactor (AC) (With 2NO & 2NC Minimum)			
	16A			
	25A			
	32A			
	63A			

ANNEXURE-H

MODULE UNIT PRICE

	80A			
	115A			
	150A			
	185A			
	265A			
	315A			
	400A			
h)	Power contactor (DC) (With 2NO & 2NC Minimum)			
	16A			
	25A			
	32A			
	63A			
	80A			
	115A			
	150A			
	185A			
	265A			
	400A			
i)	AC Aux. contactor With			
	2NO + 2NC			
	3NO + 3NC			
	4NO + 4NC			
	6NO + 6NC			
j)	DC Aux. contactor With			
	2NO + 2NC			
	3NO + 3NC			
	4NO + 4NC			
	6NO + 6NC			
k)	Protection Relay			
	VAGM 23			
	CTU 12			
	CTU 32			
	VTT 11			
	VAG 11			
	VAA 11			
	VAJHM 13			
	VAJHM 23			
	CDGM-12			
	CAG 12			
	CAG 34			
	CCUM 21			
	CDG 11			
	CDG 31			
	CDG 61			
	VDG 14			
	CDV 62			
	CAG 14			
	VAX 31			
	CAG 37			
	CAEM-21			
	VAG-21			
	VAJC-11			
	CTMM-501			
	MOTPRO			
	VAA21			
	VTT12			

ANNEXURE-H

MODULE UNIT PRICE

	VTIG			
	VTU21			
	Numerical Relay for PHASE OVER CURRENT PROTECTION (50/51), EARTH FAULT PROTECTION (50N/51N), STAND BY EARTH FAULT PROTECTION (51NS), RESTRICTED EARTH FAULT PROTECTION (64R), BUS NO VOLT, FAULT LOCKOUT FUNCTION (86), UNDER VOLTAGE WITH TIMER (27M), SYNCHRONISING CHECK FUNCTION (25, CIRCUIT BREAKER FAILURE (50BF), RELAY SELF SUPERVISION, CIRCUIT BREAKER CONDITION MONITORING, TRIP CIRCUIT SUPERVISION (95), CURRENT TRANFORMER SUPERVISION, VOLTAGE TRANFORMER SUPERVISION, BREAKER CONTROL with I/L, DISTURBANCE RECORDING, FAULT RECORDING, EVENT RECORDING, MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)			
	SEF NUMERICAL RELAY			
	Numerical Relay for PHASE OVER CURRENT PROTECTION (50/51), EARTH FAULT PROTECTION (50N/51N), STAND BY EARTH FAULT PROTECTION (51NS), RESTRICTED EARTH FAULT PROTECTION (64R), BUS NO VOLT, FAULT LOCKOUT FUNCTION (86), UNDER VOLTAGE WITH TIMER (27M), SYNCHRONISING CHECK FUNCTION (25, CIRCUIT BREAKER FAILURE (50BF), RELAY SELF SUPERVISION, CIRCUIT BREAKER CONDITION MONITORING, TRIP CIRCUIT SUPERVISION (95), CURRENT TRANFORMER SUPERVISION, VOLTAGE TRANFORMER SUPERVISION, BREAKER CONTROL with I/L, DISTURBANCE RECORDING, FAULT RECORDING, EVENT RECORDING, MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF), MEASUREMENT AND DISPLAY OF HARMONIC CONTECT OF VOLTAGE & CURRENT			
	Numerical Relay for PHASE OVER CURRENT PROTECTION (50/51), EARTH FAULT PROTECTION (50N/51N), BUS NO VOLT, FAULT LOCKOUT FUNCTION (86), UNDER VOLTAGE WITH TIMER (27M), SYNCHRONISING CHECK FUNCTION (25, CIRCUIT BREAKER FAILURE (50BF), RELAY SELF SUPERVISION, CIRCUIT BREAKER CONDITION MONITORING, TRIP CIRCUIT SUPERVISION (95), CURRENT TRANFORMER SUPERVISION, VOLTAGE TRANFORMER SUPERVISION, BREAKER CONTROL with I/L, DISTURBANCE RECORDING, FAULT RECORDING, EVENT RECORDING, MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)			
	Numerical Relay for PHASE OVER CURRENT PROTECTION (50/51), EARTH FAULT PROTECTION (50N/51N), RESTRICTED EARTH FAULT PROTECTION (64R), BUS NO VOLT, FAULT LOCKOUT FUNCTION (86), UNDER VOLTAGE WITH TIMER (27M), SYNCHRONISING CHECK FUNCTION (25, CIRCUIT BREAKER FAILURE (50BF), DIFFERENTIAL PROTECTION (87) (HIGH IMPEDANCE), REVERSE POWER PROTECTION, DG NEUTRAL DISPLACEMENT (59), DG MONITORING, RELAY SELF SUPERVISION, CIRCUIT BREAKER CONDITION MONITORING, TRIP CIRCUIT SUPERVISION (95), CURRENT TRANFORMER SUPERVISION, VOLTAGE TRANFORMER SUPERVISION, BREAKER CONTROL with I/L, DISTURBANCE RECORDING, FAULT RECORDING, EVENT RECORDING, MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)			

ANNEXURE-H

MODULE UNIT PRICE

	Numerical Relay for PHASE OVER CURRENT PROTECTION (50/51), EARTH FAULT PROTECTION (50N/51N), STALLING/ LOCKED ROTOR PROTECTION (50L/R), THERMAL OVERLAOD PROTECTION (49), NEGATIVE PHASE SEQUENCE PROTECTION (46), BUS NO VOLT, REPETATIVE START PROTECTION (66), FAULT LOCKOUT FUNCTION (86), UNDER VOLTAGE WITH TIMER (27M), MOTOR DIFFERENTIAL PROTECTION (87M), CIRCUIT BREAKER FAILURE (50BF), PHASE REVERSAL PROTECTION (46R), CURRENT UNBALANCE PROTECTION, RELAY SELF SUPERVISION, CIRCUIT BREAKER CONDITION MONITORING, TRIP CIRCUIT SUPERVISION (95), CURRENT TRANFORMER SUPERVISION, VOLTAGE TRANFORMER SUPERVISION, BREAKER CONTROL with I/L, DISTURBANCE RECORDING, FAULT RECORDING, EVENT RECORDING, MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)			
	Numerical Check synchronising Relay			
	Check synchronising Relay Type-SKE11 or better			
	Guard Relay			
	BATTERY EARTH FAULT RELAY, 1-7mA, NOMINAL VOLTAGE-220V DC, 1DV, 2NO S/R, FLUSH			
	OVERLOAD RELAY, NOMINAL VOLTAGE-220V DC, O/V VLTAGE SETTING-110%, 1/4NV, 1NO+1NC S/R			
	UNDER VOLTAGE RELAY, NOMINAL VOLTAGE-220V DC, U/V SETTING-80%, AUX..-240V AC, 1/2NH, 1NO+2NC S/R			
	BATTERY EARTH FAULT RELAY, 1-7mA, NOMINAL VOLTAGE-48V DC, 1DV, 2NO S/R, FLUSH			
	OVERLOAD RELAY, NOMINAL VOLTAGE-48V DC, O/V VLTAGE SETTING-110%, 1/4NV, 1NO+1NC S/R			
	UNDER VOLTAGE RELAY, NOMINAL VOLTAGE-48V DC, U/V SETTING-80%, AUX..-240V AC, 1/2NH, 1NO+2NC S/R			
	JAMING RELAY			
l)	**IMC for Unidirectional Drive**			
i)	Upto 5.5KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
ii)	5.6 - 7.0KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
iii)	7.1 - 13KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
iv)	13.1 - 24KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
v)	24.1 - 29.9KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
vi)	30.0 - 37.0KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
	Voltage Sensing Module for above (if not Integral in IMC Module)			
vii)	37.1 - 55KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
	Voltage Sensing Module for above (if not Integral in IMC Module)			
viii)	55.1 - 80.0KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
	Voltage Sensing Module for above (if not Integral in IMC Module)			
ix)	80.1 - 89.9KW			
	Current Sensing Module for above (if not Integral in IMC Module)			
	Voltage Sensing Module for above (if not Integral in IMC Module)			
x)	Expansion Module for IMC			
m)	Timer (DC)			
	ON DELAY TIMER, 0.5-5SEC., 220V DC, 2NO+2NC			
	ON DELAY TIMER, 1.0-10SEC. 220V DC, 2NO+2NC			
	240VAC MTR RESTART CONTROL TIMER (.2-60SECS)			
	240VAC ON DELAY TIMER(1-10SECNS)WITH 1NO			

ANNEXURE-H

MODULE UNIT PRICE

	220VDC ON DELAY TIMER(.5-5SECS) WITH 1NO			
	220VDC 0N DELAY TIMER(0.5-5SECS)WITH 3NO			
	220VDC ON DELAY TIMER(1-10SECS) WITH 3NO			
n)	Meter			
	AC ammeter (Digital)			
	AC ammeter (Analog) linear scale			
	AC ammeter (Analog) compressed scale			
	DC ammeter (Digital)			
	DC ammeter (Analog)			
	AC voltmeter (Digital)			
	DC voltmeter (Analog)			
	Wattmeter (3 Phase)			
	Wattmeter (1 Phase)			
	TVM meter			
	DIGITAL ENERGY METER			
	Frequency meter			
	Synchroscope			
	Differential Voltmeter			
	Differential Frequency meter			
	Multifunction digital Energy meter with RS485 Port (0.2 Acc. Class)			
	Multifunction digital Energy meter with RS485 Port (0.5 Acc. Class)			
	Multifunction digital Energy meter with RS485 Port (1.0 Acc. Class)			
o)	Single Phase Preventor Relay			
p)	MCB			
	6A, 4P 415V AC			
	6A DP, 240V AC			
	10A DP, 240V AC			
	16A DP, 240V AC			
	32A DP, 240V AC			
	6A DP, 110V AC			
	10A DP, 110V AC			
	16A DP, 110V AC			
	32A DP, 110V AC			
	16A DP, 220V DC			
	6A DP, 220V DC			
	6A SP, 240V AC			
	10A SP, 240V AC			
	16A SP, 240V AC			
	32A SP, 240V AC			
	6A SP, 110V AC			
	10A SP, 110V AC			
	16A SP, 110V AC			
	32A SP, 110V AC			
	16A SP, 220V DC			
	6A SP, 220V DC			
q)	SWITCH & PUSH BUTTON			
	BREAKER CONTROL SWITCH, 16A,220V DC, 2CLOSE+2TRIP			
	DC ISOLATING SWITCH 16A,220V DC, DP, BASE MTG.			
	16A, 240V AC SELECTOR SWITCH 3WAY, 4POLE, FLUSH MTG			
	25A, 240V AC SELECTOR SWITCH 3WAY, 4POLE, FLUSH MTG			
	16A, 240V AC SELECTOR SWITCH 2WAY, 2POLE, FLUSH MTG			
	NORMAL/ TRIAL SEL. SWITCH, 2POLE , 2WAY, 10A 240V AC, FLUSH MTG,			
	MCC/ NORMAL/ TRIAL SEL. SWITCH, 2POLE ,3WAY, 10A 240V AC, FLUSH MTG			
	SWGR/ REMOTE SEL. SWITCH 3POLE 2WAY,16A 220V DC, FLUSH MTG			

ANNEXURE-H

MODULE UNIT PRICE

	SWGR/ NORMAL/ TRIAL SEL. SWITCH, 3POLE, 3WAY, 16A 220V DC, FLUSH MTG.			
	NORMAL/ TRIAL SEL. SWITCH, 2POLE , 2WAY, 10A 240V AC, FLUSH MTG, LOCKABEL TYPE			
	MCC/ NORMAL/ TRIAL SEL. SWITCH, 2POLE ,3WAY, 10A 240V AC, FLUSH MTG, LOCKABEL TYPE			
	SWGR/ REMOTE SEL. SWITCH 3POLE 2WAY,16A 220V DC, FLUSH MTG.LOCKABLE TYPE			
	SWGR/ NORMAL/ TRIAL SEL. SWITCH, 3POLE, 3WAY, 16A 220V DC, FLUSH MTG., LOCKABLE TYPE			
	AMMETER SELECTOR SWITCH			
	VOLTMETER SELECTOR SWITCH			
	TOGGLE SWITCH 5A, 240V AC			
	AC SWITCH SPST-5A,240V AC			
	10A, 220V DC SWITCH			
	Door Limit switch			
	Ammeter selector switch			
	Voltmeter selector switch			
	Synchronisation selector switch			
	Trip selector switch			
	Push Button			
	2NO + 2NC Shrouded			
	1NO + 1NC Shrouded			
	2NO + 2NC Mushroom head stayput			
	2NO + 2NC Lockable type			
r)	Indicating Lamp Assembly (LED Type)			
	240V AC-GREEN			
	240V AC-RED			
	240V AC- AMBER			
	110V AC-GREEN			
	110V AC-RED			
	110V AC- AMBER			
	220V DC-WHITE			
	220V DC-RED			
	220V DC-GREEN			
	220V DC-BLUE			
	220V DC- AMBER			
	63.5V AC-RED			
	63.5V AC-YELLOW			
	63.5V AC-BLUE			
s)	CT			
i)	Metering CT			
	Upto 75/1A			
	100/1A			
	125/1A			
	150/1A			
	200/1A			
	250/1A			
	300/1A			
	400/1A			
	500/1A			
	630/1A			
	800/1A			
	1000/1A			
	1250/1A			
	1600/1A			
	2000/1A			
	2500/1A			

ANNEXURE-H

MODULE UNIT PRICE

	3000/1A			
	4000/1A			
ii)	Protection CT (5P20)			
	Upto 75/1A			
	100/1A			
	125/1A			
	150/1A			
	200/1A			
	250/1A			
	300/1A			
	400/1A			
	500/1A			
	630/1A			
	800/1A			
	1000/1A			
	1250/1A			
	1600/1A			
	2000/1A			
	2500/1A			
	3000/1A			
	4000/1A			
	630/5A			
	800/5A			
	1000/5A			
	1250/5A			
	1600/5A			
	2000/5A			
	2500/5A			
	3000/5A			
	4000/5A			
iii)	PS Class CT			
	1600/1A			
	2000/1A			
	2500/1A			
	3000/1A			
	4000/1A			
	1600/5A			
	2000/5A			
	2500/5A			
	3000/5A			
	4000/5A			
t)	Voltage Transformer			
	415/√3 : 110/√ 3V, 50VA			
	415/√3 : 110/√3 V, 100VA			
	415/√3 : 240/√3 V, 50VA			
	415/√3 : 240/√3 V, 100VA			
	415 : 110V, 50VA			
	415 : 110V, 100VA			
	415 : 240V, 50VA			
	415 : 240V, 100VA			
u)	Toggle switch (16A)			
v)	Secondary Isolating Contact Block			
w)	Control Terminal (Fixed)			
x)	Control Terminal (Drawout)			
y)	Thermostat, Dial type			
z)	CONTROL TRANSFORMER			

ANNEXURE-H

MODULE UNIT PRICE

	415/240V,CL-B, 1 KVA			
	415/240V,CL-B, 2KVA			
	415/240V,CL-B, 2.5KVA			
	415/240V,CL-B, 3KVA			
	415/240V,CL-B, 5KVA			
	415/240V,CL-B, 10KVA			
	415/110V,CL-B, 1 KVA			
	415/110V,CL-B, 2KVA			
	415/110V,CL-B, 2.5KVA			
	415/110V,CL-B, 3KVA			
	415/110V,CL-B, 5KVA			
	415/110V,CL-B, 10KVA			
aa)	Transducers			
	4-20mA Dual o/p, Aux sup 220V DC, 1A, Current Transducer			
	4-20mA Dual o/p, Aux sup 240V AC, 1A, Current Transducer			
	4-20mA Dual o/p, Aux sup 110V AC, 1A, Current Transducer			
	4-20mA Dual o/p, Aux sup 220V DC, VoltageTransducer, PTR 415/110V			
	4-20mA Dual o/p, Aux sup 240V AC, VoltageTransducer, PTR 415/110V			
	4-20mA Dual o/p, Aux sup 110V AC, VoltageTransducer, PTR 415/110V			
	4-20mA Dual o/p, Aux sup 220V DC, FrequencyTransducer, PTR 415/110V			
	4-20mA Dual o/p, Aux sup 220V DC, Input 0-75mV DC, Current Transducer-DC			
	4-20mA Dual o/p, Aux sup 240V AC, Input Voltage 0-220V DC, Voltage Transducer-DC			
	4-20mA Dual Output kW transducer			
	4-20mA Dual Output kVA transducer			
	4-20mA Dual Output PF transducer			
	4-20mA Dual Output Frequency transducer			
ab)	Interposing relay RE 302 or Eqvt with freewheeling diode & LED			
ac)	3 PIN SOCKET - 5A, 110V AC, 3PIN			
ad)	SPACE HEATER			
ae)	NEUTRAL LINK			
	20A FOR CONTROL CKT. & POWER CKT. UPTO 25A MCCB RATING			
	32A FOR 50A MCCB RATING			
	63A FOR 100A & 125A MCCB RATING			
	125A FOR 250A MCCB RATING			
	250A FOR 400A & 500A MCCB RATING			
af)	CASTLE KEY INTERLOCK FOR MCCB - 3LOCK+2KEY			
ag)	MECHANICAL INTERLOCK FOR POWER CONTACTOR			
	16A			
	25A			
	32A			
	63A			
	80A			
	115A			
	150A			
	185A			
	265A			
	315A			
	400A			
ah)	ADDON BLOCK FOR CONTACTOR			
	2NO+2NC			
	3NO+1NC			
	1NO + 1NC			

ANNEXURE-H

MODULE UNIT PRICE

	1NO			
	1NC			
ai)	ISOLATING TRANSFORMER			
	ISOLATING TRANSFORMER-15kVA			
	ISOLATING TRANSFORMER-20kVA			
	ISOLATING TRANSFORMER-25kVA			
	ISOLATING TRANSFORMER-30kVA			
25	**Foundation Frame**			
a)	MCC panel			
	upto 1600A (SF)			
	2500A (SF)			
	3000A (SF)			
	4000A (SF)			
	upto 1600A (DF)			
	2500A (DF)			
	3000A (DF)			
	4000A (DF)			
b)	220V DCDB panel			
	SF			
	DF			
c)	PCC / PMCC panel			
	upto 1600A			
	2000A			
	2500A			
	3000A			
	4000A			
26	**Connection from PMCC/MCC panel to PMCC/MCC panel**			
	250A			
	400A			
	630A			
	800A			
	1000A			
	1200A			
	1600A			
	2000A			
	2500A			
	3000A			
	4000A			
27	**Cable Glands & Lugs:**			
a)	**Single Compression Cable Glands for cable sizes:**			
	2C X 2.5 Sq. mm.			
	3C X 2.5 Sq. mm.			
	5C X 2.5 Sq. mm.			
	7C X 2.5 Sq. mm.			
	10C X 2.5 Sq. mm.			
	14C X 2.5 Sq. mm.			
	2C X 10 Sq. mm.			
	2C X 16 Sq. mm.			
	2C X 25 Sq. mm.			
	2C X 35 Sq. mm.			
	2C X 50 Sq. mm.			
	2C X 70 Sq. mm.			
	2C X 95 Sq. mm.			
	3C X 2.5 Sq. mm.			
	3C X 10 Sq. mm.			
	3C X 16 Sq. mm.			

ANNEXURE-H

MODULE UNIT PRICE

	3C X 25 Sq. mm.			
	3C X 35 Sq. mm.			
	3C X 50 Sq. mm.			
	3C X 70 Sq. mm.			
	3C X 95 Sq. mm.			
	3C X 150 Sq. mm.			
	3C X 240 Sq. mm.			
	3C X 300 Sq. mm.			
	3.5C X 25 Sq. mm.			
	3.5C X 50 Sq. mm.			
	3.5C X 70 Sq. mm.			
	3.5C X 95 Sq. mm.			
	3.5C X 240 Sq. mm.			
	3.5C X 300 Sq. mm.			
	4C X 16 Sq. mm.			
	4C X 35 Sq. mm.			
	1C X 300 Sq. mm.			
	1C X 630 Sq. mm.			
b)	**Double Compression Cable Glands for cable sizes:**			
	2C X 2.5 Sq. mm.			
	3C X 2.5 Sq. mm.			
	5C X 2.5 Sq. mm.			
	7C X 2.5 Sq. mm.			
	12C X 2.5 Sq. mm.			
	16C X 2.5 Sq. mm.			
	2C X 10 Sq. mm.			
	2C X 16 Sq. mm.			
	2C X 25 Sq. mm.			
	2C X 35 Sq. mm.			
	2C X 50 Sq. mm.			
	2C X 70 Sq. mm.			
	2C X 95 Sq. mm.			
	3C X 2.5 Sq. mm.			
	3C X 10 Sq. mm.			
	3C X 16 Sq. mm.			
	3C X 25 Sq. mm.			
	3C X 35 Sq. mm.			
	3C X 50 Sq. mm.			
	3C X 70 Sq. mm.			
	3C X 95 Sq. mm.			
	3C X 150 Sq. mm.			
	3C X 240 Sq. mm.			
	3C X 300 Sq. mm.			
	3.5C X 25 Sq. mm.			
	3.5C X 50 Sq. mm.			
	3.5C X 70 Sq. mm.			
	3.5C X 95 Sq. mm.			
	3.5C X 240 Sq. mm.			
	3.5C X 300 Sq. mm.			
	4C X 16 Sq. mm.			
	4C X 35 Sq. mm.			
	1C X 300 Sq. mm.			
	1C X 630 Sq. mm.			
c)	**Cable Lugs for sizes:**			
	1.5 Sq. mm.			
	2.5 Sq. mm.			

ANNEXURE-H

MODULE UNIT PRICE

	10 Sq. mm.			
	16 Sq. mm.			
	25 Sq. mm.			
	35 Sq. mm.			
	50 Sq. mm.			
	70 Sq. mm.			
	95 Sq. mm.			
	120 Sq. mm.			
	150 Sq. mm.			
	185 Sq. mm.			
	240 Sq. mm.			
	300 Sq. mm.			
	630 Sq. mm.			
28	**Thermal O/L relay with SPP - OLR**			
	Upto 5.5KW			
	5.6 to 11KW			
	11.1 to 22KW			
	22.1 to 45KW			
	45.1 to 75KW			
	75 to 110KW			
29	**Daily 8 hour rate deployed at site:**			
	Engineer : (per day)			
30	**Module Name plate**			
31	**Wires for Secondary wiring:**			
a)	1.5 Sq. mm. per meter			
b)	2.5 Sq. mm. per meter			
c)	4.0 Sq. mm. per meter			
32	**Control Terminal for Secondary wiring suitable for cable size:**			
1)	0.5 Sq. mm.			
2)	1.5 Sq. mm.			
3)	2.5 Sq. mm.			
33	**Electrical Junction Boxes (for termination of 0.5 sqmm screened control cables)**			
a)	48 ways			
b)	64 ways			
c)	72 ways			
a)	96 ways			
34	**ISMC channels**			
a)	ISMC 75 channel per meter			
b)	ISMC 100 channel per meter			
35	Temperature Sensor			
36	Wireless Transmitter			
37	Wireless Receiver			
38	Additional components (except networking hardware mentioned in Annexure B2) required for completeness			
39	**The bidder should list the unit price for any additional modules, components, or items that are not mentioned in the above specifications but may be necessary to fulfill the customer's requirements.**			

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IEEMA/PVC/LVSWGR/2019 (R-2) **Effective from: 1st January 2019**

PRICE VARIATION CLAUSE FOR LV SWITCHGEAR AND CONTROLGEAR (up to & including 1100 V)

The price quoted/confirmed is based on the input cost of raw materials/components and labour cost as on the date of quotation and the same is deemed to be related to prices of raw materials and all India average consumer price index number for industrial workers as specified in the price variation clause given below. In case of any variation in these prices and index numbers, the price payable shall be subject to adjustment, up or down in accordance with the following formula:

$$P = \frac{P0}{100}\left(21 + 19\,\frac{IS}{IS0} + 21\,\frac{C}{C0} + 12\,\frac{AL}{AL0} + 15\,\frac{In}{In0} + 12\,\frac{W}{W0}\right)$$

Wherein,

P = Price payable as adjusted in accordance with the above formula.

P_0 = Price quoted/confirmed. (Exclusive of all taxes & duties)

IS_0 = Wholesale price index number for 'Manufacture of Basic Metals' (Base: 2011-12=100)(refer notes)
This index number is as applicable for the month, **THREE** month prior to the date of tendering.

C_0 = Average LME settlement price of copper wire bars (refer notes)
This price is as applicable for the month, **ONE** month prior to the date of tendering.

Al_0 = Price of busbar grade aluminium (refer notes).
This price is as applicable on the 1st working day of the month, **ONE** month prior to the date of tendering

In_0 = Price of phenolic moulding powder
This price is as applicable on the 1st working day of the month, **ONE** month prior to the date of tendering.

W_0 = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2001 = 100)
This index number is as applicable for the month, **Four** months prior to the date of tendering.

For example, if date of tendering falls in April 2019, applicable prices of Copper (C_0), Aluminium Busbar (Al_0) and Insulating Material (In_0) should be as on 1st March 2019 and Wholesale price index number for 'Manufacture of Basic Metals' (IS_0) and all India average consumer price index no. (W_0) should be for the month of January 2019.

The above prices and indices are as published by IEEMA vide circular reference number IEEMA(PVC)/SWGR(R-1)/_/_ **ONE** month prior to the date of tendering.

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IS = Wholesale price index number for 'Manufacture of Basic Metals' (Base: 2011-12=100) (refer notes)
This index number is as applicable for the month, **FOUR** month prior to the date of delivery.

C = Average LME settlement price of copper wire bars (refer notes)
This price is as applicable for the month, **TWO** month prior to the date of delivery.

Al = Price of busbar grade aluminium (refer notes).
This price is as applicable on the 1st working day of the month, **TWO** month prior to the date of delivery.

In = Price of phenolic moulding powder
This price is as applicable on the 1st working day of the month, **TWO** month prior to the date of delivery.

W = All India average consumer price index number for industrial workers, as published by the Labour Bureau, Ministry of Labour, Govt. of India (Base: 2001 = 100)
This index number is as applicable for the month, **FIVE** months prior to the date of delivery.

For example, if date of delivery in terms of clause given below falls in June 2019, applicable prices of Copper (C_0), Aluminium Busbar (Al_0) and Insulating Material (In_0) should be as on 1st April 2019 and Wholesale price index number for 'Manufacture of Basic Metals' (S_0) and all India average consumer price index no. (W_0) should be for the month of February 2019.

The date of delivery is the date on which the product is notified as being ready for inspection/despatch (in the absence of such notification, the date of manufacturer's despatch note is to be considered as the date of delivery) or the contracted delivery date (including any agreed extension thereto), whichever is earlier.

Notes

a) All prices of raw materials are exclusive of modvatable GST/CV duty amount and exclusive of any other central, state or local taxes, octroi etc.

b) The details of prices are as under:

1. The wholesale price index number for 'Manufacture of Basic Metals' is as published by the Office of Economic Advisor, Ministry of commerce & Industry, Govt. of India, New Delhi with base 2011-12 = 100

2. The LME price of Copper Wire Bars (in Rs./MT) is the LME average settlement price of Copper Wire Bars converted into Indian Rupees with applicable average exchange rate of SBI of the month. This price is the landed cost, inclusive of applicable customs duty only but exclusive of countervailing duty

3. The price of busbar grade aluminium (in Rs/MT) is the average of ex-works price as quoted by the two primary producers for the busbar size 152.4 x 6.35 mm flat approximately, grade equivalent to E91 E as per IS 5082-1998 (or the latest).

4. The price of insulating material (in Rs/Kg) is the average price of phenolic moulding powder quoted by three manufacturers applicable for Switchgear and Controlgear of medium/lower voltage up to 1100 volts

Senior Director

PRE QUALIFICATION REQUIREMENT (TECHNICAL)

BHEL	**2X800MW NTPC LARA STPP STAGE – II** **PRE – QUALIFICATION REQUIREMENTS FOR LT SWITCHGEAR**	PE-PQ-508-506-E002 REV. NO 00, DATE 18/03/2025 SHEET NO. 1 of 2

SCOPE: Supply: YES; Erection & Commissioning: No

ROUTE 1

a) Bidder should have manufactured and supplied at least a total of four hundred & fifty (450) numbers of draw out type Air Circuit Breaker Panels and / or draw out type Motor Control Centre Panels with fault rating of at least 45kA for one (1) second and 105kA peak under a single order and these panels should have been in successful operation for at least two (2) years.

And

b) Bidder should have manufactured and supplied at least one hundred & fifty (150) numbers of Air Circuit Breakers having fault rating of at least 45kA rms BREAKING, 105kA peak MAKING and 45kA withstand for one (1) second, and their associated draw out type Air circuit breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak, which should have been in successful operation for at least two (2) years.

ROUTE 2

a) Bidder should have manufactured and supplied at least a total of two hundred & twenty-five (225) numbers of draw out type Air Circuit Breaker Panels and / or draw out type Motor Control Centre Panels with fault rating of at least 45kA for one (1) second and 105kA peak under a single order and these panels should have been in successful operation for at least two (2) years.

And

b) Bidder should have manufactured and supplied at least seventy-five (75) numbers of draw out type Air Circuit Breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak, which should have been in successful operation for at least two (2) years.

And

c) Bidder shall be considered qualified provided its Associate or Collaborator or Technology Provider or Licensor meets the requirement stipulated in Route-1 for sourcing of Air Circuit Breakers. The Associate or Collaborator or Technology Provider or Licensor shall provide a letter of technical support for successful performance of the Air Circuit Breakers, as per the format, given in the bidding document. This letter of technical support should be submitted at the time of placement of order on the bidder.

And

d) Bidder should have established manufacturing facility for draw out type Air Circuit Breaker Panels and draw out type Motor Control Centre Panels in India. Further, all the panels for this project shall be manufactured and supplied from the Indian manufacturing facility.

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
18-3-2025	18/03/25	18/3/2025	18/3/25
NAME: ABHINAV BANSHIWALA DESIGNATION: SR. MGR	NAME: ASHIM K DAS DESIGNATION: SR.MGR	NAME: PRAVEEN DUTTA DESIGNATION: AGM	NAME: DEBASISA RATH DESIGNATION: GM

NOTE:

1. Each Single Front Panel shall be counted as one (1) Panel, Double Front Panel as one (1) Panel and Air Circuit Breaker Panel as one (1) Panel.
2. The above PQR points are as per customer specific requirement.
3. Consideration of bidder's offer is subject to BHEL/ BHEL Customer's approval.
4. Bidder to submit all supporting documents in English. If documents submitted by bidder are in language other than English, a self-attested English translated document should also be submitted.
5. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the bidder/collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.
6. After satisfactory fulfilment of all the above criteria requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.
7. Attached Annexure-1 to be filled by the bidders on quality & general terms. Requisite Documents (like factory registration certificate, R&D set-up details etc.) asked in the Annexure-1, shall also be attached as Annexure-F2.1 to Annexure F2.17 along with the filled response in the Annexure-1.

PREPARED BY	CHECKED BY	REVIEWED BY	APPROVED BY
18-3-25	18/03/25	18/3/2025	18/3/25
NAME: ABHINAV BANSHIWALA DESIGNATION: SR. MGR	NAME: ASHIM K DAS DESIGNATION: SR.MGR	NAME: PRAVEEN DUTTA DESIGNATION: AGM	NAME: DEBASISA RATH DESIGNATION: GM

ANNEXURE- 1

SUB-VENDOR QUESTIONNAIRE

i.	*Item/Scope of Sub-contracting*	
ii.	*Address of the registered office*	*Details of Contact Person (Name, Designation, Mobile, Email)*
iii.	*Name and Address of the proposed Sub-vendor's works where item is being manufactured*	*Details of Contact Person: (Name, Designation, Mobile, Email)*
iv.	*Annual Production Capacity for proposed item/scope of sub-contracting*	
v.	*Annual production for last 3 years for proposed item/scope of sub-contracting*	
vi.	***Details of proposed works***	
1.	*Year of establishment of present works*	
2.	*Year of commencement of manufacturing at above works*	
3.	*Details of change in Works address in past (if any)*	
4.	*Total Area*	
	Covered Area	
5.	*Factory Registration Certificate*	*Details attached at Annexure – F2.1*
6.	*Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)*	*Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – F2.2 (if applicable)*
7.	*Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc)*	*Details attached at Annexure – F2.3*
8.	*After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)*	*Applicable / Not applicable Details attached at Annexure – F2.4*
9.	*Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any*	*Details attached at Annexure – F2.5*
10.	*Sources of Raw Material/Major Bought Out Item*	*Details attached at Annexure – F2.6*
11.	*Quality Control exercised during receipt of raw material/BOI, in-process, Final Testing, packing*	*Details attached at Annexure – F2.7*

ANNEXURE- 1

SUB-VENDOR QUESTIONNAIRE

12.	***Manufacturing facilities*** ***(List of machines, special process facilities, material handling etc.)***	***Details attached at Annexure – F2.8***
13.	***Testing facilities*** ***(List of testing equipment)***	***Details attached at Annexure – F2.9***
14.	***If manufacturing process involves fabrication then-*** ***List of qualified Welders*** ***List of qualified NDT personnel with area of specialization***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.10*** ***(if applicable)***
15.	***List of out-sourced manufacturing processes with Sub-Vendors' names & addresses***	***Applicable / Not applicable*** ***Details attached at Annexure. –F2.11*** ***(if applicable)***
16.	***Supply reference list including recent supplies***	***Details attached at Annexure – F2.12*** ***(as per format given below)***

Project/ package	*Customer Name*	*Supplied Item (Type/Rating/Model /Capacity/Size etc)*	*PO ref no/date*	*Supplied Quantity*	*Date of Supply*

17.	***Product satisfactory performance feedback letter/certificates/End User Feedback***	***Attached at annexure - F2.13***
18.	***Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating)*** ***Note:- Reports need not to be submitted***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.14*** ***(if applicable)***
19.	***Statutory / mandatory certification for the proposed product***	***Applicable / Not applicable*** ***Details attached at Annexure – F2.15*** ***(if applicable)***
20.	***Copy of ISO 9001 certificate (if available)***	***Attached at Annexure – F2.16***
21.	***Product technical catalogues for proposed item (if available)***	***Details attached at Annexure – F2.17***

Name:		***Desig:***		***Sign:***		***Date:***	

Company's Seal/Stamp:-

SUB QUALIFICATION REQUIREMENT (TECHNICAL)

(Designation).....

(Common seal).....

Sub QR Data to be filled in to meet the provenness requirements (Refer Clause No. 5.6.0 of Sub-Section-I intent of specification, Part-A, Section-VI. **for LT SWITCHGEAR**

S.No.	Item Description	
1.1	No. of Air circuit breaker panels and/or draw out motor control centre panels manufactured and supplied, under a single order, with fault rating of at least 45kA for one (1) second and 105kA peak which are in successful operation for at least two (2) years. **(under Route 1)**	
1.01.00	Name & address of Manufacturer	
1.02.00	Name of the plant and its location	
1.03.00	Client(s) name and its address, Fax and Tel. No.	
1.04.00	Name and designation of the responsible person in client's organisation	
1.05.00	Contract No. & Date	
1.06.00	Whether manufactured and supplied the referred Air Circuit breaker panels /MCC panels	(YES/NO)
1.07.00	Fault rating	
	KA (rms)	
	Time (Sec.)	
	KA (Peak)	
1.08.00	No. of draw out type MCC panels supplied	
1.09.00	No. of draw out type Air Circuit breaker panels supplied	
1.10.00	Date of commissioning	
1.11.00	No. of years in Successful operation	
1.12.00	Certificate in support of above stated experience	

Signature of authorized signatory.....

including capacity of Plant, Year & Month of Commissioning of Plant & descriptive scheme of plant for which the data has been indicated and that the above system installed above have caused no serious problem in the past is enclosed at Annexure …….

1.2 No. of Air circuit breakers having fault rating of at least 45kA rms BREAKING, 105kA peak MAKING and 45kA withstand for one (1) second, and their associated draw out type Air circuit breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak , manufactured and supplied which are in successful operation for at least two (2) years.
(under Route 1)

1.01.00	Name & address of Manufacturer	
1.02.00	Name of the stations and its location	
1.03.00	Client(s) name and its address, Fax and Tel. No.	
1.04.00	Name and designation of the responsible person in client's organisation	
1.05.00	Contract No. & Date	
1.06.00	Whether manufactured and supplied the referred Air Circuit Breakers and their associated draw out type Air Circuit Breaker panels	(YES/NO)
1.07.00	Air Circuit Breakers having fault rating: (i) Rated current (A) (ii) Breaking Capacity (KA rms) (iii) Making Capacity (KA peak)	
1.08.00	Draw out type Air Circuit Breaker panels having fault rating: (i) KA (rms) (ii) Time (Sec) (iii) KA (peak)	
1.09.00	Date of commissioning	
1.10.00	No. of years in Successful operation	
1.11.00	Certificate in support of above stated experience	

Signature of authorized signatory.....

including capacity of Plant, Year & Month of Commissioning of Plant & descriptive scheme of plant for which the data has been indicated and that the above system installed above have caused no serious problem in the past is enclosed at Annexure …….

Signature of authorized signatory.....

1.3 No. of Air circuit breaker panels and/or draw out motor control centre panels manufactured and supplied, under a single order, with fault rating of at least 45kA for one (1) second and 105kA peak which are in successful operation for at least two (2) years. **(under Route 2)**

1.01.00	Name & address of Manufacturer	
1.02.00	Name of the plant and its location	
1.03.00	Client(s) name and its address, Fax and Tel. No.	
1.04.00	Name and designation of the responsible person in client's organisation	
1.05.00	Contract No. & Date	
1.06.00	Whether manufactured and supplied the referred Air Circuit breaker panels /MCC panels	(YES/NO)
1.07.00	Fault rating KA (rms) Time (Sec.) KA (Peak)	
1.08.00	No. of draw out type MCC panels supplied	
1.09.00	No. of draw out type Air Circuit breaker panels supplied	
1.10.00	Date of commissioning	
1.11.00	No. of years in Successful operation	
1.12.00	Certificate in support of above stated experience including capacity of Plant, Year & Month of Commissioning of Plant & descriptive scheme of plant for which the data has been indicated and that the above system installed above have caused no serious problem in the past is enclosed at Annexure ……	

Signature of authorized signatory.....

S.No.	Item Description	
1.4	No. of draw out type Air circuit breaker panels manufactured and supplied with fault rating of at least 45kA for one (1) second and 105kA peak which are in successful operation for at least two (2) years. **(under Route 2)**	
1.01.00	Name & address of Manufacturer	
1.02.00	Name of the stations and its location	
1.03.00	Client(s) name and its address, Fax and Tel. No.	
1.04.00	Name and designation of the responsible person in client's organisation	
1.05.00	Contract No. & Date	
1.06.00	Whether manufactured and supplied the referred Air Circuit Breaker panels	(YES/NO)
1.07.00	Draw out type Air Circuit Breaker panels having fault rating: (iv) KA (rms) (v) Time (Sec) (vi) KA (peak)	
1.08.00	Date of commissioning	
1.09.00	No. of years in Successful operation	
1.10.00	Certificate in support of above stated experience including capacity of Plant, Year & Month of Commissioning of Plant & descriptive scheme of plant for which the data has been indicated and that the above system installed above have caused no serious problem in the past is enclosed at Annexure …….	
1.5	Bidder's / Sub Vendor's Associate or Collaborator or Technology Provider or Licensor data to meet qualifying requirement stipulated in Route 1. **(under Route-2)**	
1.5.1	No. of Air circuit breaker panels and/or draw out motor control	

Signature of authorized signatory.....

centre panels manufactured and supplied, under a single order, with fault rating of at least 45kA for one (1) second and 105kA peak which are in successful operation for at least two (2) years.
(under Route 2)

1.01.00	Name & address of Manufacturer (Associate or Collaborator or Technology Provider or Licensor)	
1.02.00	Name of the plant and its location	
1.03.00	Client(s) name and its address, Fax and Tel. No.	
1.04.00	Name and designation of the responsible person in client's organisation	
1.05.00	Contract No. & Date	
1.06.00	Whether manufactured and supplied the referred Air Circuit breaker panels /MCC panels	(YES/NO)
1.07.00	Fault rating KA (rms) Time (Sec.) KA (Peak)	
1.08.00	No. of draw out type MCC panels supplied	
1.09.00	No. of draw out type Air Circuit breaker panels supplied	
1.10.00	Date of commissioning	
1.11.00	No. of years in Successful operation	
1.12.00	Certificate in support of above stated experience including capacity of Plant, Year & Month of Commissioning of Plant & descriptive scheme of plant for which the data has been indicated and that the above system installed above have caused no serious problem in the past is enclosed at Annexure …….	

1.5.2 No. of Air circuit breakers having fault rating of at least 45kA rms BREAKING, 105kA peak MAKING and 45kA withstand for one (1) second, and their associated draw out type Air circuit breaker panels having fault rating of at least 45kA for one (1) second and 105kA peak , manufactured and supplied which are in successful operation for at least two (2) years.
(under Route 2)

Signature of authorized signatory.....

1.01.00	Name & address of Manufacturer (Associate or Collaborator or Technology Provider or Licensor)	
1.02.00	Name of the stations and its location	
1.03.00	Client(s) name and its address, Fax and Tel. No.	
1.04.00	Name and designation of the responsible person in client's organisation	
1.05.00	Contract No. & Date	
1.06.00	Whether manufactured and supplied the referred Air Circuit Breakers and their associated draw out type Air Circuit Breaker panels	(YES/NO)
1.07.00	Air Circuit Breakers having fault rating: (iv) Rated current (A) (v) Breaking Capacity (KA rms) (vi) Making Capacity (KA peak)	
1.08.00	Draw out type Air Circuit Breaker panels having fault rating: (vii)KA (rms) (viii) Time (Sec) (ix) KA (peak)	
1.09.00	Date of commissioning	
1.10.00	No. of years in Successful operation	
1.11.00	Certificate in support of above stated experience including capacity of Plant, Year & Month of Commissioning of Plant & descriptive scheme of plant for which the data has been indicated and that the above system installed above have caused no serious problem in the past is enclosed at Annexure …….	
1.12	The letter of technical support by Associate/ Collaborator /Technology Provider / Licensor provided **(under Route-2).**	(Yes/No)

Note : 1) Certificates from the client for the successful operation for each of the above shall be Submitted.

2) Supporting documents/ reference data as applicable shall be submitted.

Signature of authorized signatory.....

Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

Signature of authorized signatory.....