# 1X800MW NTPC SIPAT STPP STAGE – III

## TECHNICAL SPECIFICATION
## FOR
## LT SWITCHGEAR

**SPECIFICATION No. PE-TS-520-506-E002**
**ISSUE NO. 00**
**REV NO. 00**

**BHARAT HEAVY ELECTRICALS LIMITED**
**POWER SECTOR**
**PROJECT ENGINEERING MANAGEMENT**
**NOIDA, INDIA**



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## PROJECT INFORMATION

| SL.NO | DESCRIPTION | DETAILS |
|---|---|---|
| **1** | **METEOROLOGICAL DATA** | |
| 1.1 | MAXIMUM MEAN TEMPERATURE | 48°C |
| 1.2 | MINIMUM MEAN TEMPERATURE | 4.0°C |
| 1.3 | MAXIMUM RELATIVE HUMIDITY | 86 |
| 1.4 | MINIMUM RELATIVE HUMIDITY | 23 |
| 1.5 | AVERAGE ANNUAL RAINFALL | 1354.1 mm |
| 1.6 | SEISMIC ZONE (AS PER IS 1893) | III |
| 1.7 | HEIGHT ABOVE MSL | 397M |
| **2** | **ELECTRICAL DATA** | |
| 2.1 | AMBIENT TEMPERATURE FOR DESIGN OF ELECTRICAL EQUIPMENT | 50 Deg C |
| 2.2 | RATED FREQUENCY | 50Hz |
| 2.3 | FREQUENCY VARIATION | +5% & -5% |
| 2.4 | AC VOLTAGE | 415V, 230V, 230V (UPS), 110V |
| 2.5 | AC VOLTAGE VARIATION | +/- 10% for 415V |
| 2.6 | DC VOLTAGE | 220V, 48V, 24V |
| 2.7 | DC VOLTAGE VARIATION | +10% to -15% for 220V |
| 2.8 | FAULT LEVEL (KA/SEC) | i) 50KA for 1 sec for 415V system |
| | | ii) 20KA for 1 sec for 220V DC |
| | | iii) 20KA for 1 sec for 48V DC |

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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) | COMMISSIONING SPARES | YES | |
| 2 | PAINTING | YES | |
| 3 | INSPECTION & TESTING | YES | |
| 4 | PACKING | YES | |
| 5 | TRANSPORTATION & DELIVERY TO SITE | YES | |
| 6 | ERECTION & COMMISSIONING | YES | COMMISSIONING of Numerical Relay, Ethernet Switch, IMCC, Y-Link, Wireless Temp. Monitoring System & HMI only |
| 7 | SUPERVISION OF ERECTION & COMMISSIONING | NO | |
| 8 | MANDATORY SPARES | NO | |
| 9 | O & M SERVICE | NO | |
| 10 | O & M SPARES | NO | |

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| **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 bidder at any stage shall be complete in all respects. Any incomplete drawing submitted shall be treated as non- submission with delays attributable to bidder. 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. |
| 6.0 | Latest codes and standards shall be complied with. |
| 7.0 | Successful Bidder shall submit attached Quality Plan on compliance route for BHEL/ End customer's approval during contract stage. |
| 8.0 | 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 or Anodized Aluminium name plates of black background with laser engraving of a minimum 6 mm height or as per equipment standard whichever is higher. Anodized Aluminium name plates with black background with laser engraving. |
| 12.0 | Equipment must be safe, reliable and easy to maintain at all operating condition. |
| 13.0 | **SWITCHBOARDS** |
| 13.1 | All switchboards shall be of double front, draw out, complete closed-door operation, metal enclosed, indoor, floor-mounted, free-standing type of bolted design. Entire bus bar system shall be insulated with PVC sleeves (UL 224). Cable terminations located in cable alley shall be designed to meet the Form IVb (as per IEC 60439) for safety purpose. 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.<br><br>*All moving and fixed contacts of each draw-out modules must be of rating more than* ***150*** *%+ of MCCB/MPCB mounted inside the module. Each phase of vertical busbars shall be separated by phase barrier and same shall be sleeved (UL-224).*<br><br>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.<br><br>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, form 4B separation and separate vertical busbar chamber 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. |

| GENERAL TECHNICAL REQUIREMENT | |
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| 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. |
| 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 *& Solenoid Valve DBs* ). 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 “ 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.<br><br>Two (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 (Refer Annexure-3 for calculating number and type of dummy modules to be supplied). |
| 13.6 | Interlock mechanism shall be provided with the voltage monitoring such that, it should not be possible to open the rear door of incomer and bus coupler modules when the incoming power source is in live condition. In case of any bypass/overriding of this interlock, appropriate hooter at local and alarm to DCS shall be provided. |
| 13.7 | 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. |
| 13.8 | The compartment door of fixed type modules shall be interlocked to prevent opening while the MCCB/MPCB is in “ON” condition. |
| 13.9 | The Bidder shall provide adopter panel/ dummy panel required to meet various configuration / arrangement of busbars. |
| 13.10 | Cable alley door should be hinged at minimum 3 position. Panel space heater and plug & socket (As per Module PNL SP HTR mentioned in Module wise BOM) to be provided in cable alley of each vertical. |
| 13.11 | All power and control cable inside the modules shall be neatly dressed. |
| 13.12 | Control and communication cables inside the modules shall be separate and should be terminated at separate terminal blocks. |
| 13.13 | Power contactors/ Isolators should be securely mounted inside panel to prevent its vibration during operation. |
| 13.14 | 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. |
| 13.15 | Negative Bus of DCDB between two bus section should be shorted to avoid double voltage formation. |
| 13.16 | 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. |
| 13.17 | 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 as indicated in the Board wise BOM. Bidder to consider complete monitoring system with transmitter, receiver and its connection upto Unitised HMI for LT Switchgear. |
| 13.18 | Width of Dummy panels may vary from 300mm to 600mm which shall be informed during detailed engineering. |
| 13.19 | Contactors shall be of 250% of motor FLC for fan and compressor application and 200% of motor FLC for other application. |
| 13.20 | Bottom most operable handle should be at least 300mm above FFL. Shrouding of at least 3mm thickness to be provided below the hanging portion of vertical busbars. |
| 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). |

| GENERAL TECHNICAL REQUIREMENT | |
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| 15.0 | **INTELLIGENT MOTOR CONTROLLER (IMC)** |
| 15.1 | Profibus DP based IMC is envisaged which is to be interfaced to the fieldbus based 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.<br><br>The total no. of IMC modules in one Profibus DP segment and their response time shall be governed by Process requirement and other relevant clauses. The same shall be finalized during detailed engineering and submitted to the Employer for prior approval before implementation.<br><br>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 | All requisite hardware & software for seamless integration and interface of Profibus DP based IMC modules with fieldbus based DDCMIS system, even if not explicitly indicated in the Technical Specifications are to be supplied and engineered. |
| 15.3 | 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. |
| 15.4 | 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. |
| 15.5 | 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). The IMC should conform to IEC-60947-4-1 and 60947-8 for overload protections. |
| 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. Redundant feeder shall be provided by BHEL at Y-Link. |
| 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 PMCC/ MCC panels. |
| 15.10 | The IMC shall have following protection functions, control functions and other operation & diagnostic features but not limited to these: |

**GENERAL TECHNICAL REQUIREMENT**

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|---|---|---|---|---|
| | **a) PROTECTION FUNCTIONS**<br>i) Overload ($I^2t$) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running | **b) CONTROL FUNCTIONS**<br><br>i) Close / Trip Command<br>ii) Reversing starter | **c) The IMC will have standard function control blocks for various functions:**<br><br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset | **d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local / remote)-<br>a) For DK2/DN1/HTR module:<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br><br>b) For DK21 module:<br>In addition to the above for DK2 module, following measurement data shall also be provided.<br>x) 3 Phase Voltages<br>xi) 3 Phase Power<br>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:**<br>i) IMC shall be programmable from IMC's HMI, PC (laptop) and DDCMIS.<br>ii) IMC shall be configurable to operate as an overload relay<br>iii) Digital outputs shall be potential free and independent, each output shall be connectable to different field voltages<br>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.<br>v) All interface files like DTM & GSD files shall be provided for interfacing IMCs with DDCMIS. | | | |
| 15.13 | **User Interface:**<br>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.<br>ii) HMI shall have the capability of uploading / downloading parameters to IMC.<br>iii) The address & other communication parameters shall be configurable from HMI.<br>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).<br>v) HMI shall have the simple text display in English.<br>vi) HMI shall have operate / reset buttons.<br>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 | Supplier to ensure training of Customer's representatives by IMC OEM regarding Familiarisation of IMCC and its Interface with DCS. Further, IMC OEM shall also give training at End Customer's site regarding Operation & Maintenance of IMCC and its interface with DCS. | | | |
| 15.17 | 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. | | | |
| 15.18 | Y link along with OLM modules shall be installed in separate cabinet(s) in MCC room (Non-AC) for main plant. For other areas where RIO rooms are envisaged, Y-link along with OLM. | | | |
| 15.19 | In case Y links are installed in MCC room, then redundant Fiber optic links using OLMs (Optical Link Modules) in redundant bus configuration shall be provided. | | | |
| 16.0 | **NUMERICAL RELAY** | | | |



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| | **GENERAL TECHNICAL REQUIREMENT** |
| | The circuit breaker will normally be controlled from remote control panels (DDCMIS) through closing and shunt trip coils. All the protective relays associated with the Circuit breaker modules shall be of Numerical communicable type for Protection, Control, Metering and Status monitoring. All the numerical relays shall have communications on three ports, local front port communication to laptop and dual ports on IEC 61850 to communicate with the DCS through LAN. The auxiliary contacts of the MCCB shall be fed to the digital inputs available in the numerical relays of Incomer / bus coupler / motor circuit breaker feeders or 61850 Compatible IO Modules, for integration into the numerical relay network/ DCS. |
| 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.<br>**And**<br>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 BHEL/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.<br>The required no of IO's can be achieved through external I/O device of same make complying the requirement. |
| e) | Failure of a control supply and de-energization of a relay shall not initiate any circuit breaker/ vacuum contactor operation. |
| f) | Disturbance Record waveforms, event records & alarms shall be stored in Non-volatile memory and failure of control supply shall not result in deletion of any of these data. |
| g) | 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. |
| h) | 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. |
| i) | 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. Relays shall be suitable for CT secondary current of 1A. |

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| 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 | |

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| j) | 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. |
| k) | 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. |

| GENERAL TECHNICAL REQUIREMENT | |
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| l) | 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. |
| m) | 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. |
| n) | 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. |
| o) | The IP address for the Numerical Relays & SNTP address shall be furnished by customer during detailed 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 integration with DDCMIS shall be provided by supplier along with necessary engineering support as and when required during detailed engineering. |
| p) | 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. |
| q) | 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. |
| r) | 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. |
| s) | 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. |
| t) | 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. |
| 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) | Measurement accuracy shall be 2 % for rated RMS Current and voltage. |
| k) | It shall be possible to carryout open / close operation of breakers from a laptop by interfacing from the relay front port during initial commissioning. |

| GENERAL TECHNICAL REQUIREMENT | |
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| l) | 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. |
| m) | 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) -<br>(a) Inter tripping (b) Reverse Blocking including Hard wiring ( c) Earthing Interlocks |
| 16.6 | **INPUT / OUTPUT INTERFACE, FILTERS AND OPTICAL ISOLATION** |
| | Relay shall be immune to capacitance effect due to long length of connected control cables.<br>Any external hardware, if required for avoiding mal operation of the relay due to cable capacitance shall be included as a standard feature.<br>All I/Os shall have optical isolation. Analog inputs shall be protected against switching surges, harmonics etc.<br>No separate earth bus shall be required for the relays. It shall be possible to connect the relay earth to the common earth bus in the switchgear panel which shall be connected to the plant earth mat. |
| 17.0 | **ETHERNET SWTICHES AND ETHERNET SWITCH BOX** |
| 17.1 | Ethernet switches shall be 'substation hardened',19" rack mounted and shall comply with IEC-61850 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 Single mode 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. |
| 17.8 | Ethernet Switch Box shall consist of the following:<br>(a) Two nos. Ethernet switches (layer-3) at network level for Ring formation and taking data from Numerical relay network (IEC-61850) and providing to DDCMIS(IEC-61850).<br>(b) At least 2 Nos (1 working + 1 standby) ventilation fans with monitoring.<br>(c) Arrangement for receiving and distributing auxiliary power supply to various equipment/ circuits along with monitoring devices for incoming power supply.<br>(d) 1 LED light +1 Power Socket with Switch.<br>(e) Any other equipment/ device necessary for completeness of the system. |
| 17.9 | The Network level Ethernet Switches shall be provided to network the various switchgears atdifferent locations through LAN system. They shall also provide gateway between Numerical relays, HMI (Switchgear EWS) and DDCMIS. |
| 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. |

| GENERAL TECHNICAL REQUIREMENT | |
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| 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. Operating system of the HMI shall be 64-bit Windows Professional/ Enterprise version and necessary application software such as relays configuration & setting software, Disturbance record analysis software, Relays IEC 61850 configuration software, Ethernet Switches configuration software, Anti-virus software, etc shall be installed in the 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. |
| 19.5 | Laptops shall be supplied complete with following accessories:<br>• carrying case,<br>• 240VAC adaptor,<br>• 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 by BHEL. Suitable actions based on the findings of the security audit shall be carried out by the relay/ Ethernet switch/ LT switchgear supplier. |
| 21.3 | **STANDARDS AND COMPLIANCE** |
| | The system shall comply with the latest versions of the following Standards and Specifications as a minimum:<br>1. IEEE 1686-2013: IEEE Standard for Intelligent Electronic Devices Cyber Security Capabilities.<br>2. IEC-62443-4-2: Security for industrial automation and control systems - Part 4-2: Technical security requirements for IACS components.<br>3. IEC TS 62351-6: Power systems management and associated information exchange - Data and communications security - Part 6: Security for IEC 61850. |
| 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.<br>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 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.<br>It may be noted that following policies/procedures are only the operation guidelines and advisory steps to ensure maximum data security. |

| GENERAL TECHNICAL REQUIREMENT | |
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| | The following security policies shall be followed. Details of the same shall be provided during detailed engg.<br>1. Information Security Policy<br>a) Information Security Team Policy<br>b) Firewall Policy<br>c) Information Identification and Classification Policy<br>d) Security Policy Review Policy<br>e) Information Labelling and Handling Policy<br>f) System Planning and Acceptance Policy<br>g) Capacity Management Policy<br>h) Media Handling Policy<br>i) Information Security Awareness Policy<br>j) Third Party Access Policy<br>k) Change Control Policy<br>l) Anti Virus Policy<br>m) System Access Policy<br>n) Monitoring Policy<br>o) Incident Handling Policy<br>p) Information Backup and Restoration Policy<br>q) Network Access Policy<br>r) User Access Management Policy<br><br>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.<br>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). |
| | One Digital display of time shall be provided in the Network level Ethernet switch box. |
| 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 | Cable shall be terminated using double compression type cable glands. Testing requirements of Cable glands shall conform to BS:6121 and gland shall be of robust construction capable of clamping cable and cable armour (for armoured cables) firmly without injury to insulation. Cable glands shall be made of heavy duty brass machine finished and nickel chrome plated. Thickness of plating shall not be less than 10 micron. All washers and hardware shall also be made of brass with nickel chrome plating. Rubber components shall be of neoprene or better synthetic material and of tested quality.<br>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** |

| GENERAL TECHNICAL REQUIREMENT | |
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| | 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:<br>(a) One 3 phase (4 Voltage and 6 current sources) dynamic portable relay test system for allowing dynamic and steady state testing.<br>(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** |
| | **a) Spares (MCCB Modules less than 100A and MPCB Modules):** 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/ MPCB modules of each rating as spares which shall be uniformly distributed over different vertical sections.<br><br>**b) Spares (MCCB modules—100A and higher—Starter/DAE-OG/DM Modules):** In addition, all Switchgears, MCCs and AC distribution boards shall have as spares at least twenty per cent (20%) of starter modules/MCCB/ DAE-OG/DM modules or at least one module (whichever is higher) of each rating range of the selection table, equipped for the rating of the largest auxiliary fed from that range.<br><br>However, the same is already considered in the Board wise BOM (Annexure-A.1 part of technical data Part-A). |
| 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. |
| d) | 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.**<br>**Customer shall provide the required Infrastructure such as Training Conference room, Projection systems etc.** |
| 29.0 | **RESPONSIBILITY OF THE ASSOCIATE/COLLABORATOR (APPLICABLE IF LT SWITHCHGEAR IS SUPPLIED THROUGH PRE QUALIFICATION REQUIREMENT: ROUTE-2):** |

| GENERAL TECHNICAL REQUIREMENT | |
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| | 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.<br>The Associate/Collaborator (with respect to his manufactured and supplied LT Air Circuit Breaker) shall:<br>i) Participate in the Inspection of the LT Switchgears at Switchgear Supplier's Works, if required by End Customer.<br>ii) Participate in Technical Co-ordination Meetings (TCMs) from time to time during detailed engineering, if required.<br>iii) Participate in Site Testing and Commissioning of LT Switchgears, if required.<br>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). However, in case electrostatic process of painting is offered, minimum paint thickness of 50 microns shall be acceptable for finish coat. |
| 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. |
| 32.0 | All hardwares used for the panel manufacturing shall be zinc passivated with the Salt Spray life of minimum 120hrs. |
| 33.0 | **ENGINEERING** |
| 33.1 | Complete engineering including the following:<br>(a) Development of Module Type-wise Schemes with hardwired & soft logics.<br>(b) Configuration of Feeder IED including Protection and Control logics<br>(d) Relay Network Design based on reliability & speed<br>(e) Configuration and application development of Switchgear relay network as required for real time monitoring & data acquisition<br>(f) Preparation & Submission of mimic document for Relay Network architecture for helping DDCMIS supplier to create the dynamic/static mimic in DDCMIS for Network monitoring<br>(g) Preparation of I/O lists for each module type for integration with DDCMIS on IEC-61850 protocol<br>(h) The integration of Switchgear Relay Network with Switchgear DDCMIS shall be finalized during detail engineeringing.<br>(i) The required. ICD / .CID files of the Numerical relays under LV Switchgears for the integration with the DDCMIS shall be provided by the Numerical relay vendor along with necessary engineering support as and when required during detail engineering.<br>(j) During the Factory Acceptance Test (FAT) of the DDCMIS, Relay & Ethernet Switch supplier will arrange a prototype ring with at least three ethernet switches (L2) with one numerical relay of each type and L3 Switches network, at the works of the DDCMIS supplier along with the necessary engineering support. Exact test setup shall be finalized during detailed engineering. |
| | |
| 33.2 | 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 Employer's approval. Setting calculations and relay settings configured in relay software for all relays shall be submitted for Employer's approval. Approved relay configuration / settings files shall be loaded in all the relays |
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| बी एच ई एल BHEL | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>20 June 2026 |

**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 |
| 1.10 | Code of practice for earthing | | IS: 3043 |
| 1.11 | nstrument 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 |
| 1.22 | A.C. Electricity Meters | | IS : 722 |
| 1.23 | Voltage transformers | | IS: 3156 |
| 1.24 | Code of practice for climate proofing of electrical equipment. | | IS: 3202 |
| 1.25 | Electrical relays for power system protection | | IS: 3231 |
| 1.26 | Low Voltage Switchgear & Control gear assemblies | | IS: 8623 / IEC:61439-1/2 |
| 1.27 | Code of practice for selection, installation and maintenance of switchgear and control gear. | | IS: 10118 (4 parts) |
| 1.28 | Specification for dry type transformers. | | IS: 11171 |
| | | | |
| 2.0 | **DESIGN /SYSTEM PARAMETERS** | | |
| 2.1 | Max. System Voltage for continuous operations<br>Max. System Frequency for continuous operations | | 415 Volt (+/- 10% )<br>50Hz (+5/- 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 | | Shall be as per Annexure-A enclosed |
| 2.4 | Draw out type modules | | Complete Closed Door Operation |
| 2.5 | Cable alley compartment | | Form-IVB 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 kA (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 | | Insulated (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 | 25mm (Insulation Sleeves / Barriers shall be provided for clearance less than 25 mm) |
| b) | Phase-earth | mm | 25mm (Insulation Sleeves / Barriers shall be provided for clearance less than 25 mm) |
| c) | Incomer Rear Door and Busbar | mm | 400mm |
| 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) | 25 | |
| a) | CT leads | Sqmm | 2.5, 650V, FRLS, 1C |

| | | | |
|---|---|---|---|
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| | **TECHNICAL DATA PART - A** | | |
| b) | Other wires | Sqmm | 1.5 |
| 2.8 | Auxiliary buses provision | | |
| a) | AC control bus | V | 110V AC (With Neutral solidly earthed) |
| b) | DC control bus | V | 220V DC |
| c) | AC space heater bus | V | 240V AC (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 | 50kA |
| c) | Momentary making current | KA | 105kA (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 |
| | | | (4NO+4NC for DDCMIS interface and 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 | 415V AC |
| e) | Rated Insulation level | V | 690V AC |
| f) | Rated short circuit breaking capacity | KA | 50kA |
| g) | Rated making capacity | KA | 105kA |
| h) | Utilization category | | A of IS / IEC 60947 |
| i) | Type of releases required | | |
| i | Overload | | Refer Modulewise BoM (Annexure-A.2) |
| 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)** | | 110 V & 50 Hz (For basic and expansion module (if applicable) both), same shall be respective MCC module control supply. |
| a) | Power supply voltage & frequency | | 110 V & 50 Hz (For basic and expansion module (if applicable) 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 | | 110V AC, 50 Hz |
| h) | Binary output | | Rated for 6A, 110V 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:<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy |
| 2.10.2 | **Power Contactors** | | Air break electro magnetic type |
| a) | Coil voltage (nominal) | V | (i) 110V AC (-15% to +10%)<br>(Drop out voltage-less than 70%, Guaranteed Drop out at 20% of rated voltage)<br>(ii) 220V DC (-15% to +10%) |
| b) | No. of poles for contactor | | Three |
| c) | 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) |
| 2.10.4 | **High rupturing capacity (HRC) fuses** | | |
| a) | Voltage Class | V | 650V |
| b) | Rupturing Capacity | | |
| i) | AC | KA | 80kA rms for AC Circuit |
| ii) | DC | KA | 20kA for DC Circuit |
| 2.10.5 | **Instruments, meters & transducers** | | |

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| | **TECHNICAL DATA PART - A** | | |
| a) | Indicating instruments | | |
| i) | Accuracy class | | 2.0 |
| ii) | One min. power frequency withstand test voltage | kV | 2.0 (RMS) |
| b) | Current Transducers | | |
| i | Input | A | 0-1A |
| ii | Output | mA | 4 - 20mA |
| iii | Number of outputs | Nos. | 2nos. (decoupled) |
| iv | Minimum Overcurrent reach for motor current ammeters | | 6 x CT sec. current of 1A for a minimum period of 30seconds |
| v | Accuracy Class | | 1.0 |
| c) | Voltage Transducers | | |
| i | Input | | (i) 500V / 50 Hz (for AC)<br>(ii) 250V (for DC) |
| ii | Output | mA | 4-20mA |
| iii | Number of outputs | Nos. | 2nos. (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 | 220V DC |
| c) | Aux. Voltage | V | 220V DC with variation of 80% to 120% |
| d) | One minute power frequency withstand voltage (rms) | kV | 2kV |
| e) | Measurement Accuracy for rated RMS Current and voltage | % | 2 |
| f) | Power frequency withstand test voltage | kV | 2.5kV for 1 seconds |
| 2.10.7 | **Current transformers** | | |
| a) | Type | | Cast Resin Bar Primary / Nylon Casing ( Insulation Class E or Better) |
| b) | Voltage class and frequency | | 650V, 50 Hz |
| c) | Secondary rating | A | 1A |
| d) | Accuracy class (metering) & Burden | | Class 1.0, 5VA (Minimum)/ Class 0.2, 5VA (Minimum)<br>(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 | KA | Prospective current of 50 KA for the MCCB clearing time |
| h) | Dynamic withstand capability ( peak) | | |
| i | Associated with circuit breaker protected feeders | KA | 105kA (peak) |
| ii | Associated with MCCB protected feeders | KA | Prospective current of 105kA (peak) as Limited by MCCB |
| 2.10.8 | **Voltage transformers** | | |
| a) | Type | | Cast Resin, Insulation class Class E or better |
| b) | System earthing | | EFFECTIVE |
| c) | Voltage Ratio | | |
| i | Line PT | | 415V/110V |
| ii | Bus PT | | 415/√3V/110/√3 V |
| d) | Accuracy class | | Cl. 0.5 / Cl. 0.2<br>(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 | 2.5kV |
| 2.10.9 | **Control transformers (for contactor operation)** | | |
| a) | Type | | Dry / Cast Resin, Insulation Class B or better |
| b) | Voltage Ratio | | 415V/110 V with taps +/- 5% in steps of 2.5% |
| c) | One minute power frequency withstand voltage (rms) | KV | 2.5kV |
| 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 | 10kA |
| 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<br>(Refer Annexure-A.2_Modulewise BOM for details) |
| 2.10.14 | **Panel Space heaters** | | |
| a) | Voltage | V | 240V AC |
| b) | Thermostat required | | Yes |
| 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 | 650V |
| ii | current | A | 10A |
| 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 |

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| | **TECHNICAL DATA PART - A** | | |
| 2.11 | DC MCCB Box | | |
| a) | Construction/ DOP | | (i) Metal Enclosed Fixed Type<br>CRCA: 2mm structure & 1.6mm enclosure<br>Or<br>(ii)Poly Carbonate<br>(a) Halogen Free, flame Retardant (UL-94,V0) (b) Thickness: 4mm<br>(iii) UL224 sleeved Busbars<br>(iv) DOP -Indoor IP52<br>Outdoor -IP54 |
| b) | Incomer | | 63A DP MCCB |
| c) | Busbars | | 100 A fully insulated (PVC sleeved, UL224) busbars |
| d) | Outgoing | | 8 nos. 16A outgoing DP MCCB feeders |
| e) | Other Components | | 1 no. Auxiliary Contactor for supply monitoring & 1 no. Led Indicating lamp (Blue color) |
| f) | Paint Shade | | RAL 9002 |
| 2.12 | AC MCCB Box | | |
| a) | Construction/ DOP | | (i) Metal Enclosed Fixed Type<br>CRCA: 2mm structure & 1.6mm enclosure<br>Or<br>(ii) Poly Carbonate<br>(a) Halogen Free, flame Retardant (UL-94,V0) (b) Thickness: 4mm<br>(iii) UL224 sleeved Busbars<br>(iv) DOP -Indoor IP52<br>Outdoor -IP54 |
| 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 Indicating lamps (R,Y,B) for incoming supply monitoring |
| f) | Paint Shade | | RAL 9002 |
| | | | |
| 3.0 | **CONSTRUCTION FEATURES** | | |
| 3.1 | General | | |
| 3.1.1 | Operational fronts | | Both Single & Double Front<br>(Refer Annexure-A.1_Boardwise BOM for details) |
| 3.1.2 | Type of Module operation | | PCC/PMCC/MCC - Drawout type<br>ACDB/DCDB/SOLENOID VALVE DB's - Fixed Type |
| 3.1.3 | Enclosure | | |
| a) | Material | | Sheet steel |
| b) | Type | | CRCA |
| 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, Heavy duty nickel chrome plated brass machine finished. Thickness of plating not less than 10 micron. All washers and hardware shall also be made of brass with nickel chrome plating Rubber components shall be of neoprene or better synthetic material and of tested quality. |
| 3.1.5 | Lugs/ ferrules | | Heavy duty solderless crimping type (copper lugs/ ferrules for copper cables, aluminium lugs/ ferrules 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 (Gasketing arrangement shall be as per type tested design for IP 5X) |
| c) | Outdoor panels with stainless steel enclosure ( U#6 TRF AREA OUTDOOR SWGR, etc.) | | IP 55 (mounted on 500mm pedestal) |
| 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.) |
| 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 (25mm x 3mm) |
| d) | Hardware for busbars | | High Tensile steels (Bolts/Nuts/Spring Washer) |
| e) | Type of cover for busbar compartment | | Bolted Type |

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**TECHNICAL DATA PART - A**

| | | | |
|---|---|---|---|
| f) | Additional Requirement | | (i) Separate compartments for Auxiliary and Power Busbars<br>(ii) Two separate sets of vertical busbars in each panel of double front MCC / DB<br>(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 10.07.2024 shall be submitted. | | |
| a) | Circuit breaker of each rating<br>i) Test sequence 1<br>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.Refer annexure-A for details | | |
| 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. | | |
| 4.2 | For the following equipment the vendor shall submit the reports of all the type tests | | |
| a) | NUMERICAL RELAYS | | |
| b) | MCCB | | |
| c) | Intelligent Motor Controller (IMC) for Electromagnetic Compatibility (EMC) & other requirements as per applicable standards. | | |
| 4.3 | Type test reports conducted within last 10 years from 10.07.2024 for the following tests on the model of the Numerical 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. | | |
| 4.4 | **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: | | |
| | – Burden | N/A | |
| | – Change of auxiliary energizing quantity | IEC 60255-11 | |
| f) | Contact performance | N/A | |
| g) | Communication requirements | Relevant IEC protocol standards | |
| h) | Climatic environmental requirements: | IEC 60068-2-14,<br>IEC 60068-2-1,<br>IEC 60068-2-2,<br>IEC 60068-2-78,<br>IEC 60068-2-30,<br>IEC 60255-27 | |
| | – Cold | | |
| | – Dry heat | | |
| | – Change of temperature | | |
| | – Damp heat | | |
| i) | Mechanical requirements: – Shock | IEC 60255-21-1,<br>IEC 60255-21-2,<br>IEC 60255-21-3 | |
| | | | |
| | – Vibration | | |
| | – Bump | | |
| | – Seismic | | |
| j) | Enclosure protection | IEC 60529,<br>IEC 60255-27 | |
| 4.5 | 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. | | |
| 4.6 | The tests shall be carried out as per Quality Plan. | | |



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# Annexure-A

| | | |
|---|---|---|
| 1 | Outgoing side of Incomer breaker | **As these switchgear locations are not protected with current-limiting devices, IAC testing with 50 kA for 0.5sec will be required to be conducted. The breaker must remain in the ON position during the period.** |
| 2 | Main Busbar/Horizontal busbar | |
| 3 | Cable alley | As per IEC,<br>• If the connected module of the cable alley is protected with a current limiting device, arc can be initiated by keeping current limiting device in circuit.<br>• Accordingly, the testing shall be carried out as specified in clause no. 8.5 and 8.6 of the IEC-61641.<br><br>**Since MCCB is used in the modules, test shall be conducted at the outgoing of 400 Amp module with MCCB in service.** |
| 4 | Incoming side of smallest module | As per IEC clause no.6, if the part of the circuit meets the requirement of arc ignition protected zone, arc need not to be initiated. Dielectric and IP tests, as mentioned in Clause no.6 of IEC, will be required to be conducted.<br><br>**As informed by M/s Pyrotech, all modules comply with the arc ignition protected zone requirements. During the meeting held with Pyrotech at their works on 07.04.2026, it was agreed that the incoming side of the module shall be declared as an arc protected zone, as it meets the specified criteria from the vertical section up to the MCCB incomer.**<br><br>**However, to fully meet the specification for the incoming side of the module, it has also been decided to conduct the IAC at the topmost portion of the vertical bus bar, which is completely uninsulated and does not meet with the arc ignition protected zone requirement.** |

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**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** | **6DA** | **6DB** |
|---|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** | **QTY.** |
| 4000 | A | DAET(I/C) | 2 | 2 | 2 |
| 4000 | A | DAET(B/C) | 1 | 1 | 1 |
| 3000 | A | DAET(I/C) | 0 | 0 | 0 |
| 3000 | A | DAET(B/C) | 0 | 0 | 0 |
| 630 | A | DAE(O/G) | 5 | 3 | 3 |
| 800 | A | DAE(O/G) | 3 | 2 | 0 |
| 1000 | A | DAE(O/G) | 5 | 0 | 0 |
| 1250 | A | DAE(O/G) | 3 | 0 | 0 |
| 1600 | A | DAE(O/G) | 0 | 0 | 0 |
| 2500 | A | DAE(TIE) | 0 | 0 | 2 |
| 3000 | A | DAE(TIE) | 1 | 0 | 3 |
| 16 | A | E3 (O/G) | 4 | 6 | 6 |
| 32 | A | E3 (O/G) | 4 | 4 | 7 |
| 63 | A | E3 (O/G) | 6 | 7 | 3 |
| 125 | A | E3 (O/G) | 5 | 11 | 8 |
| 160 | A | E3 (O/G) | 4 | 4 | 2 |
| 200 | A | E3 (O/G) | 4 | 0 | 3 |
| 250 | A | E3 (O/G) | 3 | 15 | 12 |
| 400 | A | E3 (O/G) | 4 | 3 | 3 |
| 0.0 – 5.5 | KW | DK2 / PK2 / AK2 | 4 | 42 | 17 |
| 5.6 – 7.0 | KW | DK2 / PK2 / AK2 | 0 | 9 | 4 |



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**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** | **6DA** | **6DB** |
|---|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** | **QTY.** |
| 7.1 – 13.0 | KW | DK2 / PK2 / AK2 | 0 | 26 | 7 |
| 13.1 – 24.0 | KW | DK2 / PK2 / AK2 | 0 | 11 | 15 |
| 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 | 5 | 2 |
| 55.1 – 80.0 | KW | DK21 / PK21 / AK21 | 0 | 0 | 3 |
| 80.1 – 89.9 | KW | DK21 / PK21 / AK21 | 0 | 0 | 0 |
| 90 – 200.0 | KW | DM / PM | 0 | 6 | 6 |
| Up to 32A | | E1 | 0 | 32 | 8 |
| Up to 16A | | EA3 | 0 | 9 | 6 |
| 32 | A | EA3 | 0 | 12 | 4 |
| 63 | A | EA3 | 0 | 4 | 0 |
| 125 | A | EA3 | 0 | 0 | 0 |
| 32 | A | ET3 | 0 | 6 | 6 |
| 400 | A | ES3 | 4 | 2 | 2 |
| | | | | | |
| | | | | | |
| | | G1 (BUS PT) | 2 | 2 | 2 |
| | | CS (Control Supply) | 2 | 2 | 2 |
| | | WTS1 (Wireless Temp. Sensor Module 1) | 0 | 27 | 72 |
| | | WTS2 (Wireless Temp. Sensor Module 2) | 0 | 90 | 75 |

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| बी एच ई एल BHEL | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP** | **PE-TS-520-506-E002**<br>**Issue No: 00**<br>**Rev. No. 00**<br>**Date : 17.01.2026** |

**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** | **6DA** | **6DB** |
|---|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** | **QTY.** |
| | | Dummy Panel | 2 | 2 | 2 |
| | | Y-link | 1 | 15 | 8 |
| | | Ethernet Switch | 2 | 1 | 2 |

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





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| बी एच ई एल BHEL | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP | PE-TS-520-506-E002 | |
| | | Issue No: 00 | |
| | | Rev. Rev. No. 00 | |
| | | Date : 17.01.2026 | |

**TECHNICAL DATA PART - A**

**ANNEXURE-A.1**

**BOARDWISE BOM**

Type of Connection : TOP/SIDE BUSDUCT ENTRY EXCEPT 0DC WITH CABLE ENTRY
DOUBLE FRONT D/O TYPE
FLOOR MOUNTED

| Name of the Board (PMCC) → | | | 6DN | 6DM | 6DQ | 6DS | 0DH |
|---|---|---|---|---|---|---|---|
| RATING | UNIT | MODULE TYPE | QTY. | QTY. | QTY. | QTY. | QTY. |
| 4000 | A | DAET(I/C) | 0 | 0 | 0 | 0 | 0 |
| 4000 | A | DAET(B/C) | 0 | 0 | 0 | 0 | 0 |
| 3000 | A | DAET(I/C) | 2 | 2 | 2 | 2 | 0 |
| 3000 | A | DAET(B/C) | 0 | 0 | 0 | 0 | 0 |
| 2500 | A | DAET(I/C) | 0 | 0 | 0 | 0 | 0 |
| 2500 | A | DAET(B/C) | 0 | 0 | 0 | 0 | 0 |
| 1600 | A | DAET(I/C) | 0 | 0 | 0 | 0 | 0 |
| 1600 | A | DAET(B/C) | 0 | 0 | 0 | 0 | 0 |
| 1000 | A | DAET(I/C) | 0 | 0 | 0 | 0 | 2 |
| 1000 | A | DAET(B/C) | 0 | 0 | 0 | 0 | 1 |
| 630 | A | DAE(O/G) | 0 | 0 | 0 | 0 | 0 |
| 800 | A | DAE(O/G) | 0 | 0 | 0 | 0 | 0 |
| 1000 | A | DAE(O/G) | 0 | 0 | 0 | 0 | 0 |
| 1600 | A | DAE(O/G) | 0 | 0 | 0 | 0 | 0 |
| 16 | A | E3 (O/G) | 0 | 3 | 0 | 0 | 8 |
| 32 | A | E3 (O/G) | 3 | 0 | 0 | 0 | 5 |
| 63 | A | E3 (O/G) | 3 | 3 | 5 | 3 | 0 |
| 100 | A | E3 (O/G) | 2 | 2 | 0 | 2 | 0 |
| 125 | A | E3 (O/G) | 0 | 0 | 2 | 0 | 0 |
| 160 | A | E3 (O/G) | 0 | 0 | 1 | 0 | 3 |
| 200 | A | E3 (O/G) | 3 | 0 | 1 | 0 | 5 |
| 250 | A | E3 (O/G) | 0 | 0 | 2 | 0 | 3 |

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| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP | PE-TS-520-506-E002 | |
|---|---|---|---|
| | | Issue No: 00 | |
| | | Rev. No. 00 | |
| | | Date : 17.01.2026 | |

**TECHNICAL DATA PART - A**

**ANNEXURE-A.1**

**BOARDWISE BOM**

Type of Connection : TOP/SIDE BUSDUCT ENTRY EXCEPT 0DC WITH CABLE ENTRY
DOUBLE FRONT D/O TYPE
FLOOR MOUNTED

| Name of the Board (PMCC) → | | | 6DN | 6DM | 6DQ | 6DS | 0DH |
|---|---|---|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** | **QTY.** | **QTY.** | **QTY.** |
| 400 | A | E3 (O/G) | 0 | 0 | 0 | 0 | 0 |
| 0.0 – 5.5 | KW | DK2 / PK2 / AK2 | 3 | 8 | 4 | 5 | 18 |
| 5.6 – 7.0 | KW | DK2 / PK2 / AK2 | 0 | 0 | 0 | 0 | 0 |
| 7.1 – 13.0 | KW | DK2 / PK2 / AK2 | 3 | 0 | 5 | 0 | 3 |
| 13.1 – 24.0 | KW | DK2 / PK2 / AK2 | 0 | 0 | 0 | 0 | 2 |
| 24.1 – 29.9 | KW | DK2 / PK2 / AK2 | 0 | 0 | 0 | 0 | 0 |
| 30.0 – 37.0 | KW | DK21 / PK21 / AK21 | 0 | 0 | 0 | 0 | 0 |
| 37.1 – 55.0 | KW | DK21 / PK21 / AK21 | 0 | 0 | 0 | 0 | 0 |
| 55.1 – 80.0 | KW | DK21 / PK21 / AK21 | 0 | 0 | 0 | 0 | 0 |
| 80.1 – 89.9 | KW | DK21 / PK21 / AK21 | 0 | 0 | 0 | 0 | 0 |
| 90 – 200.0 | KW | DM / PM | 10 | 11 | 10 | 11 | 3 |
| Up to 32A | | E1 | 7 | 8 | 7 | 6 | 28 |
| 32 | A | EA3 | 0 | 0 | 0 | 0 | 0 |
| 63 | A | EA3 | 0 | 0 | 0 | 0 | 0 |
| 125 | A | EA3 | 0 | 0 | 0 | 0 | 0 |
| 32 | A | ET3 | 4 | 4 | 4 | 4 | 4 |
| 250 | A | ES3 | 2 | 2 | 2 | 2 | 2 |
| | | | | | | | |
| | | G1 (BUS PT) | 2 | 2 | 2 | 2 | 2 |
| | | CS (Control Supply) | 2 | 2 | 2 | 2 | 2 |
| | | Dummy Panel | 4 | 2 | 2 | 2 | 2 |
| | | Y-link | 1 | 1 | 2 | 1 | 3 |

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| | | Issue No: 00 | |
| | | Rev. No. 00 | |
| | | Date : 17.01.2026 | |

**TECHNICAL DATA PART - A**

**ANNEXURE-A.1**

**BOARDWISE BOM**

Type of Connection : TOP/SIDE BUSDUCT ENTRY EXCEPT 0DC WITH CABLE ENTRY

DOUBLE FRONT D/O TYPE

FLOOR MOUNTED

| Name of the Board (PMCC) → | | | 6DN | 6DM | 6DQ | 6DS | 0DH |
|---|---|---|---|---|---|---|---|
| RATING | UNIT | MODULE TYPE | QTY. | QTY. | QTY. | QTY. | QTY. |
| | | Ethernet Switch | 1 | 1 | 1 | 1 | 1 |

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



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| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 17.01.2026 |
|---|---|---|

**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) → | | | 6DC | 6DD | 6DE | 6DF | 6DH | 6DJ |
|---|---|---|---|---|---|---|---|---|
| RATING | UNIT | MODULE TYPE | QTY. | QTY. | QTY. | QTY. | QTY. | QTY. |
| 3000 | A | DAET(I/C) | 1 | 1 | 1 | 1 | 1 | 1 |
| 3000 | A | DAE(TIE) | 1 | 1 | 1 | 1 | 1 | 1 |
| 630 | A | DAE(O/G) | 0 | 0 | 0 | 0 | 0 | 0 |
| 800 | A | DAE(O/G) | 0 | 0 | 0 | 0 | 0 | 0 |
| 1000 | A | DAE(O/G) | 0 | 0 | 0 | 0 | 0 | 0 |
| 1600 | A | DAE(O/G) | 0 | 0 | 0 | 0 | 0 | 0 |
| 32 | A | E3 (O/G) | 2 | 2 | 2 | 2 | 2 | 2 |
| 400 | A | E3 (O/G) | 1 | 1 | 1 | 1 | 1 | 1 |
| 400 | A | E2 (O/G) | 24 | 24 | 24 | 24 | 24 | 24 |
| 6 | A | ALI | 6 | 6 | 6 | 6 | 6 | 6 |
| 6 | A | WLT (3D) | 6 | 6 | 6 | 6 | 6 | 6 |
| 6 | A | ARECA | 2 | 2 | 2 | 2 | 2 | 2 |
| 6 | A | MM | 2 | 2 | 2 | 2 | 2 | 2 |
| 0.37 | KW | RM1 | 26 | 26 | 26 | 26 | 26 | 26 |
| 0.37 | KW | RM2 | 25 | 25 | 25 | 25 | 25 | 25 |
| 17 | KW | HH (HOPPER HEATER) | 24 | 24 | 24 | 24 | 24 | 24 |
| 40 | KW | HI | 4 | 4 | 4 | 4 | 4 | 4 |
| 10 | KW | HS | 4 | 4 | 4 | 4 | 4 | 4 |
| 2X1.1 | KW | DDM | 8 | 8 | 8 | 8 | 8 | 8 |
| Up to 32A | | E1 | 2 | 2 | 2 | 2 | 2 | 2 |
| 250 | A | ES3 | 1 | 1 | 1 | 1 | 1 | 1 |
| 32 | A | ET3 | 6 | 6 | 6 | 6 | 6 | 6 |
| | | | | | | | | |
| | | G1 (BUS PT) | 1 | 1 | 1 | 1 | 1 | 1 |
| | | CS (Control Supply) | 1 | 1 | 1 | 1 | 1 | 1 |
| | | Dummy Panel | 2 | 2 | 2 | 2 | 2 | 2 |
| | | Y-link | 6 | 6 | 6 | 6 | 6 | 6 |
| | | Ethernet Switch | 1 | 1 | 1 | 1 | 1 | 1 |

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



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**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) ⟶** | | | **6DK** | **6DM** |
|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** |
| 4000 | A | DAET(I/C) | 1 | 1 |
| 4000 | A | DAE(B/C) | 0 | 0 |
| 630 | A | DAE(O/G) | 1 | 1 |
| 800 | A | DAE(O/G) | 0 | 0 |
| 1000 | A | DAE(O/G) | 0 | 0 |
| 3000 | A | DAE(TIE) | 1 | 1 |
| 4000 | A | DAE(TIE) | 1 | 1 |
| 16 | A | E3 (O/G) | 0 | 0 |
| 32 | A | E3 (O/G) | 0 | 0 |
| 63 | A | E3 (O/G) | 0 | 0 |
| 125 | A | E3 (O/G) | 5 | 7 |
| 160 | A | E3 (O/G) | 0 | 0 |
| 250 | A | E3 (O/G) | 2 | 2 |
| 400 | A | E3 (O/G) | 2 | 0 |
| 0.0 – 5.5 | KW | DK2 / PK2 / AK2 | 0 | 0 |
| 5.6 – 7.0 | KW | DK2 / PK2 / AK2 | 0 | 0 |
| 7.1 – 13.0 | KW | DK2 / PK2 / AK2 | 3 | 3 |
| 13.1 – 24.0 | KW | DK2 / PK2 / AK2 | 3 | 0 |
| 24.1 – 29.9 | KW | DK2 / PK2 / AK2 | 0 | 0 |
| 30.0 – 37.0 | KW | DK21 / PK21 / AK21 | 0 | 0 |
| 37.1 – 55.0 | KW | DK21 / PK21 / AK21 | 0 | 0 |
| 55.1 – 80.0 | KW | DK21 / PK21 / AK21 | 0 | 0 |

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|---|---|---|
| बी एच ई एल BHEL | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP** | **PE-TS-520-506-E002**<br>**Issue No: 00**<br>**Rev. No. 00**<br>**Date : 17.01.2026** |

**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) ⟶** | | | **6DK** | **6DM** |
|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** |
| 80.1 – 89.9 | KW | DK21 / PK21 / AK21 | 0 | 0 |
| 90 – 200.0 | KW | DM / PM | 0 | 0 |
| Up to 32A | | E1 | 0 | 0 |
| | | | | |
| | | G1 (BUS PT) | 1 | 1 |
| | | CS (Control Supply) | 1 | 1 |
| | | Dummy Panel | 2 | 2 |
| | | Y-link | 1 | 1 |
| | | Ethernet Switch | 1 | 1 |

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



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**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)** → | | | **6HC** | **6TB** |
|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** |
| 250 | A | E3 (I/C) | 0 | 0 |
| 250 | A | CC (I/C) | 0 | 0 |
| 250 | A | E3 (B/C) | 0 | 0 |
| 400 | A | E3 (I/C) | 2 | 2 |
| 400 | A | CC (I/C) | 0 | 0 |
| 400 | A | E3 (B/C) | 1 | 1 |
| 16 | A | E3 (O/G) | 9 | 10 |
| 32 | A | E3 (O/G) | 33 | 24 |
| 63 | A | E3 (O/G) | 11 | 9 |
| 100 | A | E3 (O/G) | 18 | 4 |
| 125 | A | E3 (O/G) | 3 | 3 |
| 160 | A | E3 (O/G) | 0 | 0 |
| 250 | A | E3 (O/G) | 0 | 3 |
| 400 | A | E3 (O/G) | 0 | 0 |
| 0.0 – 5.5 | KW | DK2 / PK2 / AK2 | 0 | 5 |
| 5.6 – 7.0 | KW | DK2 / PK2 / AK2 | 0 | 4 |
| 7.1 – 13.0 | KW | DK2 / PK2 / AK2 | 8 | 5 |
| 13.1 – 24.0 | KW | DK2 / PK2 / AK2 | 8 | 6 |
| 24.1 – 29.9 | KW | DK2 / PK2 / AK2 | 0 | 0 |
| 30.0 – 37.0 | KW | DK21 / PK21 / AK21 | 0 | 0 |
| 37.1 – 55.0 | KW | DK21 / PK21 / AK21 | 0 | 0 |
| 55.1 – 80.0 | KW | DK21 / PK21 / AK21 | 0 | 0 |
| 80.1 – 89.9 | KW | DK21 / PK21 / AK21 | 0 | 0 |
| 90 – 200.0 | KW | DM / PM | 0 | 0 |
| Up to 32A | | E1 | 0 | 12 |
| Up to 16A | | EA3 | 7 | 7 |
| 32 | A | EA3 | 0 | 0 |
| 63 | A | EA3 | 0 | 0 |





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**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) → | | | 6HC | 6TB |
|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** |
| 200 | A | EA3 | 0 | 0 |
| 32 | A | ET3 | 0 | 0 |
| | | VM (BUS PT) | 2 | 2 |
| | | CS (Control Supply) | 2 | 2 |
| | | Dummy Panel | 0 | 0 |
| | | Y-link | 3 | 4 |
| | | Ethernet Switch | 0 | 0 |
| | | Alarm module | 0 | 0 |

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



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**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)** → | | | **6SA** | **6TA** | **0QA** | **0QB** |
|---|---|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** | **QTY.** | **QTY.** |
| 630 | A | DAE(I/C) | 0 | 2 | 2 | 2 |
| 630 | A | DAE(B/C) | 0 | 1 | 1 | 1 |
| 800 | A | DAE(I/C) | 2 | 0 | 0 | 0 |
| 800 | A | DAE(B/C) | 1 | 0 | 0 | 0 |
| 1000 | A | DAE(I/C) | 0 | 0 | 0 | 0 |
| 1000 | A | DAE(B/C) | 0 | 0 | 0 | 0 |
| 630 | A | DAE(O/G) | 0 | 0 | 0 | 0 |
| 16 | A | E3 (O/G) | 27 | 24 | 24 | 24 |
| 32 | A | E3 (O/G) | 3 | 3 | 5 | 2 |
| 63 | A | E3 (O/G) | 5 | 5 | 17 | 2 |
| 125 | A | E3 (O/G) | 0 | 0 | 10 | 0 |
| 160 | A | E3 (O/G) | 0 | 0 | 4 | 0 |
| 250 | A | E3 (O/G) | 0 | 0 | 3 | 0 |
| 400 | A | E3 (O/G) | 0 | 0 | 0 | 0 |
| 0.0 – 5.5 | KW | DK2 / PK2 / AK2 | 15 | 41 | 18 | 5 |
| 5.6 – 7.0 | KW | DK2 / PK2 / AK2 | 0 | 0 | 0 | 0 |



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| बी एच ई एल BHEL | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP** | **PE-TS-520-506-E002**<br>**Issue No: 00**<br>**Rev. No. 00**<br>**Date : 17.01.2026** |

**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)** → | | | **6SA** | **6TA** | **0QA** | **0QB** |
|---|---|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** | **QTY.** | **QTY.** |
| 7.1 – 13.0 | KW | DK2 / PK2 / AK2 | 0 | 3 | 2 | 0 |
| 13.1 – 24.0 | KW | DK2 / PK2 / AK2 | 0 | 9 | 5 | 0 |
| 24.1 – 29.9 | KW | DK2 / PK2 / AK2 | 0 | 0 | 0 | 0 |
| 30.0 – 37.0 | KW | DK21 / PK21 / AK21 | 6 | 12 | 0 | 0 |
| 37.1 – 55.0 | KW | DK21 / PK21 / AK21 | 0 | 0 | 2 | 0 |
| 55.1 – 80.0 | KW | DK21 / PK21 / AK21 | 0 | 6 | 0 | 0 |
| 80.1 – 89.9 | KW | DK21 / PK21 / AK21 | 0 | 0 | 0 | 0 |
| 90 – 200.0 | KW | DM / PM | 0 | 0 | 0 | 5 |
| Up to 32A | | E1 | 17 | 27 | 9 | 0 |
| 125 | | EA3 | 0 | 0 | 0 | 0 |
| | | | | | | |
| | | VM (BUS PT) | 2 | 2 | 2 | 2 |
| | | CS (Control Supply) | 2 | 2 | 2 | 2 |
| | | Dummy Panel | 2 | 2 | 2 | 2 |
| | | Y-link | 3 | 9 | 4 | 1 |
| | | Ethernet Switch | 1 | 1 | 1 | 1 |

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



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**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)** → | | | **0TA** | |
|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | |
| 1250 | A | DAE(I/C) | 2 | |
| 1250 | A | DAE(B/C) | 1 | |
| 1000 | A | DAE(I/C) | 0 | |
| 1000 | A | DAE(B/C) | 0 | |
| 16 | A | E3 (O/G) | 4 | |
| 32 | A | E3 (O/G) | 15 | |
| 63 | A | E3 (O/G) | 6 | |
| 125 | A | E3 (O/G) | 10 | |
| 160 | A | E3 (O/G) | 0 | |
| 250 | A | E3 (O/G) | 3 | |
| 400 | A | E3 (O/G) | 4 | |
| 0.0 – 5.5 | KW | DK2 / PK2 / AK2 | 11 | |
| 5.6 – 7.0 | KW | DK2 / PK2 / AK2 | 0 | |
| 7.1 – 13.0 | KW | DK2 / PK2 / AK2 | 10 | |
| 13.1 – 24.0 | KW | DK2 / PK2 / AK2 | 8 | |



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|---|---|---|
| बी एच ई एल BHEL | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP** | **PE-TS-520-506-E002**<br>**Issue No: 00**<br>**Rev. No. 00**<br>**Date : 17.01.2026** |

**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)** → | | | **0TA** | |
|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | |
| 24.1 – 29.9 | KW | DK2 / PK2 / AK2 | 0 | |
| 30.0 – 37.0 | KW | DK21 / PK21 / AK21 | 8 | |
| 37.1 – 55.0 | KW | DK21 / PK21 / AK21 | 4 | |
| 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 | 29 | |
| 32 | A | EA3 | 3 | |
| 32 | A | ET3 | 3 | |

| | | | | |
|---|---|---|---|---|
| | | VM (BUS PT) | 2 | |
| | | CS (Control Supply) | 2 | |
| | | Dummy Panel | 2 | |
| | | Y-link | 6 | |
| | | Ethernet Switch | 1 | |
| | | Alarm module | | |

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



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| बी एच ई एल BHEL | **TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP** | **PE-TS-520-506-E002**<br>**Issue No: 00**<br>**Rev. No. 00**<br>**Date : 17.01.2026** |

**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-UNIT 6** |
|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** |
| 63 | A | CC (I/C) | 2 |
| 0.0 – 5.5 | KW | WB | 248 |
| 0.0 – 5.5 | KW | LR | 75 |
| 0.0 – 5.5 | KW | AH | 6 |
| | | JAMMING RELAY MODULE | 2 |
| | | | |
| | | VM (BUS PT) | 1 |
| | | CS (Control Supply) | 2 |
| | | Dummy Panel | 4 |
| | | Y-link | 0 |
| | | Ethernet Switch | 0 |

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



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**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)** → | | | **6HA** | **6KA** | **6HB** | **6QA** | **TRF AREA OUTDOOR SWGR # 6** |
|---|---|---|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** | **QTY.** | **QTY.** | **QTY.** |
| 630 | A | DAE(I/C) | 0 | 0 | 2 | 2 | 0 |
| 630 | A | DAE(B/C) | 0 | 0 | 1 | 1 | 0 |
| 400 | A | CC (I/C) | 0 | 0 | 0 | 0 | 1 |
| 400 | A | E3 (B/C) | 0 | 0 | 0 | 0 | 0 |
| 250 | A | CC (I/C) | 2 | 2 | 0 | 0 | 0 |
| 250 | A | E3 (B/C) | 0 | 0 | 0 | 0 | 0 |
| 16 | A | E3 (O/G) | 161 | 336 | 6 | 42 | 0 |
| 32 | A | E3 (O/G) | 11 | 53 | 28 | 10 | 0 |
| 63 | A | E3 (O/G) | 17 | 6 | 10 | 14 | 0 |
| 125 | A | E3 (O/G) | 4 | 0 | 5 | 2 | 0 |
| 160 | A | E3 (O/G) | 0 | 0 | 0 | 10 | 0 |
| 250 | A | E3 (O/G) | 0 | 0 | 0 | 0 | 2 |
| 400 | A | E3 (O/G) | 0 | 0 | 3 | 0 | 2 |
| Up to 32A | A | E1 | 4 | 3 | 63 | 72 | 0 |
| 125A | A | E1 | 0 | 0 | 9 | 0 | 0 |
| | | VM (BUS PT) | 1 | 1 | 2 | 2 | 1 |
| | | CS (Control Supply) | 0 | 0 | 0 | 0 | 0 |
| | | Dummy Panel | 2 | 2 | 2 | 2 | 0 |

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

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| | | **Issue No: 00** |
| | | **Rev. No. 00** |
| | | **Date : 17.01.2026** |

**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) →** | | | **6DG** |
|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** |
| 3000 | A | DG(I/C) | 2 |
| 3000 | A | DAE(B/C) | 1 |
| 3000 | A | DAE(TIE) | 2 |
| 630 | A | DAE(O/G) | 0 |
| 800 | A | DAE(O/G) | 0 |
| 1000 | A | DAE(O/G) | 3 |
| 1250 | A | DAE(O/G) | 0 |
| 16 | A | E3-TP (O/G) | 18 |
| 32 | A | E3-TP (O/G) | 7 |
| 63 | A | E3-TP (O/G) | 7 |
| 100 | A | E3-TP (O/G) | 4 |
| 125 | A | E3-TP (O/G) | 14 |
| 160 | A | E3-TP (O/G) | 3 |
| 250 | A | E3-TP (O/G) | 6 |
| 400 | A | E3-TP (O/G) | 5 |
| 0.0 – 5.5 | KW | DK2E | 14 |
| 5.6 – 7.0 | KW | DK2E | 3 |
| 7.1 – 13.0 | KW | DK2E | 6 |
| 13.1 – 24.0 | KW | DK2E | 5 |
| 24.1 – 29.9 | KW | DK2E | 29 |
| 30.0 – 37.0 | KW | DK21E | 0 |
| 37.1 – 55.0 | KW | DK21E | 15 |
| 55.1 – 80.0 | KW | DK21E | 10 |
| 80.1 – 89.9 | KW | DK21E | 0 |
| 90 – 200.0 | KW | DM / PM | 4 |
| Up to 32A | | E1 | 3 |
| | | | |
| | | G2 (BUS PT) | 2 |
| | | CS (Control Supply) | 2 |
| | | WTS1 (Wireless Temp. Sensor Module 1) | 45 |
| | | WTS2 (Wireless Temp. Sensor Module 2) | 60 |
| | | Dummy Panel | 2 |
| | | Y-link | 11 |
| | | Ethernet Switch | 1 |

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

| | | |
|---|---|---|
| बी एच ई एल BHEL | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 17.01.2026 |

**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) | | | 6FA | 0FA | |
|---|---|---|---|---|---|
| **RATING** | **UNIT** | **MODULE TYPE** | **QTY.** | **QTY.** | |
| 125 | A | DB | 0 | 2 | |
| 125 | A | DC | 0 | 2 | |
| 125 | A | CH | 0 | 2 | |
| 125 | A | HD | 0 | 1 | |
| 1600 | A | DB | 2 | 0 | |
| 1600 | A | DC | 2 | 0 | |
| 1600 | A | CH | 2 | 0 | |
| 1600 | A | HD | 1 | 0 | |
| UP TO 32A | A | MCCB TYPE (X) | 108 | 30 | |
| 63 | A | MCCB TYPE (X) | 20 | 10 | |
| 100 | A | MCCB TYPE (X) | 4 | 0 | |
| 125 | A | MCCB TYPE (X) | 3 | 2 | |
| 250 | A | MCCB TYPE (X) | 3 | 0 | |
| 400 | A | MCCB TYPE (X) | 3 | 0 | |
| 600 | A | MCCB TYPE (X) | 3 | 0 | |
| | | | | | |
| | | S (BUS PT) | 2 | 2 | |
| | | CS (Control Supply) | 0 | 0 | |
| | | Dummy Panel | 2 | 2 | |

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



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|---|---|---|

**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 1000A & 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 | |
| | | NEUTRAL LINK | 2 | |
| | | INDICATING LAMP | 5 | |
| | | CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 3 | |
| | | CURRENT TRANSFORMER (PROTECTION) WITH VDR, 5VA or better, CL-PS, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 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 (ONE LOCAL FRONT PORT FOR COMMUNICATION WITH LAPTOP & TWO RJ REAR PORT AS PER IEC-61850 FOR COMMUNICATION WITH DDCMIS) FOR FOLLOWING FUNCTIONS:<br>• PHASE OVER CURRENT PROTECTION (50/51)<br>• EARTH FAULT PROTECTION (50N/51N)<br>• STAND BY EARTH FAULT PROTECTION (51NS)<br>• RESTRICTED EARTH FAULT PROTECTION (64R)<br>• BUS NO VOLT<br>• FAULT LOCKOUT FUNCTION (86)<br>• UNDER VOLTAGE WITH TIMER (27M)<br>• SYNCHRONISING CHECK FUNCTION (25)<br>• CIRCUIT BREAKER FAILURE (50BF)<br>• RELAY SELF SUPERVISION<br>• CIRCUIT BREAKER CONDITION MONITORING<br>• TRIP CIRCUIT SUPERVISION (95)<br>• CURRENT TRANFORMER SUPERVISION<br>• VOLTAGE TRANFORMER SUPERVISION<br>• BREAKER CONTROL with I/L<br>• DISTURBANCE RECORDING<br>• FAULT RECORDING<br>• EVENT RECORDING<br>• MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)<br>• NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT<br>• 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<br>• CT INPUT 5 NOs. (3-Ph, 1 for REF and 1 SPARE) WITH CT SECONDARY CURRENT OF 1A<br>• PT INPUT 4 NOs. (3 NOS FOR BUS VOLTAGE & 1 NO FOR LINE VOLTAGE) | 1 | |
| | | | | |
| 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 | |
| | | NEUTRAL LINK | 2 | |
| | | INDICATING LAMP | 5 | |
| | | CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 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 | |



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| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>DATE: 20.03.2026 |
|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | NUMERICAL RELAY WITH COMMUNICATION FACILITY (ONE LOCAL FRONT PORT FOR COMMUNICATION WITH LAPTOP & TWO RJ REAR PORT AS PER IEC-61850 FOR COMMUNICATION WITH DDCMIS) FOR FOLLOWING FUNCTIONS:<br>• PHASE OVER CURRENT PROTECTION (50/51)<br>• EARTH FAULT PROTECTION (50N/51N)<br>• STAND BY EARTH FAULT PROTECTION (51NS)<br>• RESTRICTED EARTH FAULT PROTECTION (64R)<br>• BUS NO VOLT<br>• FAULT LOCKOUT FUNCTION (86)<br>• UNDER VOLTAGE WITH TIMER (27M)<br>• SYNCHRONISING CHECK FUNCTION (25)<br>• CIRCUIT BREAKER FAILURE (50BF)<br>• RELAY SELF SUPERVISION<br>• CIRCUIT BREAKER CONDITION MONITORING<br>• TRIP CIRCUIT SUPERVISION (95)<br>• CURRENT TRANFORMER SUPERVISION<br>• VOLTAGE TRANFORMER SUPERVISION<br>• BREAKER CONTROL with I/L<br>• DISTURBANCE RECORDING<br>• FAULT RECORDING<br>• EVENT RECORDING<br>• MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)<br>• NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT<br>• 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<br>• CT INPUT 5 NOs. (3-Ph, 1 for REF and 1 SPARE) WITH CT SECONDARY CURRENT OF 1A<br>• PT INPUT 4 NOs. (3 NOS FOR BUS VOLTAGE & 1 NO FOR LINE VOLTAGE) | 1 | |
| | | | | |
| **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 | |
| | | NEUTRAL LINK | 1 | |
| | | INDICATING LAMP | 2 | |
| | | CURRENT TRANSFORMER (PROTECTION) WITH VDR, 5VA or better, **CL-5P20**, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 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 (ONE LOCAL FRONT PORT FOR COMMUNICATION WITH LAPTOP & TWO RJ REAR PORT AS PER IEC-61850 FOR COMMUNICATION WITH DDCMIS) FOR FOLLOWING FUNCTIONS:<br>• PHASE OVER CURRENT PROTECTION (50/51)<br>• EARTH FAULT PROTECTION (50N/51N)<br>• BUS NO VOLT<br>• FAULT LOCKOUT FUNCTION (86)<br>• UNDER VOLTAGE WITH TIMER (27M)<br>• SYNCHRONISING CHECK FUNCTION (25)<br>• CIRCUIT BREAKER FAILURE (50BF)<br>• RELAY SELF SUPERVISION<br>• CIRCUIT BREAKER CONDITION MONITORING<br>• TRIP CIRCUIT SUPERVISION (95)<br>• CURRENT TRANFORMER SUPERVISION<br>• VOLTAGE TRANFORMER SUPERVISION<br>• BREAKER CONTROL FUNCTION<br>• DISTURBANCE RECORDING<br>• FAULT RECORDING<br>• EVENT RECORDING<br>• MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)<br>• NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT<br>• 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<br>• PT INPUT 4 NOs. | 1 | |
| | | | | |
| **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 | |
| | | NEUTRAL LINK | 2 | |
| | | INDICATING LAMP | 5 | |
| | | CURRENT TRANSFORMER (METERING), 5VA (Min.), CL-1, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 1 | |
| | | CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 3 | |
| | | CURRENT TRANSFORMER (PROTECTION) WITH VDR, 5VA or better, CL-PS, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 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 | |



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**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | 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 (ONE LOCAL FRONT PORT FOR COMMUNICATION WITH LAPTOP & TWO RJ REAR PORT AS PER IEC-61850 FOR COMMUNICATION WITH DDCMIS) FOR FOLLOWING FUNCTIONS:<br>• PHASE OVER CURRENT PROTECTION (50/51)<br>• EARTH FAULT PROTECTION (50N/51N)<br>• RESTRICTED EARTH FAULT PROTECTION (64R)<br>• BUS NO VOLT<br>• FAULT LOCKOUT FUNCTION (86)<br>• UNDER VOLTAGE WITH TIMER (27M)<br>• SYNCHRONISING CHECK FUNCTION (25)<br>• CIRCUIT BREAKER FAILURE (50BF)<br>• DIFFERENTIAL PROTECTION (87) (HIGH IMPEDANCE)<br>• REVERSE POWER PROTECTION<br>• DG NEUTRAL DISPLACEMENT (59)<br>• DG MONITORING<br>• RELAY SELF SUPERVISION<br>• CIRCUIT BREAKER CONDITION MONITORING<br>• TRIP CIRCUIT SUPERVISION (95)<br>• CURRENT TRANFORMER SUPERVISION<br>• VOLTAGE TRANFORMER SUPERVISION<br>• BREAKER CONTROL FUNCTION<br>• DISTURBANCE RECORDING<br>• FAULT RECORDING<br>• EVENT RECORDING<br>• MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)<br>• NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT<br>• 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<br>• CT INPUT 4 NOs. (3 FOR CURRENT PROTECTION, 1 SPARE), SECONDARY CURRENT: 1A<br>• PT INPUT 4 NOs. | 1 | |
| | | | | |
| **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 | |
| | | NEUTRAL LINK | 1 | |
| | | INDICATING LAMP | 2 | |
| | | CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 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 (ONE LOCAL FRONT PORT FOR COMMUNICATION WITH LAPTOP & TWO RJ REAR PORT AS PER IEC-61850 FOR COMMUNICATION WITH DDCMIS) FOR FOLLOWING FUNCTIONS:<br>• PHASE OVER CURRENT PROTECTION (50/51)<br>• EARTH FAULT PROTECTION (50N/51N)<br>• BUS NO VOLT<br>• FAULT LOCKOUT FUNCTION (86)<br>• UNDER VOLTAGE WITH TIMER (27M)<br>• SYNCHRONISING CHECK FUNCTION (25) (Applicable for DAE-TIE only)<br>• CIRCUIT BREAKER FAILURE (50BF)<br>• RELAY SELF SUPERVISION<br>• CIRCUIT BREAKER CONDITION MONITORING<br>• TRIP CIRCUIT SUPERVISION (95)<br>• CURRENT TRANFORMER SUPERVISION<br>• VOLTAGE TRANFORMER SUPERVISION<br>• BREAKER CONTROL FUNCTION<br>• DISTURBANCE RECORDING<br>• FAULT RECORDING<br>• EVENT RECORDING<br>• MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF)<br>• NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT<br>• 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<br>• CT INPUT 5 NOs. (3-Ph, 1 for REF and 1 SPARE) WITH CT SECONDARY CURRENT OF 1A<br>• PT INPUT 4 NOs. (3 NOS FOR BUS VOLTAGE & 1 NO FOR LINE VOLTAGE) | 1 | |
| | | | | |
| **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 | |
| | | NEUTRAL LINK | 1 | |
| | | INDICATING LAMP | 3 | |

| | | | | |
|---|---|---|---|---|
| | | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP STAGE – III** | | **PE-TS-520-506-E002**<br>**Issue No: 00**<br>**Rev. No. 00**<br>**DATE: 20.03.2026** |
| | | **TECHNICAL DATA PART - A**<br>**ANNEXURE-A.2**<br>**MODULE WISE BOM** | | |
| | | CURRENT TRANSFORMER (METERING), 5VA (Min.), CL-1, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 1 | |
| | | CURRENT TRANSFORMER, 5VA or better, CL-5P20, INSL CL-E OR BETTER, SECONDARY CURRENT: 1A | 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 | |
| | | AUXILIARY CONTACTOR 2NO+2NC WITH ADD-ON BLOCK 1NO+1NC, COIL VOLTAGE:- 220V DC | 1 | |
| | | INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE | 2 | |
| | | NUMERICAL RELAY WITH COMMUNICATION FACILITY (ONE LOCAL FRONT PORT FOR COMMUNICATION WITH LAPTOP & TWO RJ REAR PORT AS PER IEC-61850 FOR COMMUNICATION WITH DDCMIS) FOR FOLLOWING FUNCTIONS:<br>• PHASE OVER CURRENT PROTECTION (50/51)<br>• EARTH FAULT PROTECTION (50N/51N)<br>• STALLING/ LOCKED ROTOR PROTECTION (50L/R)<br>• THERMAL OVERLAOD PROTECTION (49)<br>• NEGATIVE PHASE SEQUENCE PROTECTION (46)<br>• BUS NO VOLT<br>• REPETATIVE START PROTECTION (66)<br>• FAULT LOCKOUT FUNCTION (86)<br>• UNDER VOLTAGE WITH TIMER (27M)<br><br>• CIRCUIT BREAKER FAILURE (50BF)<br>• PHASE REVERSAL PROTECTION (46R)<br>• MOTOR START MONITORING & RESTART INHIBIT FEATURE<br>• VT FUSE-FAIL PROTECTION (60)<br>• CURRENT UNBALANCE PROTECTION<br>• RELAY SELF SUPERVISION<br>• CIRCUIT BREAKER CONDITION MONITORING<br>• TRIP CIRCUIT SUPERVISION (95)<br>• CURRENT TRANFORMER SUPERVISION<br>• VOLTAGE TRANFORMER SUPERVISION<br>• BREAKER CONTROL FUNCTION<br>• DISTURBANCE RECORDING<br>• FAULT RECORDING<br>• EVENT RECORDING<br>• MEASUREMENT FUNCTIONS (3I, Io, 3U, Uo, Hz, P, Q, E, PF, H, 27U)<br>• NO. OF DI/DO SHALL BE AS PER SCHEME REQUIREMENT<br>• 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<br>• CT INPUT 5 NOs. (3-Ph, 1 for REF and 1 SPARE) WITH CT SECONDARY CURRENT OF 1A<br>• PT INPUT 4 NOs. (3 NOS FOR BUS VOLTAGE & 1 NO FOR LINE VOLTAGE) | 1 | |
| | | | | |
| **7** | **G1** | **BUS PT MODULE FOR PCC/ PMCC** | | |
| | | TRIPLE POLE MCCB | 1 | |
| | | 4 POLE MCB | 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 | |
| | | 4 POLE MCB | 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 | |
| | | | | |



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| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>DATE: 20.03.2026 |
|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| **13** | **CH** | **220V/ 48V DC INCOMER OF DCDB FROM CHARGER** | | |
| | | MCCB -A TP, 1C/O AUX. CONTACT & EXTENDED ROTARY HANDLE | 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 | |
| | | | | |
| **16** | **MCCB TYPE (X)** | **220V/ 48V DC OUTGOING FEEDER** | | |
| | | 250V DC DP MCCB | 1 | |
| | | POWER TERMINALS | As required | |
| | | | | |
| **17** | **CC (I/C)** | **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 ROTARY 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) | As required | |
| | | | | |
| **18** | **E3 (I/C)** | **MCC/ ACDB INCOMER OF RATING UP TO 400A** | | |
| | | **TP MCCB ADJ. O/L & S/C RELEASE** | 1 | |
| | | EXTENDED ROTARY HANDLE | 1 | |
| | | NEUTRAL LINK EQUIVALENT TO MCCB RATING | 1 | |
| | | AUXILIARY CONTACT FOR MCCB 1C/O | 1 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | 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 RELEASE** | 1 | |
| | | EXTENDED ROTARY HANDLE | 1 | |
| | | NEUTRAL LINK EQUIVALENT TO MCCB RATING | 1 | |
| | | AUXILIARY CONTACT FOR MCCB 1C/O | 1 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | NEUTRAL CT | 1 | |
| | | CT SHORTING TERMINAL - STUD TYPE | As required | |
| | | POWER TERMINALS | As required | |
| | | | | |
| **20(A)** | **E3 (O/G)** | **TPN AC OUTGOING MCCB OPERATED FEEDER FOR RATING UP TO 400A** | | |
| | | TP MCCB ADJ. **S/C & O/L** RELEASE | 1 | |
| | | EXTENDED ROTARY HANDLE | 1 | |
| | | NEUTRAL LINK EQUIVALENT TO MCCB RATING | 1 | |
| | | AUXILIARY CONTACT FOR MCCB 1C/O | 1 | |
| | | | | |
| **20(B)** | **E3-TP (O/G)** | **TP AC OUTGOING MCCB OPERATED FEEDER FOR RATING UP TO 400A (FOR 3PHASE, 3WIRE SYSTEM)** | | |
| | | TP MCCB ADJ. **S/C & O/L** RELEASE | 1 | |
| | | EXTENDED ROTARY HANDLE | 1 | |
| | | AUXILIARY CONTACT FOR MCCB 1C/O | 1 | |
| | | | | |
| **21** | **E2** | **2 PHASE AC OUTGOING MCCB OPERATED FEEDER** | | |
| | | **DP** MCCB ADJ. S/C **& O/L** RELEASE | 1 | |
| | | EXTENDED ROTARY HANDLE | 1 | |
| | | AUXILIARY CONTACT FOR MCCB 1C/O | 1 | |
| | | | | |



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| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>DATE: 20.03.2026 |
|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| **22** | **E1** | **SINGLE PHASE AC OUTGOING MCCB OPERATED FEEDER** | | |
| | | **DP** MCCB ADJ. S/C **& O/L** RELEASE | 1 | |
| | | EXTENDED ROTARY HANDLE | 1 | |
| | | NEUTRAL 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** | | |
| | | **FP** MCCB ADJ. S/C **& O/L** RELEASE | 1 | |
| | | EXTENDED ROTARY HANDLE | 1 | |
| | | NEUTRAL 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 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | MULTIFUNCTION DIGITAL ENERGY METER WITH RS485 PORT (0.5 ACC. CLASS) | 1 | |
| | | | | |
| **24** | **DK2/PK2/AK2** | **UNIDIRECTIONAL MOTOR FEEDER BELOW 30KW (CONTROLLED FROM DDCMIS/PLC/ATRS)** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local/ remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | 1 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 2 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE | 2 | |
| | | | | |
| **25** | **DK21/PK21/ AK21** | **UNIDIRECTIONAL MOTOR FEEDER RATED 30KW & BELOW 90KW (CONTROLLED FROM DDCMIS/PLC/ATRS)** | | |
| | | TP MCCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |



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**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT & VOLTAGE SENSING MODULE AND BOTH CT & VT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local /remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>x) 3 Phase Voltages<br>xi) 3 Phase Power<br>xii) 3 phase Energy<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | 1 | |
| | | CONTROL MCB 6A, 10KA | 2 | |
| | | NEUTRAL 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) | As required | |
| | | 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 | |
| | | | | |
| **26** | **DK2E/PK2E/AK2E** | **UNIDIRECTIONAL MOTOR FEEDER (REACCELERATION) BELOW 30KW (CONTROLLED FROM DDCMIS/PLC/ATRS)** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local/ remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status | 1 | |

| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>DATE: 20.03.2026 |
|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 2 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE | 2 | |
| | | POWER OFF DELAY TIMER | 1 | |
| | | | | |
| **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 ROTARY 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:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local /remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>x) 3 Phase Voltages<br>xi) 3 Phase Power<br>xii) 3 phase Energy<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | 1 | |
| | | CONTROL MCB 6A, 10KA | 2 | |
| | | NEUTRAL 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) | As required | |
| | | 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 | |
| | | | | |
| **28** | **K2** | **UNIDIRECTIONAL MOTOR FEEDER BELOW 30KW (CONTROLLED FROM LCP)** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |



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|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

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



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|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | SP ON/ OFF SWITCH FOR MOTOR SPACE HEATER OF MOTOR FDR, 10A, 240V AC | 1 | |
| | | | | |
| **30** | **K3** | **UNIDIRECTIONAL MOTOR FEEDER BELOW 30KW (CONTROLLED FROM LPBS)** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local/ remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | 1 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 1 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | | | |
| **31** | **K31** | **UNIDIRECTIONAL MOTOR FEEDER RATED 30KW & BELOW 90KW (CONTROLLED FROM LPBS)** | | |
| | | TP MCCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local /remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status | 1 | |



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|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>x) 3 Phase Voltages<br>xi) 3 Phase Power<br>xii) 3 phase Energy<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | | |
| | | CONTROL MCB 6A, 10KA | 2 | |
| | | NEUTRAL LINK-16A | 2 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 1 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | SP ON/ OFF SWITCH FOR MOTOR SPACE HEATER OF MOTOR FDR, 10A, 240V AC | 1 | |
| | | | | |
| **32** | **DN1/PN1/AN1** | **BIDIRECTIONAL MOTOR FEEDER (CONTROLLED FROM DDCMIS/PLC/ATRS)** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local/ remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | 1 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 3 | |
| | | INDICATING LAMP | 4 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE | 3 | |
| | | | | |
| **33** | **EA3** | **3 PHASE MCCB CONTACTOR CONTROLLED FEEDER (CONTROLLED FROM DDCMIS)** | | |
| | | TP MCCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |



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**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local/ remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | 1 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 2 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE | 2 | |
| | | | | |
| **34** | **EA1** | **1 PHASE MCCB CONTACTOR CONTROLLED FEEDER (CONTROLLED FROM DDCMIS)** | | |
| | | TP MCCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 2 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE | 2 | |
| | | | | |
| **35** | **SHS** | **240V AC SPACE HEATER SUPPLY MODULE** | | |
| | | CONTROL MCB | 4 | |
| | | NEUTRAL 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 | |
| | | NEUTRAL 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 | |
| | | | | |
| **37** | **RM1** | **RAPPING MOTOR FEEDER WITH IMC** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |

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|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local/ remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | 1 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL 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) | As required | |
| | | | | |
| **38** | **RM2** | **RAPPING MOTOR FEEDER WITH OLR** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |
| | | NEUTRAL 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) | As required | |
| | | | | |
| **39** | **DDM** | **DUST DENSITY MONITOR FEEDER** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |



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**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| | | INTELLIGENT MOTOR CONTROLLER (IMC) WITH CURRENT SENSING MODULE AND CT (IN-BUILT/ EXTERNAL) SHALL HAVE FOLLOWING FUNCTIONS:<br><br>**a) PROTECTION FUNCTIONS**<br>i) Overload (I2t) Protection with site selectable Trip class 5 to 30<br>ii) Current imbalance<br>iii) No. of starts/hr limitation<br>iv) Stall Protection during start<br>v) Load Jam protection during running<br>**b) CONTROL FUNCTIONS**<br>i) Close / Trip Command<br>ii) Reversing starter<br>**c) STANDARD CONTROL BLOCKS FOR VARIOUS FUNCTIONS**<br>i) Watch dog facility<br>ii) Ready to start<br>iii) External wiring<br>iv) Emergency stop<br>v) External check-back signal<br>vi) DP fault<br>vii) Test 1 with shut-down<br>viii) Test 2 without shut-down<br>ix) Reset<br>**d) OPERATING AND DIAGNOSTICS DATA**<br>The IMC shall continuously monitor and provide the following data for display (local/ remote)<br>i) 3-Phase currents<br>ii) Motor ON / OFF status<br>iii) Motor Fault / Switchgear Disturbance<br>iv) Overload trip status<br>v) Overload alarm status<br>vi) Operating hours<br>vii) Number of switching operations<br>viii) Number of overload trips<br>ix) At least last 5 trip data with time stamping in non-volatile memory of IMC in FIFO sequence<br>**e) LED INDICATIONS**<br>i) Controller healthy<br>ii) Controller fault<br>iii) Controller power supply healthy. | 2 | |
| | | CONTROL MCB 6A, 10KA | 2 | |
| | | NEUTRAL LINK-16A | 2 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 2 | |
| | | INDICATING LAMP | 5 | |
| | | ROTARY ON/OFF SWITCH | 1 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | | | |
| **40** | **HH** | **HOPPER HEATER FEEDER** | | |
| | | TP MCCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY HANDLE | 1 | |
| | | AUXILIARY CONTACT FOR MCCB 1C/O | 1 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL 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 | |
| | | | | |
| **41** | **HS** | **SHAFT INSULATOR HEATER FEEDER** | | |
| | | TP MCCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |
| | | NEUTRAL 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 ROTARY 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 | |
| | | NEUTRAL 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 | |
| | | | | |

| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>DATE: 20.03.2026 |
|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| **43** | **ALI(H)** | **ASH LEVEL INDICATOR (HIGH) FEEDER** | | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL 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 | |
| | | NEUTRAL 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 ROTARY 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 ROTARY 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 | |
| | | | | |
| **48** | **WB** | **WALL BLOWER FEEDER** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |
| | | OVERLOAD RELAY,BUILT IN SPPR FEATURE 1NO+1NC | 2 | |
| | | AUX. & INDEPENDENT MOUNTING TYPE MOUNTING KIT FOR O/L RELAY | 2 | |
| | | RESET CORD ACTUATOR | 2 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 1 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | Note: Further for details of Wall Blower feeder refer SBMCC Drawing. | | |
| | | | | |
| **49** | **LR** | **LR BLOWER FEEDER** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |
| | | OVERLOAD RELAY,BUILT IN SPPR FEATURE 1NO+1NC | 2 | |
| | | AUX. & INDEPENDENT MOUNTING TYPE MOUNTING KIT FOR O/L RELAY | 2 | |
| | | RESET CORD ACTUATOR | 2 | |
| | | CONTROL MCB 6A, 10KA | 1 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 1 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | Note: Further for details of LR Blower feeder refer SBMCC Drawing. | | |
| | | | | |
| **50** | **AH** | **AH BLOWER FEEDER** | | |
| | | TP MPCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |
| | | 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 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 1 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | Note: Further for details of AH Blower feeder refer SBMCC Drawing. | | |



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| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>DATE: 20.03.2026 |
|---|---|---|

**TECHNICAL DATA PART - A**

**ANNEXURE-A.2**

**MODULE WISE BOM**

| | | | | |
|---|---|---|---|---|
| **51** | **JAMMING RELAY MODULE** | **JAMMING RELAY FOR SOOT BLOWER MCC** | | |
| | | CURRENT TRANSFORMER, CLASS-5P20, -- VA | 1 | |
| | | CT DISCONNECTING TERMINALS | 4 | |
| | | MCB DP 6A, C CURVE, 10kA BC | 1 | |
| | | ELECTRONIC TYPE JAMMING RELAY OCR | 1 | |
| | | CONTROL TERMINAL SUITABLE UPTO 2.5 Sq.mm WIRE | As required | |
| | | | | |
| **52** | **WTS1** | **WIRELESS TEMPERATURE SENSOR (WTS1) MODULE (IN ONE ACB/PCC PANEL WITH SINGLE ACB)** | | |
| | | TEMPERATURE SENSORS | **9** | Quantity shall be finalised during detailed engineering |
| | | TRANSMITTER | As required | |
| | | RECEIVER | As required | |
| | | ADDITIONAL COMPONENTS (EXCEPT NETWORKING HARDWARE & CABLE i.e. ANNEXURE B3) REQUIRED FOR COMPLETENESS | As required | |
| **53** | **WTS2** | **WIRELESS TEMPERATURE SENSOR (WTS2) MODULE (IN ONE ACB/PCC PANEL WITH DOUBLE ACB)** | | |
| | | TEMPERATURE SENSORS | **18** | Quantity shall be finalised during detailed engineering |
| | | TRANSMITTER | As required | |
| | | RECEIVER | As required | |
| | | ADDITIONAL COMPONENTS (EXCEPT NETWORKING HARDWARE & CABLE i.e. ANNEXURE B3) REQUIRED FOR COMPLETENESS | As required | |
| **54** | **WTS3** | **WIRELESS TEMPERATURE SENSOR (WTS3) MODULE (IN ONE MCC PANEL)** | | |
| | | TEMPERATURE SENSORS | **6** | Quantity shall be finalised during detailed engineering |
| | | TRANSMITTER | As required | |
| | | RECEIVER | As required | |
| | | ADDITIONAL COMPONENTS (EXCEPT NETWORKING HARDWARE & CABLE i.e. ANNEXURE B3) REQUIRED FOR COMPLETENESS | As required | |
| **55** | **ALARM MODULE** | **ALARM MODULE -** | | |
| | | CONTROL MCB 6A - 1 | 1 | |
| | | 9 WINDOWS ALARM ANNUNCIATION -1 | 1 | |
| | | ELECTRONIC HOOTER (96SQMM) - 1 | 1 | |
| | | TEST/ACCEPT/RESET PB WITH 1 NO CONTACT - TOTAL 3 | 3 | |
| | | TERMINALS (FIXED) - AS REQUIRED | As required | Quantity shall be finalised during detailed engineering |
| | | | | |
| **56** | **ET3** | **3 PHASE MCCB CONTACTOR CONTROLLED FEEDER WITHOUT IMC (CONTROLLED FROM DDCMIS)** | | |
| | | TP MCCB ADJ. S/C RELEASE | 1 | |
| | | EXTENDED ROTARY 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 | |
| | | NEUTRAL LINK-16A | 1 | |
| | | AUX. CONTACTOR, 2NO+2NC, CV. 110 V AC | 2 | |
| | | INDICATING LAMP | 3 | |
| | | CONTROL TERMINALS (DRAWOUT) | As required | |
| | | INTERPOSING/ COUPLING RELAY WITH BUILT IN LED, TEST KNOB & FREEWHEELING DIODE | 2 | |



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**Technical Data - Part - B**

| 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 $50^0$C | ..... |
| | 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**<br>a) Rated voltage<br>b) Rated insulation level .....<br>c) Rated ultimate &Service S.C.breaking capacity .....<br>d) Rated making capacity .....<br>e) Utilization category ..... |
| **22.00.00** | **Ethernet switches (For Networking of Numerical Relays)**<br>a) Compliance to IEC 61850 .....<br>b) No of Ports .....<br>c) Power supply to Ethernet Switches ..... |

| | | |
|---|---|---|
| | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP STAGE – III** | **PE-TS-520-506-E002** |
| | | **Issue No: 00** |
| | | **Rev. No. 00** |
| | | **20 June 2026** |

**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 Switchboard location | Annexure-3 |
| 4 | Tentative LV Switchgear Schemes | Annexure-4 |
| 5 | Soot Blower MCC Scheme | Annexure-5 |



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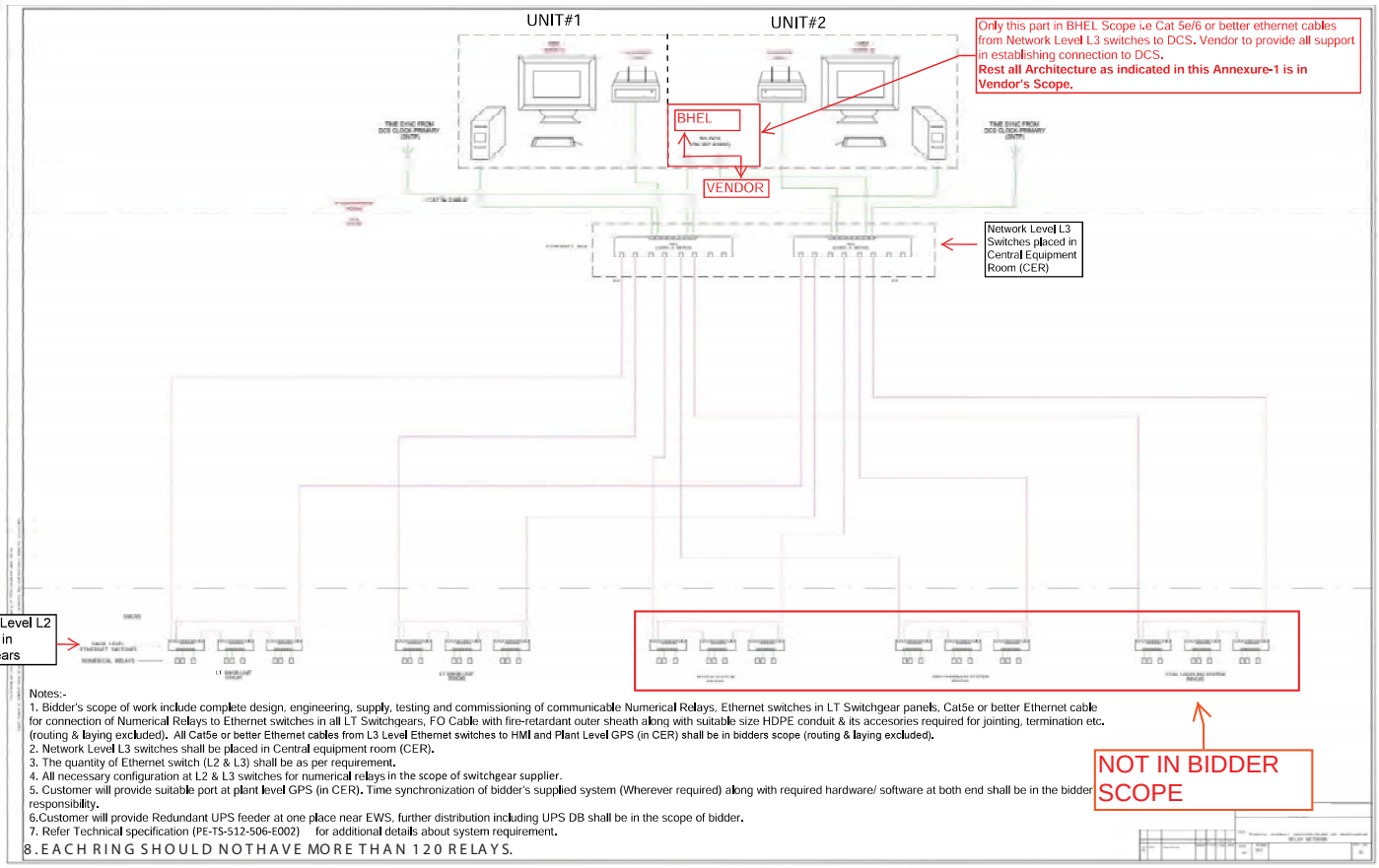
**ANNEXURE-1**

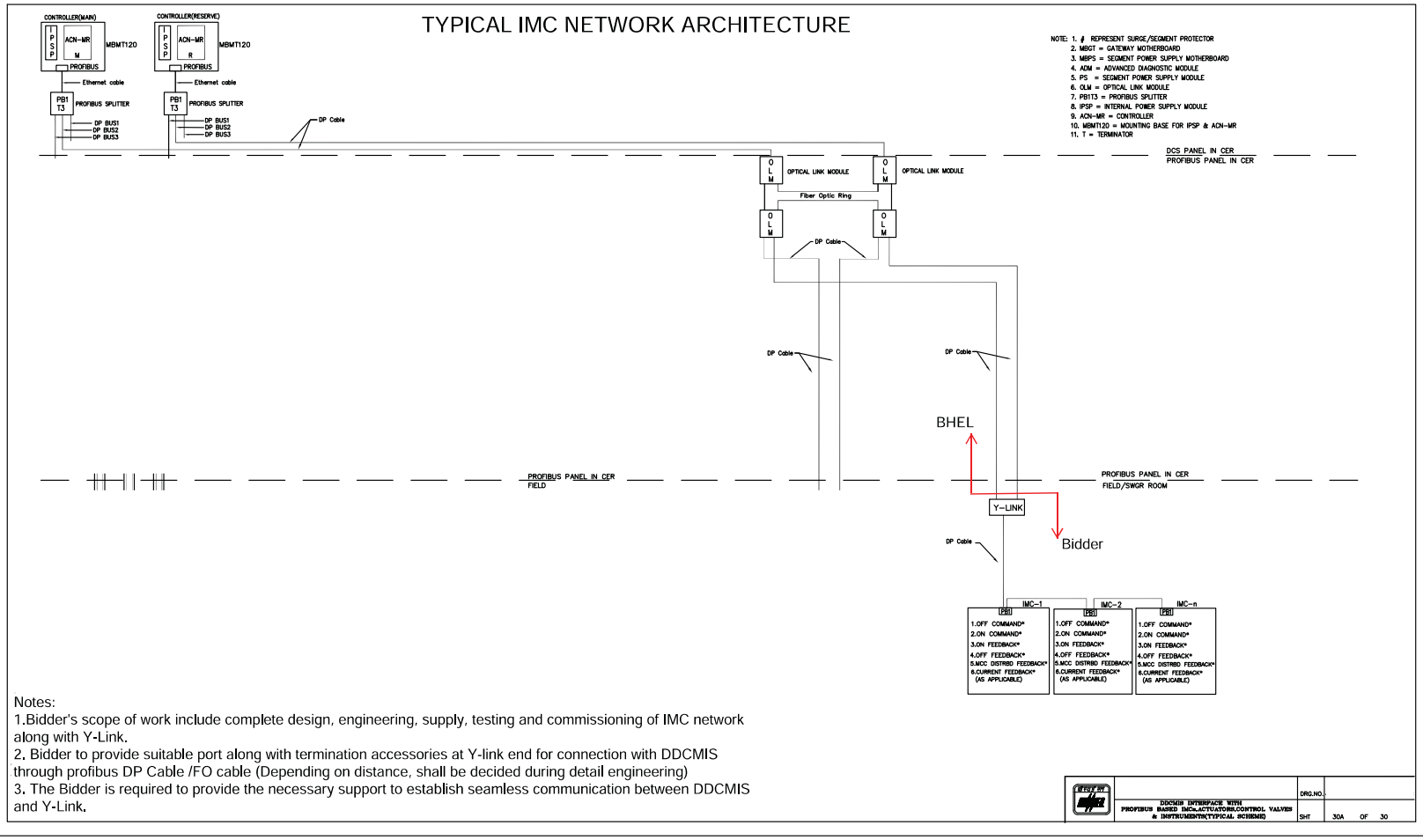
## Typical Switchgear Relay Network Architecture

| CLAUSE NO. | TECHNICAL REQUIREMENT |
|---|---|




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 suitable size HDPE conduit & its accesories required for jointing, termination etc. (routing & laying excluded). All Cat5e or better Ethernet cables from L3 Level Ethernet switches to HMI and Plant Level GPS (in CER) shall be in bidders scope (routing & laying excluded).
2. Network Level L3 switches shall be placed in Central equipment room (CER).
3. The quantity of Ethernet switch (L2 & L3) shall be as per requirement.
4. All necessary configuration at L2 & 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 in the bidder 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 (PE-TS-512-506-E002) for additional details about system requirement.
8.EACH RING SHOULD NOTHAVE MORE THAN 120 RELAYS.

ANNEXURE-2




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.



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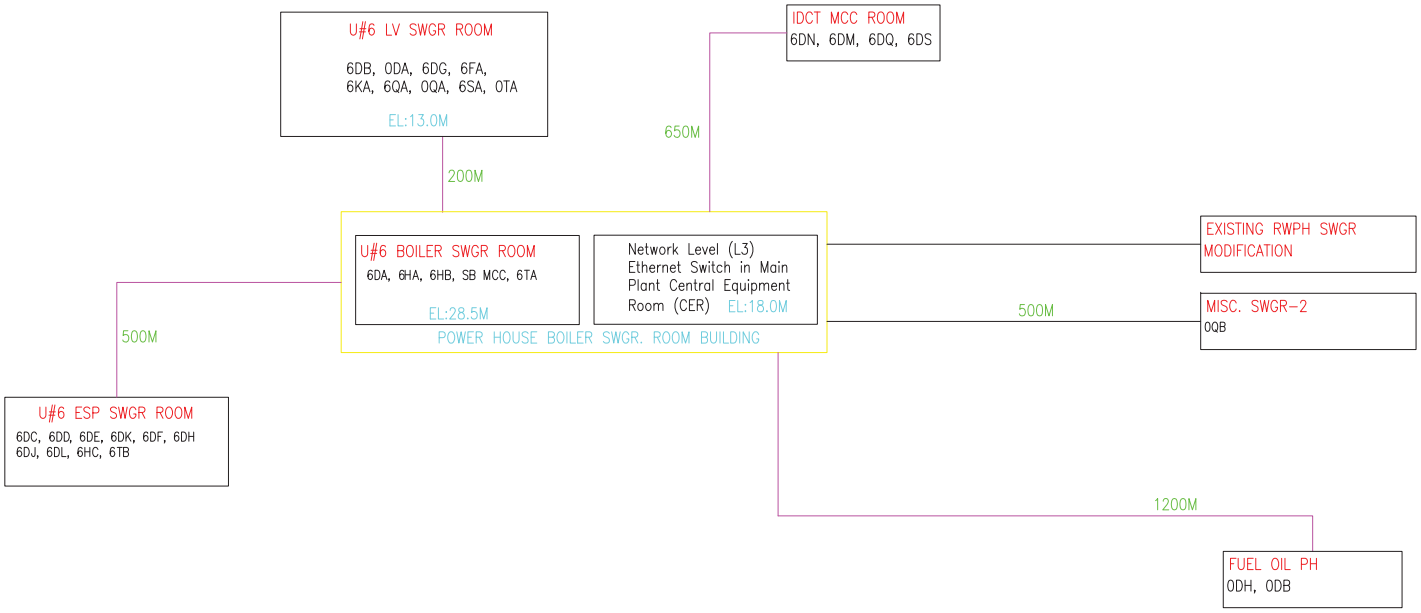
ATIVE SWITCHBOARD LOCATION DETAILS FOR 1X800MW SIPAT STPP STAGE-III

ANNEXURE-3




NOTE: TENTATIVE ROUTE LENGTH IN METERS SHOWN ON THIS DOCUMENT

DRAWING NO: 3-96-186-16421

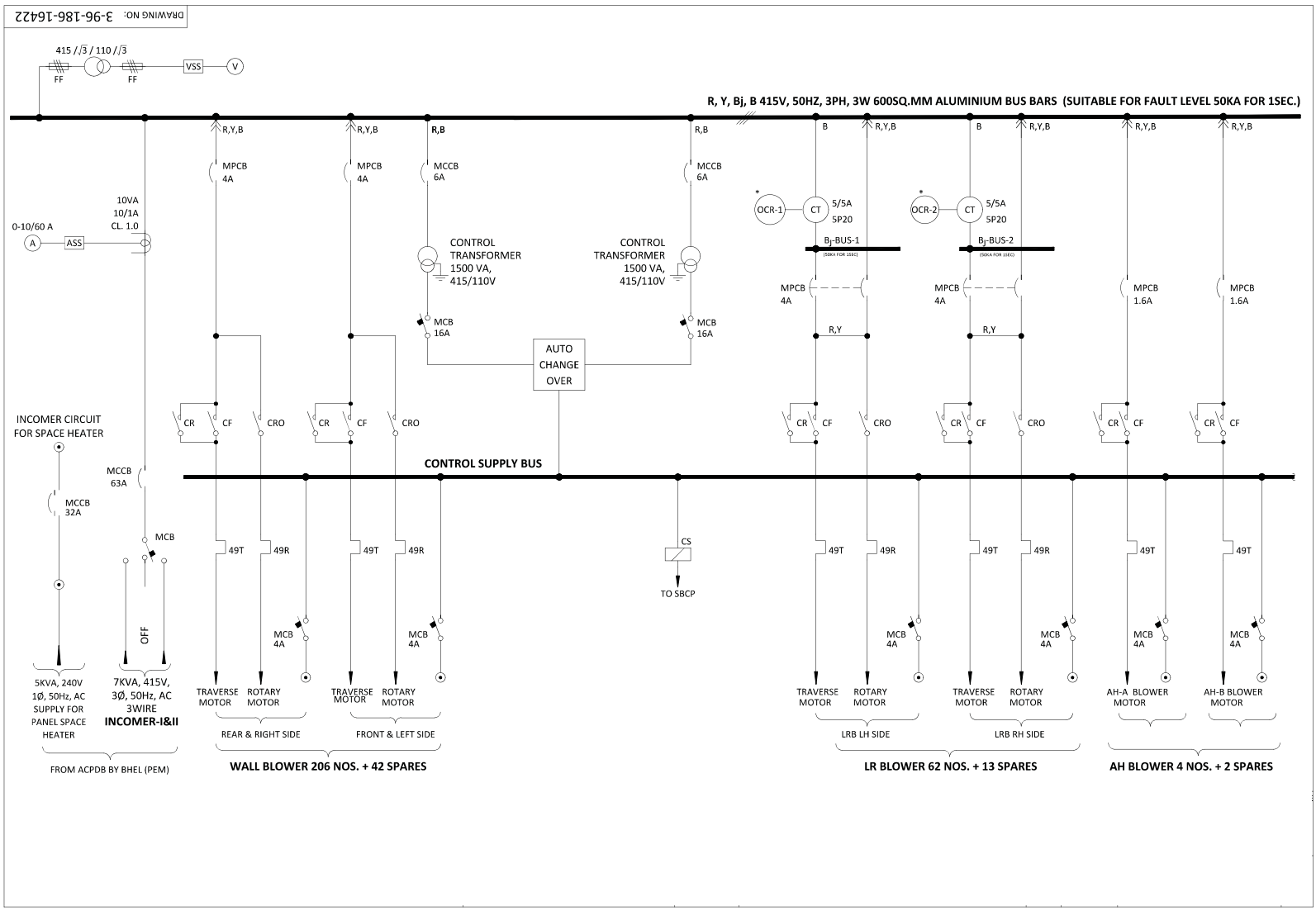
**ANNEXURE-5**

# SOOT BLOWER MCC SCHEME

| LEGEND | |
|---|---|
| 49R | THERMAL OVER LOAD RELAY ROTARY |
| 49T | THERMAL OVER LOAD RELAY TRAVERSE |
| 74 | AUX. CONTACTORS |
| A | AMMETER |
| CF | CONTACTOR FOR FORWARD |
| CR | CONTACTOR FOR REVERSE |
| CRO | CONTACTOR FOR ROTARY |
| CS | CONTROL SUPPLY HEALTHY |
| CT | CURRENT TRANSFORMER |
| FF | FUSE |
| LSTE | WALL BLOWER HOME POSITION LIMIT SWITCH |
| LSTR | WALL BLOWER ROTARY LIMIT SWITCH |
| LSTS | WALL BLOWER FORWARD END POSITION LIMIT SWITCH |
| LS1 | LRB/AHB FORWARD END POSITION LIMIT SWITCH |
| LS2 | LRB/AHB HOME POSITION LIMIT SWITCH |
| MCB | MINIATURE CIRCUIT BREAKER |
| MCCB | MOULDED CASE CIRCUIT BREAKER |
| MPCB | MOTOR PROTECTION CIRCUIT BREAKER |
| SBC | SOOTBLOWER CONTROLS SYSTEM |
| V | VOLTMETER |

| 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) |
| | MPCB/MCCB |
| | MCB |
| | SWITCH |
| | DRAWOUT TYPE TERMINALS |
| | CURRENT TRANSFORMER |
| | POTENTIAL TRANSFORMER |

FILE NAME: SINSBS02



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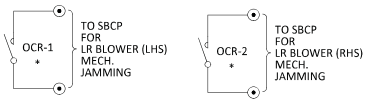
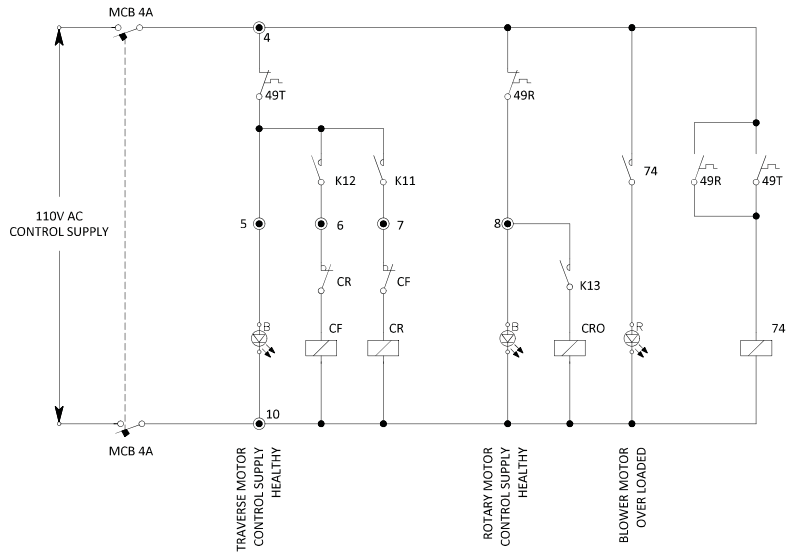


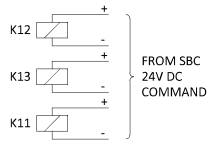

*NON-COMMUNICABLE NUMERICAL RELAY TO BE PROVIDED FOR OVER CURRENT SENSING FOR LR BLOWERS (OCR 1 & 2).

| DESCRIPTION | INCOMER FOR SPACE HEATER | INCOMER-I | INCOMER-II | WALL BLOWERS | | LR BLOWERS | | AH BLOWER |
|---|---|---|---|---|---|---|---|---|
| FEEDER NO. DETAILS | 1 | 1 | 1 | 206 + 42 SPARES | | 62 + 13 SPARES | | 4 NOS. + 2 SPARE |
| DRIVE DETAILS | - | - | - | TRAVERSE | ROTARY | TRAVERSE | ROTARY | |
| MOTOR CAPACITY IN KW | 5 KVA | 7 KVA | 7 KVA | 0.56 | 0.09 | 0.56 | 0.736 | 0.18 |
| FULL LOAD CURRENT IN AMPS | - | - | - | 1.36 | 0.64 | 1.4 | 1.65 | 0.56 |
| O/L RELAY RANGE IN AMPS | - | - | - | 0.9-1.5 | 0.45-0.75 | 0.9-1.5 | 1.0-2.0 | 0.45-0.75 |
| MCCB/MPCB RATING IN AMPS | 32A | 63 A | 63 A | 4 | 4 | 4 | 4 | 1.6 |
| POWER CONTACTOR | - | - | - | 16 | 16 | 16 | 16 | 16 |
| CABLE SIZE | 3CX6SQ.MM(AL) PC | 3CX10SQ.MM(AL) PC | 3CX10SQ.MM(AL) PC | 3CX2.5SQ.MM(CU) | 3CX2.5SQ.MM(CU) | 3CX2.5SQ.MM(CU) | 3CX2.5SQ.MM(CU) | 3CX2.5SQ.MM(CU) |

FILE NAME: SINSBS04

DRAWING NO: 3-96-16424




| LIMIT SWITCH CONTACT DEVELOPMENT | | | | |
|---|---|---|---|---|
| CONTACT | POSITION | HOME | INTER MEDIATE | FORWARD END |
| LSTS | 1-2 | - | - | X |
| | 3-4 | X | X | - |
| LSTE | 9-10 | - | X | X |
| | 7-8 | X | - | - |
| LSTR | 5-6 | - | - | MAKES AFTER 1 Rev. |
| X CONTACT CLOSED, - CONTACT OPEN | | | | |

ALL LIMIT SWITCHES ARE WIRED TO DCS.

**WRITE UP ON OPERATION OF WALL BLOWERS**

There are 3 limit switches and two motors, one for traverse motion and the other for rotary motion. At a time only one motion will take place. When an impulse is given for the blower start, the forward Motion starts. When the blower reaches its full forward position , it actuates the limit switch LSTS. This gives an impulse to trip traverse motor and to start the rotary motor through SBC. When the blower completes its rotary motion, it actuates limit switch LSTR. This gives an impulse for the Blower to retract from SBC by energising the reverse contactor in the starter. Limit switch LSTR and LSTS resets. As soon as the blower leaves the forward end position resetting of LSTS, SBC trips the rotary motor. When it reaches Its initial position, it actuates limit switch LSTE and the blower is stopped.

**N O T E**

K11, K12, & K13 ARE ENERGISED BY 24V DC COMMANDS FROM SBC.
K12 - ADVANCE COMMAND
K13 - ROTATE COMMAND
K11 - RETRACT COMMAND

FILE NAME: SINSBS05





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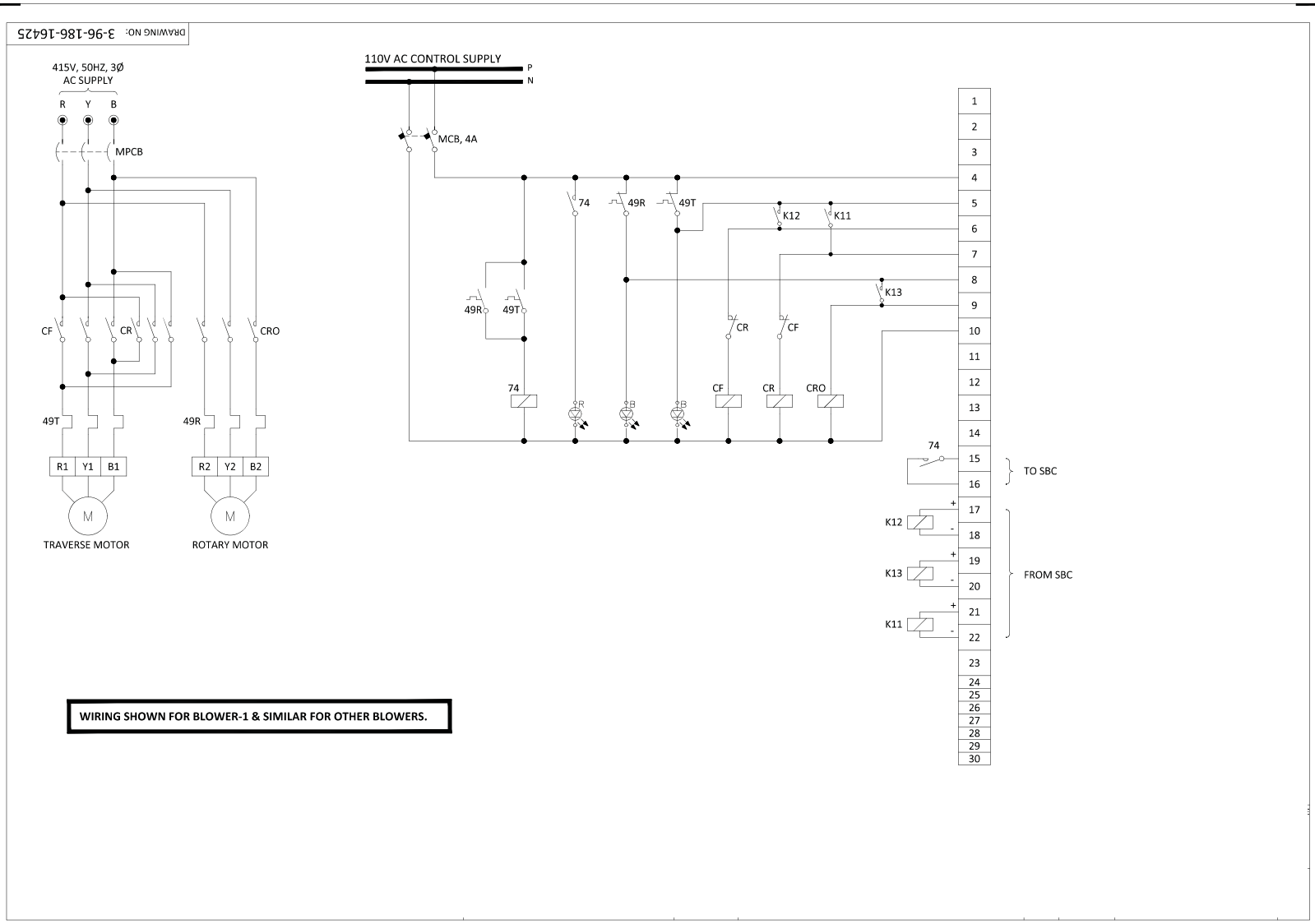
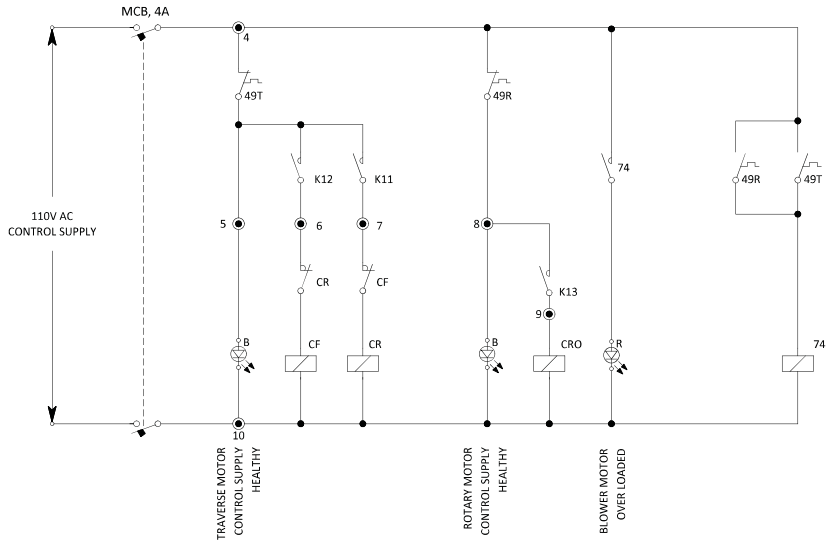
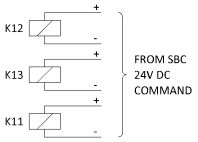

DRAWING NO: 3-96-186-16425
415V, 50HZ, 3Ø
AC SUPPLY
R
Y
B
MPCB
CF
CR
CRO
49T
49R
R1
Y1
B1
R2
Y2
B2
M
TRAVERSE MOTOR
ROTARY MOTOR
110V AC CONTROL SUPPLY
P
N
MCB, 4A
74
49R
49T
K12
K11
K13
CR
CF
CRO
TO SBC
FROM SBC
WIRING SHOWN FOR BLOWER-1 & SIMILAR FOR OTHER BLOWERS.
FILE NAME: SINSBS06
74

DRAWING NO: 3-96-186-16426




**LIMIT SWITCH CONTACT DEVELOPMENT**

| CONTACT | POSITION | HOME | INTER MEDIATE | FORWARD END |
|---|---|---|---|---|
| LS-1 | 1-2 | X | X | - |
| LS-2 | 4-5 | - | X | X |
| | 4-6 | X | - | - |
| X CONTACT CLOSED, - CONTACT OPEN | | | | |

ALL LIMIT SWITCHES ARE DIRECTLY WIRED TO DCS.

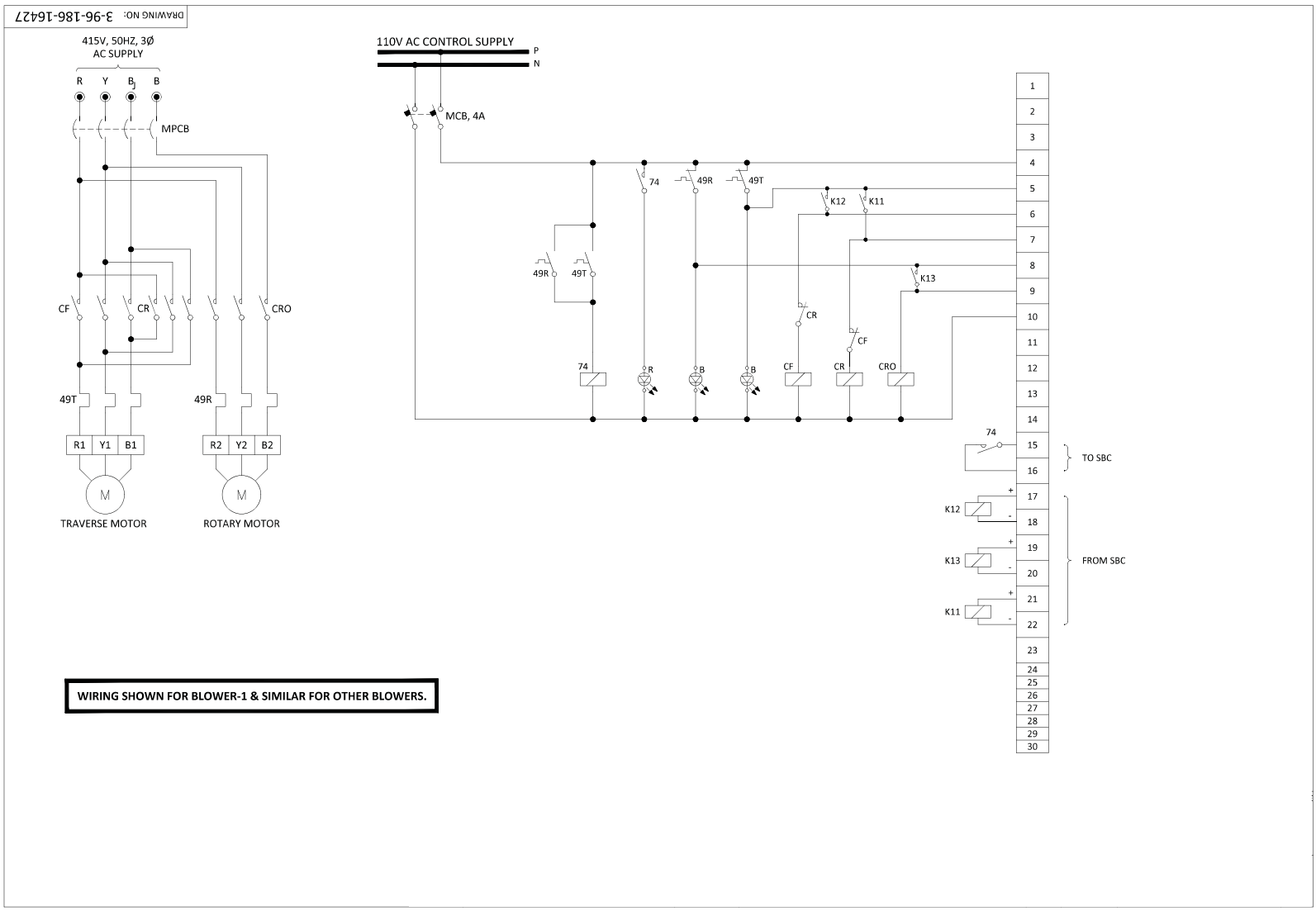
**WRITE UP ON OPERATION OF LONG RETRACTABLE BLOWER.**

The long retractable blower has dual electric motor drives. One motor moves the lance into and out of the boiler. The other rotates it always in the same direction. Rotation is continuous from the moment the lance starts to extend until retraction is completed. At the end of travel into boiler the two jets always return over a different path than that taken while the lance was extending. To start the LR blower, First the rotary motor is given command forward and starts rotating. Then the traverse motor starts is given start command. The limit switch LS-2 (contact 4,5) closes as soon as the blower starts moving. At the end of the forward Motion limit switch LS-1 opens (contacts 1,2). This will be used for reseting forward command and to issue retract command. When the blower reaches the home position. The limit switch LS-2 (contact 4,5) opens and the blower stops.

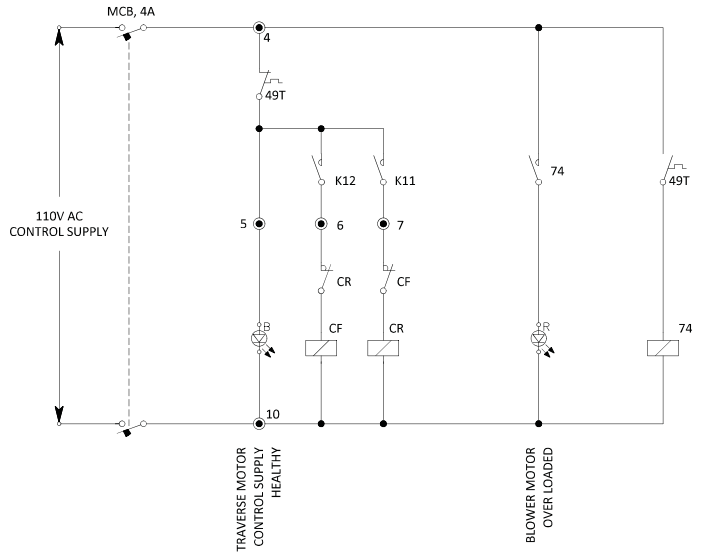
**N O T E**

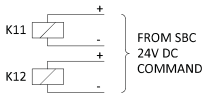
K11, K12, & K13 ARE ENERGISED BY 24V DC COMMANDS FROM SBC.
K12 - ADVANCE COMMAND
K13 - ROTATE COMMAND
K11 - RETRACT COMMAND

FILE NAME: SINSBS07


DRAWING NO: 3-96-186-16427
415V, 50HZ, 3Ø
AC SUPPLY
R
Y
B
B
MPCB
CF
CR
CRO
49T
49R
R1
Y1
B1
R2
Y2
B2
M
TRAVERSE MOTOR
ROTARY MOTOR
110V AC CONTROL SUPPLY
P
N
MCB, 4A
74
49R
49T
K12
K11
K13
CR
CF
CRO
R
B
TO SBC
FROM SBC
WIRING SHOWN FOR BLOWER-1 & SIMILAR FOR OTHER BLOWERS.
FILE NAME: SINSBS08
76

DRAWING NO: 3-96-186-16428




**LIMIT SWITCH CONTACT DEVELOPMENT**

| CONTACT | POSITION | HOME | INTER MEDIATE | FORWARD END |
|---|---|---|---|---|
| LS-1 | 1-2 | X | X | - |
| LS-2 | 4-5 | - | X | X |
| | 4-6 | X | - | - |
| X CONTACT CLOSED, - CONTACT OPEN | | | | |

ALL LIMIT SWITCHES ARE WIRED TO DCS.

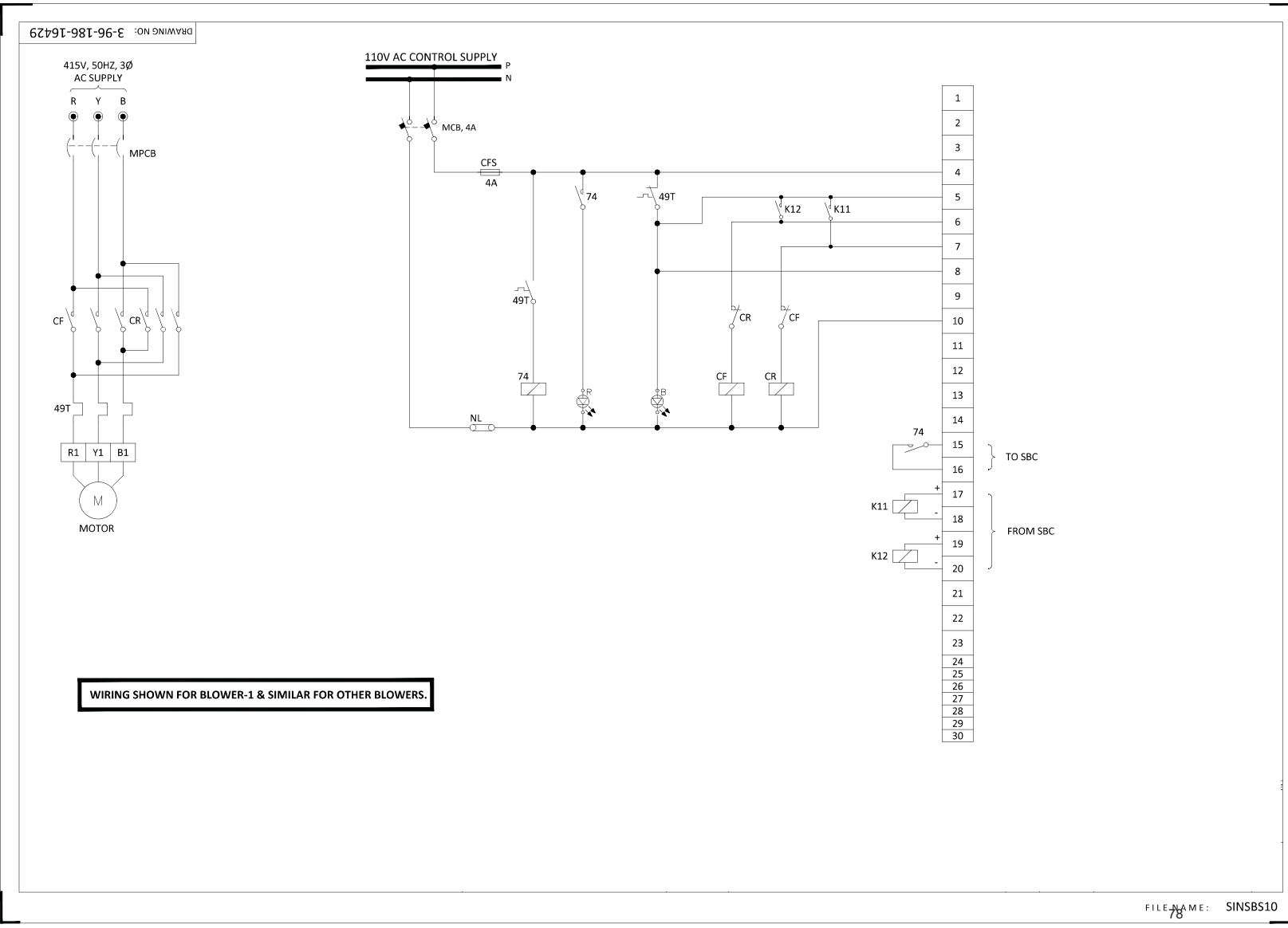
**WRITE UP ON OPERATION OF AIR HEATER BLOWERS**

There are 2 limit switches (LS-1 & LS-2) and one motor. When an impulse is given for the blower start, the forward motion starts. When the blower moves from home position limit switch LS-2 (Contact 4,5) contact makes and associated solenoid valve shall be given open command from DDCMIS. Opening the solenoid valve will admit the steam through AH blower. When the blower reaches forward end position limit switch LS-1 opens. This issues retract command to the blower. During retract cycle there will be no steam blowing. When the blower completes its retract motion, limit switch LS-2 (Contact 4,5) opens and blower stops.

**N O T E**

K11 & K12 ARE ENERGISED BY 24V DC COMMANDS FROM SBC.
K11 - RETRACT COMMAND
K12 - ADVANCE COMMAND

FILE NAME: SINSBS09



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**ANNEXURE-4**

## TENTATIVE LV SWITCHGEAR SCHEMES

| CLAUSE NO. | TECHNICAL REQUIREMENT |
|---|---|

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**LEGENE 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 C/C PROTECTION
- 50N IDMTL/DMT SENSITIVE/F PROTECTION
- 51N INSTATENOUS E/F PROTECTION
- 49 THREE PHASE THERMAL O/L PROTN.WTH O/L ALARM & RESTART INHIBITE FUNCTION
- 48/49 STALLING/LOCKED ROTOR PROTECTION
- 46 THREE PHASE NEGATIVE PHASE SEQUENCE PROTECTION
- 66 NUMBER OF START LIMITATION /REPATETIVE START PROTECTION
- 2 THE DELAY PROTECTION
- 60 FUSE FAILURE PROTECTON
- 87M 3 PHASE MOTOR DIFFERENTIAL PROTECTION
- MCB
- MPCB

**LEGEND DESCRIPTION**

- 64B 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
- I 3 PHASE CURRENT MEASUREMENT
- In NEUTRAL CURRENT MEASUREMENT
- V 3 PHASE VOLTAGE MEASUREMENT
- Vo 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
- NCCB

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

LEGEND DRAWING

A3 420X297



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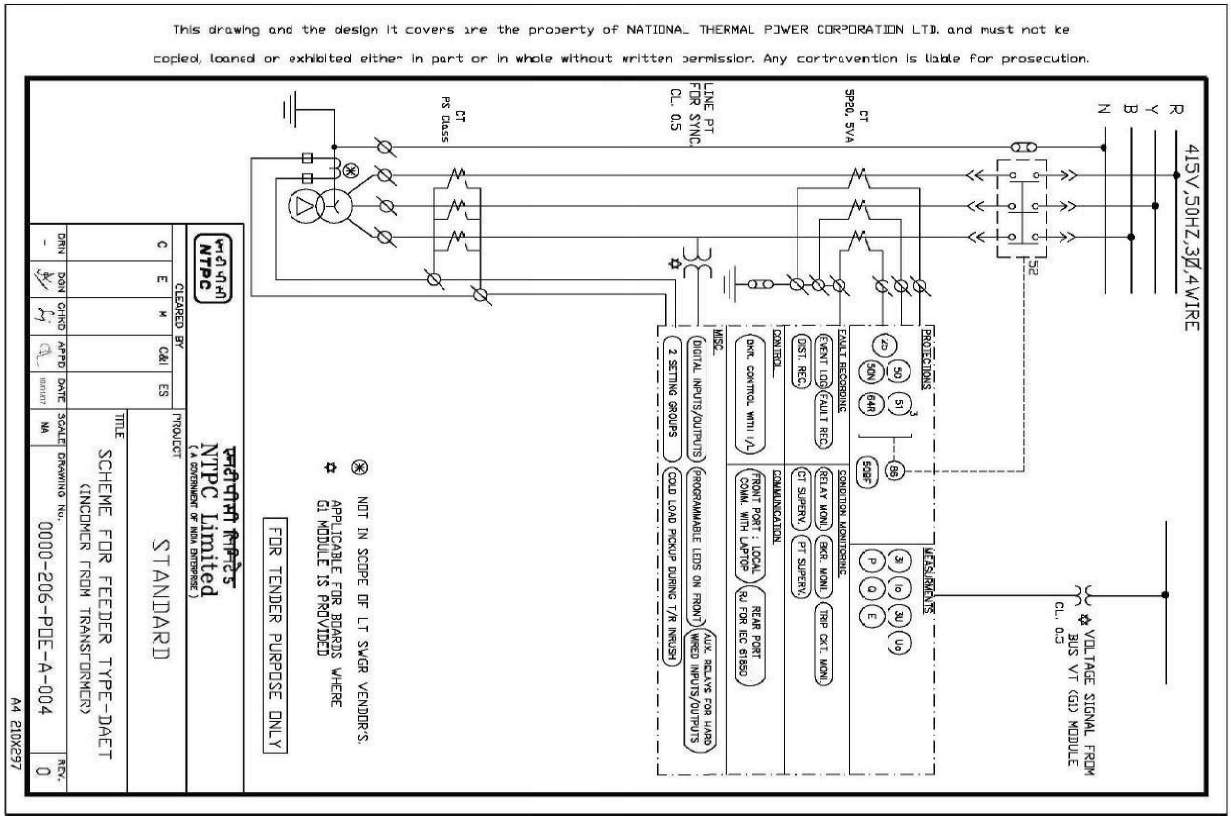






File No. PEM-PG0MM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
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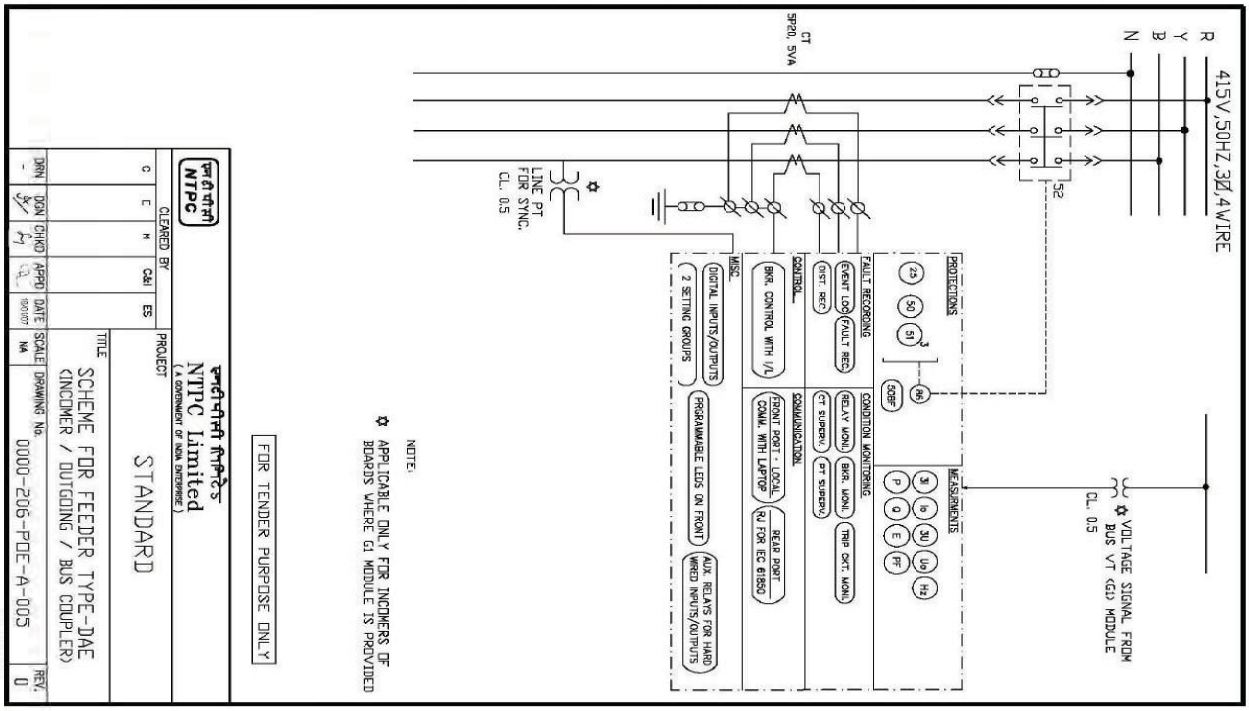






File No. PEM-PG0MM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
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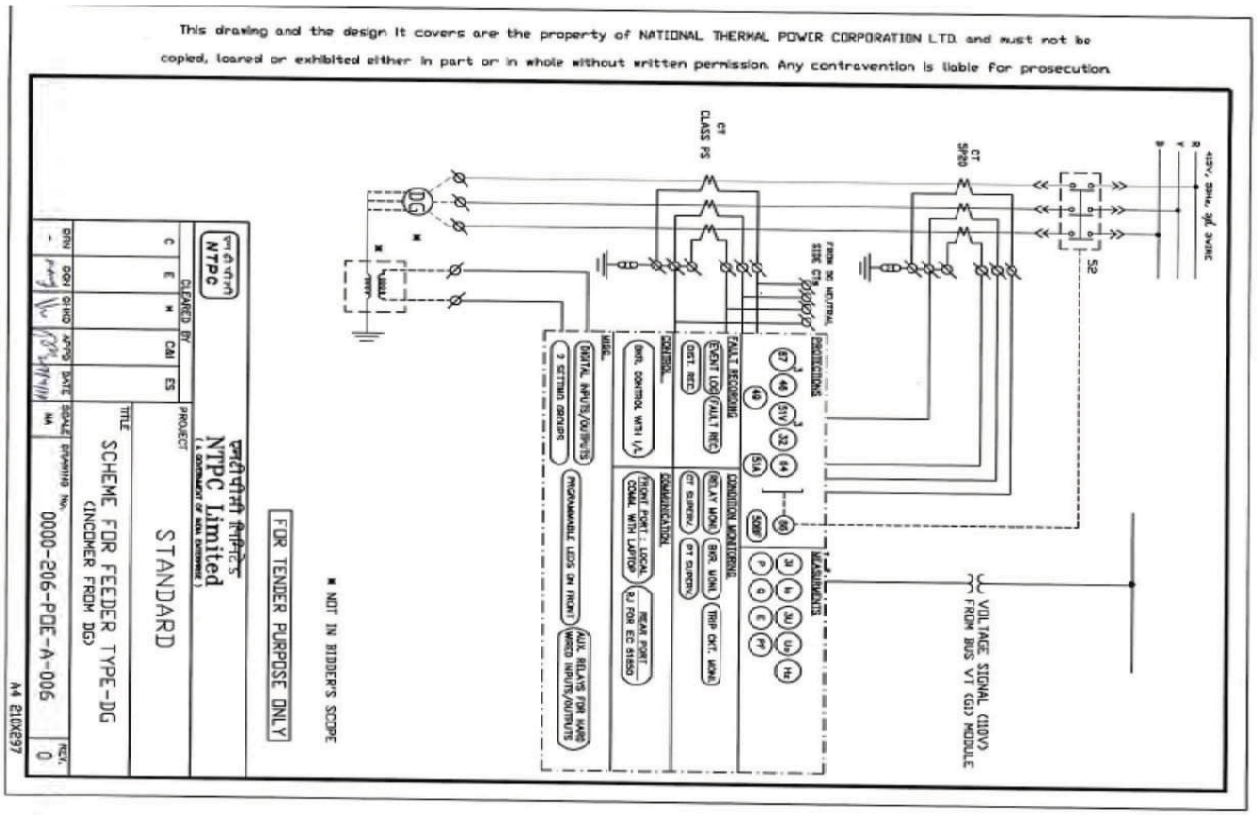
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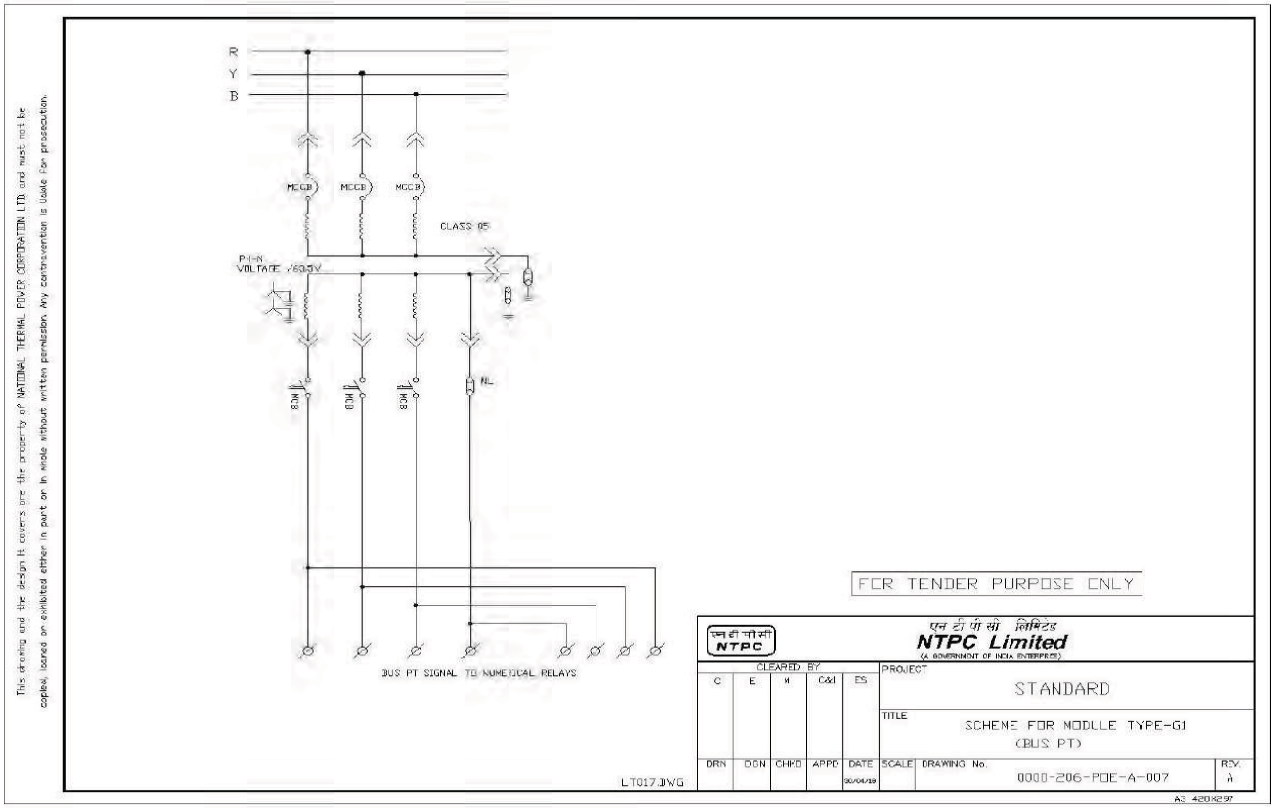
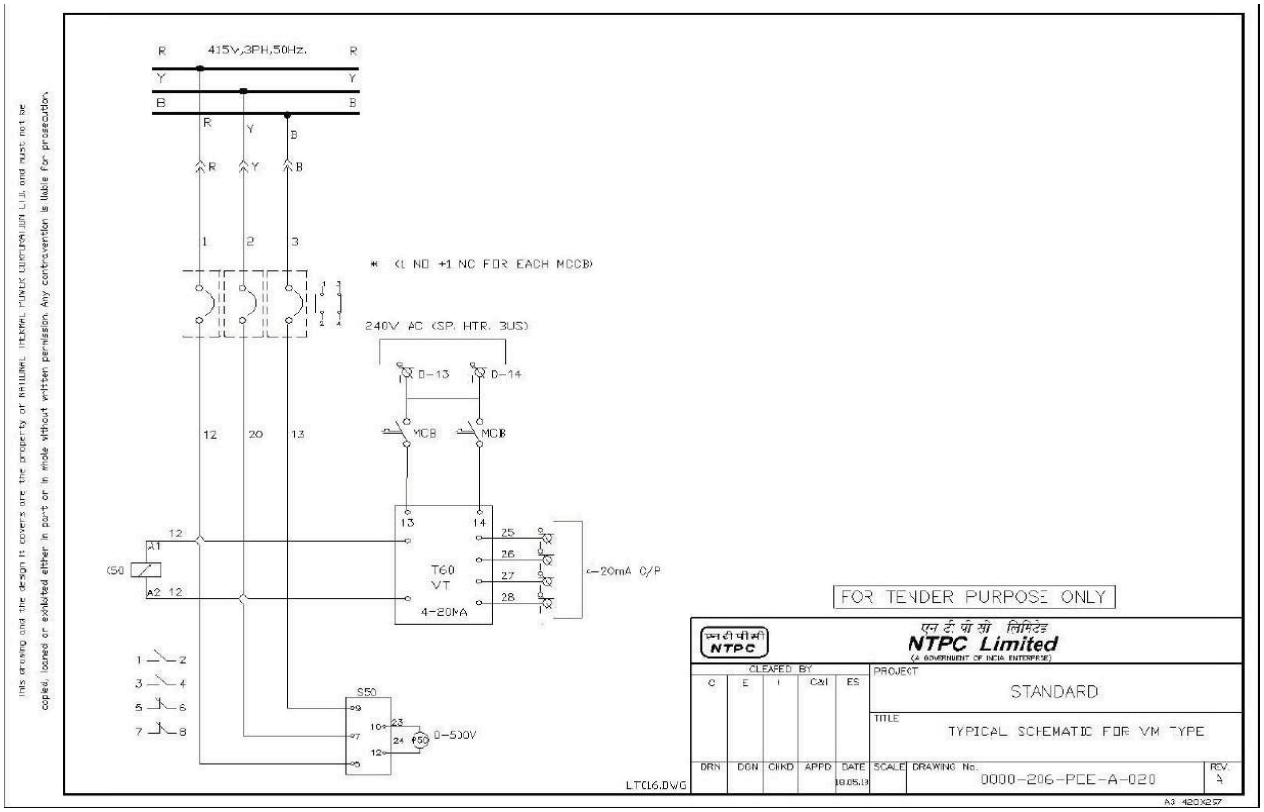
415V, 50Hz, 3Ph, 4W, 3NAC
R
Y
B
N
52
CT
5P20
CT
CLASS PS
FROM DC NEUTRAL
SIDE CB
PROTECTIONS
67
46
51V
32
64
49
51A
50
50BF
MEASUREMENTS
IR
IY
IB
IN
IG
VR
VY
VB
VN
VG
FAULT RECORDING
EVENT LOG
FAULT REC
DIST. REC
CONDITION MONITORING
RELAY MONI
BKR. MONI
TRIP CKT. MONI
CT SUPERV.
PT SUPERV.
CONTROL
BKR. CONTROL WITH LA
COMMUNICATION
FRONT PORT - LOCAL
COMM. WITH LAPTOP
REAR PORT
IEC 61850
MISC.
DIGITAL INPUTS/OUTPUTS
3 SETTING GROUPS
PROGRAMMABLE LEDS ON FRONT
AUX. RELAYS FOR HARD WIRED INPUTS/OUTPUTS
VOLTAGE SIGNAL (110V)
FROM BUS VT (GIS) MODULE
* NOT IN BIDDER'S SCOPE
FOR TENDER PURPOSE ONLY
NTPC
NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)
PROJECT
STANDARD
TITLE
SCHEME FOR FEEDER TYPE-DG
(INCOMER FROM DG)
DRN
CHKD
APPD
DATE
SHEET
DRAWING No.
0000-206-POE-A-006
REV.
0
A4 210X297

82


R
Y
B
MCCB
MCCB
MCCB
CLASS 05
P-N
VOLTAGE 110/63V
MCB
MCB
MCB
NL
BUS PT SIGNAL TO NUMERICAL RELAYS
This drawing and the design it covers are the property of NATIONAL THERMAL POWER CORPORATION LTD and must not be copied, loaned or exhibited either in part or in whole without written permission. Any contravention is liable for prosecution.
FOR TENDER PURPOSE ONLY
NTPC
एन टी पी सी लिमिटेड
NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)
CLEARED BY
C
E
M
C&I
ES
PROJECT
STANDARD
TITLE
SCHEME FOR MODULE TYPE-G1
(BUS PT)
DRN
DGN
CHKD
APPD
DATE
30/04/19
SCALE
DRAWING No.
0000-206-POE-A-007
REV.
A
LT017.DWG
A3 420X297

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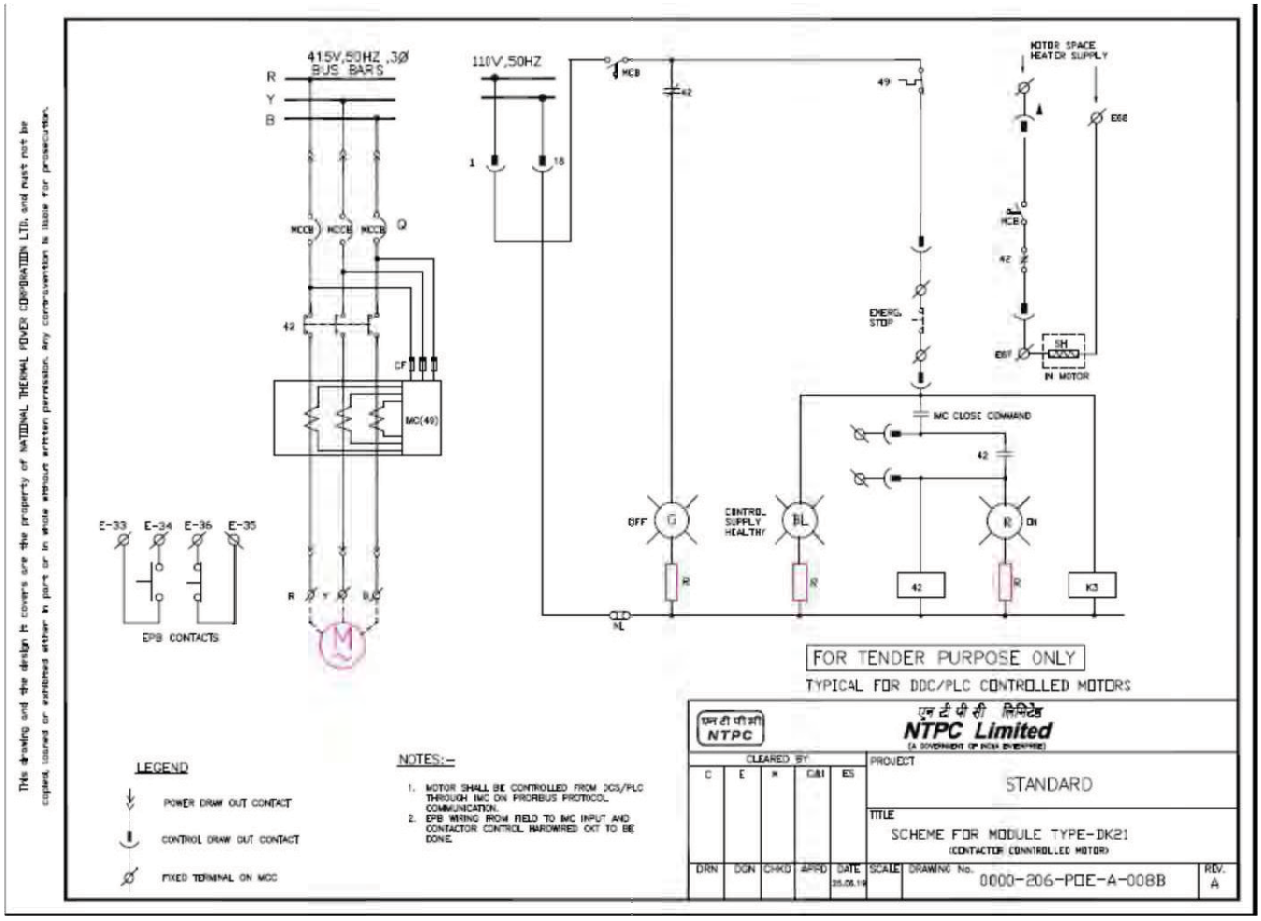
415V,50HZ ,3Ø
BUS BARS
R
Y
B
110V,50HZ
MCB
MCCB
MCCB
MCCB
Q
42
CP
MC(49)
E-33
E-34
E-36
E-35
EPB CONTACTS
M
42
1
15
49
ENERG. STOP
MOTOR SPACE HEATER SUPPLY
E66
MCB
42
E67
SH
IN MOTOR
MC CLOSE COMMAND
42
OFF
G
CONTRO. SUPPLY HEALTHY
BL
R
ON
42
K3
NL
FOR TENDER PURPOSE ONLY
TYPICAL FOR DDC/PLC CONTROLLED 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 OUT TO BE DONE.
NTPC
NTPC Limited
(A GOVERNMENT OF INDIA ENTERPRISE)
CLEARED BY
C
E
M
C&I
ES
PROJECT
STANDARD
TITLE
SCHEME FOR MODULE TYPE-DK21
(CONTACTOR CONTROLLED MOTOR)
DRN
DGN
CHKD
APRD
DATE
SCALE
DRAWING No.
0000-206-POE-A-008B
REV.
A
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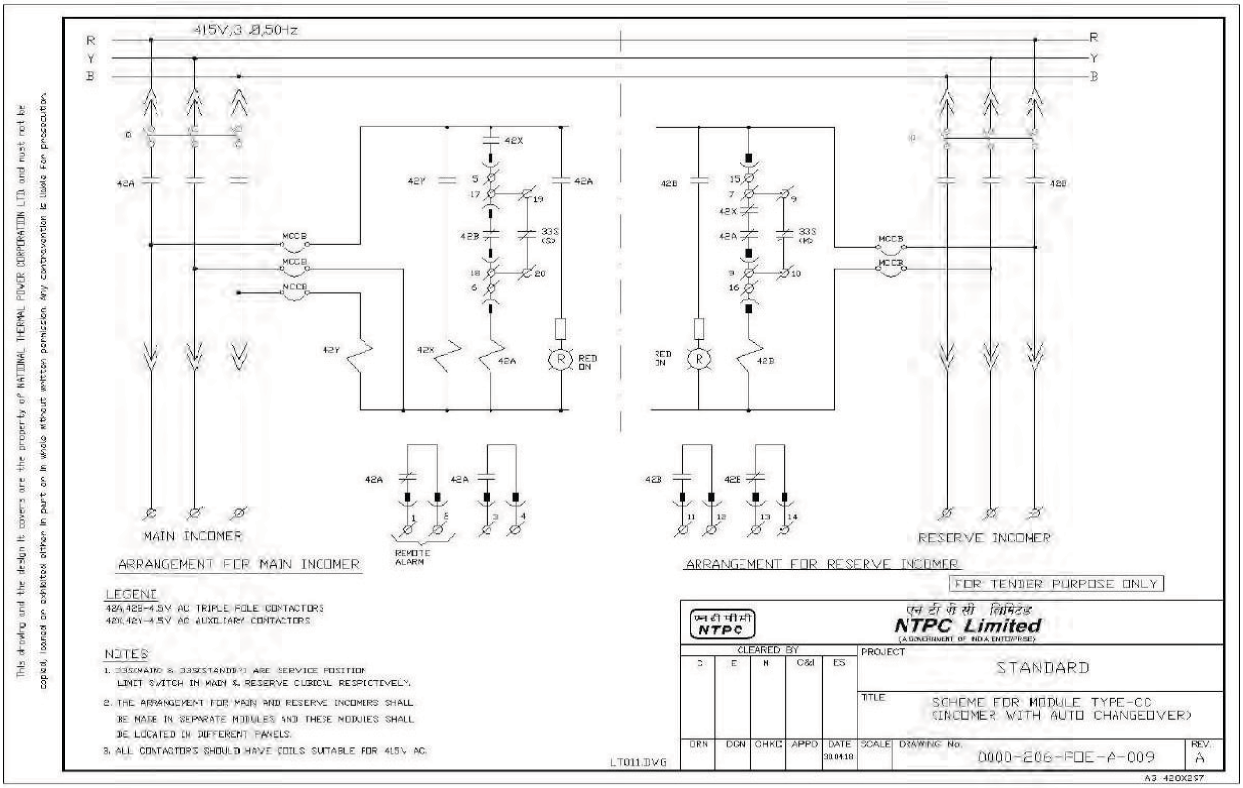


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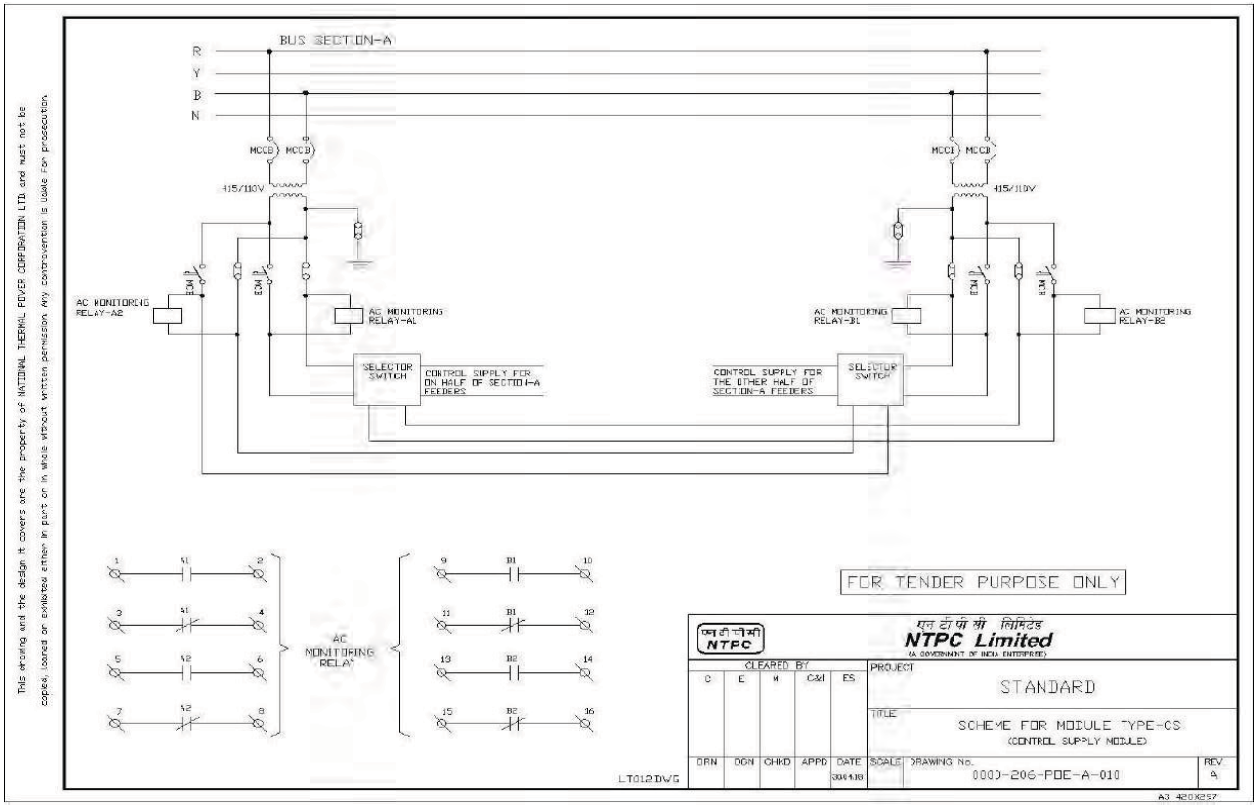
BUS SECTION-A
R
Y
B
N
MCCB
MCCB
415/110V
AC MONITORING RELAY-A2
AC MONITORING RELAY-A1
SELECTOR SWITCH
CONTROL SUPPLY FOR ON HALF OF SECTION-A FEEDERS
CONTROL SUPPLY FOR THE OTHER HALF OF SECTION-A FEEDERS
AC MONITORING RELAY-B1
AC MONITORING RELAY-B2
AC MONITORING RELAY
FOR TENDER PURPOSE ONLY
NTPC Limited
STANDARD
SCHEME FOR MODULE TYPE-CS
(CONTROL SUPPLY MODULE)
0000-206-PDE-A-010
LT012.DWG
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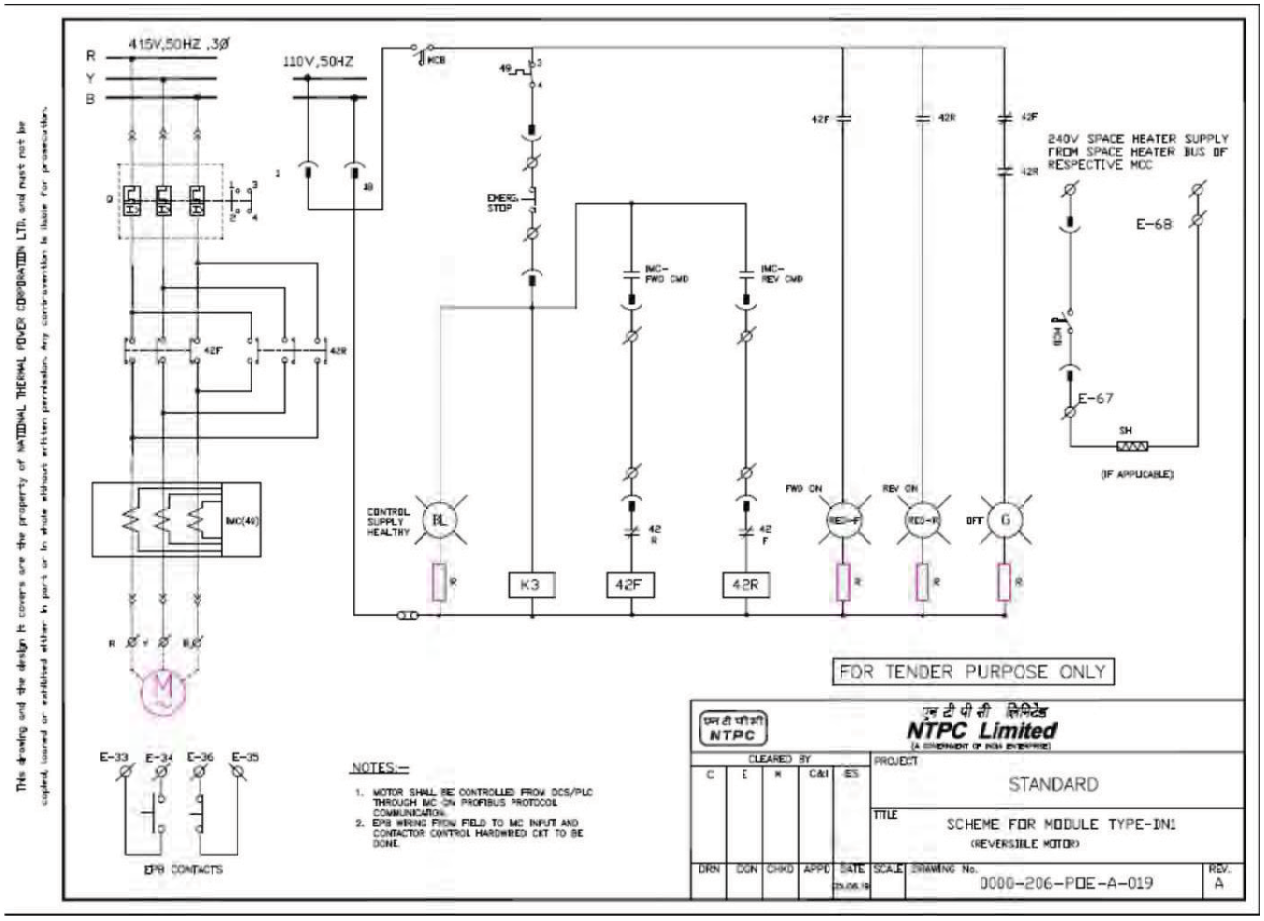


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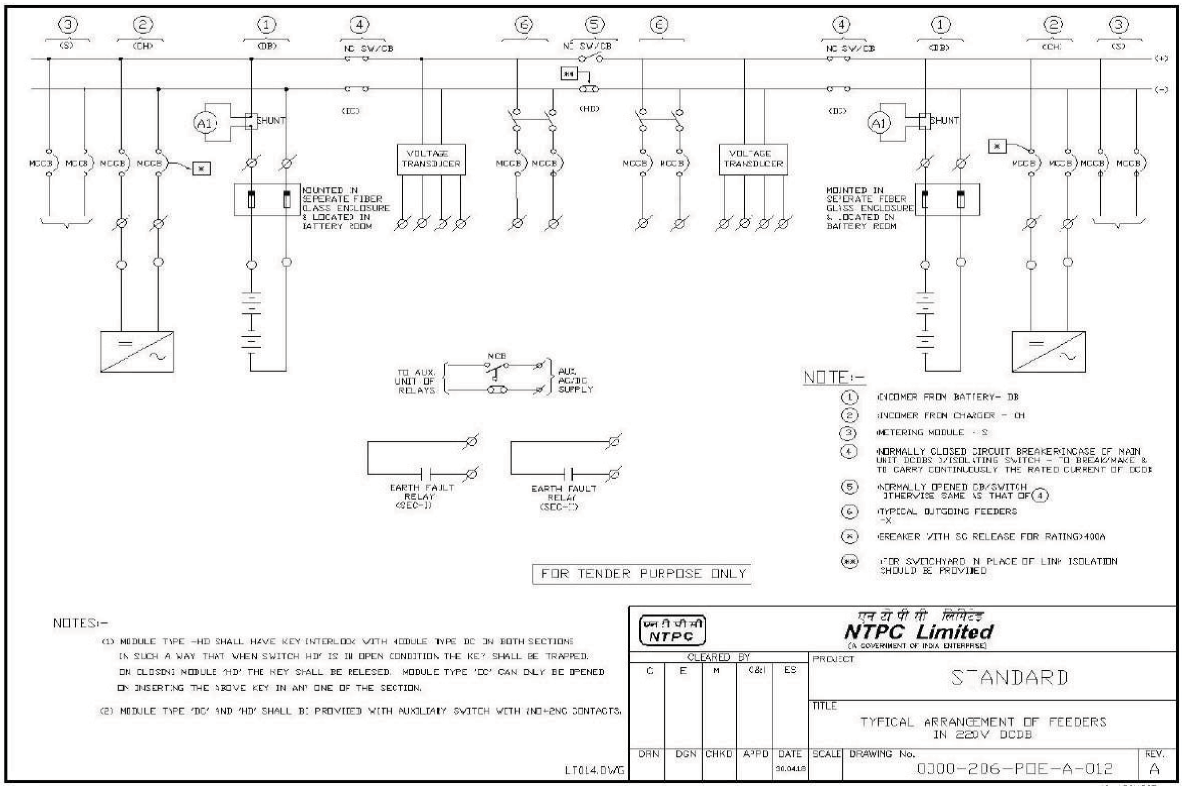
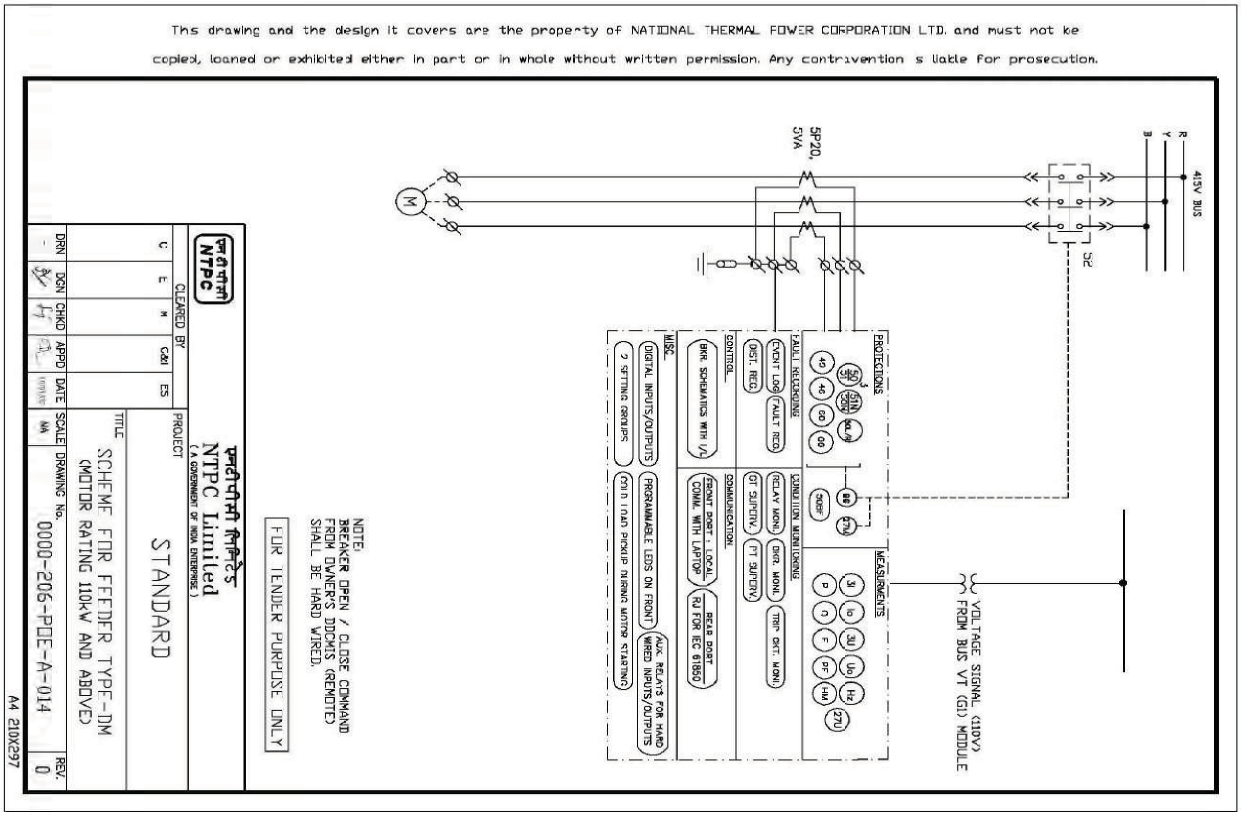






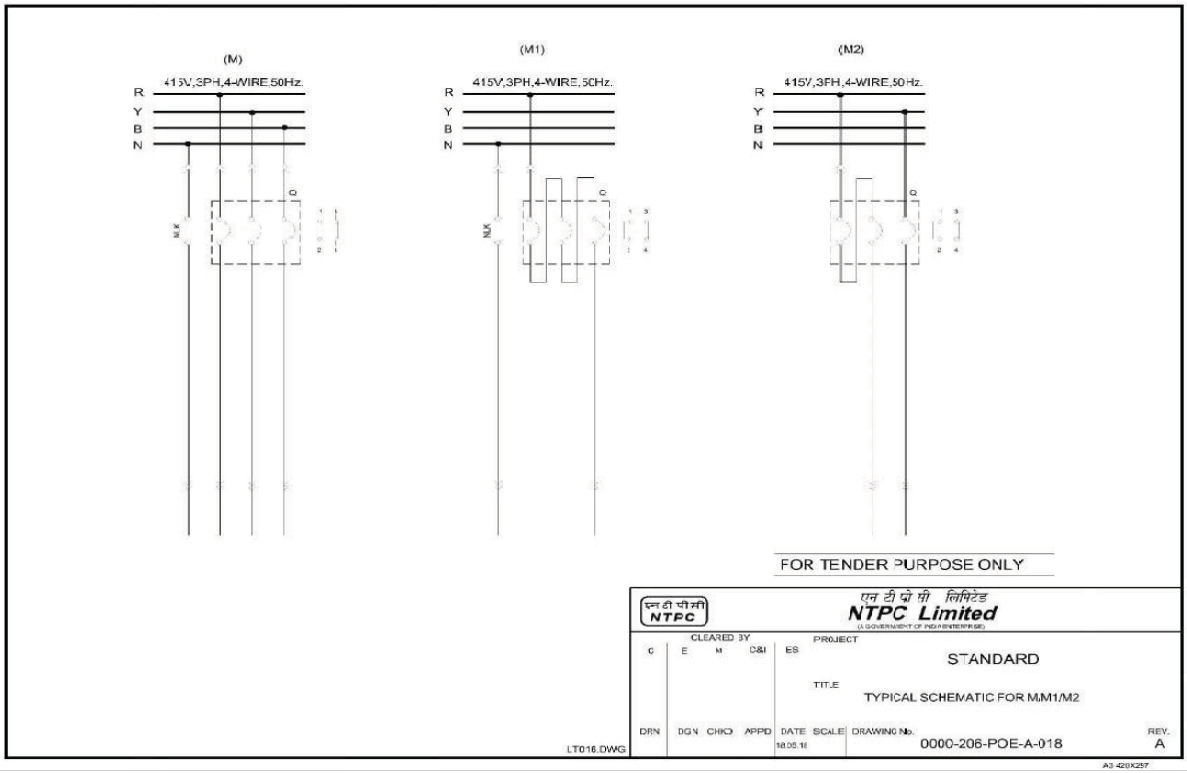

File No. PEM-PGOMM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
Generated from eOffice by Nitish Manu, MANAGER(NM)-PG I-2-PS-PEM, MANAGER, BHARAT HEAVY ELECTRICAL LTD on 14/07/2026 09:56 am








File No. PEM-PG0MM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
Generated from eOffice by Nitish Manu, MANAGER(NM)-PG I-2-PS-PEM, MANAGER, BHARAT HEAVY ELECTRICAL LTD on 14/07/2026 09:56 am

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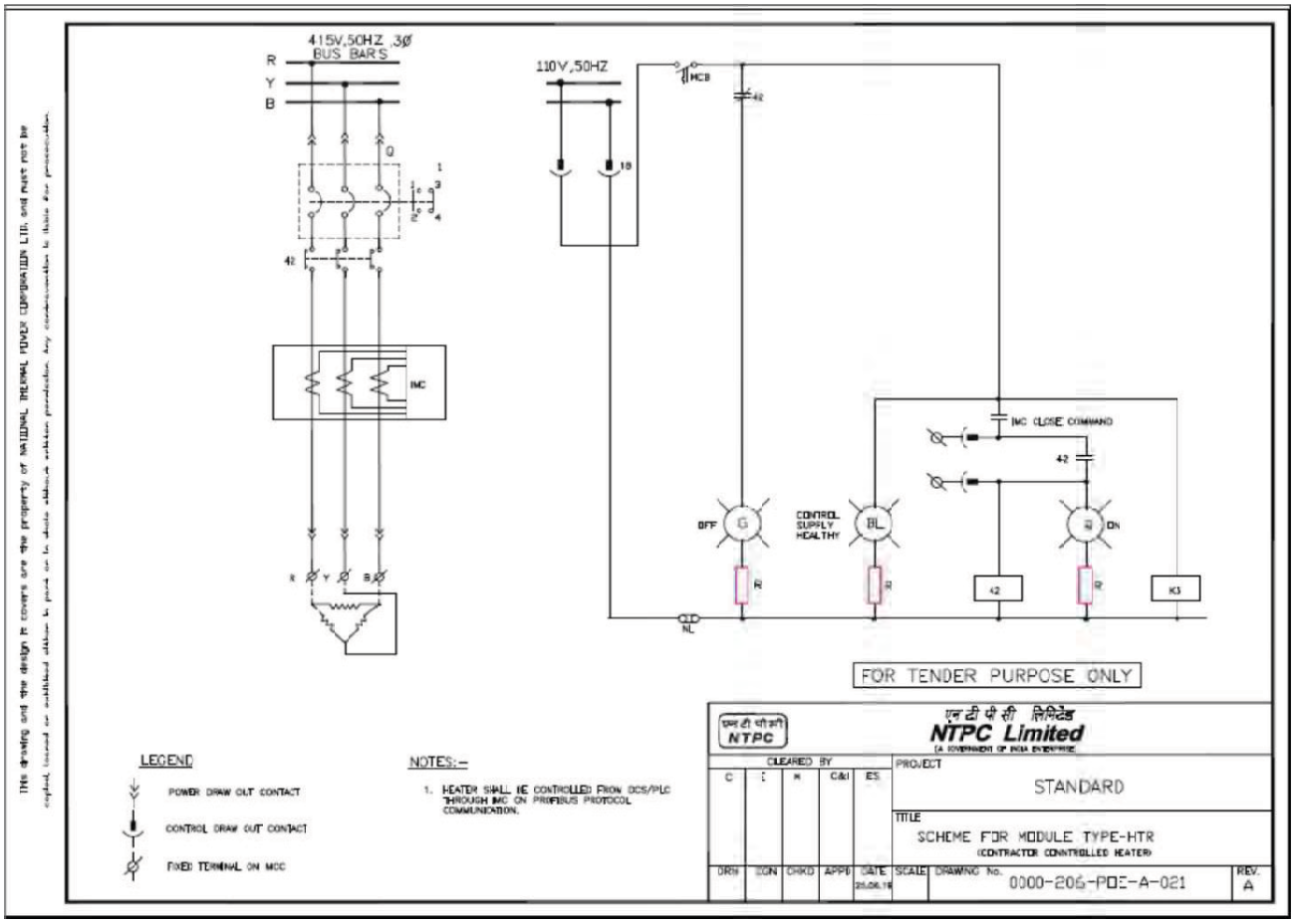
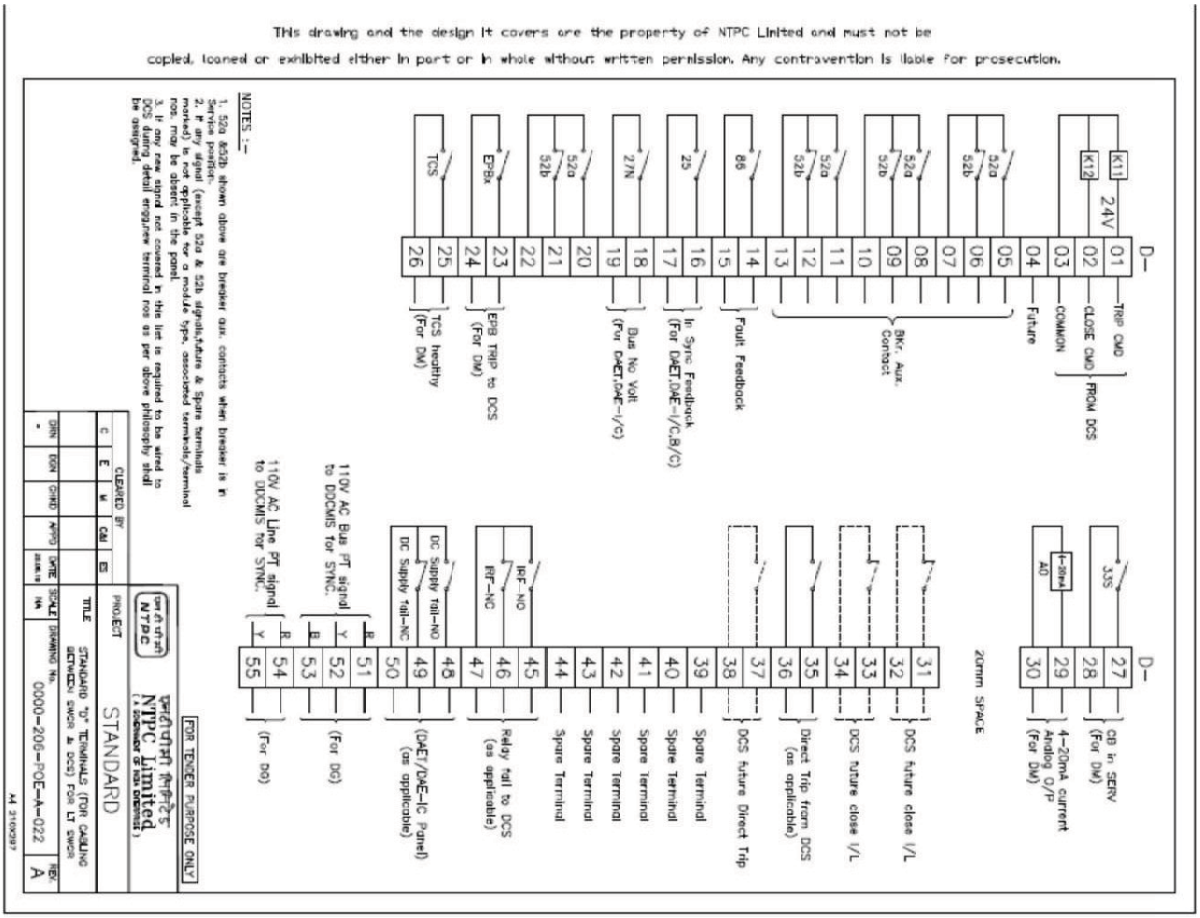

415V,50HZ ,3Ø
BUS BARS
R
Y
B
110V,50HZ
MCB
42
IMC
IMC CLOSE COMMAND
OFF
G
CONTROL SUPPLY HEALTHY
BL
ON
R
42
K3
NL
FOR TENDER PURPOSE ONLY
LEGEND
POWER DRAW OUT CONTACT
CONTROL DRAW OUT CONTACT
FIXED TERMINAL ON MCC
NOTES:-
1. HEATER SHALL BE CONTROLLED FROM DCS/PLC THROUGH IMC ON PROFIBUS PROTOCOL COMMUNICATION.
NTPC
NTPC Limited
PROJECT
STANDARD
TITLE
SCHEME FOR MODULE TYPE-HTR
(CONTRACTOR CONTROLLED HEATER)
DRN
DGN
CHKD
APPD
DATE
SCALE
DRAWING No.
0000-206-PDI-A-021
REV.
A








File No. PEM-PG0MM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
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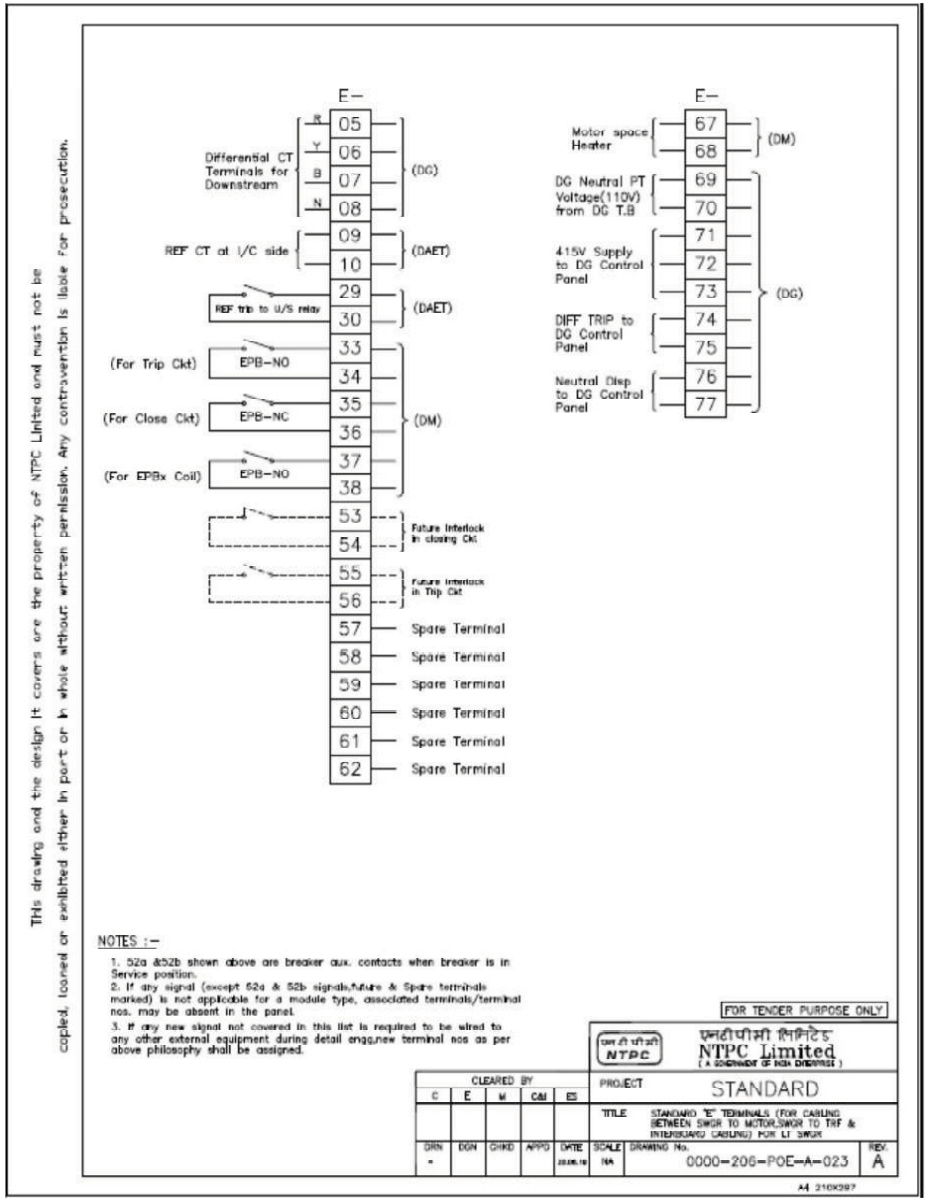






File No. PEM-PGOMM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
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| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002 |
| | | Issue No: 00 |
| | | Rev. No. 00 |
| | | 20 June 2026 |

# QUALITY PLAN

| | MANUFACTURE'S NAME & ADDRESS | MANUFACTURING QUALITY PLAN | | |
|---|---|---|---|---|
| | | PACKAGE :<br>ITEM : LT SWITCHGEAR PANELS (DRAW OUT TYPE AND FIXED TYPE) | QAP NO :<br>REV. :<br>DATE :<br>PAGE : | PROJECT :<br>CUSTOMER :<br>END USER : |

| SR. NO | COMPONENT & OPERATION | CHARACTERISTICS | CLASSIFICATION | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY 10 | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | D* | M** | C | N | 11 |
| **1** | **RAW MATERIAL** | | | | | | | | | | | | | |
| **1.1** | Angles, Channels & Sheet Steel for Fabrication (CR/HR) | i) Thickness | Major | Meas. | 1 sample of each type & size/lot | - | Approved Drawing/IS-513, IS-1079, IS-2062 | Approved Drawing/ IS-513, IS-1079, IS-2062 | QC records/ MTC | | P | - | - | |
| | | ii) Surface finish & check for waviness / flatness | Major | Visual | -do- | - | Approved Drawing/IS-513, IS-1079, IS-2062 | Approved Drawing/ IS-513, IS-1079, IS-2062 | QC records/ MTC | | P | - | - | |
| | | iii) Bending Test | Major | Mech. | Sample | - | Approved Drawing/IS-513-1994 | Approved Drawing/ IS-513-1994 | MTC | | V | - | - | |
| **1.2** | Bus Bar – Copper / Aluminum | i) Dimension | Major | Meas. | 1 sample of each type & size/lot | - | As per IS- 5082 / IS-1897/ Approved Drg. | As per IS- 5082 / IS-1897/Approved Drg. | QC records/ MTC | | P | V | V | |
| | | ii) Physical and Chemical Test | Major | Meas. | -do- | - | As per IS- 5082 / IS-1897/ Approved Drg. | As per IS- 5082 / IS-1897/Approved Drg. | QC records/ MTC | | P | V | V | |
| | | iii) Surface Finish | Major | Visual | -do- | - | As per IS- 5082 / IS-1897 | As per IS- 5082 / IS-1897 | QC Records | | P | V | V | |
| | | iv) Conductivity | Major | Ele. | 10% Sample | - | As per IS- 5082 / IS-1897 | As per IS- 5082 / IS-1897 | MTC | | P | V | V | |
| **2** | **BROUGHT OUT ITEMS** | | | | | | | | | | | | | |
| 2.1 | Air Circuit Breaker | i) Make, Type, Rating | Major | Visual | 100% | - | Approved Drg. /Data sheet/IEC 60947-2 | Approved Drg. /Data sheet/ IEC 60947-2 | QC Records | | P | V | V | |
| | | ii) All Routine test | Critical | Tests | -do- | - | Approved Drg. /Data sheet/IEC 60947-2 | Approved Drg. /Data sheet/ IEC 60947-2 | MTC | ✓ | V | V | V | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Suman Nakwal<br>HARISH KUMAR | * Records, identified with "TICK"(✓) shall be included by contractor in documentation.<br>**M: Manufacturer/Sub-Contractor, C: Contractor / Nominated Inspection Agency, N: End User . Indicated "P" PERFORM, "W" WITNESS & "V" VERIFICATION "W" Indicated in column N shall be "CHP" of NTPC. (FS – Factory Standard)<br>Note: COC - Wherever mention shall be COC by Pyrotech. | FOR END USER | DOC NO :<br>REV NO :<br>CAT : | | |
| Manufacturer / Sub Supplier | Main Supplier | | | | | |
| SIGNATURE | | | | REVIEWED BY | APPROVAL BY | APPROVAL SEAL |

Page 1 of 16

96

| | MANUFACTURE'S NAME & ADDRESS | MANUFACTURING QUALITY PLAN | | |
|---|---|---|---|---|
| | | PACKAGE :<br>ITEM : LT SWITCHGEAR PANELS (DRAW OUT TYPE AND FIXED TYPE) | QAP NO :<br>REV. :<br>DATE :<br>PAGE : | PROJECT :<br>CUSTOMER :<br>END USER : |

| SR. NO | COMPONENT & OPERATION | CHARACTERISTICS | CLASSIFICATION | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY 10 | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | D* | M** | C | N | 11 |
| 2.2 | CT's | i) Overall dimensions & mounting arrangement | Major | Meas. | 10% of each type & rating per lot | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC Records / MTC | | P | - | - | |
| | | ii) Make, Type, Rating, Accuracy class | Major | Visual | -do- | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC Records/ MTC | | P | V▲ | V▲ | |
| | | iii) All routine tests | Critical | Ele. | 100% | 10% | IS-2705 | IS-2705 | MTC | ✓ | V | V | V | |
| 2.3 | PT's | i) Overall dimensions & mounting arrangement | Major | Meas. | 10% of each type & rating per lot | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC Records / MTC | | P | - | - | |
| | | ii) Make, Type, Rating, Accuracy class | Major | Visual | -do- | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC Records / MTC | | P | V▲ | V▲ | |
| | | iii) All routine tests | Critical | Ele. | 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 relay, Indicating lamp | i) Make, Type, Rating | Major | Visual | 10% of each type & rating per lot | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | COC/ QC Records | | P | V▲ | V▲ | |
| 2.5 | Indicating Instruments | i) Make, Type, Rating, Accuracy class | Major | Visual | 10% of each type & rating/lot | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | MTC | | P | V▲ | - | |

| | | | | | |
|---|---|---|---|---|---|
| | Suman Nakwal<br>HARISH KUMAR | * Records, identified with "TICK"(✓) shall be included by contractor in documentation.<br>**M: Manufacturer/Sub-Contractor, C: Contractor / Nominated Inspection Agency, N: End User . Indicated "P" PERFORM, "W" WITNESS & "V" VERIFICATION<br>"W" Indicated in column N shall be "CHP" of NTPC. (FS – Factory Standard)<br>Note: COC - Wherever mention shall be COC by Pyrotech. | FOR END USER | DOC NO :<br>REV NO :<br>CAT : | |
| Manufacturer / Sub Supplier | Main Supplier | | | | |
| SIGNATURE | | | | REVIEWED BY | APPROVAL SEAL |



File No. PEM-PGOMM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
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| | MANUFACTURE'S NAME & ADDRESS | MANUFACTURING QUALITY PLAN | | PROJECT : |
|---|---|---|---|---|
| | | PACKAGE :<br>ITEM : LT SWITCHGEAR PANELS (DRAW OUT TYPE AND FIXED TYPE) | QAP NO :<br>REV. :<br>DATE :<br>PAGE : | CUSTOMER :<br>END USER : |

| SR. NO | COMPONENT & OPERATION | CHARACTERISTICS | CLASSIFICATION | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY 10 | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | D* | M** | C | N | 11 |
| | | ii) Routine tests | Major | Ele. | 100% | 100 % | IS-1248 | IS-1248 | MTC | ✓ | V | V | V | |
| 2.6 | Transducer, MFM, IMC, Energy Meter. | i) Make, Type, Rating, Accuracy class | Major | Visual | 10% of each type & rating/lot | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC RECORD/ MTC | | P | V | - | |
| | | ii) Routine tests | Major | Ele. | 100% | 10% | Approved Drg. /Data sheet/ IEC-60688/ IEC62052/ IEC60947 | Approved Drg. /Data sheet/ IEC-60688/IEC62052/IEC60947 | MTC | ✓ | V | V | V | |
| 2.7 | Control Transformer | i) Make, Type, Rating | Major | Visual | 10% of each type & rating/lot | | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC RECORD | | P | V | V | |
| | | ii) Routine tests including Voltage Ratio | Major | Ele. | 100% | 10% | Approved Drg. / Data sheet/ IS-12021 | Approved Drg. /Data sheet/ IS-12021 | MTC | ✓ | V | V | V | |
| 2.8 | PVC Wires / Cables (Multi strand FRLS) | i) Make, Type, Rating | Major | Visual | 10% of each type & rating/lot | | IS-694 | IS-694 | QC RECORD | | P | - | - | BIS CERTIFIED WIRE (ISI MARK) |
| | | ii) Routine tests including FRLS test | Major | Ele. | 100% | 10% | IS-694 | IS-694 | MTC | | V | V | V | |
| 2.9 | Insulating Barriers, Shrouds and Bus-bar Insulators | i) Visual | Major | Visual | 1 Sample per lot | 1 Sample per lot | As per approved Drg. | As per approved Drg. | QC Record | | P | | | |

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| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | D* | M** | C | N | 11 |
| | | ii) Flame Resistance Test | Major | Elec. | 1 Sample per lot | 1 Sample per lot | As per approved Data Sheet | As per approved Data Sheet | MTC / COC/ QC Record | | V | V | V | UL 94 V0 MATERIAL TO BE USED. |
| 2.10 | ACB handling Trolley | i)Dimensional & Functional Check | Major | Test | 10% of each type & rating of first lot | -- | Approved Drg. | Approved Drg. | QC Records | | P | V | | Subsequent lot will be cleared based on COC |
| 2.11 | Space heater, Thermostat, 3-pin socket, Hooter, Terminal Block | i) Make, Type, Rating | Major | Visual | 1 Sample of each type/lot | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC Records | | V | - | - | |
| 2.12 | Numerical Relay | i)Make, Type, Rating | Major | Meas. | 100% | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC Records | | V | - | - | |
| | | ii) Routine test report | Major | Ele. | 100% | 100 % | Approved Drg. /Data sheet/ IEC 60255/ IEC 61850 | Approved Drg. /Data sheet/ IEC 60255/IEC 61850 | MTC | ✓ | V | V | V | CHP OF NUMERICAL RELAY TO BE SHOWN AT THE TIME OF FINAL INSPECTION. |
| | | iii) Numerical Relay Testing | Major | Ele. | 10% of each type, & rating/lot | 10% of each type, & Rating /lot | Approved FAT Procedure | Approved FAT Procedure | | ✓ | P | W | W | SEPARATE FAT PROCEDURE IS TO BE FURNISHED FOR NTPC REVIEW AND APPROVAL. |

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| 2.13 | Synthetic rubber Gasket/ Neoprene rubber gasket | i) Visual & Dimension, Profile, shore hardness, Elongation at break & ageing & compression Test, Ozone Resistance Test | Major | Review of Documents | 100% | - | Approved Drg. /Data sheet | Approved Drg. /Data sheet | QC Records/ COC | ✓ | P | V | V | Gaskets as per type tested design |
| 2.14 | High Tensile Bolt | i) Appearance and Dimension | Major | Visual | Sample | - | Approved Drawing | Approved Drawing | QC Records/ COC | | V | - | - | |
| | | ii) Mechanical Properties | Major | Mech. | Sample | - | Approved Drawing/IS 1367 | Approved Drawing/IS 1367 | QC Records/ COC/ MTC | | V | - | - | |
| 2.15 | PVC Sleeve | i) Visual | Major | Visual | Sample | - | Approved Drawing | Approved Drawing | QC Records/ COC /MTC | | V | - | - | UL224 Sleeve to be used |
| **3** | **IN PROCESS INSPECTION** | | | | | | | | | | | | | |
| **3.1** | Panel Fabrication | i) Cutting, punching, shearing & bending | Major | Meas. | Mfr. Practice | - | Manufacturer's Standard | Manufacturer's Standard | QC Records | | P | - | - | |
| | | ii) panel front door cut-outs punching | Major | Meas. | -do- | - | Approved Drg. | Approved Drg. | QC Records | | P | - | - | |
| **3.2** | Paint Check | i) Pre- Treatment of sheet | Major | Process | Mfr. Practice | - | Manufacturer's Standard/IS-6005 | Manufacturer's Standard/IS-6005 | QC Records | | P | - | - | |

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| | | ii) Paint Shade, Thickness & Adhesion | Major | Process | 1 sample per lot | - | Approved Drg. / Annexure-II | Approved Drg. / Annexure-II | QC Records | | P | - | - | Cross Hatch method using Adhesive tape |
| 3.3 | Panel Assembly | i) Panel shell assembly, Top & back cover assembly, Panel door assembly, hinge fitting & door knob fitting etc. | Major | Process | 100% | - | Mfr Internal Drgs made to meet Appd. GA Drgs. | Mfr Internal Drgs made to meet Appd. GA Drgs. | QC Records | | P | - | - | |
| | | ii) Size of busbar & busbar finish | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | iii) Colour coding of busbar | Major | Visual | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | iv) Insulator type & mounting | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | v) Busbar support distance & tightness of bolts for Main bus bars and bus bar joints | Major | Process | 100% | - | Manufacturer's Standard | Manufacturer's Standard | QC Records | | P | - | - | |
| | | vi) Main , Control & Auxiliary Busbar Clearances | Major | Process | 100% | - | Mfr Internal Drgs made to meet Appd. GA Drgs. | Mfr Internal Drgs made to meet Appd. GA Drgs. | QC Records | | P | - | - | |
| | | vii) CT / PT mounting arrangement & tightness | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |

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| | | viii) Termination for power & control circuits | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | ix) Lug size & crimping quality | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | x) Earthing busbar size & continuity; earth-ing of panel & doors | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | xi) Breaker safety shutter operation | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | xii)Spring loaded power and control contact alignment | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | xiii) Tin/Silver plating/ bimetallic strip between Cu. & Al. joint | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| 3.4 | Module assembly | i) Component identification | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | ii) Component layout, mounting & dimensions | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | iii) Incoming & outgoing power & control contacts assembly & alignment | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |

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| | | iv) Power circuit wire / strip termination & clearances | Major | Process | 100% | - | Mfr Internal Drgs made to meet Appd. GA Drgs. | Mfr Internal Drgs made to meet Appd. GA Drgs. | QC Records | | P | - | - | |
| | | v) Bus bar joints | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| | | vi) Functional Checks | Major | Process | 100% | - | -do- | -do- | QC Records | | P | - | - | |
| 3.5 | Control Wiring | i) Wire Size & lug size. Color of wire | Minor | Visual | 100% | - | As Per apprd. Wiring diagram | As Per apprd. Wiring diagram | QC Records | | P | - | - | |
| | | ii) Proper wire Clamping & Ferruling | Minor | Visual | 100% | - | Mfr std | Mfr std | QC Records | | P | - | - | |
| | | iii) Continuity as per wiring drg. | Critical | Test | Sample | - | As Per Apprd. Drg. | As Per Apprd. Drg. | QC Records | | P | - | - | |
| | | iv) Tightness of termination & crimping check | Major | Test | 100% | - | Mfr std | Mfr std | QC Records | | P | - | - | |
| 4 | **FINAL INSPECTION & TESTING** | | | | | | | | | | | | | |
| 4.1 | Visual & Dimension Check | i) Overall visual check for aesthetics, verticality of panels and alignment between two transport sections | Major | Visual | 100% | 10% | Approved GA Drgs | Approved GA Drgs | QC Records | ✓ | P | W | W | |

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| | | ii) Verification of overall dimensions Including sheet steel thickness | Major | Meas. | 100% | 1 sample of each type of panel / lot | Approved GA Drgs | Approved GA Drgs | QC Records | ✓ | P | W | W | |
| | | iii) Bus duct interface, phase sequence, flange dimensions & clearances | Major | Visual | 100% | 100% | Approved GA Drgs | Approved GA Drgs | QC Records | ✓ | P | W | W | |
| | | iv) Bus bar (Main – horizontal) – clearances, color coding, phase sequence identification for each Transport unit including sleeve insulation checking | Critical | Meas. & Visual | 100% | 10% | As Per Approved Drgs | As Per Approved Drgs | QC Records | ✓ | P | W | W | |
| | | v) Verification of tightness of bus bar joints by torque wrench | Critical | Mech. | 100% | 10% | As Per Approved Drgs / Technical Specification | As Per Approved Drgs / Technical Specification | QC Records | ✓ | P | W | W | Torque marking on bolt head will be done. |

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| | | vi) CT/PT fixing & mounting arrangement | Major | Visual | 100% | 10% | Mfr. Std. | Mfr. Std. | QC Records | ✓ | P | W | W | Clearance between CT and busbar to be ensured. |
| | | vii) Check shrouding of accessible live parts, Cable supports and tool falling shroud in cable alley and application of PVC sleeves on bus bars. | Major | Visual | 100% | 10% | Technical Specification | Technical Specification | QC Records | ✓ | P | W | W | Form-4B as per IEC-61439 |
| | | viii) Verification of Components for make, type, rating & layout | Major | Visual | 100% | 10% of each type of module/lot | As per approved scheme drg/ Make List | As per approved scheme drg/ Make List | QC Records | ✓ | P | W | W | |
| | | ix) Check control wiring / terminal arrangement & ferruling | Major | Visual | 100% | Same as above | NTPC approved drg. | NTPC approved drg. | QC Records | ✓ | P | W | W | |
| | | x) Safety Shutters operation check | Critical | Ele. | 100% | Same as above | Technical Specification | Technical Specification | QC Records | ✓ | P | W | W | |
| | | xi) Check door interlock & defeat interlock feature | Major | Ele. | 100% | Same as above | Technical Specification | Technical Specification | QC Records | ✓ | P | W | W | |

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| | | xii) Mech operation test for ACB as per IS | Critical | Ele. | 100% | Same as above | IS 13947/IEC 60947 | IS 13947/IEC 60947 | QC Records | ✓ | P | W | W | |
| | | xiii) Breaker operation at service, test & isolate position | Critical | Ele. | 100% | 100 % | IS 13947/IEC 60947; As per app. Drg | IS 13947/IEC 60947; As per app. Drg | QC Records | ✓ | P | W | W | |
| | | xiv) Power & control draw-out contacts alignment check | Major | Ele. | 100% | 10% of each type of module/ lot | Technical Specification | Technical Specification | QC Records | ✓ | P | W | W | |
| | | xv)Check for Breaker Anti-pumping & trip free feature | Major | Ele. | 100% | 100 % | Technical Specification | Technical Specification | QC Records | ✓ | P | W | W | |
| | | xvi) Earthing of ACB Cradle | Major | Visual | 100% | 100 % | Technical Specification | Technical Specification | QC Records | ✓ | P | W | W | |
| | | xvii) Interlocks & operation check: elect. / mech open, close: under test , service & isolation position | Critical | Ele. | 100% | 10% of each type of module/ lot | As per Approved drgs. | As per Approved drgs. | QC Records | ✓ | P | W | W | |

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|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | D* | M** | C | N | 11 |
| | | xviii) interchangeability check for draw-out modules | Major | Mech. | 100% | 10% | Technical Specification | Technical Specification | QC Records | ✓ | P | W | W | |
| | | xix) Earth bus dimensions, earthing of draw-out modules, door etc. | Major | Ele. | 100% | 10% of each type of module/lot | As per Approved drgs. | As per Approved drgs. | QC Records | ✓ | P | W | W | SEPARATE COPPER EARTH BUS FOR IMC |
| | | xx) Check Paint shade, thickness, Adhesion & finish | Major | Visual/ Test | 100% for shade & finish; 2-3 samples / lot for thickness & adhesion check | 2- 3 samples / board | As per approved drg. /Data Sheet | Approved drg./ Data Sheet | QC Records | ✓ | P | W | W | |
| | | xxi) Bus-bar support arrangement, center to center distance between supports | Major | Mech. | 100% | 10% | As per Approved drgs. | As per Approved drgs. | QC Records | ✓ | P | W | W | |
| | | xxii) Overlapping of Bus bar joints | Major | Mech. | 100% | 10% | As per Approved drgs. | As per Approved drgs. | QC Records | ✓ | P | W | W | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Suman Nakwal<br>HARISH KUMAR | * Records, identified with "TICK"(✓) shall be included by contractor in documentation.<br>**M: Manufacturer/Sub-Contractor, C: Contractor / Nominated Inspection Agency, N: End User . Indicated "P" PERFORM, "W" WITNESS & "V" VERIFICATION<br>"W" Indicated in column N shall be "CHP" of NTPC. (FS – Factory Standard)<br>Note: COC - Wherever mention shall be COC by Pyrotech. | FOR END USER | DOC NO :<br>REV NO :<br>CAT : | | |
| Manufacturer / Sub Supplier | Main Supplier | | | | | |
| SIGNATURE | | | | REVIEWED BY | APPROVED BY | APPROVAL SEAL |



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| | | MANUFACTURE'S NAME & ADDRESS | MANUFACTURING QUALITY PLAN | | PROJECT :<br>CUSTOMER :<br>END USER : |
|---|---|---|---|---|---|
| | | | PACKAGE :<br>ITEM : LT SWITCHGEAR PANELS (DRAW OUT TYPE AND FIXED TYPE) | QAP NO :<br>REV. :<br>DATE :<br>PAGE : | |

| SR. NO | COMPONENT & OPERATION | CHARACTERISTICS | CLASSIFICATION | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY 10 | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | D* | M** | C | N | 11 |
| | | xxiii) Draw in- draw out- draw- in of modules at random and check damages of contacts including module/breaker interchangeability check. | | Visual | Random | | | No Damages | | QC Records | P | W | W | |
| | | xxiv) Degree of protection check, check profile & fixing of gaskets | Major | Visual | 2 – 5 samples at gasketted joints/ board | 2-5 samples at gasketted joints/ board | As per approved drgs / Technical Specification | No insertion possible from openings & gasketted joints | QC Records | ✓ | P | W | W | Paper insertion method for IP 5X compartments & 1 mm wire insertion method for IP 4X Compartments. |
| | | xxv) Degree of Protection Check for IMC | Major | Visual | 2 – 5 sample | 2-5 sample | As per approved drgs / Technical Specification | As per approved drgs / Technical Specification | QC Records | ✓ | P | W | W | |
| | | xxvi) Functional test on each type of draw out module | Major | Ele. | 100% | 10% of each type of module | As per Approved drgs. | As per Approved drgs. | QC Records | ✓ | P | W | W | |
| | | xxvii) Close door operation check | Major | Mech. | 100% | 10% of each type of module | As per Approved drgs. | As per Approved drgs. | QC Records | ✓ | P | W | W | |

| | | | | | | |
|---|---|---|---|---|---|---|
| | Suman Nakwal<br>HARISH KUMAR | * Records, identified with "TICK"(✓) shall be included by contractor in documentation.<br>**M: Manufacturer/Sub-Contractor, C: Contractor / Nominated Inspection Agency, N: End User . Indicated "P" PERFORM, "W" WITNESS & "V" VERIFICATION "W" Indicated in column N shall be "CHP" of NTPC. (FS – Factory Standard)<br>Note: COC - Wherever mention shall be COC by Pyrotech. | FOR END USER | DOC NO :<br>REV NO :<br>CAT : | | |
| Manufacturer / Sub Supplier | Main Supplier | | | | | |
| SIGNATURE | | | | REVIEWED BY | APPROVED BY | APPROVAL SEAL |



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| | MANUFACTURE'S NAME & ADDRESS | MANUFACTURING QUALITY PLAN | | PROJECT : |
|---|---|---|---|---|
| | | PACKAGE :<br>ITEM : LT SWITCHGEAR PANELS (DRAW OUT TYPE AND FIXED TYPE) | QAP NO :<br>REV. :<br>DATE :<br>PAGE : | CUSTOMER :<br>END USER : |

| SR. NO | COMPONENT & OPERATION | CHARACTERISTICS | CLASSIFICATION | TYPE OF CHECK | QUANTUM OF CHECK | | REFERENCE DOCUMENT | ACCEPTANCE NORMS | FORMAT OF RECORD | AGENCY 10 | | | | REMARKS |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2 | 3 | 4 | 5 | M | C/N | 7 | 8 | 9 | D* | M** | C | N | 11 |
| | | xxviii)Provision of symmetric guide | Major | Mech. | 100% | 10% of each type of module | As per Approved drgs/ As per Approved General Notes | As per Approved drgs/ As per Approved General Notes | QC Records | ✓ | P | W | W | For module size >300 mm will use 4 nos. guide rails |
| | | xxix) Gap checking of busbar and module contact at test position | Major | Mech. | 100% | 10% of each type of module | As per Approved drgs/ As per Approved General Notes | As per Approved drgs/ As per Approved General Notes | QC Records | ✓ | P | W | W | |
| | | xxx) Functional test on IMC Module with input/output checking | Major | Ele. | 100% | 10% of each type of module | As per Approved drgs. | As per Approved drgs. | QC Records | ✓ | P | W | W | |
| | | xxxi) IR Test before & after the HV Test | Major | Ele. | 100% | 100% | IS-8623/IEC 61439 | IS-8623/ IEC 61439 | QC Records | ✓ | P | W | W | |
| | | xxxii) HV test on Power circuit. | Critical | Ele. | 100% | 100% | IS-8623/ IEC 61439 | IS-8623/ IEC 61439 | QC Records | ✓ | P | W | W | |
| | | xxxiii) Prototype Panel with offered panel | Critical | Visual | 100% | 100% | Technical Specifications, Approved Design & Data Sheet | Technical Specifications, Approved Design & Data Sheet | QC Records | ✓ | P | W | W | To be retained with proper identification If required as per contract |
| 5 | Packing | i) Soundness of packing, Loading etc. | Major | Verification | 100% | 100% | Packing shall be as per Annexure-III | Packing shall be as per Annexure-III | | | P | V | - | |

NOTE: Prototype Inspection shall be offered for joint inspection with PE-Electrical, CQA & RIO before start of manufacturing of LT Switchgear.

| | | | | | |
|---|---|---|---|---|---|
| | Suman Nakwal<br>HARISH KUMAR | * Records, identified with "TICK"(✓) shall be included by contractor in documentation.<br>**M: Manufacturer/Sub-Contractor, C: Contractor / Nominated Inspection Agency, N: End User . Indicated "P" PERFORM, "W" WITNESS & "V" VERIFICATION "W" Indicated in column N shall be "CHP" of NTPC. (FS – Factory Standard)<br>Note: COC - Wherever mention shall be COC by Pyrotech. | FOR END USER | DOC NO :<br>REV NO :<br>CAT : | |
| Manufacturer / Sub Supplier | Main Supplier | | | | |
| SIGNATURE | | | | REVIEWED BY | APPROVED BY | APPROVAL SEAL |



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# SUB VENDOR LIST



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| | | |
|---|---|---|
| | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP STAGE – III** | **PE-TS-520-506-E002**<br>**Issue No: 00**<br>**Rev. No. 00**<br>**20 June 2026** |

| S. No. | Item Description | Proposed Vendors |
|---|---|---|
| 1 | MOULDED CASE CIRCUIT BREAKER (MCCB) | |
| 2 | MOTOR PROTECTION CIRCUIT BREAKER (MPCB) | |
| 3 | MINIATURE CIRCUIT BREAKER (MCB) | |
| 4 | AC POWER CONTACTOR | |
| 5 | AC AUXILIARY CONTACTOR | |
| 6 | DC POWER CONTACTOR | |
| 7 | DC AUXILIARY CONTACTOR | |
| 8 | INTELLIGENT MOTOR CONTROLLER | |
| 9 | AMMETER (ANALOG) | |
| 10 | AMMETER (DIGITAL) | |
| 11 | VOLTMETER (ANALOG) | |
| 12 | VOLTMETER (DIGITAL) | |
| 13 | ENERGY METER ( ANALOG) | |
| 14 | ENERGY METER ( DIGITAL) | |
| 15 | MULTIFUNCTION METER (MFM) | |
| 16 | TRANSDUCER | |
| 17 | ELECTRONIC MOTOR PROTECTION RELAY (EMPR) | |
| 18 | AUXILIARY RELAY | |
| 19 | INTERPOSING/COUPLING RELAY | |
| 20 | TIMER/TIME DELAY RELAY | |
| 21 | INDICATION LAMP | |
| 22 | INDUSTRIAL SOCKET | |
| 23 | CONTROL SWITCHES/ SELECTOR SWITCH | |
| 24 | DC SWITCH | |
| 25 | DIODES | |
| 26 | PUSH BUTTON | |
| 27 | CABLE GLANDS | |
| 28 | CABLE LUGS | |
| 29 | TERMINAL BLOCK (FIXED/DRAWOUT) | |
| 30 | LT SWITCH GEAR (FIXED/DRAWOUT) PANELS | |
| 31 | DATA CONCENTRATOR | |
| 32 | ETHERNET SWITCHES | |
| 33 | Y-LINK | |
| 34 | DP CABLE | |
| 35 | OPTICAL FIBRE CABLE | |
| 36 | THERMAL OVERLOAD RELAY | |
| **Note:** | Bidder may include items alongwith subvendors that are not listed above. | |
| | Make of all the equipment/instrument under this specification shall be subjected to NTPC/BHEL approval in the event of order. NTPC/BHEL reserves the right to accept/reject any make or sub-vendor and to add new sub-vendors for the project after award of contract. Approval, rejection or addition of makes shall not have any price implication to BHEL after award of contract. | |

| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>20 June 2026 |

## 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). However, in case electrostatic process of painting is offered, minimum paint thickness of 50 microns shall be acceptable for finish coat.



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**GENERAL PAINTING SPECIFICATION**
**FOR**
**LOW VOLTAGE SWITCHGEAR**

## 1. General Specification:

All 415V switchgears, MCC's, AC & DC distribution boards etc. shall be painted by powder coating process.

## 2. Pre-Treatment or Surface Preparation:

Minimum 7 tank process or better shall be used for pre-treatment or surface preparation of sheet steel used for enclosures. The sequence of pre-treatment process shall include but not be limited to the following steps:

**TANK-1:** DEGREASING

Sheet Metal Surface shall be cleaned of grease, oils, soils, lubricants, oxide films, Heat Treatment / welding Scales etc. by using ALKALINE DEGREASER at Room Temperature for a Duration of 30-40 Minutes

**TANK-2:** WATER RINSE-I

Sheet Metal Surface shall be rinsed with water

**TANK-3:** DERUSTING

Sheet Metal Surface shall be cleaned of Rust by using Mixed HYDROCHLORIC ACID at Room Temperature for a Duration of 20 Minutes.

**TANK-4:** WATER RINSE-II

Sheet Metal Surface shall be rinsed with water

**TANK-5:** SURFACE ACTIVATION

Sheet Metal Surface shall be activated for Zn & Mn phosphate Coating by using ACTIVATION CHEMICALS ACID at Room Temperature for a Duration of 20 Minutes.

**TANK-6:** PHOSPHATING

Sheet Metal Surface shall be smoothly & uniformly coated with Zn Phosphate by using ZINC PHOSPHATE SOLUTION at Room Temperature for a Duration of 5 - 20 Minutes

**TANK-7:** WATER RINSE-III

Sheet Metal Surface shall be rinsed with water

**TANK-8:** PASSIVATION

For Sealing Pores of Sheet Metal Surface for obtaining Maximum Corrosion Resistance over Phosphate Coating by DECXYLITE SOLUTION at Room Temperature for a Duration of 15 - 20 Minutes

3. **Powder Coating:**
The following steps shall be followed to complete the powder coating process -

- **OVEN DRYING**
Sheet Metal Parts shall be dried by HOT AIR at 150 Deg C Process, Duration-10-20 Minutes.

- **POWDER COATING**
Within 24 Hours of Oven Drying, Sheet Metal parts shall be coated with Powder of shade desired by client through Spraying in Spray Booths, and then Epoxy-Powder Coated/Sprayed Sheet Metal parts are BAKED in an electrically fired oven at 140-150 Deg C for 10-15 Minutes.

4. **Paint Thickness:**
To be followed as per Customer Specifications or Project-wise Technical Specification documents.

5. **Paint Shade:**
To be followed as per Customer Specifications or Project-wise Technical Specification documents.

6. **Testing and Verification of Painting Process:**
To be followed as per Customer Approved or Project-wise approved Quality Plan.

Routine tests:
a. Test for Paint shade with reference to shade card
b. Paint thickness measurement
c. Adhesion test

Special Tests:
If any special tests are specified, the same shall be carried out as per approved Quality Plan



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| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT TPS | PE-TS-520-506-E002<br>Issue No. 0<br>Rev. No: 0<br>Date: 17.01.2026 |

# PACKING REQUIREMENT

| Sl.no | DESCRIPTION |
|---|---|
| 1 | TYPE OF PACKING : |
| 1.1 | Each switchboard/Item must be thoroughly cleaned inside and outside before packing. Remove all foreign particles, dust, oil, grease, and weld spatter. Ensure no extra hardware or tools remain inside the panel. |
| 1.2 | Item shall be fully covered with 3 to 4 layer of stretch film sheet (at least 25 micron) and shall be packed inside wooden box, fixed on wooden base depending upon the size. |
| 1.3 | Item shall be fixed on wooden base only & height of the bottom support/ wooden base shall be 18cm minimum. 100GSM (Colourless) Multi Layered Cross Laminated Polyethylene to be placed on the bottom of panels. As mentioned above 3 to 4 layer of stretch film with protective cushon on critical component with minimum 30% overlap shall be done. After which panel shall be covered with minimum 50 micron polythene. |
| 1.4 | All Items shall be firmly fixed to the bottom of the packing box i.e. wooden base with the help of supports/blocks to arrest the movement from all sides. All opening shall be protected with polyethylene blind end caps. |
| 1.5 | Ply Wood Case/Box shall be used to pack the panels after fixing of supports on the wooden base. Plywood must be of appropriate thickness used for making packing box. Construction of plywood box must give strength, stability, and durability during transportation & unloading of material to site. |
| 1.6 | Finally 100GSM (Colourless) Multi Layered Cross Laminated Polyethylene are used to make covers to the Wooden box individually. The cross lamination shall have qualities of extra toughness, together with flexibility and lightness coupled with good weather resistance to ultra violet rays. It is preferable to have a single piece of the above Multi-layered cross laminated polyethylene sheet fixed on the four sides. In case jointing is unavoidable, it should be done by overlapping of approximately 100mm. |
| 1.7 | Loose items/Spares/ accessories shall be separately packed with strectch film & then polyethylene sheet of at least 100 GSM inside the packing box. |
| 1.8 | Planks for Wooden Box support |
| a | Horizontal, vertical, diagonal planks shall be given for binding of Wooden Box. |
| b | Thickness of planks for Front, rear, top and bottom sides and binding, jointing battens shall be 25/20mm +2/-3 mm. |
| c | Suitable Width of binding planks & Suitable distance between any 2 binding planks shall be provided. |
| d | Diagonal planks shall be used in between vertical binding planks when distance between inner to inner of vertical planks is more than 750mm. |
| e | Diagonal planks are not required for top planks and width side, if the width of pallet is less than 750mm. |
| f | Single length planks shall be used for cubicles whose overall length is less than 2400mm. |



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| | |
|---|---|
| 2 | QUALITY OF WOODS: |
| 2.1 | 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 | CUSHONING MATERIAL & MOISTURE ABSORBER : |
| 3.1 | Suitable cushioning shall be provided by rubberized coir/ thermocol / expanded soft polyethylene foam. Provide extra potections on cores, edges or critical components i.e. HMI, Numerical Relay etc. |
| 3.2 | Adequate quantity of packed silica gel, VCI Powder/Tablets, packed in thin muslin cloth cotton bags shall be suitably placed inside the packing box. |
| 4 | NAILS |
| 4.1 | Adequate diameter and length of nails shall be provided. |
| 5 | HOOP IRON STRIPS |
| 5.1 | These are used for strapping the boxes. The material shall be free from rust. If sufficient nailing is done for bigger boxes thickness, strapping need not be done. Clips shall be used for strapping the hoop iron strips on the boxes. |
| 6 | BRACKETS |
| 6.1 | These brackets are used for nailing to the corners of cubicle boxes. The brackets shall be of mild steel of suitable. The brackets shall be of “L" shape. Two holes shall be provided towards the end of each side for screwing /nailing. |
| 7 | FASTENERS |
| 7.1 | Bolts, double nuts, spring washers will have to be used to hold the job that there shall be no jerk. |
| 8 | PACKING SLIP & HOLDER : |
| 8.1 | Packing slip kept in polyethylene bag shall be placed inside the wooden box at appropriate place. |
| 8.2 | 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. |
| 9 | Refer below illustration for typical packing stages. Images are shown for representation only and it is manufacturer responsibility to ensure proper packing. |

WOODEN BASE 100 GSM POLYTHYLENE ON BASE DESSICANT 3 TO 4 LAYER OF STRETCH FILM

100 GSM POLYTHYLENE ON BOX WOODEN BOX 50 MICRON POLYTHENE COVER

| | | |
|---|---|---|
| | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP STAGE – III** | **PE-TS-520-506-E002**<br>**Issue No: 00**<br>**Rev. Rev. No. 00**<br>**20 June 2026** |

## 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- E, F & 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-V0-520-506-E101 | COMPONENT SELECTION CHART & GENERAL NOTES AND LEGENDS | 35 | 7 | Refer Remark-1 |
| 2 | PE-V0-520-506-E102 | DATA SHEETS FOR LT SWITCHGEAR | 35 | 7 | Refer Remark-1 |
| 3 | PE-V0-520-506-E103 | BUSBAR SIZING CALCULATION FOR LT SWITCHGEAR | 35 | 7 | Refer Remark-1 |
| 4 | PE-V0-520-506-E104 | TYPE-2 COORDINATION CHART | 35 | 7 | Refer Remark-1 |
| 5 | PE-V0-520-506-E105 | MODULE SIZE SELECTION CHART | 35 | 7 | Refer Remark-1 |
| 6 | PE-V0-520-506-E902 | MQP FOR LT SWITCHGEAR PANEL ALONGWITH MAKE OF COMPONENTS & EQUIPMENTS AND FAT PROCEDURE OF NUMERICAL RELAYS | 35 | 7 | Refer Remark-1 |
| 7 | PE-V0-520-506-E2XX | CONTROL SCHEMES | 35 | 7 | Refer Remark-1 |
| 8 | PE-V0-520-506-E3XX | GA & SLD FOR LV SWITCHBOARDS | 10 | 5 | Refer Remark-2a & 2b |
| ***Secondary Documents*** | | | | | |
| 1 | PE-V0-520-506-E5XX | BILL OF MATERIAL FOR MODULE's | 10 | 5 | After Approval of Scheme |
| 2 | PE-V0-520-506-E106 | TYPE TEST REPORT FOR - LT SWITCHGEAR | 35 | 7 | |
| 3 | PE-V0-520-506-E107 | TOOLS & TACKLES FOR LT SWITCHGEAR | 35 | 7 | |
| 4 | PE-V0-520-506-E108 | E&C SPARE FOR LT SWITCHGEAR | 35 | 7 | |

| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>20 June 2026 |

## DOCUMENTATION REQUIREMENT

**Remark-1:**
Documents for which inputs are 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 LT 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) LT Switchboards shall be cleared for manufacturing in various Lots. Every Lot shall be cleared after approval of related drawings/ documents 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 release of lot or date of issue of applicable Cat-1 approved drawings/ documents whichever is later. Delay by vendor in submission/re-submission of applicable drawing/documents shall be reduced from the given delivery period of respective Lot. However, delay in submission/re-submission of common drawing/documents shall not be considered for reduction of delivery period of subsequent lots.
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 as per NIT.

**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-V0-520-506-E101 | COMPONENT SELECTION CHART & GENERAL NOTES AND LEGENDS | |
| 2 | - | PE-V0-520-506-E102 | DATA SHEETS FOR LT SWITCHGEAR | |
| 3 | - | PE-V0-520-506-E103 | BUSBAR SIZING CALCULATION FOR LT SWITCHGEAR | |
| 4 | - | PE-V0-520-506-E104 | TYPE-2 COORDINATION CHART | |
| 5 | - | PE-V0-520-506-E105 | MODULE SIZE SELECTION CHART | |
| 6 | - | PE-V0-520-506-E106 | TYPE TEST REPORT FOR - LT SWITCHGEAR | |
| 7 | - | PE-V0-520-506-E107 | TOOLS & TACKLES FOR LT SWITCHGEAR | |
| 8 | - | PE-V0-520-506-E108 | E&C SPARE FOR LT SWITCHGEAR | |
| 9 | - | PE-V0-520-506-E109 | MANDATORY SPARE FOR LT SWITCHGEAR | |
| 10 | - | PE-V0-520-506-E110 | TYPE TEST REPORT OF ETHERNET SWITCHES | |
| 11 | - | PE-V0-520-506-E111 | CROSS SECTIONAL DRWG OF PROTOTYPE PANELS | |
| 12 | - | PE-V0-520-506-E112 | DATA SHEET FOR DATA CABLE, FO CABLE | |
| 13 | - | PE-V0-520-506-E113 | OVERALL SYSTEM ARCHITECTURE FOR LT SWITCHGEAR NETWORK | |
| 14 | - | PE-V0-520-506-E114 | DATA LIST | |
| 15 | - | PE-V0-520-506-E115 | FUNCTIONAL DESIGN SPECIFICATION | |
| 16 | - | PE-V0-520-506-E201 | CONTROL SCHEME FOR 2 INCOMER +1 BUS COUPLER (2 DAET+1 DAE) | |
| 17 | - | PE-V0-520-506-E202 | CONTROL SCHEME FOR 2 INCOMER (2 DAET) | |
| 18 | - | PE-V0-520-506-E203 | CONTROL SCHEME FOR 2 INCOMER +1 BUS COUPLER (2 DAE+1 DAE) | |
| 19 | - | PE-V0-520-506-E204 | CONTROL SCHEME FOR EMERGENCY SWITCH BOARD (2 DG IC+2 TIE IC+1 BC) | |
| 20 | - | PE-V0-520-506-E205 | CONTROL SCHEME FOR PCC OUTGOING BREAKER FEEDER TYPE DAE | |
| 21 | - | PE-V0-520-506-E206 | CONTROL SCHEME FOR OUTGOING TIE (DAE) FROM TURBINE PMCC TO UES | |
| 22 | - | PE-V0-520-506-E207 | CONTROL SCHEME FOR ACB CONTROLLED MOTOR FEEDER (90KW & ABOVE ) - TYPE DM | |
| 23 | - | PE-V0-520-506-E208 | CONTROL SCHEME FOR BUS PT MODULE FOR PCC/PMCC (MODULE - G1) | |
| 24 | - | PE-V0-520-506-E209 | CONTROL SCHEME FOR BUS PT MODULE FOR DG SWGR (MODULE - G2) | |
| 25 | - | PE-V0-520-506-E210 | CONTROL SCHEME FOR METERING MODULE FOR MCC (MODULE - VM) DO/FIXED | |
| 26 | - | PE-V0-520-506-E211 | CONTROL SCHEME FOR CONTROL TRAFSORMER MODULE TYPE CS | |
| 27 | - | PE-V0-520-506-E212 | CONTROL SCHEME FOR 220V DCDB I/C & B/C (TYPE DC + DB + CH + HD) | |
| 28 | - | PE-V0-520-506-E213 | CONTROL SCHEME FOR 48V DCDB I/C & B/C (TYPE DC + DB + CH + HD) | |
| 29 | - | PE-V0-520-506-E214 | CONTROL SCHEME FOR DC METERING & PROTECTION MODULE TYPE S | |
| 30 | - | PE-V0-520-506-E215 | 220V/ 48V DC OUTGOING FEEDER TYPE X | |
| 31 | - | PE-V0-520-506-E216 | CONTROL SCHEME FOR CONTACTOR CHANGEOVER BETWEEN TWO INCOMER MODULE TYPE CC (DO/FIXED) | |
| 32 | - | PE-V0-520-506-E217 | CONTROL SCHEME FOR INCOMING MCCB (DO+FIXED) (MCCB) E3(I/C) | |
| 33 | - | PE-V0-520-506-E218 | CONTROL SCHEME FOR BUSCOUPLER MODULE TYPE MCCB (DRAWOUT/FIXED) E3 (B/C) | |
| 34 | - | PE-V0-520-506-E219 | CONTROL SCHEME FOR 3 PHASE NEUTRAL MCCB OUTGOING FEEDER (DRAWOUT/FIXED) E3 (O/G) | |
| 35 | | PE-V0-520-506-E220 | CONTROL SCHEME FOR 3 PHASE MCCB OUTGOING FEEDER (DRAWOUT/FIXED) E3-TP (O/G) | |
| 36 | - | PE-V0-520-506-E221 | CONTROL SCHEME FOR 2 PHASE MCCB OUTGOING FEEDER TYPE E2 (DRAWOUT/FIXED) | |
| 37 | - | PE-V0-520-506-E222 | CONTROL SCHEME FOR 1 PHASE MCCB OUTGOING FEEDER TYPE E1 (DRAWOUT/FIXED) | |
| 38 | - | PE-V0-520-506-E223 | CONTROL SCHEME FOR TPN AC OUTGOING FOR SOLAR, MCCB OPERATED FEEDER FOR RATING UP TO 400A ES3 | |

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**ANNEXURE-7**

**DOCUMENTS TO BE SUBMITTED**

| S.No. | NTPC Drawing No. | BHEL Drawing No. | Drawing Title | Remarks |
|---|---|---|---|---|
| 39 | - | PE-V0-520-506-E224 | CONTROL SCHEME FOR MOTORS TYPE DK2 (BELOW 30KW) | |
| 40 | - | PE-V0-520-506-E225 | CONTROL SCHEME FOR MOTORS TYPE DK21 (30KW & BELOW 90KW ) | |
| 41 | - | PE-V0-520-506-E226 | CONTROL SCHEME FOR RE-ACCELARATION MOTORS MODULE TYPE DK2E (UPTO 30KW) | |
| 42 | - | PE-V0-520-506-E227 | CONTROL SCHEME FOR RE-ACCELARATION MOTORS MODULE TYPE DK21E (ABOVE 30KW & BELOW 90KW) | |
| 43 | - | PE-V0-520-506-E228 | CONTROL SCHEME FOR MOTORS TYPE K2 (UPTO 30KW) | |
| 44 | - | PE-V0-520-506-E229 | CONTROL SCHEME FOR MOTORS TYPE K21 (ABOVE 30KW & BELOW 90KW) | |
| 45 | - | PE-V0-520-506-E230 | CONTROL SCHEME FOR MOTORS TYPE K3 (UPTO 30KW) | |
| 46 | - | PE-V0-520-506-E231 | CONTROL SCHEME FOR MOTORS TYPE K31 (ABOVE 30KW & BELOW 90KW) | |
| 47 | - | PE-V0-520-506-E232 | CONTROL SCHEME FOR REVERSIBLE MOTOR TYPE DN1 (BELOW 30KW) | |
| 48 | - | PE-V0-520-506-E233 | CONTROL SCHEME FOR REVERSIBLE MOTOR TYPE DN11 (30KW AND ABOVE) | |
| 49 | - | PE-V0-520-506-E234 | CONTROL SCHEME FOR HEATERS TYPE EA3 (BELOW 30KW) | |
| 50 | - | PE-V0-520-506-E235 | CONTROL SCHEME FOR HEATERS TYPE EA1 | |
| 51 | - | PE-V0-520-506-E236 | CONTROL SCHEME FOR SPACE HEATER SUPPLY SHS | |
| 52 | - | PE-V0-520-506-E237 | CONTROL SCHEME FOR PANEL SPACE HEATER AND PLUGS & SOCKETS PNL SP HTR | |
| 53 | - | PE-V0-520-506-E238 | CONTROL SCHEME FOR RAPPING MOTOR (RM) | |
| 54 | - | PE-V0-520-506-E239 | CONTROL SCHEME FOR DUST DENSITY MONITOR (DDM) | |
| 55 | - | PE-V0-520-506-E240 | CONTROL SCHEME FOR HOPPER HEATER (HH) | |
| 56 | - | PE-V0-520-506-E241 | CONTROL SCHEME FOR SHAFT INSULATOR HEATER (HS) | |
| 57 | - | PE-V0-520-506-E242 | CONTROL SCHEME FOR SUPPORT INSULATOR HEATER (HI) | |
| 58 | - | PE-V0-520-506-E243 | CONTROL SCHEME FOR ASH LEVEL INDICATOR HIGH (ALI(H)) | |
| 59 | - | PE-V0-520-506-E244 | CONTROL SCHEME FOR ASH LEVEL INDICATOR LOW (ALI(L)) | |
| 60 | - | PE-V0-520-506-E245 | CONTROL SCHEME FOR ARECA MARSHALING MODULE (ARECA) | |
| 61 | - | PE-V0-520-506-E246 | CONTROL SCHEME FOR WAVE LEVEL TRANSMITTER (WLT) | |
| 62 | - | PE-V0-520-506-E247 | CONTROL SCHEME FOR MARSHALING MODULE (MM) | |
| 63 | - | PE-V0-520-506-E248 | CONTROL SCHEME FOR WALL BLOWER | |
| 64 | - | PE-V0-520-506-E249 | CONTROL SCHEME FOR LR BLOWER | |
| 65 | - | PE-V0-520-506-E250 | CONTROL SCHEME FOR AH BLOWER | |
| 66 | | PE-V0-520-506-E251 | CONTROL SCHEME FOR ALARM MODULE | |
| 67 | | PE-V0-520-506-E252 | CONTROL SCHEME FOR TP MCCB CONTACTOR CONTROLLED FEEDER WITHOUT IMC (CONTROLLED FROM DDCMIS) ET3 | |
| 68 | - | PE-V0-520-506-E301 | GA & SLD DRAWING FOR U#6 EMERGENCY MCC | |
| 69 | - | PE-V0-520-506-E302 | GA & SLD DRAWING FOR U#6 220V MAIN DCDB | |
| 70 | - | PE-V0-520-506-E303 | GA & SLD DRAWING FOR U#6 BOILER SERVICE PMCC | |
| 71 | - | PE-V0-520-506-E304 | GA & SLD DRAWING FOR U#6 BOILER VALVE & DAMPER ACDB | |
| 72 | - | PE-V0-520-506-E305 | GA & SLD DRAWING FOR U#6 BOILER ACDB | |
| 73 | - | PE-V0-520-506-E306 | GA & SLD DRAWING FOR U#6 SOOT BLOWER | |
| 74 | - | PE-V0-520-506-E307 | GA & SLD DRAWING FOR U#6 TURBINE SERVICE PMCC | |
| 75 | - | PE-V0-520-506-E308 | GA & SLD DRAWING FOR U#6 UNIT SERVICE ACDB | |
| 76 | - | PE-V0-520-506-E309 | GA & SLD DRAWING FOR U#6 TURBINE VALVE DB | |
| 77 | - | PE-V0-520-506-E310 | GA & SLD DRAWING FOR U#6 ESP PMCC's | |
| 78 | - | PE-V0-520-506-E311 | GA & SLD DRAWING FOR U#6 ESP STANDBY PMCC-1 | |
| 79 | - | PE-V0-520-506-E312 | GA & SLD DRAWING FOR U#6 ESP STANDBY PMCC-2 | |
| 80 | - | PE-V0-520-506-E313 | GA & SLD DRAWING FOR U#6 ESP HVAC MCC | |

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**ANNEXURE-7**

**DOCUMENTS TO BE SUBMITTED**

| S.No. | NTPC Drawing No. | BHEL Drawing No. | Drawing Title | Remarks |
|---|---|---|---|---|
| 81 | - | PE-V0-520-506-E314 | GA & SLD DRAWING FOR U#6 ESP & ID FAN AREA MCC | |
| 82 | - | PE-V0-520-506-E315 | GA & SLD DRAWING FOR U#6 STATION SERVICE PMCC | |
| 83 | - | PE-V0-520-506-E316 | GA & SLD DRAWING FOR U#6 VENTILATION MCC | |
| 84 | - | PE-V0-520-506-E317 | GA & SLD DRAWING FOR U#6 MISC. SERVICES MCC -1 | |
| 85 | - | PE-V0-520-506-E318 | GA & SLD DRAWING FOR U#6 AIR WASHER MCC | |
| 86 | - | PE-V0-520-506-E319 | GA & SLD DRAWING FOR U#6 TRF AREA OUTDOOR SWGR | |
| 87 | - | PE-V0-520-506-E320 | GA & SLD DRAWING FOR 220V OFFSITE DCDB | |
| 88 | - | PE-V0-520-506-E321 | GA & SLD DRAWING FOR U#6 MISC. SERVICES MCC -2 | |
| 89 | - | PE-V0-520-506-E501 | BILL OF MATERIAL FOR MODULE DAET (I/C) | |
| 90 | - | PE-V0-520-506-E502 | BILL OF MATERIAL FOR MODULE DAE (I/C) | |
| 91 | - | PE-V0-520-506-E503 | BILL OF MATERIAL FOR MODULE DAET/DAE (B/C) | |
| 92 | - | PE-V0-520-506-E504 | BILL OF MATERIAL FOR MODULE DG (I/C) | |
| 93 | - | PE-V0-520-506-E505 | BILL OF MATERIAL FOR MODULE DAE(O/G)/DAE-TIE | |
| 94 | - | PE-V0-520-506-E506 | BILL OF MATERIAL FOR MODULE DM/PM/AM | |
| 95 | - | PE-V0-520-506-E507 | BILL OF MATERIAL FOR MODULE G1 | |
| 96 | - | PE-V0-520-506-E512 | BILL OF MATERIAL FOR MODULE G2 | |
| 97 | - | PE-V0-520-506-E509 | BILL OF MATERIAL FOR MODULE VM | |
| 98 | - | PE-V0-520-506-E510 | BILL OF MATERIAL FOR MODULE CS | |
| 99 | - | PE-V0-520-506-E511 | BILL OF MATERIAL FOR MODULE DB/DC/CH/HD | |
| 100 | - | PE-V0-520-506-E512 | BILL OF MATERIAL FOR MODULE S | |
| 101 | - | PE-V0-520-506-E513 | BILL OF MATERIAL FOR MODULE X | |
| 102 | - | PE-V0-520-506-E514 | BILL OF MATERIAL FOR MODULE CC | |
| 103 | - | PE-V0-520-506-E515 | BILL OF MATERIAL FOR MODULE E3 (I/C) | |
| 104 | - | PE-V0-520-506-E516 | BILL OF MATERIAL FOR MODULE E3 (B/C) | |
| 105 | - | PE-V0-520-506-E517 | BILL OF MATERIAL FOR MODULE E3 & E3-TP | |
| 106 | - | PE-V0-520-506-E518 | BILL OF MATERIAL FOR MODULE E2 | |
| 107 | - | PE-V0-520-506-E519 | BILL OF MATERIAL FOR MODULE E1 | |
| 108 | - | PE-V0-520-506-E520 | BILL OF MATERIAL FOR MODULE ES3 | |
| 109 | - | PE-V0-520-506-E521 | BILL OF MATERIAL FOR MODULE DK2/PK2/AK2 | |
| 110 | - | PE-V0-520-506-E522 | BILL OF MATERIAL FOR MODULE DK21/PK21/ AK21 | |
| 111 | - | PE-V0-520-506-E523 | BILL OF MATERIAL FOR MODULE DK2E/PK2E/AK2E | |
| 112 | - | PE-V0-520-506-E524 | BILL OF MATERIAL FOR MODULE DK21E/PK21E/ AK21E | |
| 113 | - | PE-V0-520-506-E525 | BILL OF MATERIAL FOR MODULE K2 | |
| 114 | - | PE-V0-520-506-E526 | BILL OF MATERIAL FOR MODULE K21 | |
| 115 | - | PE-V0-520-506-E527 | BILL OF MATERIAL FOR MODULE K3 | |
| 116 | - | PE-V0-520-506-E528 | BILL OF MATERIAL FOR MODULE K31 | |
| 117 | - | PE-V0-520-506-E529 | BILL OF MATERIAL FOR MODULE DN1 | |
| 118 | | PE-V0-520-506-E530 | BILL OF MATERIAL FOR MODULE DN11 | |
| 119 | - | PE-V0-520-506-E531 | BILL OF MATERIAL FOR MODULE EA3 | |
| 120 | - | PE-V0-520-506-E532 | BILL OF MATERIAL FOR MODULE EA1 | |
| 121 | - | PE-V0-520-506-E533 | BILL OF MATERIAL FOR MODULE SHS | |
| 122 | - | PE-V0-520-506-E534 | BILL OF MATERIAL FOR MODULE PNL SP HTR | |
| 123 | - | PE-V0-520-506-E535 | BILL OF MATERIAL FOR MODULE RM1 | |
| 124 | - | PE-V0-520-506-E536 | BILL OF MATERIAL FOR MODULE RM2 | |
| 125 | - | PE-V0-520-506-E537 | BILL OF MATERIAL FOR MODULE DDM | |

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**ANNEXURE-7**

**DOCUMENTS TO BE SUBMITTED**

| S.No. | NTPC Drawing No. | BHEL Drawing No. | Drawing Title | Remarks |
|---|---|---|---|---|
| 126 | - | PE-V0-520-506-E538 | BILL OF MATERIAL FOR MODULE HH | |
| 127 | - | PE-V0-520-506-E539 | BILL OF MATERIAL FOR MODULE HS | |
| 128 | - | PE-V0-520-506-E540 | BILL OF MATERIAL FOR MODULE HI | |
| 129 | - | PE-V0-520-506-E541 | BILL OF MATERIAL FOR MODULE ALI (H) | |
| 130 | - | PE-V0-520-506-E542 | BILL OF MATERIAL FOR MODULE ALI (L) | |
| 131 | - | PE-V0-520-506-E543 | BILL OF MATERIAL FOR MODULE ARECA | |
| 132 | - | PE-V0-520-506-E544 | BILL OF MATERIAL FOR MODULE WLT | |
| 133 | - | PE-V0-520-506-E545 | BILL OF MATERIAL FOR MODULE MM | |
| 134 | - | PE-V0-520-506-E546 | BILL OF MATERIAL FOR MODULE WB | |
| 135 | - | PE-V0-520-506-E547 | BILL OF MATERIAL FOR MODULE LR | |
| 136 | - | PE-V0-520-506-E548 | BILL OF MATERIAL FOR MODULE AH | |
| 137 | - | PE-V0-520-506-E549 | BILL OF MATERIAL FOR MODULE WT1, WT2 & WT3 | |
| 138 | - | PE-V0-520-506-E550 | BILL OF MATERIAL FOR MODULE ALARM MODULE | |
| 139 | - | PE-V0-520-506-E551 | BILL OF MATERIAL FOR MODULE ET3 | |
| 140 | - | PE-V0-520-506-E902 | MQP FOR LT SWITCHGEAR PANEL ALONGWITH MAKE OF COMPONENTS & EQUIPMENTS AND FAT PROCEDURE OF NUMERICAL RELAYS | |



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| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002 |
| | | Issue No: 00 |
| | | Rev. No. 00 |
| | | 20 June 2026 |

| COMPLIANCE CERTIFICATE | |
|---|---|
| 1 | It is hereby confirm that the technical specification (sheet 1 to 182) 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 Authorized Representative

Name and Designation :

Name & Address of the Bidder

Date

| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002 |
| | | Issue No: 00 |
| | | Rev. No. 00 |
| | | 20 June 2026 |

# UNPRICED SCHEDULE



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|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 20.06.2026 |

**Annexure-B**

**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 | BOARD NAME PLATE, DESCRIPTION & RATING |
|---|---|---|---|---|---|---|---|---|---|---|---|
| A | **SWITCHBOARD** | | | | | | | | | | |
| 1 | 506-0110315-00-A | UNIT EMERGENCY SWBD | NOs | 1 | 3000 | 6DG | | | | | U#6 EMERGENCY MCC 6DG, 3000A |
| 2 | 506-0110039-00-A | 220V MAIN DCDB | NOs | 1 | 1600 | 6FA | | | | | U#6 220V MAIN DCDB 6FA, 1600A |
| 3 | 506-0110381-00-A | Unit Boiler PMCC | NOs | 1 | 4000 | 6DA | | | | | U#6 BOILER SERVICE PMCC 6DA, 4000A |
| 4 | 506-0110106-00-A | BOILER V&D ACDB | NOs | 1 | 250 | 6HA | | | | | U#6 BOILER VALVE & DAMPER ACDB 6HA, 250A |
| 5 | 506-0110091-00-A | BOILER ACDB | NOs | 1 | 630 | 6HB | | | | | U#6 BOILER ACDB 6HB, 630A |
| 6 | 506-0110419-00-A | SOOT BLOWER MCC-1 | NOs | 1 | 63 | | | | | | U#6 SOOT BLOWER MCC, 63A |
| 7 | 506-0110386-00-A | Unit Turbine PMCC | NOs | 1 | 4000 | 6DB | | | | | U#6 TURBINE SERVICE PMCC 6DB, 4000A |
| 8 | 506-0110320-00-A | UNIT SERVICE ACDB | NOs | 1 | 630 | 6QA | | | | | U#6 UNIT SERVICE ACDB 6QA, 630A |
| 9 | 506-0110299-00-A | TURBINE VALVE ACDB | NOs | 1 | 250 | 6KA | | | | | U#6 TURBINE VALVE DB 6KA, 250A |
| 10 | 506-0110179-00-A | ESP SWBD | NOs | 6 | 3000 | 6DC,6DD,6DE, 6DF,6DH,6DJ | | | | | U#6 ESP PMCC's, 3000A |
| 11 | 506-0110973-00-A | ESP STANDBY PMCC 1 | NOs | 1 | 4000 | 6DK | | | | | U#6 ESP STANDBY PMCC 6DK, 4000A |
| 12 | 506-0110974-00-A | ESP STANDBY PMCC 2 | NOs | 1 | 4000 | 6DL | | | | | U#6 ESP STANDBY PMCC 6DL, 4000A |
| 13 | 506-0110169-00-A | ESP A/C & VENT MCC | NOs | 1 | 400 | 6TB | | | | | U#6 ESP HVAC MCC 6TB, 400A |
| 14 | 506-0110164-00-A | ESP & ID FAN AREA MCC | NOs | 1 | 400 | 6HC | | | | | U#6 ESP & ID FAN AREA MCC 6HC, 400A |
| 15 | 506-0110263-00-A | STATION SERVICE SWBD. | NOs | 1 | 4000 | 0DA | | | | | U#6 STATION SERVICE PMCC 0DA, 4000A |
| 16 | 506-0110077-00-A | AIR CONDITIONING MCC | NOs | 1 | 1250 | 0TA | | | | | U#6 AIR CONDITIONING MCC 0TA, 1250A |
| 17 | 506-0110330-00-A | VENTILATION MCC | NOs | 1 | 630 | 6TA | | | | | U#6 VENTILATION MCC 6TA, 630A |
| 18 | 506-0110241-00-A | MISC. SERVICE MCC-1 | NOs | 1 | 630 | 0QA | | | | | U#6 MISC. SERVICES MCC-1 0QA, 630A |
| 18 | 506-0110242-00-A | MISC. SERVICE MCC-2 | NOs | 1 | 630 | 0QB | | | | | U#6 MISC. SERVICES MCC-2 0QB, 630A |
| 19 | 506-0110078-00-A | AIR WASHER MCC | NOs | 1 | 800 | 6SA | | | | | U#6 AIR WASHER MCC 6SA, 800A |
| 20 | 506-0110983-00-A | OUTDOOR SWGR # 1 | NOs | 1 | 400 | | | | | | U#6 TRF AREA OUTDOOR SWGR, 400A |
| 21 | 506-0110138-00-A | COOLING TOWER SWBD.-1 | NOs | 1 | 3000 | 6DN | | | | | U#6 & IDCT PMCC's, 3000A |
| 22 | 506-0110139-00-A | COOLING TOWER SWBD.-2 | NOs | 1 | 3000 | 6DM | | | | | U#6 & IDCT PMCC's, 3000A |
| 23 | 506-0110140-00-A | COOLING TOWER SWBD.-3 | NOs | 1 | 3000 | 6DQ | | | | | U#6 & IDCT PMCC's, 3000A |
| 24 | 506-0110141-00-A | COOLING TOWER SWBD.-4 | NOs | 1 | 3000 | 6DS | | | | | U#6 & IDCT PMCC's, 3000A |
| 25 | 506-0110190-00-A | FUEL OIL P/H SWBD. | NOs | 1 | 1000 | 0DH | | | | | FOPH PMCC 0DH, 1000A |
| 26 | 506-0110044-00-A | 220V OFFSITE DCDB | NOs | 1 | 125 | 0FA | | | | | FOPH DCDB 0FA |
| 27 | 506-0110986-00-A | DC MCCB BOX | NOs | 15 | 63 | | | | | | |
| 28 | 506-0110985-00-A | AC MCCB BOX | NOs | 50 | 63 | | | | | | |
| B | **HMI SYSTEM** | | | | | | | | | | |
| 1 | 506-0110417-00-A | HMI (EWS) | NOS. | 2 | | | | | | | |
| 2 | 506-0111038-00-A | CONSOLE FOR HMI | NOS. | 2 | | | | | | | REFER NOTE- B.2 & B.3 |
| 3 | 506-0111039-00-A | LASER PRINTER (A4 SIZE) | NOS. | 2 | | | | | | | |
| 4 | 506-0111040-00-A | TABLE FOR PRINTER | NOS. | 2 | | | | | | | REFER NOTE- B.3 |
| B1 | **NUMERICAL RELAY,IMCC AND WIRELESS TEMP MONITORING SYSTEM-NETWORKING HARDWARE** | | | | | | | | | | |
| 1 | | ETHERNET SWITCH WITH IEC-61850 PROTOCOL | | | | | | | | | IT SHALL BE PART OF SWITCHBOARD |
| 2 | 506-0111041-00-A | NETWORK LEVEL ETHERNET SWITCH (OF ADEQUATE PORTS) | NOS. | 2 | | | | | | | NEAR DDCMIS END, INCLUDING COMPLETE DESIGN, ENGINEERING, SUPPLY, TESTING AND ERECTION & COMMISSIONING. EACH SET SHALL BE SUITABLE FOR RECEIVING SIGNALS FROM EACH SWITCHGEAR LEVEL NETWORK/RING OF ETHERNET SWITCH's.<br>BOTH SET OF NETWORK LEVEL ETHERNET SWITCH SHALL BE MOUNTED IN ETHERNET SWITCH BOX. |

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| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 3 | 506-0111042-00-A | CAT5e/CAT6 or Better Ethernet CABLE | METERS | 3500 | | | | | | | |
| 4 | 506-0111043-00-A | SIMPLEX FIBER OPTICAL CABLE FOR COMMUNICATION BETWEEN SWGR LEVEL ETHERNET SWITCH's (& THEIR RINGS) & NETWORK LEVEL ETHERNET SWITCH | METERS | 25000 | | | | | | | |
| 5 | 506-0111044-00-A | SIMPLEX FIBER OPTICAL CABLE PATCH CORD WITH CONNECTORS AT BOTH ENDS OF MINIMUM LENGTH 10 METERS | NOS. | 30 | | | | | | | |
| 6 | 506-0111045-00-A | HDPE CONDUIT (RODENT FREE) | METERS | 25000 | | | | | | | USED FOR FIBER OPTICAL CABLE AT S.NO B1- 4 |
| 7 | 506-0111046-00-A | FO TERMINATION ACCESSORIES AT BIDDER'S SUPPLIED EQUIPMENT END UNDER THIS PACKAGE | NOS. | 1 | | | | | | | ANNEXURE-1_TYPICAL SWITCHGEAR RELAY NETWORK ARCHITECTURE FOR SCOPE AND TERMINAL POINT |
| 8 | 506-0111047-00-A | LAPTOP PC WITH LICENCED VERSION SOFTWARE, HARDWARE FOR RELAY, IMC PARAMETERISATION | NOS. | 2 | | | | | | | |
| 9 | 506-0111048-00-A | INTERFACE CABLE WITH SUITABLE CONNECTING PORT AT BOTH END FOR CONNECTION OF NUMERICAL RELAY FRONT PORT TO THE LAPTOP | NOS. | 20 | | | | | | | EACH CABLE OF LENGTH ATLEAST 5M |
| 10 | 506-0111049-00-A | INTERFACE CABLE WITH SUITABLE CONNECTING PORT AT BOTH END FOR CONNECTION OF IMCC FRONT PORT TO THE LAPTOP | NOS. | 15 | | | | | | | EACH CABLE OF LENGTH ATLEAST 5M |
| B2 | **AMC for 3 years for following :**<br>**- Numerical Relays (with IEC 61850) in all LV Switchgears**<br>**- IEC 61850 Ethernet switches in Switchgear panels**<br>**- Cat5e Ethernet cable / FO cable/ Optical Fibre Cable with fire retardant outer sheath**<br>**- Optical fibre cable termination equipment such as LIU, patch cord etc. for complete network**<br>**- Laptops**<br>**- HMI stations (Engineering Work Stations and printers)**<br>**- All other equipment required to meet the intended specification** | | | | | | | | | | |
| 1 | 506-0111050-00-A | 1st year | **YEAR** | **1** | | | | | | | |
| 2 | 506-0111051-00-A | 2nd year | **YEAR** | **1** | | | | | | | |
| 3 | 506-0111052-00-A | 3rd year | **YEAR** | **1** | | | | | | | |
| **B3** | **NETWORKING HARDWARE FOR WIRELESS TEMPERATURE MONITORING SENSOR** | | | | | | | | | | |
| 1 | 506-0111053-00-A | COMPLETE NETWORKING HARDWARE(EXCEPT CABLE & TERMINATION ACCESSORIES) NEAR SWITCHGEAR END FOR COMMUNICATION BETWEEN WIRELESS TEMPERATURE RECEIVER END & DDCMIS/HMI FOR TEMPERATURE MONITORING SYSTEM :-<br>FOR SET OF SWITCHBOARDS-<br>SET- 6DA, 6DB & 6DG | NOS. | 1 | | | | | | | INCLUDING COMPLETE DESIGN, ENGINEERING AND SUPPLY.<br>1 SET CONSISTS OF 3 SWITCHBOARDS |

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|---|---|---|---|---|---|---|---|---|---|---|---|
| 2 | 506-0111054-00-A | SPECIAL CABLE(TWISTED PAIR/CAT/OPTICAL FIBRE CABLE OR AS APPLICABLE) INCLUDING TERMINATION ACCESSORIES FOR COMMUNICATION BETWEEN SWITCHGEAR & DDCMIS/HMI FOR TEMPERATURE MONITORING SYSTEM :-<br>FOR SET OF SWITCHBOARDS-<br>SET- 6DA, 6DB & 6DG | NOS. | 1 | | | | | | | INCLUDING COMPLETE DESIGN, ENGINEERING AND SUPPLY.<br>1 SET CONSISTS OF 3 SWITCHBOARDS |
| **C** | **TOOLS & TACKLE** | | | | | | | | | | |
| 1 | 506-0111055-00-A | ACB RACKING HANDLE | NOS. | 15 | | | | | | | |
| 2 | 506-0110283-00-A | TELESCOPIC TROLLY (TROLLEY FOR ACB HANDLING) | NOS. | 10 | | | | | | | |
| 3 | 506-0111056-00-A | DOOR KEY | NOS. | 50 | | | | | | | |
| 4 | 506-0111057-00-A | RELAY TEST EQUIPMENT | NOS. | 1 | | | | | | | |
| 5 | 506-0111058-00-A | MODULE RACKING HANDLE | NOS. | 15 | | | | | | | |
| **D** | **SITE MODIFICATION** | | | | | | | | | | |
| 1 | 506-0111059-00-A | LUMP SUM ALL INCLUSIVE CHARGES PER VISIT FOR SKILLED TECHNICIAN (EXCEPT DAILY CHARGES) | VISITS | 10 | | | | | | | |
| 2 | 506-0111060-00-A | LUMP SUM ALL INCLUSIVE DAILY CHARGES FOR SKILLED TECHNICIAN | DAYS | 45 | | | | | | | |
| 3 | 506-0111061-00-A | LUMP SUM ALL INCLUSIVE CHARGES PER VISIT FOR SERVICE ENGINEER (EXCEPT DAILY CHARGES) | VISITS | 10 | | | | | | | |
| 4 | 506-0111062-00-A | LUMP SUM ALL INCLUSIVE DAILY CHARGES FOR SERVICE ENGINEER | DAYS | 45 | | | | | | | |
| 5 | 506-0111063-00-A | SITE MODIFICATION MATERIAL @ 1% OF TOTAL BOARD COST (i.e. SUMMATION OF S.NO. 1 TO S.NO. 26 OF BOQ CUM PRICE SCHEDULE) | SET | 1 | | | | | | | |
| **E** | **NUMERICAL RELAY,IMCC AND WIRELESS TEMP MONITORING SYSTEM-COMMISSIONING** | | | | | | | | | | AS PER ANNEXURE-E |
| **F** | **E&C SPARES** | | | | | | | | | | AS PER ANNEXURE-F |

**NOTES:**

| | |
|---|---|
| A1 | 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-520-506-E002) RESPECTIVELY. |
| A.2 | BIDDER HAS TO QUOTE FOR THE FOLLOWING ALONG WITH THE BID: |
| i | HMI SYSTEM: AS PER SR. NO. B ABOVE. |
| ii | NETWORKING HARDWARE FOR NUMERICAL RELAYS, IMC AS PER SR. NO.-B1 & FOR WIRELESS TEMPERATURE MONITORING SYSTEM AS PER SR. NO.B3 ABOVE, |
| iii | AMC FOR NUMERICAL RELAYS AS PER SR. NO. B2 ABOVE. |
| iv | NUMERICAL RELAY, IMCC, WIRELESS TEMPERATURE MONITORING & HMI SYSTEM COMMISSIONING: AS PER ANNEXURE-E |
| v | TOOLS & TACKLES: AS PER SR. NO. C ABOVE. |
| vi | SITE MODIFICATION CHARGES: AS PER SR. NO. D (1 TO 5) ABOVE. |
| vii | E & C SPARES: AS PER ANNEXURE-F |
| viii | BIDDER TO PROVIDE A SCHEDULE OF UNIT PRICES IN ACCORDANCE WITH THE LIST PROVIDED IN ANNEXURE-H |



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| | |
|---|---|
| A.3 | BIDDER TO ENSURE THAT SUMMATION OF PRICES (AS PER ANNEXURE-H) OF APPLICABLE MODULES (AS PER ANNEXURE A.1-BOARDWISE BOM) AND APPLICABLE PANELS (MENTIONED ABOVE BY THE BIDDER) OF A BOARD SHALL BE EQUIVALENT TO BOARD PRICE QUOTED ABOVE FOR THAT BOARD. VARIATION OF +/- 5% IS ACCEPTABLE IN THE DERIVED PRICE FROM THE BOARD PRICE QUOTED ABOVE. |
| A.4 | ADDITION/ DELETION OF QUANTITIES SHALL BE APPLICALBE AT THE QUOTED PRICES. ALLOWABLE VARIATION IN QUANTITY AND PRICE SHALL BE AS PER NIT. |
| A.5 | ALL LT PCC/ PMCC/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. |
| A.6 | BIDDER IS REQUIRED TO PROVIDE THE QUANTITY OF PANELS CORRESPONDING TO EACH BOARD IN THE TABLE ABOVE WHEN SUBMITTING THEIR TECHNO-COMMERCIAL PROPOSAL. |
| A.7 | IN CASE MODULE DOORS ARE PART OF MODULES, 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-520-506-E002), 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. |
| A.8 | NO ADDITIONAL PRICES SHALL BE PAID FOR PROTOTYPE PANELS, PRICES QUOTED ABOVE INCLUDES COST OF PROTOTYPE PANELS ALSO. |
| A.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 MCCB BOX; DC MCCB BOX; HMI SYSTEM; NUMERICAL RELAY, IMCC AND WIRELESS TEMP MONITORING SYSTEM- NETWORKING HARDWARE; AMC FOR NUMERICAL RELAY; NUMERICAL RELAY, IMCC, WIRELESS TEMP MONITORING AND HMI SYSTEM-COMMISSIONING; TOOLS & TACKLE; SITE MODIFICATION; E & C SPARES |
| A.10 | IN UNIT ADDITION-DELETION PRICES (ANNEXURE-H), PRICES QUOTED FOR COMPONENTS SHALL BE REASONABLE AND AS PER LIST PRICE OF CONCERNED MANUFACTURERS. |
| B.1 | REFER ANNEXURE-1_TYPICAL SWITCHGEAR RELAY NETWORK ARCHITECTURE. |
| B.2 | 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. |
| B.3 | MAKE AND COLOR SHADE OF FURNITURE SHALL BE DECIDED DURING DETAIL ENGINEERING. FURNITURE COLOR SHADE SHOULD MATCH WITH CONTROL ROOM FURNITURE. |
| B.4 | 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. |
| B.5 | FOR TESTING AND ERECTION & COMMISSIONING CHARGES FOR HMI- ITEMS, KINDLY REFER S.No.4 OF ANNEXURE-E |
| B1.1 | REFER ANNEXURE- 3_TENTATIVE SWITCHBOARD LOCATION DETAIL FOR DISTANCE BETWEEN SWITCHGEAR AND NETWORK LEVEL ETHERNET SWITCH IN MAIN CONTROL ROOM. |
| B1.2 | REFER ANNEXURE- 1_TYPICAL SWITCHGEAR RELAY NETWORK ARCHITECTURE FOR HMI REQUIREMENT. |
| B1.3 | 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. |
| B2.1 | THE COMMENCEMENT DATE FOR AMC WILL BE FROM THE DATE OF TAKEOVER BY THE END CUSTOMER. HOWEVER, TENTATIVE DATE OF AMC COMMENCEMENT SHALL BE **20.12.2028.** |
| B3.1 | REFER ANNEXURE- 3_TENTATIVE SWITCHBOARD LOACTION DETAIL FOR DISTANCE BETWEEN SWITCHGEAR AND MAIN CONTROL ROOM. |
| B3.2 | FOR ABOVE ITEMS LISTED AT S.NO. B3 (1) AND .B3 (2), BMCC(6DA), TMCC (6DB) and EMCC(6DG) OF ONE UNIT IS CONSIDERED AS 1 SET |
| C.1 | BIDDER HAS TO QUOTE FOR TOOLS AND TACKLES MENTIONED ABOVE. HOWEVER, BIDDER HAS TO INDICATE ANY SPECIAL TOOLS (IF REQUIRED). |
| D.1 | MODIFICATION OF EXISTING RAW WATER SWITCHBOARD IS ALSO ENVISAGED IN THE SCOPE. THE PAYMENT SHALL BE DONE AS PER THE RATE FINALISED AS PER ANNEXURES ABOVE . |

| | | | |
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| | | **TECHNICAL SPECIFICATION**<br>**LT SWITCHGEAR**<br>**1X800MW NTPC SIPAT STPP STAGE – III** | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 07.04.2026 |

**ANNEXURE-E**

**NUMERICAL RELAY, IMCC, WIRELESS TEMPERATURE MONITORING & HMI SYSTEMS - COMMISSIONING CHARGES**

| S. No. | ITEM NO. | Item Description | Quantity | Unit | Unit Price (Ex- Works) Rs. | Total Price (Ex- Works) Rs. | Remarks |
|---|---|---|---|---|---|---|---|
| 1 | 506-0110403-00-C | LUMP SUM ALL INCLUSIVE CHARGES PER NUMERICAL RELAY COMMISSIONING (INCLUDING CONVEYANCE TO SITE, BOARDING AND LODGING) | 225 | NOS. | | | |
| 2 | 506-0110404-00-C | LUMP SUM ALL INCLUSIVE CHARGES PER IMC COMMISSIONING (INCLUDING CONVEYANCE TO SITE, BOARDING AND LODGING) | 2000 | NOS. | | | |
| 3 | 506-0110405-00-C | LUMP SUM ALL INCLUSIVE CHARGES FOR WIRELESS TEMPERATURE MONITORING SYSTEM COMMISSIONING. FOR ONE LOT OF SWITCHBOARDS- LOT- 6DA, 6DB & 6DG SWITCHBOARDS | 1 | NOS. | | | 1 NO.CONSISTS OF 3 SWITCHBOARD |
| 4 | 506-0110407-00-C | TESTING AND ERECTION & COMMISSIONING CHARGES FOR HMI- ITEMS AT SL. NO. B1-B4(HMI SYSTEM) OF ANNEXURE-B | 2 | NOS. | | | 1 NO. SHALL CONSIST OF TESTING AND ERECTION & COMMISSIONING OF ONE ITEM EACH OF SL. NO. B1-B4(HMI SYSTEM) OF ANNEXURE-B |
| | | | | | **TOTAL =** | | |

**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 (BMCC, TMCC and EMCC) = UNIT PRICE FOR COMMISSIONING CHARGES AS PER SL.NO.3.A ABOVE (SAME TO BE CERTIFIED BY BHEL). |
| 4 | FOR LINE ITEM 3, TESTING AND COMMISSIONING OF WIRELESS TEMPERATURE MONITORING SYSTEM FOR BMCC(6DA), TMCC (6DB) and EMCC(6DG) IS CONSIDERED AS 1 NO. |
| 5 | APPROXIMATELY 15 NOs. OF NUMERICAL RELAYS AND/OR 50 NOs. OF IMCS CAN BE CONSIDERED BY BIDDER FOR COMMISSIONING IN EACH VISIT. |
| 6 | FOR LINE ITEM 1, 2, 3 BIDDER TO NOTE THAT TESTING, CONFIGURATION AND NETWORKING SETUP OF RELAY, IMC & TEMPERATURE MONITORING SYSTEM SHALL BE THE BIDDER'S RESPONSIBILITY COMPLETELY. |
| 7 | FOR LINE ITEM 4, BIDDER TO NOTE THAT ERECTION & COMMISSIONING, TESTING, CONFIGURATION AND NETWORKING SETUP OF HMI SYSTEM SHALL BE THE BIDDER'S RESPONSIBILITY COMPLETELY. |
| 8 | 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 TEMPERATURE MONITORING SYSTEM AND DCS/HMI. |
| 9 | FOR LINE ITEMS 1 TO 4, BIDDER TO DEPUTE ITS MANPOWER WITHIN 15 DAYS FROM THE DATE OF INTIMATION BY BHEL. |



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| | | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 20.06.2026 |

## ANNEXURE-F

### E&C SPARES

| S. No. | Item no. | Item / Component | Unit | Quantity | Unit Price (Ex-Works) Rs. | Total Price (Ex- Works) Rs. |
|---|---|---|---|---|---|---|
| **1** | | **FACTORY BUILT ASSEMBLIES (PCC/MCC/DB)** | | | | |
| 1.1 | 506-0110990-00-G | Busbar supports (Horizontal)(1 set of 3) | Nos. | 1 | | |
| 1.2 | 506-0110991-00-G | Primary isolating contacts (Bus side) of each rating(1 set of 3) | Nos. | 1 | | |
| 1.3 | 506-0110992-00-G | Primary isolating contacts (Load side) of each rating (1 set of 3) | Nos. | 1 | | |
| 1.4 | 506-0110993-00-G | Secondary isolating contacts of each rating (1 set of 3) | Nos. | 1 | | |
| 1.5 | 506-0110994-00-G | Gaskets (each size) | Meter | 10 | | |
| 1.6 | 506-0110995-00-G | Fixed Terminal (1way) | Nos. | 20 | | |
| 1.7 | 506-0110996-00-G | Shrouds (for outgoing modules) | Nos. | one for each physical size of module | | |
| 1.8 | | Wire (for secondary wiring) | | | | |
| a. | 506-0110997-00-G | 2.5 $mm^2$ | Metres | 100 | | |
| b. | 506-0110998-00-G | 1.5$mm^2$ | Metres | 100 | | |
| 1.9 | 506-0111021-00-G | Lugs (for 2.5 secondary wiring) | Nos. | 100 | | |
| 1.10 | 506-0110999-00-G | Lugs (for 1.5 secondary wiring) | Nos. | 100 | | |
| **2** | | **AIR CIRCUIT BREAKER (FOR EACH RATING)** | | | | |
| 2.1 | 506-0111000-00-G | Shunt trip coil | Nos. | 5 | | |
| 2.2 | 506-0111001-00-G | spring charging motor | Nos. | 1 motor of each rating | | |
| 2.3 | 506-0111002-00-G | closing coil | Nos. | 5 | | |
| 2.4 | 506-0111003-00-G | Auxiliary switch | Nos. | 1 | | |
| **3** | | **ISOLATING SWITCH** | | | | |
| 3.1 | 506-0111004-00-G | Main contact kit for each rating (1 set of 3) | Nos. | 1 | | |
| **4** | | **POWER CONTACTORS** | | | | |
| 4.1 | 506-0111005-00-G | Contactor coil of each rating | Nos. | 1 | | |
| 4.2 | 506-0111006-00-G | Contacts kit (main) for each rating (1 set of 3) | Nos. | 1 | | |
| **5** | | **AUXILIARY CONTACTORS** | | | | |
| 5.1 | 506-0111007-00-G | Complete unit with 2NO + 2NC contacts | Nos. | 1 no. of each rating/type | | |
| 5.2 | | Contactor coils | | | | |
| a. | 506-0111008-00-G | AC for each Aux. contactor rating | Nos. | 1 | | |
| b. | 506-0111009-00-G | DC for each Aux. contactor rating | Nos. | 1 | | |
| **6** | 506-0111010-00-G | MCCB | Nos. | 1 no. of each rating/type | | |
| 7 | 506-0111011-00-G | MPCB | Nos. | 1 no. of each rating/type | | |
| 8 | 506-0111012-00-G | MCB | Nos. | 1 no. of each rating/type | | |
| **7** | | **PUSH BUTTONS** | | | | |
| 6.1 | 506-0111013-00-G | Actuator contacts | Nos. | 5 | | |
| 6.2 | 506-0111014-00-G | Element | Nos. | 5 | | |
| **8** | | **INDICATING LAMPS** | | | | |
| 8.1 | 506-0111015-00-G | Complete unit | Nos. | 10 | | |
| 8.2 | 506-0111016-00-G | Lens (assorted) | Nos. | 10 | | |
| **9** | | **OTHERS** | | | | |
| 9.1 | 506-0111017-00-G | Selector & control switch (each type) | Nos. | 1 | | |
| 9.2 | 506-0111018-00-G | Connecting cable between CT and IMCC of appropriate length | Nos. | 50 | | |
| 9.3 | 506-0111019-00-G | Connecting cable between VT and IMCC of appropriate length | Nos. | 50 | | |
| 9.4 | 506-0111020-00-G | IMC Display HMI cable of Appropriate length | Nos. | 50 | | |
| | | | | | **TOTAL =** | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

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



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 300A – Drawout Type | 1 | | |
| | 400A – Drawout Type | 1 | | |
| f) | 220V DCDB Incomer from charger - Module type CH (I/C) | | | |
| | 50A – CH Fixed Type | 1 | | |
| | 100A – CH Fixed Type | 1 | | |
| | 125A – CH Fixed Type | 1 | | |
| | 150A – CH Fixed Type | 1 | | |
| | 200A – CH Fixed Type | 1 | | |
| | 300A – CH Fixed Type | 1 | | |
| | 400A – CH Fixed Type | 1 | | |
| | 450A – CH Fixed Type | 1 | | |
| | 500A – CH Fixed Type | 1 | | |
| | 630A – CH Fixed Type | 1 | | |
| | 800A – CH Fixed Type | 1 | | |
| | 1000A – CH Fixed Type | 1 | | |
| | 1250A – CH Fixed Type | 1 | | |
| | 1600A – CH Fixed Type | 1 | | |
| | 50A – CH Drawout Type | 1 | | |
| | 100A – CH Drawout Type | 1 | | |
| | 125A – CH Drawout Type | 1 | | |
| | 150A – CH Drawout Type | 1 | | |
| | 200A – CH Drawout Type | 1 | | |
| | 300A – CH Drawout Type | 1 | | |
| | 400A – CH Drawout Type | 1 | | |
| | 450A – CH Drawout Type | 1 | | |
| | 500A – CH Drawout Type | 1 | | |
| | 630A – CH Drawout Type | 1 | | |
| | 800A – CH Drawout Type | 1 | | |
| | 1000A – CH Drawout Type | 1 | | |
| | 1250A – CH Drawout Type | 1 | | |
| | 1600A – CH Drawout Type | 1 | | |
| g) | 220V DCDB Incomer from battery - Module type DB (I/C) | | | |
| | 50A – DB Fixed Type | 1 | | |
| | 100A – DB Fixed Type | 1 | | |
| | 125A – DB Fixed Type | 1 | | |
| | 150A – DB Fixed Type | 1 | | |
| | 200A – DB Fixed Type | 1 | | |
| | 300A – DB Fixed Type | 1 | | |
| | 400A – DB Fixed Type | 1 | | |
| | 450A – DB Fixed Type | 1 | | |
| | 500A – DB Fixed Type | 1 | | |
| | 630A – DB Fixed Type | 1 | | |
| | 800A – DB Fixed Type | 1 | | |
| | 1000A – DB Fixed Type | 1 | | |
| | 1250A – DB Fixed Type | 1 | | |
| | 1600A – DB Fixed Type | 1 | | |
| | 50A – DB Drawout Type | 1 | | |
| | 100A – DB Drawout Type | 1 | | |
| | 125A – DB Drawout Type | 1 | | |
| | 150A – DB Drawout Type | 1 | | |
| | 200A – DB Drawout Type | 1 | | |
| | 300A – DB Drawout Type | 1 | | |
| | 400A – DB Drawout Type | 1 | | |
| | 450A – DB Drawout Type | 1 | | |
| | 500A – DB Drawout Type | 1 | | |
| | 630A – DB Drawout Type | 1 | | |
| | 800A – DB Drawout Type | 1 | | |
| | 1000A – DB Drawout Type | 1 | | |
| | 1250A – DB Drawout Type | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 1600A – DB Drawout Type | 1 | | |
| **2** | **BUSCOUPLER UNIT** | | | |
| a) | ACB Buscoupler to PCC/PMCC/MCC - Module Type DAET/ DAE (B/C) | | | |
| | 630A | 1 | | |
| | 800A | 1 | | |
| | 1000A | 1 | | |
| | 1250A | 1 | | |
| | 1600A | 1 | | |
| | 2000A | 1 | | |
| | 2500A | 1 | | |
| | 3000A | 1 | | |
| | 4000A | 1 | | |
| b) | MCCB Buscoupler for MCC / ACDB – Module Type E3 (B/C) | | | |
| | 63A – Fixed Type | 1 | | |
| | 125A – Fixed Type | 1 | | |
| | 160A – Fixed Type | 1 | | |
| | 200A – Fixed Type | 1 | | |
| | 250A – Fixed Type | 1 | | |
| | 300A – Fixed Type | 1 | | |
| | 400A – Fixed Type | 1 | | |
| | 63A – Drawout Type | 1 | | |
| | 125A – Drawout Type | 1 | | |
| | 160A – Drawout Type | 1 | | |
| | 200A – Drawout Type | 1 | | |
| | 250A – Drawout Type | 1 | | |
| | 300A – Drawout Type | 1 | | |
| | 400A – Drawout Type | 1 | | |
| c) | 220V DCDB buscoupler - Module Type - DC | | | |
| | 50A – DC Fixed Type | 1 | | |
| | 100A – DC Fixed Type | 1 | | |
| | 125A – DC Fixed Type | 1 | | |
| | 150A – DC Fixed Type | 1 | | |
| | 200A – DC Fixed Type | 1 | | |
| | 300A – DC Fixed Type | 1 | | |
| | 400A – DC Fixed Type | 1 | | |
| | 450A – DC Fixed Type | 1 | | |
| | 500A – DC Fixed Type | 1 | | |
| | 630A – DC Fixed Type | 1 | | |
| | 800A – DC Fixed Type | 1 | | |
| | 1000A – DC Fixed Type | 1 | | |
| | 1250A – DC Fixed Type | 1 | | |
| | 1600A – DC Fixed Type | 1 | | |
| | 50A – DC Drawout Type | 1 | | |
| | 100A – DC Drawout Type | 1 | | |
| | 125A – DC Drawout Type | 1 | | |
| | 150A – DC Drawout Type | 1 | | |
| | 200A – DC Drawout Type | 1 | | |
| | 300A – DC Drawout Type | 1 | | |
| | 400A – DC Drawout Type | 1 | | |
| | 450A – DC Drawout Type | 1 | | |
| | 500A – DC Drawout Type | 1 | | |
| | 630A – DC Drawout Type | 1 | | |
| | 800A – DC Drawout Type | 1 | | |
| | 1000A – DC Drawout Type | 1 | | |
| | 1250A – DC Drawout Type | 1 | | |
| | 1600A – DC Drawout Type | 1 | | |
| d) | 220V DCDB TIE - Module Type - HD | | | |
| | 50A – HD Fixed Type | 1 | | |
| | 100A – HD Fixed Type | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 125A – HD Fixed Type | 1 | | |
| | 150A – HD Fixed Type | 1 | | |
| | 200A – HD Fixed Type | 1 | | |
| | 300A – HD Fixed Type | 1 | | |
| | 400A – HD Fixed Type | 1 | | |
| | 450A – HD Fixed Type | 1 | | |
| | 500A – HD Fixed Type | 1 | | |
| | 630A – HD Fixed Type | 1 | | |
| | 800A – HD Fixed Type | 1 | | |
| | 1000A – HD Fixed Type | 1 | | |
| | 1250A – HD Fixed Type | 1 | | |
| | 1600A – HD Fixed Type | 1 | | |
| | 50A – HD Drawout Type | 1 | | |
| | 100A – HD Drawout Type | 1 | | |
| | 125A – HD Drawout Type | 1 | | |
| | 150A – HD Drawout Type | 1 | | |
| | 200A – HD Drawout Type | 1 | | |
| | 300A – HD Drawout Type | 1 | | |
| | 400A – HD Drawout Type | 1 | | |
| | 450A – HD Drawout Type | 1 | | |
| | 500A – HD Drawout Type | 1 | | |
| | 630A – HD Drawout Type | 1 | | |
| | 800A – HD Drawout Type | 1 | | |
| | 1000A – HD Drawout Type | 1 | | |
| | 1250A – HD Drawout Type | 1 | | |
| | 1600A – HD Drawout Type | 1 | | |
| **3** | **ACB outgoing supply feeder - Module Type DAE (O/G)/DAE-TIE** | | | |
| | 630A | 1 | | |
| | 800A | 1 | | |
| | 1000A | 1 | | |
| | 1250A | 1 | | |
| | 1600A | 1 | | |
| | 2000A | 1 | | |
| | 2500A | 1 | | |
| | 3000A | 1 | | |
| | 4000A | 1 | | |
| **4** | **ACB outgoing motor feeder - Module Type DM/PM/AM (controlled from DDCMIS/PLC/ATRS)** | | | |
| | 90- 200KW | 1 | | |
| **5** | **MCCB outgoing supply feeders** | | | |
| a) | Module Type E3(O/G) | | | |
| | 16A - Fixed type | 1 | | |
| | 32A - Fixed type | 1 | | |
| | 63A - Fixed type | 1 | | |
| | 100A - Fixed type | 1 | | |
| | 125A - Fixed type | 1 | | |
| | 160A - Fixed type | 1 | | |
| | 200A - Fixed type | 1 | | |
| | 250A - Fixed type | 1 | | |
| | 300A - Fixed type | 1 | | |
| | 400A - Fixed type | 1 | | |
| | 16A - Drawout Type | 1 | | |
| | 32A - Drawout Type | 1 | | |
| | 63A - Drawout Type | 1 | | |
| | 100A - Drawout Type | 1 | | |
| | 125A - Drawout Type | 1 | | |
| | 160A - Drawout Type | 1 | | |
| | 200A - Drawout Type | 1 | | |
| | 250A - Drawout Type | 1 | | |



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**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 300A - Drawout Type | 1 | | |
| | 400A - Drawout Type | 1 | | |
| b) | Module Type E3-TP (O/G) | | | |
| | 16A - Fixed type | 1 | | |
| | 32A - Fixed type | 1 | | |
| | 63A - Fixed type | 1 | | |
| | 100A - Fixed type | 1 | | |
| | 125A - Fixed type | 1 | | |
| | 160A - Fixed type | 1 | | |
| | 200A - Fixed type | 1 | | |
| | 250A - Fixed type | 1 | | |
| | 300A - Fixed type | 1 | | |
| | 400A - Fixed type | 1 | | |
| | 16A - Drawout Type | 1 | | |
| | 32A - Drawout Type | 1 | | |
| | 63A - Drawout Type | 1 | | |
| | 100A - Drawout Type | 1 | | |
| | 125A - Drawout Type | 1 | | |
| | 160A - Drawout Type | 1 | | |
| | 200A - Drawout Type | 1 | | |
| | 250A - Drawout Type | 1 | | |
| | 300A - Drawout Type | 1 | | |
| | 400A - Drawout Type | 1 | | |
| c) | Module Type ES3 (O/G) | | | |
| | 63A - Fixed type | 1 | | |
| | 100A - Fixed type | 1 | | |
| | 125A - Fixed type | 1 | | |
| | 160A - Fixed type | 1 | | |
| | 200A - Fixed type | 1 | | |
| | 250A - Fixed type | 1 | | |
| | 400A - Fixed type | 1 | | |
| | 63A - Drawout Type | 1 | | |
| | 100A - Drawout Type | 1 | | |
| | 125A - Drawout Type | 1 | | |
| | 160A - Drawout Type | 1 | | |
| | 200A - Drawout Type | 1 | | |
| | 250A - Drawout Type | 1 | | |
| | 400A - Drawout Type | 1 | | |
| d) | 2-ph feeder Module Type E2(O/G) | | | |
| | 100A - Fixed type | 1 | | |
| | 160A - Fixed type | 1 | | |
| | 200A - Fixed type | 1 | | |
| | 250A - Fixed type | 1 | | |
| | 300A - Fixed type | 1 | | |
| | 400A - Fixed type | 1 | | |
| | 100A - Drawout Type | 1 | | |
| | 160A - Drawout Type | 1 | | |
| | 200A - Drawout Type | 1 | | |
| | 250A - Drawout Type | 1 | | |
| | 300A - Drawout Type | 1 | | |
| | 400A - Drawout Type | 1 | | |
| e) | Double pole 1-ph feeder Module Type E1(O/G) | | | |
| | 16A - Fixed type | 1 | | |
| | 32A - Fixed type | 1 | | |
| | 63A - Fixed type | 1 | | |
| | 100A - Fixed type | 1 | | |
| | 125A - Fixed type | 1 | | |
| | 16A - Drawout Type | 1 | | |
| | 32A - Drawout Type | 1 | | |
| | 63A - Drawout Type | 1 | | |
| | 100A - Drawout Type | 1 | | |
| | 125A - Drawout Type | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| f) | 3-Ph MCCB controlled outgoing contactor feeder with IMC Module Type EA3(O/G) | | | |
| | 16A - Fixed type | 1 | | |
| | 32A - Fixed type | 1 | | |
| | 63A - Fixed type | 1 | | |
| | 100A - Fixed type | 1 | | |
| | 125A - Fixed type | 1 | | |
| | 200A - Fixed type | 1 | | |
| | 250A - Fixed type | 1 | | |
| | 400A - Fixed type | 1 | | |
| | 16A - Drawout Type | 1 | | |
| | 32A - Drawout Type | 1 | | |
| | 63A - Drawout Type | 1 | | |
| | 100A - Drawout Type | 1 | | |
| | 125A - Drawout Type | 1 | | |
| | 200A - Drawout Type | 1 | | |
| | 250A - Drawout Type | 1 | | |
| | 400A - Drawout Type | 1 | | |
| g) | 3-Ph MCCB controlled outgoing contactor feeder without IMC Module Type ET3(O/G) | | | |
| | 16A - Fixed type | 1 | | |
| | 32A - Fixed type | 1 | | |
| | 63A - Fixed type | 1 | | |
| | 100A - Fixed type | 1 | | |
| | 125A - Fixed type | 1 | | |
| | 200A - Fixed type | 1 | | |
| | 250A - Fixed type | 1 | | |
| | 400A - Fixed type | 1 | | |
| | 16A - Drawout Type | 1 | | |
| | 32A - Drawout Type | 1 | | |
| | 63A - Drawout Type | 1 | | |
| | 100A - Drawout Type | 1 | | |
| | 125A - Drawout Type | 1 | | |
| | 200A - Drawout Type | 1 | | |
| | 250A - Drawout Type | 1 | | |
| | 400A - Drawout Type | 1 | | |
| h) | 1-Ph MCCB controlled outgoing contactor feeder Module Type EA1(O/G) | | | |
| | 16A - Fixed type | 1 | | |
| | 32A - Fixed type | 1 | | |
| | 63A - Fixed type | 1 | | |
| | 16A - Drawout Type | 1 | | |
| | 32A - Drawout Type | 1 | | |
| | 63A - Drawout Type | 1 | | |
| i) | 220V DC Outgoing MCCB Type (X) Feeder | | | |
| | 16A - Fixed type | 1 | | |
| | 32A - Fixed type | 1 | | |
| | 63A - Fixed type | 1 | | |
| | 100A - Fixed type | 1 | | |
| | 125A - Fixed type | 1 | | |
| | 200A - Fixed type | 1 | | |
| | 250A - Fixed type | 1 | | |
| | 300A - Fixed type | 1 | | |
| | 400A - Fixed type | 1 | | |
| | 600A - Fixed type | 1 | | |
| | 800A - Fixed type | 1 | | |
| | 16A - Drawout Type | 1 | | |
| | 32A - Drawout Type | 1 | | |
| | 63A - Drawout Type | 1 | | |
| | 100A - Drawout Type | 1 | | |
| | 125A - Drawout Type | 1 | | |
| | 200A - Drawout Type | 1 | | |
| | 250A - Drawout Type | 1 | | |



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**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 300A - Drawout Type | 1 | | |
| | 400A - Drawout Type | 1 | | |
| | 600A - Drawout Type | 1 | | |
| | 800A - Drawout Type | 1 | | |
| **6** | **DOL Motor Starter - Unidirectional Drive - Drawout Type** | | | |
| a) | Module Type DK2 / PK2 / AK2 (controlled from DDCMIS/PLC/ATRS) | | | |
| | Upto 5.5KW | 1 | | |
| | 5.6 - 7.0KW | 1 | | |
| | 7.1 - 13KW | 1 | | |
| | 13.1 - 24KW | 1 | | |
| | 24.1 - 29.9KW | 1 | | |
| b) | Module Type DK21 / PK21 / AK21 (controlled from DDCMIS/PLC/ATRS) | | | |
| | 30.0 - 37.0KW | 1 | | |
| | 37.1 - 55KW | 1 | | |
| | 55.1 - 80.0KW | 1 | | |
| | 80.1 - 89.9KW | 1 | | |
| c) | Module Type DK2E/PK2E/AK2E (Reacceleration) (controlled from DDCMIS/PLC/ATRS) | | | |
| | Upto 5.5KW | 1 | | |
| | 5.6 - 7.0KW | 1 | | |
| | 7.1 - 13KW | 1 | | |
| | 13.1 - 24KW | 1 | | |
| | 24.1 – 29.9KW | 1 | | |
| d) | Module Type DK21E/PK21E/AK21E (Reacceleration) (controlled from DDCMIS/PLC/ATRS) | | | |
| | 30.0 - 37.0KW | 1 | | |
| | 37.1 - 55KW | 1 | | |
| | 55.1 - 80.0KW | 1 | | |
| | 80.1 - 89.9KW | 1 | | |
| e) | Module Type K2 (Controlled from LCP) | | | |
| | Upto 5.5KW | 1 | | |
| | 5.6 - 7.0KW | 1 | | |
| | 7.1 - 13KW | 1 | | |
| | 13.1 - 24KW | 1 | | |
| | 24.1 - 29.9KW | 1 | | |
| f) | Module Type K21 (Controlled from LCP) | | | |
| | 30.0 - 37.0KW | 1 | | |
| | 37.1 - 55KW | 1 | | |
| | 55.1 - 80.0KW | 1 | | |
| | 80.1 - 89.9KW | 1 | | |
| g) | Module Type K3 (Controlled from LPBS) | | | |
| | Upto 5.5KW | 1 | | |
| | 5.6 - 7.0KW | 1 | | |
| | 7.1 - 13KW | 1 | | |
| | 13.1 - 24KW | 1 | | |
| | 24.1 - 29.9KW | 1 | | |
| h) | Module Type K31 (Controlled from LPBS) | | | |
| | 30.0 - 37.0KW | 1 | | |
| | 37.1 - 55KW | 1 | | |
| | 55.1 - 80.0KW | 1 | | |
| | 80.1 - 89.9KW | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| **7** | **RDOL Motor Starter - Bidirectional Drive - Drawout Type** | | | |
| a) | Module Type DN1/ PN1/ AN1 (controlled from DDCMIS/PLC/ATRS) | | | |
| | Upto 5.5KW | 1 | | |
| | 5.6 - 7.0KW | 1 | | |
| | 7.1 - 13KW | 1 | | |
| | 13.1 - 24KW | 1 | | |
| | 24.1 – 29.9KW | 1 | | |
| | 30.0 - 37.0KW | 1 | | |
| | 37.1 - 55KW | 1 | | |
| | 55.1 - 80.0KW | 1 | | |
| | 80.1 - 89.9KW | 1 | | |
| **8.1** | Rapping Motor (RM1) Module with IMC | 1 | | |
| **8.2** | Rapping Motor (RM2) Module with OLR | 1 | | |
| **9** | DUST DENSITY MONITOR (DDM) Module | 1 | | |
| **10** | HOPPER HEATER (HH) Module | 1 | | |
| **11** | SUPPORT INSULATOR HEATER (HI) Module | 1 | | |
| **12** | SHAFT INSULATOR HEATER (HS) Module | 1 | | |
| **13** | Ash Level Indicator (ALI) Module | 1 | | |
| **14** | ARECA MARSHALING (ARECA) Module | 1 | | |
| **15** | WAVE LEVEL TRANSMITTER (WLT) Module | 1 | | |
| **16** | MARSHALING MODULE FOR SSPB OF RAPPING MOTOR AND HOPPER HEATER FEEDBACK (MM) | 1 | | |
| **17** | WALL BLOWER Module | 1 | | |
| **18** | LR BLOWER Module | 1 | | |
| **19** | AH BLOWER Module | 1 | | |
| **20** | JAMMING RELAY Module | 1 | | |
| **21** | Wireless Temperature Sensor (WTS1) Module (In one ACB/PCC panel with single ACB) | 1 | | |
| **22** | Wireless Temperature Sensor (WTS2) Module (In one ACB panel with double ACB) | 1 | | |
| **23** | Wireless Temperature Sensor (WTS3) Module (In one Double front MCC panel) | 1 | | |
| **24** | **Common Auxiliary Module** | | | |
| a) | PT module | | | |
| i | Bus PT module for PCC/PMCC - G1 Type | 1 | | |
| ii | Bus PT module for Emergency MCC - G2 Type | 1 | | |
| iii | Bus PT module for MCC/ACDB - VM Type | 1 | | |
| iv | Bus PT DCDB - S Type | 1 | | |
| b.1) | 110V AC control supply module – Type CS (consisting of 415/110V control Trafo.) | | | |
| | 1KVA | 1 | | |
| | 2KVA | 1 | | |
| | 2.5KVA | 1 | | |
| | 3KVA | 1 | | |
| | 5KVA | 1 | | |
| | 7.5KVA | 1 | | |
| | 10KVA | 1 | | |
| b.2) | 240 V AC control supply module – type CS (consisting of 415/240V control Trafo.) | | | |
| | 1KVA | 1 | | |
| | 2KVA | 1 | | |
| | 2.5KVA | 1 | | |
| | 3KVA | 1 | | |
| | 5KVA | 1 | | |
| | 7.5KVA | 1 | | |
| | 10KVA | 1 | | |
| b.3) | 24V AC control supply module – Type CS (consisting of 415/24V control Trafo.) | | | |
| | 250VA | 1 | | |
| | 500VA | 1 | | |
| | 1KVA | 1 | | |



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**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 2KVA | 1 | | |
| | 2.5KVA | 1 | | |
| | 3KVA | 1 | | |
| | 5KVA | 1 | | |
| | 7.5KVA | 1 | | |
| | 10KVA | 1 | | |
| c) | 240V AC motor space heater module | 1 | | |
| d) | 220V DC supply module (for receiving 220V DC supply) | 1 | | |
| e) | 24V DC supply module | 1 | | |
| f) | Alarm module | 1 | | |
| g) | 240 V AC Panel Space heating supply module – type SH (consisting of 415/240V control Trafo.) | | | |
| | 1KVA | 1 | | |
| | 2KVA | 1 | | |
| | 2.5KVA | 1 | | |
| | 3KVA | 1 | | |
| | 5KVA | 1 | | |
| | 7.5KVA | 1 | | |
| | 10KVA | 1 | | |
| h) | 240V AC SPACE HEATER SUPPLY MODULE- SHS | 1 | | |
| **25** | **Empty Panel with Horizontal & Vertical Busbar, Support & Auxiliary Busbar (4 Wire System)** | | | |
| a) | PCC Panel (Single Front Drawout Type) Without Temperature Sensor | | | |
| | 630 / 630A | 1 | | |
| | 1000 / 1000A | 1 | | |
| | 1250 / 1250A | 1 | | |
| | 1600 / 1600A | 1 | | |
| | 2000 / 2000A | 1 | | |
| | 2500 / 2500A | 1 | | |
| | 3000 / 3000A | 1 | | |
| | 4000 / 4000A | 1 | | |
| b) | MCC Panel (Single Front Fixed Type ) | | | |
| | 63 / 63A | 1 | | |
| | 250 / 250A | 1 | | |
| | 400 / 400A | 1 | | |
| | 630 / 630A | 1 | | |
| | 800 / 630A | 1 | | |
| | 1000 / 630A | 1 | | |
| | 1250 / 630A | 1 | | |
| | 1600 / 630A | 1 | | |
| | 2000 / 630A | 1 | | |
| | 2500 / 630A | 1 | | |
| | 3000 / 630A | 1 | | |
| | 4000 / 630A | 1 | | |
| c) | MCC Panel (Single Front Drawout Type) | | | |
| | 63 / 63A | 1 | | |
| | 250 / 250A | 1 | | |
| | 400 / 400A | 1 | | |
| | 630 / 630A | 1 | | |
| | 800 / 630A | 1 | | |
| | 1000 / 630A | 1 | | |
| | 1250 / 630A | 1 | | |
| | 1600 / 630A | 1 | | |
| | 2000 / 630A | 1 | | |
| | 2500 / 630A | 1 | | |
| | 3000 / 630A | 1 | | |
| | 4000 / 630A | 1 | | |
| d) | MCC Panel (Double Front Drawout Type) | | | |
| | 63 / 63A | 1 | | |
| | 250 / 250A | 1 | | |
| | 400 / 400A | 1 | | |
| | 630 / 630A | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 800 / 630A | 1 | | |
| | 1000 / 630A | 1 | | |
| | 1250 / 630A | 1 | | |
| | 1600 / 630A | 1 | | |
| | 2000 / 630A | 1 | | |
| | 2500 / 630A | 1 | | |
| | 3000 / 630A | 1 | | |
| | 4000 / 630A | 1 | | |
| e) | ACDB Panel (Double Front Fixed Type) | | | |
| | 250 / 250A | 1 | | |
| | 400 / 400A | 1 | | |
| | 630 / 250A | 1 | | |
| | 630 / 630A | 1 | | |
| f) | 220V DCDB Panel (Single Front Fixed type) with 20kA, 1 second fault Level | | | |
| | UPTO 125A (with 125A VBB) | 1 | | |
| | UPTO 630A (with 630A VBB) | 1 | | |
| | 1000A (with 630A VBB) | 1 | | |
| | 1600A (with 630A VBB) | 1 | | |
| g) | 220V DCDB Panel (Single Front Fixed type) with 40kA, 1 second fault Level | | | |
| | UPTO 125A (with 125A VBB) | 1 | | |
| | UPTO 630A (with 630A VBB) | 1 | | |
| | 1000A (with 630A VBB) | 1 | | |
| | 1600A (with 630A VBB) | 1 | | |
| h) | 220V DCDB Panel (Double Front Fixed type) with 20kA, 1 second fault Level | | | |
| | UPTO 125A (with 125A VBB) | 1 | | |
| | UPTO 630A (with 630A VBB) | 1 | | |
| | 1000A (with 630A VBB) | 1 | | |
| | 1250A (with 630A VBB) | 1 | | |
| | 1600A (with 630A VBB) | 1 | | |
| i) | 220V DCDB Panel (Double Front Fixed type) with 40kA, 1 second fault Level | | | |
| | UPTO 125A (with 125A VBB) | 1 | | |
| | UPTO 630A (with 630A VBB) | 1 | | |
| | 1000A (with 630A VBB) | 1 | | |
| | 1250A (with 630A VBB) | 1 | | |
| | 1600A (with 630A VBB) | 1 | | |
| j) | 48V DCDB Panel (Single Front Fixed type) | | | |
| | UPTO 125A (with 125A VBB) | 1 | | |
| | UPTO 200A (with 200A VBB) | 1 | | |
| | UPTO 630A (with 630A VBB) | 1 | | |
| k) | 48V DCDB Panel (Double Front Fixed type) | | | |
| | UPTO 125A (with 125A VBB) | 1 | | |
| | UPTO 200A (with 200A VBB) | 1 | | |
| | UPTO 630A (with 630A VBB) | 1 | | |
| l) | Empty ACB Panel with Horizontal & Vertical Busbar, Support & Auxiliary Busbar | | | |
| | 630 / 630A | 1 | | |
| | 800 / 630A | 1 | | |
| | 800 / 800A | 1 | | |
| | 1000 / 630A | 1 | | |
| | 1000 / 800A | 1 | | |
| | 1000 / 1000A | 1 | | |
| | 1250 / 630A | 1 | | |
| | 1250 / 800A | 1 | | |
| | 1250 / 1000A | 1 | | |
| | 1250 / 1250A | 1 | | |
| | 1600 / 630A | 1 | | |
| | 1600 / 800A | 1 | | |
| | 1600 / 1000A | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 1600 / 1250A | 1 | | |
| | 1600 / 1600A | 1 | | |
| | 2000 / 630A | 1 | | |
| | 2000 / 800A | 1 | | |
| | 2000 / 1000A | 1 | | |
| | 2000 / 1250A | 1 | | |
| | 2000 / 1600A | 1 | | |
| | 2000 / 2000A | 1 | | |
| | 2500 / 630A | 1 | | |
| | 2500 / 800A | 1 | | |
| | 2500 / 1000A | 1 | | |
| | 2500 / 1250A | 1 | | |
| | 2500 / 1600A | 1 | | |
| | 2500 / 2000A | 1 | | |
| | 2500 / 2500A | 1 | | |
| | 3000 / 630A | 1 | | |
| | 3000 / 800A | 1 | | |
| | 3000 / 1000A | 1 | | |
| | 3000 / 1250A | 1 | | |
| | 3000 / 1600A | 1 | | |
| | 3000 / 2000A | 1 | | |
| | 3000 / 2500A | 1 | | |
| | 3000 / 3000A | 1 | | |
| | 4000 / 630A | 1 | | |
| | 4000 / 800A | 1 | | |
| | 4000 / 1000A | 1 | | |
| | 4000 / 1250A | 1 | | |
| | 4000 / 1600A | 1 | | |
| | 4000 / 2000A | 1 | | |
| | 4000 / 2500A | 1 | | |
| | 4000 / 3000A | 1 | | |
| | 4000 / 4000A | 1 | | |
| **26** | **Empty Panel with Horizontal & Vertical Busbar, Support & Auxiliary Busbar (3 Wire System)** | | | |
| a) | PCC Panel (Single Front Drawout Type) Without Temperature Sensor | | | |
| | 2000 / 2000A | 1 | | |
| | 3000 / 3000A | 1 | | |
| b) | MCC Panel (Double Front Drawout Type) | | | |
| | 2000 / 630A | 1 | | |
| | 3000 / 630A | 1 | | |
| c) | ACDB Panel (Double Front Fixed Type) | | | |
| | 250 / 250A | 1 | | |
| | 400 / 400A | 1 | | |
| d) | Empty ACB Panel with Horizontal & Vertical Busbar, Support & Auxiliary Busbar | | | |
| | 2000 / 630A | 1 | | |
| | 2000 / 800A | 1 | | |
| | 2000 / 1000A | 1 | | |
| | 2000 / 1250A | 1 | | |
| | 2000 / 1600A | 1 | | |
| | 2000 / 2000A | 1 | | |
| | 3000 / 630A | 1 | | |
| | 3000 / 800A | 1 | | |
| | 3000 / 1000A | 1 | | |
| | 3000 / 1250A | 1 | | |
| | 3000 / 1600A | 1 | | |
| | 3000 / 2000A | 1 | | |
| | 3000 / 2500A | 1 | | |
| | 3000 / 3000A | 1 | | |
| **27** | **Dummy Panel** | | | |



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| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 20.06.2026 |

**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | UPTO 630A | 1 | | |
| | 800A | 1 | | |
| | 1000A | 1 | | |
| | 1250A | 1 | | |
| | 1600A | 1 | | |
| | 2000A | 1 | | |
| | 2500A | 1 | | |
| | 3000A | 1 | | |
| | 4000A | 1 | | |
| **28** | **Unit Prices For Circuit Components** | | | |
| a) | Air Circuit Breaker without releases | | | |
| | 630A ACB, 4P, EDO, AC | 1 | | |
| | 800A ACB, 4P, EDO, AC | 1 | | |
| | 1000A ACB, 4P, EDO, AC | 1 | | |
| | 1250A ACB, 4P, EDO, AC | 1 | | |
| | 1600A ACB, 4P, EDO, AC | 1 | | |
| | 2000A ACB, 4P, EDO, AC | 1 | | |
| | 2500A ACB, 4P, EDO, AC | 1 | | |
| | 3000A ACB, 4P, EDO, AC | 1 | | |
| | 4000A ACB, 4P, EDO, AC | 1 | | |
| | 630A ACB, 3P, EDO, AC | 1 | | |
| | 800A ACB, 3P, EDO, AC | 1 | | |
| | 1000A ACB, 3P, EDO, AC | 1 | | |
| | 1250A ACB, 3P, EDO, AC | 1 | | |
| | 1600A ACB, 3P, EDO, AC | 1 | | |
| | 2000A ACB, 3P, EDO, AC | 1 | | |
| | 2500A ACB, 3P, EDO, AC | 1 | | |
| | 3000A ACB, 3P, EDO, AC | 1 | | |
| | 4000A ACB, 3P, EDO, AC | 1 | | |
| | 800A ACB, 2P, MDO, DC | 1 | | |
| | 1000A ACB, 2P, MDO, DC | 1 | | |
| | 1250A ACB, 2P, MDO, DC | 1 | | |
| | 1600A ACB, 2P, MDO, DC | 1 | | |
| b) | MPCB, Short-Circuit Release | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 80A | 1 | | |
| | 115A | 1 | | |
| c) | **TP** MCCB, 2NO+2NC AUX, FSC **& O/L RELEASE** | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 100A | 1 | | |
| | 125A | 1 | | |
| | 160A | 1 | | |
| | 200A | 1 | | |
| | 250A | 1 | | |
| | 315A | 1 | | |
| | 400A | 1 | | |
| d) | **TP** MCCB, 2NO+2NC AUX, **ADJ S/C & O/L RELEASE** | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 100A | 1 | | |
| | 125A | 1 | | |



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| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 20.06.2026 |

**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 160A | 1 | | |
| | 200A | 1 | | |
| | 250A | 1 | | |
| | 315A | 1 | | |
| | 400A | 1 | | |
| e) | **TP** MCCB with LSIG release | | | |
| | 200A | 1 | | |
| | 250A | 1 | | |
| | 300A | 1 | | |
| | 350A | 1 | | |
| | 400A | 1 | | |
| f) | **TP** MCCB - Motorized with LSIG release | | | |
| | 200A | 1 | | |
| | 250A | 1 | | |
| | 300A | 1 | | |
| | 350A | 1 | | |
| | 400A | 1 | | |
| g) | Power contactor (AC) ( With 2NO & 2NC Minimum) | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 80A | 1 | | |
| | 115A | 1 | | |
| | 150A | 1 | | |
| | 185A | 1 | | |
| | 265A | 1 | | |
| | 315A | 1 | | |
| | 400A | 1 | | |
| i) | AC Aux. contactor With | | | |
| | 2NO + 2NC | 1 | | |
| | 4NO + 4NC | 1 | | |
| j) | DC Aux. contactor With | | | |
| | 2NO + 2NC | 1 | | |
| | 4NO + 4NC | 1 | | |
| k) | Protection Relay | | | |
| | VAGM 23 | 1 | | |
| | VTT 11 | 1 | | |
| | VAG 11 | 1 | | |
| | VAA 11 | 1 | | |
| | VAJHM 13 | 1 | | |
| | VAJHM 23 | 1 | | |
| | CAG 12 | 1 | | |
| | VDG 14 | 1 | | |
| | CAG 14 | 1 | | |
| | VAX 31 | 1 | | |
| | CAG 37 | 1 | | |
| | CAEM-21 | 1 | | |
| | VAG-21 | 1 | | |
| | VAJC-11 | 1 | | |
| | VAA21 | 1 | | |
| | VTT12 | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 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) | 1 | | |
| | 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 | 1 | | |
| | 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) | 1 | | |
| | 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) | 1 | | |
| | 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) | 1 | | |
| | OVERLOAD RELAY, NOMINAL VOLTAGE-48V DC, O/V VLTAGE SETTING-110%, 1/4NV, 1NO+1NC S/R | 1 | | |



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| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 20.06.2026 |

**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | ELECTRONIC TYPE JAMMING RELAY | 1 | | |
| **I)** | **IMC & its modules for Unidirectional Drive** | | | |
| 1.1 | IMC Upto 5.5KW | 1 | | |
| 1.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 2.1 | IMC for 5.6 - 7.0KW | 1 | | |
| 2.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 3.1 | IMC for 7.1 - 13KW | 1 | | |
| 3.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 4.1 | IMC for 13.1 - 24KW | 1 | | |
| 4.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 5.1 | IMC for 24.1 - 29.9KW | 1 | | |
| 5.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 6.1 | IMC for 30.0 - 37.0KW | 1 | | |
| 6.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 6.3 | Voltage Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 7.1 | IMC for 37.1 - 55KW | 1 | | |
| 7.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 7.3 | Voltage Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 8.1 | IMC for 55.1 - 80.0KW | 1 | | |
| 8.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 8.3 | Voltage Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 9.1 | IMC for 80.1 - 89.9KW | 1 | | |
| 9.2 | Current Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 9.3 | Voltage Sensing Module for above (if not Integral in IMC Module) | 1 | | |
| 10 | Expansion Module for IMC | 1 | | |
| **m)** | **Timer (DC)** | | | |
| | ON DELAY TIMER, 0.5-5SEC., 220V DC, 2NO+2NC | 1 | | |
| | ON DELAY TIMER, 1.0-10SEC. 220V DC, 2NO+2NC | 1 | | |
| | 240VAC ON DELAY TIMER(1-10SECNS)WITH 1NO | 1 | | |
| | 220VDC ON DELAY TIMER(.5-5SECS) WITH 1NO | 1 | | |
| | 220VDC 0N DELAY TIMER(0.5-5SECS)WITH 3NO | 1 | | |
| | 220VDC ON DELAY TIMER(1-10SECS) WITH 3NO | 1 | | |
| **n)** | **Meter** | | | |
| | AC ammeter (Digital) | 1 | | |
| | AC ammeter (Analog) linear scale | 1 | | |
| | AC ammeter (Analog) compressed scale | 1 | | |
| | DC ammeter (Digital) | 1 | | |
| | DC ammeter (Analog) | 1 | | |
| | DC ammeter with shunt and center zero | 1 | | |
| | AC voltmeter (Digital) | 1 | | |
| | DC voltmeter (Analog) | 1 | | |
| | Wattmeter (3 Phase) | 1 | | |
| | Wattmeter (1 Phase) | 1 | | |
| | TVM meter | 1 | | |
| | DIGITAL ENERGY METER | 1 | | |
| | Frequency meter | 1 | | |
| | Multifunction digital Energy meter with RS485 Port (0.2 Acc. Class) | 1 | | |
| | Multifunction digital Energy meter with RS485 Port (0.5 Acc. Class) | 1 | | |
| | Multifunction digital Energy meter with RS485 Port (1.0 Acc. Class) | 1 | | |
| | ABT meter (0.2S Acc. Class) | 1 | | |
| **o)** | **Single Phase Preventor Relay** | 1 | | |
| **p)** | **MCB** | | | |
| | 6A, 4P 415V AC | 1 | | |
| | 10A, 4P 415V AC | 1 | | |
| | 16A, 4P 415V AC | 1 | | |
| | 6A DP, 240V AC | 1 | | |
| | 10A DP, 240V AC | 1 | | |
| | 16A DP, 240V AC | 1 | | |
| | 32A DP, 240V AC | 1 | | |



File No. PEM-PG0MM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
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| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 20.06.2026 |

**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 6A DP, 110V AC | 1 | | |
| | 10A DP, 110V AC | 1 | | |
| | 16A DP, 110V AC | 1 | | |
| | 32A DP, 110V AC | 1 | | |
| | 6A DP, 220V DC | 1 | | |
| | 10A DP, 220V DC | 1 | | |
| | 16A DP, 220V DC | 1 | | |
| | 6A SP, 240V AC | 1 | | |
| | 10A SP, 240V AC | 1 | | |
| | 16A SP, 240V AC | 1 | | |
| | 32A SP, 240V AC | 1 | | |
| | 6A SP, 110V AC | 1 | | |
| | 10A SP, 110V AC | 1 | | |
| | 16A SP, 110V AC | 1 | | |
| | 32A SP, 110V AC | 1 | | |
| | 6A SP, 220V DC | 1 | | |
| | 10A SP, 220V DC | 1 | | |
| | 16A SP, 220V DC | 1 | | |
| **q)** | **SWITCH & PUSH BUTTON** | | | |
| | BREAKER CONTROL SWITCH, 16A,220V DC, 2CLOSE+2TRIP | 1 | | |
| | DC ISOLATING SWITCH 16A,220V DC, DP, BASE MTG. | 1 | | |
| | 16A, 240V AC SELECTOR SWITCH 3WAY, 4POLE, FLUSH MTG | 1 | | |
| | 25A, 240V AC SELECTOR SWITCH 3WAY, 4POLE, FLUSH MTG | 1 | | |
| | 16A, 240V AC SELECTOR SWITCH 2WAY, 2POLE, FLUSH MTG | 1 | | |
| | NORMAL/ TRIAL SEL. SWITCH, 2POLE , 2WAY, 10A 240V AC, FLUSH MTG, | 1 | | |
| | MCC/ NORMAL/ TRIAL SEL. SWITCH, 2POLE ,3WAY, 10A 240V AC, FLUSH MTG | 1 | | |
| | SWGR/ REMOTE SEL. SWITCH 3POLE 2WAY,16A 220V DC, FLUSH MTG | 1 | | |
| | SWGR/ NORMAL/ TRIAL SEL. SWITCH, 3POLE, 3WAY, 16A 220V DC, FLUSH MTG. | 1 | | |
| | NORMAL/ TRIAL SEL. SWITCH, 2POLE , 2WAY, 10A 240V AC, FLUSH MTG, LOCKABEL TYPE | 1 | | |
| | MCC/ NORMAL/ TRIAL SEL. SWITCH, 2POLE ,3WAY, 10A 240V AC, FLUSH MTG, LOCKABEL TYPE | 1 | | |
| | SWGR/ REMOTE SEL. SWITCH 3POLE 2WAY,16A 220V DC, FLUSH MTG.LOCKABLE TYPE | 1 | | |
| | SWGR/ NORMAL/ TRIAL SEL. SWITCH, 3POLE, 3WAY, 16A 220V DC, FLUSH MTG., LOCKABLE TYPE | 1 | | |
| | AMMETER SELECTOR SWITCH | 1 | | |
| | VOLTMETER SELECTOR SWITCH | 1 | | |
| | TOGGLE SWITCH 5A, 240V AC | 1 | | |
| | AC SWITCH SPST-5A,240V AC | 1 | | |
| | 10A, 220V DC SWITCH | 1 | | |
| | Door Limit switch | 1 | | |
| | Ammeter selector switch | 1 | | |
| | Voltmeter selector switch | 1 | | |
| | Trip selector switch | 1 | | |
| | Push Button | 1 | | |
| | 2NO + 2NC Shrouded | 1 | | |
| | 1NO + 1NC Shrouded | 1 | | |
| | 2NO + 2NC Mushroom head stayput | 1 | | |
| | 2NO + 2NC Lockable type | 1 | | |
| **r)** | **Indicating Lamp Assembly (LED Type)** | | | |
| | 240V AC-GREEN | 1 | | |
| | 240V AC-RED | 1 | | |
| | 240V AC- AMBER | 1 | | |
| | 110V AC-GREEN | 1 | | |
| | 110V AC-RED | 1 | | |
| | 110V AC- AMBER | 1 | | |



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| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>Date : 20.06.2026 |

**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 220V DC-WHITE | 1 | | |
| | 220V DC-RED | 1 | | |
| | 220V DC-GREEN | 1 | | |
| | 220V DC-BLUE | 1 | | |
| | 220V DC- AMBER | 1 | | |
| | 63.5V AC-RED | 1 | | |
| | 63.5V AC-YELLOW | 1 | | |
| | 63.5V AC-BLUE | 1 | | |
| **s)** | **CT** | | | |
| i) | Metering CT | | | |
| | Upto 75/1A | 1 | | |
| | 100/1A | 1 | | |
| | 125/1A | 1 | | |
| | 150/1A | 1 | | |
| | 200/1A | 1 | | |
| | 250/1A | 1 | | |
| | 300/1A | 1 | | |
| | 400/1A | 1 | | |
| | 500/1A | 1 | | |
| | 630/1A | 1 | | |
| | 800/1A | 1 | | |
| | 1000/1A | 1 | | |
| | 1250/1A | 1 | | |
| | 1600/1A | 1 | | |
| | 2000/1A | 1 | | |
| | 2500/1A | 1 | | |
| | 3000/1A | 1 | | |
| | 4000/1A | 1 | | |
| ii) | Protection CT (5P20) | | | |
| | Upto 75/1A | 1 | | |
| | 100/1A | 1 | | |
| | 125/1A | 1 | | |
| | 150/1A | 1 | | |
| | 200/1A | 1 | | |
| | 250/1A | 1 | | |
| | 300/1A | 1 | | |
| | 400/1A | 1 | | |
| | 500/1A | 1 | | |
| | 630/1A | 1 | | |
| | 800/1A | 1 | | |
| | 1000/1A | 1 | | |
| | 1250/1A | 1 | | |
| | 1600/1A | 1 | | |
| | 2000/1A | 1 | | |
| | 2500/1A | 1 | | |
| | 3000/1A | 1 | | |
| | 4000/1A | 1 | | |
| | 630/5A | 1 | | |
| | 800/5A | 1 | | |
| | 1000/5A | 1 | | |
| | 1250/5A | 1 | | |
| | 1600/5A | 1 | | |
| | 2000/5A | 1 | | |
| | 2500/5A | 1 | | |
| | 3000/5A | 1 | | |
| | 4000/5A | 1 | | |
| iii) | PS Class CT | | | |
| | 1000/1A | 1 | | |
| | 1600/1A | 1 | | |



File No. PEM-PG0MM/92/2026-PS-PEM-PGI-2 (Computer No. 319409)
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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 2000/1A | 1 | | |
| | 2500/1A | 1 | | |
| | 3000/1A | 1 | | |
| | 4000/1A | 1 | | |
| | 1000/5A | 1 | | |
| | 1600/5A | 1 | | |
| | 2000/5A | 1 | | |
| | 2500/5A | 1 | | |
| | 3000/5A | 1 | | |
| | 4000/5A | 1 | | |
| **t)** | **Voltage Transformer** | | | |
| | 415/√3 : 110/√ 3V, 50VA | 1 | | |
| | 415/√3 : 110/√3 V, 100VA | 1 | | |
| | 415/√3 : 240/√3 V, 50VA | 1 | | |
| | 415/√3 : 240/√3 V, 100VA | 1 | | |
| | 415 : 110V, 50VA | 1 | | |
| | 415 : 110V, 100VA | 1 | | |
| | 415 : 240V, 50VA | 1 | | |
| | 415 : 240V, 100VA | 1 | | |
| **u)** | **Toggle switch (16A)** | 1 | | |
| **v)** | **Secondary Isolating Contact Block** | 1 | | |
| **w)** | **Control Terminal (Fixed)** | 1 | | |
| **x)** | **Control Terminal (Drawout)** | 1 | | |
| **y)** | **Thermostat, Dial type** | 1 | | |
| **z)** | **CONTROL TRANSFORMER** | | | |
| | 415/240V,CL-B, 1 KVA | 1 | | |
| | 415/240V,CL-B, 2KVA | 1 | | |
| | 415/240V,CL-B, 2.5KVA | 1 | | |
| | 415/240V,CL-B, 3KVA | 1 | | |
| | 415/240V,CL-B, 5KVA | 1 | | |
| | 415/240V,CL-B, 7.5KVA | 1 | | |
| | 415/240V,CL-B, 10KVA | 1 | | |
| | 415/110V,CL-B, 1 KVA | 1 | | |
| | 415/110V,CL-B, 2KVA | 1 | | |
| | 415/110V,CL-B, 2.5KVA | 1 | | |
| | 415/110V,CL-B, 3KVA | 1 | | |
| | 415/110V,CL-B, 5KVA | 1 | | |
| | 415/110V,CL-B, 7.5KVA | 1 | | |
| | 415/110V,CL-B, 10KVA | 1 | | |
| **aa)** | **Transducers** | | | |
| | 4-20mA Dual o/p, Aux sup 220V DC, 1A, Current Transducer | 1 | | |
| | 4-20mA Dual o/p, Aux sup 240V AC, 1A, Current Transducer | 1 | | |
| | 4-20mA Dual o/p, Aux sup 110V AC, 1A, Current Transducer | 1 | | |
| | 4-20mA Dual o/p, Aux sup 220V DC, VoltageTransducer, PTR 415/110V | 1 | | |
| | 4-20mA Dual o/p, Aux sup 240V AC, VoltageTransducer, PTR 415/110V | 1 | | |
| | 4-20mA Dual o/p, Aux sup 110V AC, VoltageTransducer, PTR 415/110V | 1 | | |
| | 4-20mA Dual o/p, Aux sup 220V DC, FrequencyTransducer, PTR 415/110V | 1 | | |
| | 4-20mA Dual o/p, Aux sup 220V DC, Input 0-75mV DC, Current Transducer-DC | 1 | | |
| | 4-20mA Dual o/p, Aux sup 240V AC, Input Voltage 0-220V DC, Voltage Transducer-DC | 1 | | |
| | 4-20mA Dual Output kW transducer | 1 | | |
| | 4-20mA Dual Output kVA transducer | 1 | | |
| | 4-20mA Dual Output PF transducer | 1 | | |
| | 4-20mA Dual Output Frequency transducer | 1 | | |
| **ab)** | **Interposing relay RE 302 or Eqvt with freewheeling diode & LED** | 1 | | |
| **ac)** | **3 PIN SOCKET - 5A, 110V AC, 3PIN** | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| **ad)** | **SPACE HEATER** | 1 | | |
| **ae)** | **NEUTRAL LINK WITH MOUNTING ASSEMBLY** | | | |
| | 20A FOR CONTROL CKT. & POWER CKT. UPTO 25A MCCB RATING | 1 | | |
| | 32A FOR 50A MCCB RATING | 1 | | |
| | 63A FOR 100A & 125A MCCB RATING | 1 | | |
| | 125A FOR 250A MCCB RATING | 1 | | |
| | 250A FOR 400A & 500A MCCB RATING | 1 | | |
| **af)** | **CASTLE KEY INTERLOCK FOR MCCB - 3LOCK+2KEY** | 1 | | |
| **ag)** | **MECHANICAL INTERLOCK FOR POWER CONTACTOR** | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 80A | 1 | | |
| | 115A | 1 | | |
| | 150A | 1 | | |
| | 185A | 1 | | |
| | 265A | 1 | | |
| | 315A | 1 | | |
| | 400A | 1 | | |
| **ah)** | **ADDON BLOCK FOR CONTACTOR** | | | |
| | 2NO+2NC | 1 | | |
| | 3NO+1NC | 1 | | |
| | 1NO + 1NC | 1 | | |
| | 1NO | 1 | | |
| | 1NC | 1 | | |
| **ai)** | **ISOLATOR WITH HANDLE** | | | |
| | 16A | 1 | | |
| | 32A | 1 | | |
| **29** | **Connection from PMCC/MCC panel to PMCC/MCC panel (per meter length)** | | | |
| | 250A | 1 | | |
| | 400A | 1 | | |
| | 630A | 1 | | |
| | 800A | 1 | | |
| | 1000A | 1 | | |
| | 1200A | 1 | | |
| | 1600A | 1 | | |
| | 2000A | 1 | | |
| | 2500A | 1 | | |
| | 3000A | 1 | | |
| | 4000A | 1 | | |
| **30** | **Cable Glands & Lugs:** | | | |
| a) | **Single Compression Cable Glands for cable sizes:** | | | |
| | 2C X 2.5 Sq. mm. | 1 | | |
| | 3C X 2.5 Sq. mm. | 1 | | |
| | 5C X 2.5 Sq. mm. | 1 | | |
| | 7C X 2.5 Sq. mm. | 1 | | |
| | 10C X 2.5 Sq. mm. | 1 | | |
| | 14C X 2.5 Sq. mm. | 1 | | |
| | 2C X 10 Sq. mm. | 1 | | |
| | 2C X 16 Sq. mm. | 1 | | |
| | 2C X 25 Sq. mm. | 1 | | |
| | 2C X 35 Sq. mm. | 1 | | |
| | 2C X 50 Sq. mm. | 1 | | |
| | 2C X 70 Sq. mm. | 1 | | |
| | 2C X 95 Sq. mm. | 1 | | |
| | 3C X 2.5 Sq. mm. | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

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



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 16 Sq. mm. | 1 | | |
| | 25 Sq. mm. | 1 | | |
| | 35 Sq. mm. | 1 | | |
| | 50 Sq. mm. | 1 | | |
| | 70 Sq. mm. | 1 | | |
| | 95 Sq. mm. | 1 | | |
| | 120 Sq. mm. | 1 | | |
| | 150 Sq. mm. | 1 | | |
| | 185 Sq. mm. | 1 | | |
| | 240 Sq. mm. | 1 | | |
| | 300 Sq. mm. | 1 | | |
| | 630 Sq. mm. | 1 | | |
| **31.1** | **Thermal O/L relay with SPP - OLR** | | | |
| | Upto 5.5KW | 1 | | |
| | 5.6 to 7.0KW | 1 | | |
| | 7.1 to 13KW | 1 | | |
| | 13.1 to 24KW | 1 | | |
| | 24.1 to 29.9KW | 1 | | |
| | 30.0 to 37.0KW | 1 | | |
| | 37.1 to 55.0KW | 1 | | |
| | 55.1 to 80.0KW | 1 | | |
| | 80.1 to 89.9KW | 1 | | |
| **31.2** | **Heavy Duty Thermal O/L relay with SPP - OLR** | | | |
| | Upto 5.5KW | 1 | | |
| | 5.6 to 7.0KW | 1 | | |
| | 7.1 to 13KW | 1 | | |
| | 13.1 to 24KW | 1 | | |
| | 24.1 to 29.9KW | 1 | | |
| | 30.0 to 37.0KW | 1 | | |
| | 37.1 to 55.0KW | 1 | | |
| | 55.1 to 80.0KW | 1 | | |
| | 80.1 to 89.9KW | 1 | | |
| **32** | **Daily 8 hour rate deployed at site:** | | | |
| | Engineer : (per day) | 1 | | |
| **33** | **Module Name plate** | 1 | | |
| **34** | **Wires for Secondary wiring:** | | | |
| a) | 1.5 Sq. mm. per meter | 1 | | |
| b) | 2.5 Sq. mm. per meter | 1 | | |
| c) | 4.0 Sq. mm. per meter | 1 | | |
| **35** | **Control Terminal for Secondary wiring suitable for cable size:** | | | |
| 1) | 0.5 Sq. mm. | 1 | | |
| 2) | 1.5 Sq. mm. | 1 | | |
| 3) | 2.5 Sq. mm. | 1 | | |
| **36** | **Electrical Junction Boxes (for termination of 0.5 sqmm screened control cables)** | | | |
| a) | 48 ways | 1 | | |
| b) | 64 ways | 1 | | |
| c) | 72 ways | 1 | | |
| a) | 96 ways | 1 | | |
| **37** | **Temperature Sensor for WIRELESS TEMPERATURE MONITORING SENSOR** | 1 | | |
| **38** | **Wireless Transmitter for WIRELESS TEMPERATURE MONITORING SENSOR** | 1 | | |
| **39** | **Wireless Receiver for WIRELESS TEMPERATURE MONITORING SENSOR** | 1 | | |
| **40** | **Additional components (except networking hardware mentioned inSr. No. B3 of BOQ) required for completeness of WIRELESS TEMPERATURE MONITORING SENSOR** | 1 | | |
| **41** | **DP MCCB, ADJ. SC & O/L Release:** | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 100A | 1 | | |
| | 125A | 1 | | |
| | 160A | 1 | | |
| | 200A | 1 | | |
| **42** | **TP MCCB motor duty type with S/C release:** | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 100A | 1 | | |
| | 125A | 1 | | |
| | 160A | 1 | | |
| | 200A | 1 | | |
| | 250A | 1 | | |
| | 400A | 1 | | |
| **43** | **TP MCCB ADJ S/C , O/L, E/F release:** | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 80A | 1 | | |
| | 100A | 1 | | |
| | 125A | 1 | | |
| | 160A | 1 | | |
| | 200A | 1 | | |
| | 250A | 1 | | |
| | 400A | 1 | | |
| **44** | **DC MCCB** | | | |
| | 16A | 1 | | |
| | 25A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 80A | 1 | | |
| | 115A | 1 | | |
| | 150A | 1 | | |
| | 185A | 1 | | |
| | 265A | 1 | | |
| | 315A | 1 | | |
| | 400A | 1 | | |
| **45** | **SWITCH FUSE UNIT (DC) - DP along with fuse, link etc complete (suitable for 40kA fault current)** | | | |
| | 16A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 100A | 1 | | |
| | 125A | 1 | | |
| | 200A | 1 | | |
| | 250A | 1 | | |
| | 300A | 1 | | |
| | 400A | 1 | | |
| | 600A | 1 | | |
| | 800A | 1 | | |
| **46** | **SWITCH FUSE UNIT (AC) - TP along with fuse, link etc complete** | | | |
| | 16A | 1 | | |
| | 32A | 1 | | |
| | 63A | 1 | | |
| | 100A | 1 | | |
| | 125A | 1 | | |
| | 200A | 1 | | |



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**ANNEXURE-H**

**MODULE UNIT PRICE**

| | | | | |
|---|---|---|---|---|
| | 250A | 1 | | |
| | 300A | 1 | | |
| | 400A | 1 | | |
| | 600A | 1 | | |
| | 800A | 1 | | |
| **47** | **Y-Link** | 1 | | |
| **48** | **OLM, Profibus DP connector along with accessories (at Y-link end) for interface of Y-Link with DDCMIS.** | 1 | | |
| **49** | **SP ON/ OFF SWITCH FOR MOTOR SPACE HEATER OF BREAKER MOTOR FDR, 10A, 240V AC** | 1 | | |
| **50** | **4 POLE, 2 POSI., SELECTOR SWITCH FOR CONTROL TRF., 110V AC** | 1 | | |
| **51** | ***EXTENDED ROTORY HANDLE*** | 1 | | |
| **52** | **AUXILIARY CONTACT FOR MCCB 1C/O** | 1 | | |
| **53** | **TRIP CONTACT FOR MCCB 1C/O** | 1 | | |
| **54** | **CONTROL TERMINALS (DRAWOUT)** | 1 | | |
| **55** | **3 PIN INDUSTRIAL SOCKET & PLUG** | 1 | | |
| **56** | **ROTARY ON/OFF SWITCH** | 1 | | |
| **57** | **TIMER WITH 2C/O** | 1 | | |
| **58** | **CONTROL TRANSFORMER, DRY TYPE, CAST RESIN, 415/24V, INS. CL-B OR BETTER** | 1 | | |
| **59** | ***RECTIFIER*** | 1 | | |
| **60** | ***LIMIT SWITCH (BREAKER)*** | 1 | | |
| **61** | **Ethernet Switch with 16 Copper Ports & 4 FO ports** | 1 | | |
| **62** | **Ethernet Switch with 08 Copper Ports & 4 FO ports** | 1 | | |
| **63** | **Cat5e/ Cat6 Ethernet Cable** | 1 | | |
| **64** | **Fibre Optic Patch Cord (minimum length - 10metres)** | 1 | | |
| **65** | **9 WINDOWS ALARM ANNUNCIATION -1** | 1 | | |
| **66** | **ELECTRONIC HOOTER (96SQMM)** | 1 | | |
| | | | | |
| **NOTE:** | **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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**IEEMA/PVC/LVSWGR/2019 (R-2)** **Effective from: 1st January 2019**

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

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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

| | | |
|---|---|---|
| बी एच ई एल BHEL | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002<br>Issue No: 00<br>Rev. No. 00<br>20 June 2026 |

# PRE QUALIFICATION REQUIREMENT (TECHNICAL)



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|---|---|---|
| बी एच ई एल BHEL | **PRE-QUALIFICATION REQUIRMENTS OF LT SWITCHGEAR FOR 1X800MW SIPAT THERMAL POWER PLANT** | PE-PQ-520-506-E001<br>REVISION NO. 0 DATE 10.06.2026<br>SHEET NO. 1 of 2 |

**ITEMS** : LT SWITCHGEAR

**SCOPE:** Supply: YES; Erection & Commissioning: NO;

| | |
|---|---|
| **1.0** | Vendor should meet the requirement stipulated at sr. no 1.1 or 1.2 |
| **1.1** | **In case vendor is a manufacturer of LT panels and Air Circuit Breakers**<br>ROUTE-1<br>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.<br>And<br>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. |
| **1.2** | **In case vendor is a manufacturer of LT panels and have collaboration for Air Circuit breaker**<br>ROUTE-2<br>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.<br>And<br>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.<br>And<br>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. |

| PREPARED BY | CHECKED BY | REVIEWED BY | APPROVED BY |
|---|---|---|---|
| 10/6/26 | 10/6/26 | 10.06.26 | 10/6/2026 |
| KHUSHBU AGRAWAL<br>Sr. MANAGER | KAVITA GUPTA<br>DGM | N.N. JAJWARE<br>DGM(SH-E01) | PRAVEEN DUTTA<br>AGM(DH-ELECTRICAL) |



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|---|---|---|
| बी एच ई एल BHEL | **PRE-QUALIFICATION REQUIRMENTS OF LT SWITCHGEAR FOR 1X800MW SIPAT THERMAL POWER PLANT** | PE-PQ-520-506-E001<br>REVISION NO. 0 DATE 10.06.2026<br>SHEET NO. **2** of **2** |

| | |
|---|---|
| **2.0** | 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. |

**NOTES:**

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. For the purpose of qualification of Bidders, experience shall be reckoned as on bid opening date.

3. The above PQR points are as per customer specific requirements.

4. Consideration of vendor's offer is subject to BHEL/ BHEL Customer's approval.

5. Vendor to submit all supporting documents in English. If documents submitted by vendor are in language other than English, a self-attested English translated document should also be submitted.

6. Notwithstanding anything stated above, BHEL reserves the right to assess the capabilities and capacity of the vendor/collaborators to perform the contract, should the circumstances warrant such assessment in the overall interest of BHEL.

7. After satisfactory fulfillment of all the above criteria requirement, offer shall be considered for further evaluation as per NIT and all the other terms of the tender.

8. Attached annexure (Annexure-I) to be filled by the bidder on quality & general terms. Requisite Documents (like factory registration certificate, R&D set-up details etc.) asked in Annexure-I, shall also be attached as Annexure F2.1 to F2.17 along with the filled response in the Annexure-I.

| PREPARED BY | CHECKED BY | REVIEWED BY | APPROVED BY |
|---|---|---|---|
| 10/6/26 | 10/6/26. | 10.06.26 | 10/6/2026 |
| KHUSHBU AGRAWAL<br>Sr. MANAGER | KAVITA GUPTA<br>DGM | N.N. JAJWARE<br>DGM(SH-E01) | PRAVEEN DUTTA<br>AGM(DH-ELECTRICAL) |

**Annexure-I**

| | | |
|---|---|---|
| *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* |

| | | |
|---|---|---|
| 12. | *Manufacturing facilities*<br>*(List of machines, special process facilities, material handling etc.)* | *Details attached at Annexure – F2.8* |
| 13. | *Testing facilities*<br>*(List of testing equipment)* | *Details attached at Annexure – F2.9* |
| 14. | *If manufacturing process involves fabrication then-*<br>*List of qualified Welders*<br>*List of qualified NDT personnel with area of specialization* | *Applicable / Not applicable*<br>*Details attached at Annexure – F2.10*<br>*(if applicable)* |
| 15. | *List of out-sourced manufacturing processes with Sub-Vendors' names & addresses* | *Applicable / Not applicable*<br>*Details attached at Annexure. –F2.11*<br>*(if applicable)* |
| 16. | *Supply reference list including recent supplies* | *Details attached at Annexure – F2.12*<br>*(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)*<br>*Note: - Reports need not to be submitted* | *Applicable / Not applicable*<br>*Details attached at Annexure – F2.14*<br>*(if applicable)* |
| 19. | *Statutory / mandatory certification for the proposed product* | *Applicable / Not applicable*<br>*Details attached at Annexure – F2.15*<br>*(if applicable)* |
| 20. | *Copy of ISO 9001 certificate*<br>*(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: -*

## Annexure-II ( On Company Letter Head)

## LETTER OF TECHNICAL SUPPORT FOR SATISFACTORY PERFORMANCE OF AIR CIRCUIT BREAKERS

TO
[EMPLOYER'S NAME & ADDRESS]
**Sub:** Letter of Support submitted from ..... (name of the Associate*/Collaborator*/Technology provider*/Licensor*) undertaking the responsibility for satisfactory performance of .... (name of the equipment).
Dear Sirs,

1. In accordance with the Award of the Contract by ..... (Name of the Contractor) to M/s. ..... (Name of the sub-vendor), we, the aforesaid Associate*/Collaborator*/Technology provider*/Licensor*, (M/s .....) shall be fully responsible for the satisfactory performance of the ..... (equipment name).

2. Further, the manner of achieving the objective set forth in point 1 above shall be as follows For ..... (Equipment name):
   (a) We shall provide manufacturing and assembly drawings of..... (Equipment name). ..... (Equipment name) shall be manufactured and supplied as per above drawings provided by us.
   (b) We shall depute technical experts to Bidder's/sub-vendor's works for supervision during manufacturing, assembly, inspection, as and when required by Employer. We shall participate in site erection, commissioning and final testing (as and when necessary) of the..... (equipment name).
   (c) We shall participate in Technical Co-ordination meetings (TCMs) from time to time, as and when required by Employer.
   (d) We shall promptly carry out all the corrective measures and shall promptly provide corrected design and shall undertake replacements, rectifications or modifications to the equipment as and when required by Employer in case the equipment fails to demonstrate successful performance as per contract at site.

3. We, the Associate*/Collaborator*/Technology provider*/Licensor* do hereby undertake and confirm that this Letter of Support shall be valid till 90(ninety) days after the end of the defect liability period of the contract.

Signature of the Authorised Representative: ...
For M/s .....
(Associate*/Collaborator*/Technology provider*/Licensor*)
Name .....
Designation .....
Date: ...

Common Seal of the Company

***: Strike off whichever is not applicable.**



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| | | |
|---|---|---|
| | TECHNICAL SPECIFICATION<br>LT SWITCHGEAR<br>1X800MW NTPC SIPAT STPP STAGE – III | PE-TS-520-506-E002 |
| | | Issue No: 00 |
| | | Rev. No. 00 |
| | | 20 June 2026 |

# SUB QUALIFICATION REQUIREMENT (TECHNICAL)



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(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<br>KA (rms)<br>Time (Sec.)<br>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 | |

**Signature of authorized signatory.....**



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| | | |
|---|---|---|
| 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 …… | |
| 1.2 | 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:<br>(i) Rated current (A)<br>(ii) Breaking Capacity (KA rms)<br>(iii) Making Capacity (KA peak) | |
| 1.08.00 | Draw out type Air Circuit Breaker panels having fault rating:<br>(i) KA (rms)<br>(ii) Time (Sec)<br>(iii) KA (peak) | |

**Signature of authorized signatory.....**



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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 ……

**Signature of authorized signatory.....**



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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<br>KA (rms)<br>Time (Sec.)<br>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.....**



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| 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:<br>(iv) KA (rms)<br>(v) Time (Sec)<br>(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<br>KA (rms)<br>Time (Sec.)<br>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.....**



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| | | |
|---|---|---|
| 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:<br>(iv) Rated current (A)<br>(v) Breaking Capacity (KA rms)<br>(vi) Making Capacity (KA peak) | |
| 1.08.00 | Draw out type Air Circuit Breaker panels having fault rating:<br>(vii) KA (rms)<br>(viii) Time (Sec)<br>(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) |

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**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.....**



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Date : (Signature).....

Place : (Printed Name).....

(Designation).....

(Common seal).....

**Signature of authorized signatory.....**



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