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91	Section-2 part -A clause 10.1.1.28.7	Tentative proposed system architecture is attached S-2/C-1/7	Tentative proposed system architecture for LMS system is attached S-2/C-1/7. All the RTU and system hardware configuration shall be redundant in nature including network connectivity so that failure of one component shall not cause failure of system. . The central server/ Processor system shall be installed in new GIS Substation. Detail technical specification of LMS system is given in Section-3 chapter-9 part B & tentative IO list is given in annexure S-3/C-9/4
92	Section 3 chapter-2 clause 1.1.1	This specification covers design, manufacture, assembly, testing at manufacturer's works before dispatch, inspection, supply & delivery (including loading, transportation & unloading on platform at site), erection, installation, all civil work including foundation, site testing & commissioning of 04 nos. oil filled 220/34.5kV, 50/65MVA (ONAN/ONAF) power transformers as detailed in this specification including Nitrogen injection based fire system, high velocity water spray based fire system, On line dehydration system, On line PD monitoring system, FO sensor based temperature monitoring, OLTC, RTCC with AVR and complete with all other required accessories for safe, efficient, satisfactory and trouble free operation of the equipment and in compliance with IS/ IEC/ HVPNL & CEA guidelines	This specification covers design, manufacture, assembly, testing at manufacturer's works before dispatch, inspection, supply & delivery (including loading, transportation & unloading on platform at site), erection, installation, all civil work including foundation, site testing & commissioning of 04 nos. oil filled 220/34.5kV, 50/65MVA (ONAN/ONAF) power transformers as detailed in this specification including Nitrogen injection based fire system, high velocity water spray based fire system, On line dehydration system, On line PD monitoring system, FO sensor based temperature monitoring, OLTC, RTCC with AVR and complete with all other required accessories for safe, efficient, satisfactory and trouble free operation of the equipment and in compliance with IS/ IEC/ CEA guidelines

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93	Section 3 chapter-2 Note-5, under clause No.2.0	The transformer shall have % impedance on 50 MVA base with tolerance as per IS: 2026/Part-1 (1983). Impedance shall include positive and zero sequence and shall be expressed in terms of the branches of the star connected equivalent diagram, all on the same KVA base and range shall be given for each branch of the equivalent circuit in turn. Only Positive Percentage tolerance allowed at extreme tap should be as applicable to normal tap.	The transformer shall have % impedance on 50 MVA base with tolerance as per IS: 2026/Part-1 (1983). Impedance shall include positive and zero sequence and shall be expressed in terms of the branches of the star connected equivalent diagram, all on the same KVA base and range shall be given for each branch of the equivalent circuit in turn. Percentage tolerance as per applicable IS allowed at extreme tap should be as applicable to normal tap.
94	Section 3 chapter-2 Clause No. 2.0, Sr.No.20 Clause no 2.2.1	Each transformer shall be capable of operating continuously at its normal rating without exceeding the temperature rise limits specified as under : Winding (measured by resistance) Temp. rise in °C ONAN = 45°C ONAF = 50°C Top oil (measured by thermometer). Temp. rise in °C ONAN = 40°C ONAF = 45°C Note: The maximum ambient temperature for the purpose of design shall be considered as 50°C, i.e. even at this temperature, the rise mentioned above shall not exceed. The gradient in temperature between phases shall not be more than 10°C. Heat flow diagram shall be submitted by successful bidder.	Each transformer shall be capable of operating continuously at its normal rating without exceeding the temperature rise limits specified as under : Winding (measured by resistance) Temp. rise in °C- 55°C Top oil (measured by thermometer). Temp. rise in °C-50 °C Note: The maximum ambient temperature for the purpose of design shall be considered as 50°C, i.e. even at this temperature, the rise mentioned above shall not exceed. The gradient in temperature between phases shall not be more than 10°C. Heat flow diagram shall be submitted by successful bidder.

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95	Section 3 chapter-2 Clause No. 2.0, Sr.No.21.d. & Clause No. 2.1.2	PD = 100 pc max & The partial discharges in the transformer at the time of dispatch shall not be more than 100 pC at 1.5 p.u.	The partial discharges in the transformer at the time of dispatch shall not be more than 500 pC at 1.5 p.u./ $\sqrt{3}$ in line with IEC standard.
96	Section 3 chapter-2 Clause No. 2.2.3,	The transformer will deliver rated current without exceeding temperature rise when operating on 105% of the rated voltages. The transformer shall be capable of being operated without danger on any tapping at the rated MVA with voltage of $\pm 15\%$ corresponding to the voltage of that tapping.	The transformer will deliver rated current without exceeding temperature rise when operating on 105% of the rated voltages. The transformer shall be capable of being operated without danger on any tapping at the rated MVA with voltage of $\pm 15\%$ corresponding to the voltage of that tapping. The highest system voltage will be 245 KV
97	Section 3 chapter-2 Clause No. 3.3.5	Windings shall be subjected to a shrinkage treatment before final assembly, so that no further shrinkage occurs during service. Adjustable device shall be provided for taking up any possible shrinkage of coils in service if required.	Windings shall be subjected to a shrinkage treatment before final assembly, so that no further shrinkage occurs during service. Adjustable device or any other arrangement/ design consideration shall be provided for taking up any possible shrinkage of coils in service if required.
98	Section 3 chapter-2 Clause No. 3.8.1	Bushing for 220kV above shall be preferably Resin Impregnated Synthetic (RIS) type or Composite Polymer insulator. 33 kV bushing shall be RIS type.	Bushing for 220kV above shall be preferably Resin Impregnated Synthetic (RIS) type or Composite Polymer insulator. 33 kV bushing shall be RIS type or Oil type.
99	Section 3 chapter-2 Clause No. 3.3.17	The coil clamping rings wherever used shall preferably be of flat insulated steel laminations. Axial laminated material except bakelised paper shall not be used.	The coil clamping rings wherever used shall preferably be of flat insulated steel laminations. Axial laminated material except bakelised paper preferably not to be used.

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100	Section 3 chapter-2 Clause No. 2.0, Sr.No.25. & Note -8 & 9	As per Clause NO.2.0 , Sr.No.25 , losses of each transformer at ONAF rating (at full load at 75 deg. C) a. No load losses (Wi) = 50 kW b. Load losses (Wp) = 330 kW c. Auxiliary losses (Wc) = 7 kW & Note 8 - Losses:-The losses of each transformer at principal tap rating at full load at 75 deg. C shall be less than or equal to specified in point no. 25 of principle technical parameter with applicable tolerances as per IS-2026.. The manufacturers have to adhere to these limits and their bids shall be rejected, if any one of no-load loss, load loss or auxiliary loss and exceeds the maximum limits as specified. With specified fixed loss figures of maximum losses, manufacturers have to adhere to these figures by designing transformer suitably. Therefore, there will be no capitalization at tender stage. The order will be placed to lowest bidder as per IOCL policy & non compliance of loss figure will lead to bid rejection. The stray losses shall not be more than 18% of full load losses at 75 deg C, calculated from measured losses and the purchaser shall reject the transformer in case, no load losses or load losses or auxiliary losses or stray losses exceed the value specified. The measurement of losses shall be carried out with 3 (Three) Watt meter method only and CTs, meters used for these measurements shall be of class of accuracy of 0.2s or better and PT's of class of accuracy of 0.2 or better. However, no weightage shall be given for supply of transformer, with losses (measured during routine tests) less than the losses specified in point no. 25 of principle technical parameter. As per Note-9, under clause No.2.0, Tolerance in Losses: Tolerance will be applicable for total loss and component losses as per IS-2026 (table 7).	Clause NO.2.0 , Sr.No.25 - losses of each transformer at ONAF rating (at full load at 75 deg. C) a. No load losses (Wi) = 50 kW (max) b. Load losses (Wp) = 330 kW (max) c. Auxiliary losses (Wc) = 7 kW (max) Note-8, under clause No.2.0- Losses:-The losses of each transformer at principal tap rating at full load at 75 deg. C shall be less than or equal to specified in point no. 25 of principle technical parameter with applicable tolerances as per IS-2026.. The manufacturers have to adhere to these limits and their bids shall be rejected, if any one of no-load loss, load loss or auxiliary loss and exceeds the maximum limits as specified. With specified fixed loss figures of maximum losses, manufacturers have to adhere to these figures by designing transformer suitably. Therefore, there will be no capitalization at tender stage. The order will be placed to lowest bidder as per IOCL policy & non compliance of loss figure will lead to bid rejection. purchaser shall reject the transformer in case, no load losses or load losses or auxiliary losses exceed the value specified above. The measurement of losses shall be carried out with 3 (Three) Watt meter method only and CTs, meters used for these measurements shall be of class of accuracy of 0.2s or better and PT's of class of accuracy of 0.2 or better. However, no weightage shall be given for supply of transformer, with losses (measured during routine tests) less than the losses specified in point no. 25 of principle technical parameter. Note 9 - Tolerance in Losses: Tolerance will be applicable for total loss and component losses as per IS- 2026 (table 7).
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10	Note-1, under clause No.2.0	The transformers shall be designed to have short circuit rating of five seconds as per IS: 2026. The thermal ability to withstand short circuit shall be judged by calculation to be supplied above in the tender. The dynamic ability to withstand short circuit shall be demonstrated by test in case testing facility is available in India other-wise calculations will be supplied along with contract drawing.	The transformers shall be designed to have short circuit rating of five seconds (thermal) as per applicable IS/IEC standards. The thermal ability to withstand short circuit shall be judged by calculation to be supplied above in the tender. The dynamic ability to withstand short circuit shall be demonstrated by test / type test reports to be submitted. The dynamic short circuit withstand capacity shall be as per relevant IS/IEC standards. The dynamic ability to withstand short circuit shall be demonstrated by test as per applicable IEC standards in case testing facility is available in India other-wise calculations will be supplied along with contract drawing
102	Clause No.2.2.1	The transformer shall be installed out-door without any protection from sun and rain. The maximum hot spot temperature shall be limited to 98°C considering annual weighted ambient temperature of 32°C with Class-A insulation. However, the hot spot temperature rise shall be uniform for all the units of the order. In any case, the hot spot temperature should not be more than 116 °C.	The transformer shall be installed out-door without any protection from sun and rain. The maximum hot spot temperature shall be limited to 98°C considering annual weighted ambient temperature of 32°C with Class-A insulation. However, the hot spot temperature rise shall be uniform for all the units of the order. In any case, the hot spot temperature should not be more than the limits specified in relevant IS/IEC standards.
103	Clause No.2.2.3	The transformer will deliver rated current without exceeding temperature rise when operating on 105% of the rated voltages. The transformer shall be capable of being operated without danger on any tapping at the rated MVA with voltage of $\pm 15\%$ corresponding to the voltage of that tapping.	The transformer will deliver rated current without exceeding temperature rise when operating on 105% of the rated voltages. The transformer shall be capable of being operated without danger on any tapping at the rated MVA with voltage of $\pm 15\%$ corresponding to the voltage of that tapping, while the highest system voltage shall be limited as per IS/IEC standards.
104	Clause No.3.8.11	Bushing CTs shall preferably be provided for REF protection as specified in Part – II Cl. 2.5. The bushing shall be removable without disturbing the CTs.	Bushing CTs shall preferably be provided for REF protection as specified in Part – II Cl. 2.5. The bushing shall be removable without disturbing the CTs. The detailed design of the CTs shall be in the scope of the LSTK contractor considering the tender and project requirements.

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105	Clause No.3.10.3	Fans shall be located so that they are readily accessible for inspection and repair. Heat exchangers, fans and oil pumps shall be completely interchangeable.	Fans shall be located so that they are readily accessible for inspection and repair. Fans shall be completely interchangeable.
106	Clause No.4.1	Transportation: The bidder shall dispatch the transformer filled the atmosphere of Nitrogen. The necessary arrangement shall be ensured by the bidder to take care of pressure drop of Nitrogen during transit and storage till completion of oil filling during erection. A gas pressure testing valve with necessary pressure gauge and adaptor valve shall be provided. The transformer shall be fitted with sufficient number of impact recorders during transportation to measure the movement due to impact in all three directions. The impact recorder shall be provided with suitable communication port (USB port) to down load data at any time. The impact recorder shall be returned after submission of all the data in hard and soft copy.	Transportation: The bidder shall dispatch the transformer filled the atmosphere of Nitrogen. The necessary arrangement shall be ensured by the bidder to take care of pressure drop of Nitrogen during transit and storage till completion of oil filling during erection. A gas pressure testing valve with necessary pressure gauge and adaptor valve shall be provided. The transformer shall be fitted with sufficient number of impact recorders during transportation to measure the movement due to impact in all three directions. The impact recorder shall be provided with suitable communication port (USB port) to down load data at any time. The impact recorder shall be returned after submission of all the data in hard and soft copy. Dry air or any method of transportation is not acceptable.
107	Annex-S-2/C-3/6 Table: F.4 (vi)	Fast De-pressurization system	Fast De-pressurization system (Not Applicable)
108	Section-3 Chapter-2 Clause No. 1.6.2	The tentative bay widths & heights are given as 16600(width in mm) & 14500 (height in mm). Exact dimensions to be decided as per project requirement by	The tentative bay widths & heights are given as 16600(width in mm) & 14500 (height in mm). Exact dimensions to be decided as per project requirement by LSTK contractor so that proper installation plot area with proper approaches from required sides. Tentative plot plan is also attached as Annexure- S-3/C-3/1 as reference

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		LSTK contractor so that proper installation plot area with proper approaches from required sides. Tentative plot plan is also attached as Annexure- S-3/C-3/1 as reference only.	only. The LSTK contractor to note the overall plot size is limited for complete ISBL work and as indicated in GELO attached as Annex-S-2/C-1/4. The exact equipment layout and plot plan shall be developed by LSTK contractor based on the overall plot size and tender specification.
109	Annex-S-3/C-3/3 Clause 1.1 (bullet point-1)	This Construction specification covers the requirements for painting of all equipments, piping, steel structures, Switchgear building etc. It also explains the method of surface preparation, painting systems, procedure for painting and inspection requirements.	This Construction specification covers the requirements for painting of all piping, steel structures, Switchgear building etc. It also explains the method of surface preparation, painting systems, procedure for painting and inspection requirements. The equipment specific painting requirements shall be as per OEM guidelines or applicable standards.
110	DOCUMENT "DESIGN BASIS" Clause No. 4.0	EQUIPMENT DESIGN PHILOSOPHY TRANSFORMERS	EQUIPMENT DESIGN PHILOSOPHY TRANSFORMERS – Not Applicable
111	Cl. 3.1.19 of Standard Specification For 4 Nos. 220/33 kV, 50/65 MVA (ONAN/ONAF) POWER TRANSFORMER	The transformer shall be so designed as 220 kV side to be connected to GIB. All interconnecting facility from 220 kV GIB to Transformer Terminal to be designed by vendor with approval of owner. 33 kV terminal box shall be suitable for termination of multi-run 33 KV XLPE cables as per project requirements.	The transformer shall be so designed as 220 kV side to be connected to GIB. All interconnecting facility from 220 kV GIB to Transformer Terminal to be designed by vendor with approval of owner. For the LV side termination, provision of 33 kV terminal box shall be made suitable for termination of multi-run 33 KV XLPE cables (minimum 3 runs of 3C X 300 XLPE copper) as per project requirements.




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112	Section-2 Part-A Clause: 10.1.2.13	Construction of control room extension of existing control room including false flooring, false ceiling, all services	Construction of control room extension of existing control room including false flooring, false ceiling, all services, laying of drainage pipes & collecting tank & soakage pit, rain harvesting system and all other services as per drawings/specifications to complete the building in all respect and making it functional. PEB building shall not be acceptable for the subject job.
113	Cl. 3.11 (ii) of Standard Specification For 4 Nos. 220/33 kV, 50/65 MVA (ONAN/ONAF) POWER TRANSFORMER	One winding hot spot winding temperature detector in LT winding of each phase having 4 sets of contacts, as under:	One winding temperature detector in LT winding of and One no. for HV winding having 4 sets of contacts, as under:
114	Cl. 3.15.2 of Standard Specification For 4 Nos. 220/33 kV, 50/65 MVA (ONAN/ONAF) POWER TRANSFORMER	Hot dip galvanized with a minimum thickness of 70 μ m and painting as per the following specification.	Hot dip galvanized with a minimum thickness of 70 μ m or by use of a proper corrosion resistant paintings. The hot dip galvanization and painting process is required in line with relevant IS/IEC codes and standards. Otherwise the following guidelines may please used as a reference




115	Section-2 Part Clause 13.7	The list of engineering consultancy firms for approval of all plans, design, drawings and specifications of all equipments, civil work, structural work, foundation work, GIS system and all electrical system is given below: It is to be noted that the design preparing agency and drawing approving agency cannot be same. 1. Engineers India Limited 2. Project & Development India: Limited 3. TOYO Engineering India Pvt. Limited 4. JACOBS Engineering Group 5. MECON Limited 6. Foster Wheeler India Pvt. Limited. 7. National Thermal Power Corporation Limited 8. Sterlin & Wilson Pvt. Limited. 9. Bechtel India Pvt. Limited. 10. Tata Consulting Engineers Limited. 11. Tractebel Engineering Pvt. Ltd. 12. Any Government Institutions/ Government approved agency.	The list of engineering consultancy firms for approval of all plans, design, drawings and specifications of all equipments, civil work, structural work, foundation work, GIS system and all electrical system is given below: It is to be noted that the design preparing agency and drawing approving agency cannot be same. 1. Engineers India Limited 2. Project & Development India: Limited 3. TOYO Engineering India Pvt. Limited 4. JACOBS Engineering Group 5. MECON Limited 6. Foster Wheeler India Pvt. Limited. 7. National Thermal Power Corporation Limited 8. Sterlin & Wilson Pvt. Limited. 9. Bechtel India Pvt. Limited. 10. Tata Consulting Engineers Limited. 11. Tractebel Engineering Pvt. Ltd. 12. Any Government Institutions/ Government approved agency. It shall be sole responsibility of LSTK contractor to line-up and co-ordinate with the agencies for approval of drawings and design calculation. Once the approval process of the drawings are completed, then the set of drawings shall be submitted to owner for final comments and approval.
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116	General Guidelines for Civil Works Clause 5.2.6	100mm thick base layer of cement concrete in 1:4:8 (1 cement: 4 fine aggregates: 8 coarse aggregate nominal size 20MM) conforming to zone-II as per IS:583 shall be provided in the areas excluding roads, drains, cable trenches as per detailed engineering drawing. For easy drainage of water, the slope of 1:1000 is to be provided from the ridge to the nearest drain. The ridge shall be suitably located at the centre of the area between the nearest drains. The above slope shall be provided at the top of base layer of cement concrete in 1:4:8. A layer of cement slurry of mix 1:4 (1 cement: 4 fine aggregates) shall be laid uniformly over cement concrete layer. The cement consumption for cement slurry shall not be less than 150kg per 100 sq.m.	100mm thick base layer of cement concrete in 1:4:8 (1 cement: 4 fine aggregates: 8 coarse aggregate nominal size 20MM) conforming to zone-II as per IS:583 shall be provided in the areas excluding roads, drains, cable trenches as per detailed engineering drawing. For easy drainage of water, the slope of 1:1000 is to be provided from the ridge to the nearest drain. The ridge shall be suitably located at the centre of the area between the nearest drains. The above slope shall be provided at the top of base layer of cement concrete in 1:4:8. A layer of cement slurry of mix 1:4 (1 cement: 4 fine aggregates) shall be laid uniformly over cement concrete layer. The cement consumption for cement slurry shall not be less than 150kg per 100 sq.m. Only OPC type cements shall be used as per tender specification. Also the mixing grades shall be in line with the tender specification
117	Annex-S-3/C-7/3 Clause 18 on Pg 712 & Clause 10 on Pg 90	Recommended Make of components: The recommended list of makes of components shall be in line with the details provided in Section-3 Chapter-11 & MAKE OF COMPONENTS Component Make Current transformer Precision / Pragati / Kappa / Prayog Potential transformers Precision / Pragati / Kappa / Prayog Push buttons Siemens / Teknic / L&T.	Make of components: The list of makes of components shall be in line with the details provided in Section-3 Chapter-17 and additional list of chapter-17A. For transformer and GIS system, the make list of chapter-17 A shall be followed. No deviation from the list of makes provided in this chapter shall be acceptable, even during detailed engineering or execution of work.




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118	Annex- S-2/C-1/2 Clause 10.0	Gantry (Tower and Beam) for 220kV double circuit line termination from refinery battery wall to new GIS switchyard including all required strings, ACSR moose conductor, support insulator, clamps, connectors etc. The connectivity from point of supply to ISBL shall be in the scope of vendor including design, supply and commissioning .	Gantry (Tower and Beam) for 220kV double circuit line termination from refinery battery wall to new GIS switchyard including all required strings, double ACSR moose conductor, support insulator, clamps, connectors etc. The connectivity from point of supply to ISBL shall be in the scope of vendor including design, supply and commissioning .
119	Section-3 Chapter-1 Clause 8.14	The metal enclosures for the SF6 gas insulated equipment modules shall be made from Aluminum alloy. Suitable anti corrosive paints shade 631 of IS: 5 must be applied on the exterior of the enclosures. The enclosure shall be separate phase wise separate metallic type. The external fixtures should be made of corrosion-resistant material and should be capped wherever required. Necessary provisions shall be made in enclosure for providing on line PD monitoring systems which are also included in the scope of supply. Bidder shall provide adequate number of UHF sensors in the offered GIS for connection to PD meter and the number and location of these sensors shall be placed in strategic locations subject to approval of the purchaser.	The metal enclosures for the SF6 gas insulated equipment modules shall be made from Aluminum alloy. Suitable anti corrosive paints or suitable metallurgy of construction shall be used as per relevant IS/IEC standards to ensure durability of all components. The enclosure shall be separate phase wise separate metallic type. The external fixtures should be made of corrosion-resistant material and should be capped wherever required. Necessary provisions shall be made in enclosure for providing on line PD monitoring systems which are also included in the scope of supply. Bidder shall provide adequate number of UHF sensors in the offered GIS for connection to PD meter and the number and location of these sensors shall be placed in strategic locations subject to approval of the purchaser.

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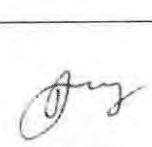
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120	Section-3 Chapter-1 Clause 9.12	Disconnect switches and grounding switches shall have electrical and Mechanical interlocks to prevent grounding switch from closing on an energized section.	Disconnect switches and grounding switches shall have electrical and Mechanical interlocks to prevent grounding switch from closing on an energized section. Padlocking system can also be provided for interlocking.
121	Section-3 Chapter-1 Clause 9.1.3	For 220 kV class enclosure shall be phase wise separate metallic type.	For 220 KV Class enclosure may be single phase encapsulated or three phase encapsulated type as per OEM design and architecture. However the offered design must be type tested in line with relevant IEC standard.
122	Section-3 Chapter-1 Clause 9.1.21	The Circuit Breakers shall have a First Pole to Clear factor of 1.5 for Circuit Breakers up to 245 kV class	The Circuit Breakers shall have a First Pole to Clear factor for Circuit Breakers up to 245 kV class shall be in line with relevant IEC standard
123	Section-3 Chapter-1 Clause 9.5.1	The breaker shall include suitable spring operating mechanism to assure proper opening & closing operations. The provision shall be made for checking adjustments and opening characteristics. The mechanism shall be capable of re-closing within the range specified in the applicable standards. The mechanism shall include dual trip coils. Charging of opening mechanism shall be possible in the event of failure of the motor drive.	The breaker shall include suitable spring operating mechanism or spring -hydraulic mechanism to assure proper opening & closing operations. All auxiliaries required for operating mechanism shall be in the scope of LSKT contractor including its design supply installation and commissioning. The offered design must be a proven design and shall not be proto-type. The provision shall be made for checking adjustments and opening characteristics. The mechanism shall be capable of re-closing within the range specified in the applicable standards. The mechanism shall include dual trip coils. Charging of opening mechanism shall be possible in the event of failure of the motor drive.
124	Section-3 Chapter-1 Clause	One local control cabinet (LCC) of OEM of GIS shall be supplied for the local control and operation of each bay. Each LCC shall contain the local control, interlocking, operation and indication devices for the associated GIS bay.	One local control cabinet (LCC) of OEM of GIS shall be supplied for the local control and operation of each bay. Each LCC shall contain the local control, interlocking, operation and indication devices for the associated GIS bay. The LCC can be either standalone or integrated type

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125	iv.a on Pg 216	Bus VT	Each voltage transformer shall be metal enclosed, SF6 insulated inductive type in accordance with relevant IEC 60044-2. The location, polarity, ratios, and accuracy shall be as specified during detailed engineering stage. Also each Bus VT shall be provided with dedicated disconnector switch
126	Section-3 Chapter-1 Clause 2.0 point no 13a & 14a	13a. Rated short duration Power frequency withstand Voltage for 1 minute (kV rms): HV side: 395 KVrms 14a. Rated lightning impulse withstand Voltage 1.2/50 microsecond impulse (kVp): HV side: 950 KVp	13a. Rated short duration Power frequency withstand Voltage for 1 minute (kV rms): HV side: 460 KVrms 14a. Rated lightning impulse withstand Voltage 1.2/50 microsecond impulse (kVp): HV side: 1050 KVp
127	Section-3 Chapter-1 Clause 2.0 point no 21.c & 2.2.1	Tan delta 0.01 max. for winding, for 0.007 max. for bushing & The Maximum Limit of value of tan delta at 20°C shall be 0.5% for windings, 0.4% for bushings and 0.2 % for oil.	The Maximum Limit of value of tan delta at 20°C shall be 0.5% for windings, 0.7% for bushings and 0.2 % for oil.
128	Section-3 Chapter-1 Clause 3.1.4	Cast iron shall not be used for any parts other than the radiator valve bodies. Corresponding parts liable to replace shall be interchangeable.	Cast iron shall not be used for any parts other than the radiator valve bodies. Corresponding parts liable to replace shall be interchangeable. However also in case of valves up to and including 100 mm shall be of GM and larger valves shall be of Cast Iron bodies with GM fittings. They shall be of full way type with internal screw and shall open when turned counter clock wise when facing the hand wheel, along with suitable locking in open and close positions.




129	Section-3 Chapter-1 Clause 5.4	Short circuit test : Short circuit test in accordance with latest IS-2026 Part (5) clause 4.2, IEC-60076-5 and CEA regulation-2010 (CEA regulation no. 10(3)(g), 34(4)(k), 43(2)(a)(vi)) shall be got conducted on one of the units of each voltage and capacity at any test Agencies where facilities exist in the presence of Purchaser's representative. However, in case of those manufacturers who have already got short circuit test in accordance with Cl. 4.2 of IS-2026 Part(5) or latest edition conducted during the last 7 years on same design and Page 39 of 89 capacity (same or higher) of the Transformer, fresh short circuit test is not required to be conducted. The bidder in such a case shall submit the copy of type test report along with the bid. If this test is not conducted by the firm earlier, then charges and all necessary testing arrangements shall be in the scope of the bidder.	Short circuit test : Short circuit test in accordance with latest IS-2026 Part (5) clause 4.2, IEC-60076-5 and CEA regulation-2010 (CEA regulation no. 10(3)(g), 34(4)(k), 43(2)(a)(vi)) shall be got conducted on one of the units of each voltage and capacity at any test Agencies where facilities exist in the presence of Purchaser's representative. However, in case of those manufacturers who have already got short circuit test in accordance with Cl. 4.2 of IS-2026 Part(5) or latest edition conducted on similar Transformer, fresh short circuit test is not required to be conducted. The definition of similar transformers shall be as per IEC-60076-5. The bidder in such a case shall submit the copy of type test report along with the bid. If this test is not conducted by the firm earlier, then charges and all necessary testing arrangements shall be in the scope of the bidder.
130	Section-3 Chapter-5 Cluase 1.1.2.1	Design and fabrication of Control & Protection Panels for mounting the relay and relay assemblies along with all necessary accessories like switches, measuring & recording instruments & indicating lamps etc. and wiring up of the same to provide self contained and ready to use protection as per this specification.	Design and fabrication of Control & Protection Panels for mounting the relay and relay assemblies along with all necessary accessories like switches, measuring & indicating lamps etc. and wiring up of the same to provide self contained and ready to use protection as per this specification.




131	Section-3 Chapter-5 Cluase 1.1.3	Bidder shall design the complete protection philosophy in line with HVPNL grid codes, CEA requirements, Requirement of OEM of different components & as per applicable standards.	ES4K contractor shall design the complete protection philosophy in line with HVPNL grid codes, CEA requirements, Requirement of OEM of different components & as per applicable standards. While designing the protection philosophy requirement as per tender specification shall be complied. Any specific guidelines of HVPNL and CEA shall be incorporated during detailed engineering by ES4K contractor. All co-ordination work specific to HVPNL/CEA guidelines shall be in the scope of ES4K contractor. Any approvals specific to HVPNL requirements and CEA requirements shall be in the scope of ES4K contractor including its co-ordination. ES4K contractor shall ensure submission and approval of HVPNL/UHBVN in respective drawings and datasheets during approval phase of documents, so that their comments shall be incorporated before going for manufacturing.
132	Section-3 Chapter-5 Clause 1.1.7 (c) on Pg: 507	Complete relay coordination for new Electrical system offered in tender.	Complete relay coordination for new Electrical system offered in tender upto the point of power evacuation at 33 KV level both PR and PNCP end.
133	Section-3 Chapter-5 Clause 1.1.10	Central Transducer Panel- Central transducer panels to be provided for all required inputs for SCADA, ECS (existing), SCAP system & load management package. It shall be provided in project along with its complete engineering, interconnection details, supply, erection and commissioning including supply of transducers, wiring (hard wired, Optical Fiber, D/A & A/D conversion) as per detailed engineering.	Central Transducer Panel- Central transducer panels to be provided for all required inputs for SCADA, ECS (existing), SCAP system & load management package. It shall be provided in project along with its complete engineering, interconnection details, supply, erection and commissioning including supply of transducers, wiring (hard wired, Optical Fiber, D/A & A/D conversion) as per detailed engineering. For all other requirements, only hardwired mode of communication from the central transducer panel only shall be allowed, no soft- communication based analog value sourcing shall be allowed..

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134	Section-3 Chapter-5 Clause 1.1.10	Grid islanding facility: The RELAY panel shall have exclusive relays & protection elements with redundancy to ensure implementation of Grid islanding on following criteria (minimum) – a. Frequency based b. Rate of change of frequency &/or combination of both frequency and rate of change of frequency c. Directional Power (active and reactive) d. Voltage level with directional current (VOC) e. Vector jump / vector surge protection f. Voltage based protection	Grid islanding facility at 220 KV incomer line bays The RELAY panel shall have exclusive relays & protection elements with redundancy to ensure implementation of Grid islanding on following criteria (minimum) – a. Frequency based b. Rate of change of frequency &/or combination of both frequency and rate of change of frequency c. Directional Power (active and reactive) d. Voltage level with directional current (VOC) e. Vector jump / vector surge protection f. Voltage based protection
135	Section-3, Chapter -5 Clause no. 5.5	Panel Internal Wiring All wiring shall be carried out with 1100V grade single core multi strand flexible copper conductor wires with PVC insulation and shall be Flame Retardant Low Smoke (FRLS) type, vermin and rodent proof. The current carrying capacity of wire shall be adequate for the duty assigned to it considering short circuit condition and shall have sufficient flexibility to facilitate proper termination at any location. Color coded wires (red, yellow, blue, black) shall be used for CT, VT and CVT secondary connections.	Panel Internal Wiring All wiring shall be carried out with 1100V grade single core multi strand flexible copper conductor wires with PVC insulation and shall be Flame Retardant Low Smoke (FRLS) type, vermin and rodent proof. The current carrying capacity of wire shall be adequate for the duty assigned to it considering short circuit condition and shall have sufficient flexibility to facilitate proper termination at any location. Color coded wires (red, yellow, blue, black) shall be used for CT, VT and CVT secondary connections. The copper conductor used for internal wiring be as follows: a) All circuits except instrument transformer circuit of 1.5 Sq mm per lead b) CT circuit - one 2.5 Sq mm per lead. c) VT circuits one 2.5 Sq mm per lead. d) Energy metering - 2.5 Sq mm per lead for both PT & CT circuits. No deviation in the control wire sizing and its specification is

		The copper conductor used for internal wiring be as follows: a) All circuits except instrument transformer circuit of 1.5 Sq mm per lead b) CT circuit - one 2.5 Sq mm per lead. c) VT circuits one 2.5 Sq mm per lead. d) Energy metering - 2.5 Sq mm per lead for both PT & CT circuits.	allowed.
136	Section-3, Chapter -5 Clause 5.10.7	Panels shall be matched with other panels in the control room in respect of dimensions, color, appearance and arrangement of equipment on the front.	Panels shall preferably be matched with other panels in the control room in respect of dimensions, color, appearance and arrangement of equipment on the front specifically in existing control rooms and sub-stations.. However 220kV contractor may design as per applicable standards and tender requirements.
137	Section-3, Chapter -5 Clause 5.10.1	Measuring and recording instruments, 1. Microprocessor type: Separate digital type of meters to be provided in each of the bays in Relay Panel for 220kV for comprehensive measurement of electrical parameters. 2. Conventional type : Separate analogue meters shall be provided, wherever applicable. All analogue instruments shall be of square pattern, 96 x 96 mm, flush mounted type. Instruments shall be provided wherever specified in the data sheet. The accuracy class for all instruments shall be 1.0 as per IS: 1248.	Measuring and recording instruments 1. Microprocessor type Separate digital type of meters to be provided in each of the bays in Relay Panel for 220kV for comprehensive measurement of electrical parameters. 2. Conventional type Separate analogue meters shall be provided, wherever applicable. All analogue instruments shall be of square pattern, 96 x 96 mm, flush mounted type. Instruments shall be provided wherever specified in the data sheet. The accuracy class for all instruments shall be 1.0 as per IS: 1248. In SCAP digital meters are to be provided as per tender requirements. All metering and recording is available as per tender requirements in BCU unit separate digital meter may not be supplied including requirement of SAS interface shall also be taken care.

138	Section-3, Chapter -5 Clause 5.10.1.4	4. Auxiliary equipment	Auxiliary equipment: The make of components under this clause shall be as per approved make list of components as under Section-3 Chapter-17.
139	Section-3, Chapter -5 Clause 5.11.16(a)	a. The relay shall have suitable communication facility for connectivity to SCADA system offered in tender. The complete integration and mapping of data in SCADA from relay is sole responsibility of bidder. The relay shall be capable of supporting IEC 61850 protocol (with fibre optical port) and shall be compatible with existing SAS (may be of other make). C. Laptops (Minimum: 2 Nos.) shall be of brand new latest version of windows operating system of following specifications:	a. The relay of new GIS switchgear shall have suitable communication facility for connectivity to new SAS system. The complete integration and mapping of data in SAS from relay is sole responsibility of bidder. The relay shall be capable of supporting IEC 61850 protocol (with either fiber optical port/ LAN ports) C. Requirements of Laptops for the complete project: - Two nos. for relay configuration and parameterization. - Two nos. for SAS system interfaces. - Two nos. for tariff metering purposes. - Two nos. for PD measurement purposes. All the laptops shall have application softwares fully loaded based on its application. Other specifications of laptops shall be as per tender requirements.

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140	Section-3, Chapter -5 Clause 16.0(A).1.c on Pg 527	Auto Mode Corresponding Bus will be Charged, Selector Switch will be in Auto selection- Auto close command will be generated through a Auto synchronizer relay installed at SCAP, which shall give close command along-with checking Synch condition through a check synch. Relay & necessary interlocks pertaining to synch. Condition	Auto Mode Corresponding Bus will be Charged, Selector Switch will be in Auto selection- Auto close command will be generated through a Auto synchronizer relay installed at SCAP, which shall give close command along-with checking Synch condition through a check synch. Relay & necessary interlocks pertaining to synch. Condition. Central auto-synchronizing scheme can be offered for complete system. in auto-mode the auto-synchronizer shall control all generators frequency and voltage simultaneously for synchronization of the grid incomers/transformer feeders For manual synchronization: Separate Synchronizing trolley along with auto-synchronizer consisting of synchronizing trolley to be provided in line with the tender specification.
141	Section-3, Chapter -5 Clause Clause 6.0 on Pg: 531	Distributed Bus Zone Protection for all Bays With DR in Bay as well as Central Unit (Protocol – 61850) with main zone and check zone facilities for each bus with due overlapping to avoid any blind zones including bus-coupler.	Distributed Bus Zone Protection for all Bays With DR in Bay as well as Central Unit (Protocol – 61850) with main zone and check zone facilities for each bus with due overlapping to avoid any blind zones including bus-coupler. The bus-differential protection may be high impedance or low impedance type as per OEM design.

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142	Section-3 Chapter-5 Clause no. 17	SCAP PANEL REQUIREMENTS: 6) SCAP Panel at PR shall have facility of synchronization for following feeders: a) 220 KV Line Incomers: 2 Nos b) 220 KV/33KV Power Transformers O/G feeders: 8 Nos c) 33KV side Generation Bus Incomer feeders: 5 Nos d) 220 KV Bus Coupler Panel: 1 No.	SCAP PANEL REQUIREMENTS: 6) SCAP Panel at PR shall have facility of synchronization for following feeders: a) 220 KV Line Incomers: 2 Nos b) 220 KV/33KV Power Transformers O/G feeders: 8 Nos c) 33KV LIB feeders: 2 Nos d) 220 KV Bus Coupler Panel: 1 No. e) <i>Spare Feeders: 2 No. (33 kV)</i> SCAP Panel at PNCP shall have facility of synchronisation for following feeders: a) 33KV Generation bus incomers: 2 Nos b) 33 KV LIBs at PNCP end : 2 Nos. c) <i>Spare Feeders: 2 No. (33 kV)</i>
143	Section-3, Chapter -5 Clause Clause 16.10	All openings, covers and doors shall be provided with neoprene Gaskets. Removable blanking plates shall be provided to cover the openings in the event of withdrawing the feeder modules. Number of blanking plates shall be 10% of each module size with a minimum of one number.	All openings, covers and doors shall be provided with neoprene or EPDM Gaskets. Removable blanking plates shall be provided to cover the openings in the event of withdrawing the feeder modules. Number of blanking plates shall be 10% of each module size with a minimum of one number.
144	Section-3, Chapter -5 Clause Clause 17. (B). 1	The panel will be free standing Unit with mosaic accessories load bearing sides having 3mm thickness and non load bearing sides having 2mm thickness.	The panel will be free standing Unit with mosaic/Simplex accessories load bearing sides having 3mm

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PROTECTION SCHEME FOR
LINES:
Pg 539/1047

PROTECTION SCHEME FOR
LINES:

a. All the zones shall have setting such that they can detect the fault on line from minimum 0.3 km to 50 km.

B. IRIG-B

C. reverse power relay

D. Frequency Relay

E. TRANSFORMER
DIFFERENTIAL
PROTECTION

F. ix) Be suitable for rated current of both 1A and 5A.

G. NUMERICAL BUS
BAR PROTECTION
RELAYS

H. To enhance security, the Bus bar Protection scheme shall have two independent measurements and tripping criteria.

I. Preferably, these two criteria shall be the stabilized differential current and the phase (directional) comparison of currents in the different bays.

PROTECTION SCHEME FOR LINES:

a. All the zones shall have setting such that they can detect the fault on line from minimum 0.3 km to 50 km.

B. IRIG-B/ SNTP

C. reverse power relay

D. Frequency Relay

E. TRANSFORMER
DIFFERENTIAL
PROTECTION

F. ix) Be suitable for rated current of both 1A and 5A.

G. NUMERICAL BUS
BAR PROTECTION
RELAYS

H. To enhance security, the Bus bar Protection scheme shall have two independent measurements and tripping criteria.

I. Preferably, these two criteria shall be the stabilized differential current and the phase (directional) comparison of currents in the different bays.

All protection schemes shall be as per tender specification and HVPNL and CEA guidelines

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146	Fast Bus Transformer Pg: 554/1047	Fast Bus Transformer: Fast bus transfer scheme is required for 220 KV Bus-coupler. The offered relay shall have all the following options for auto-bus transfer. a) Fast Transfer b) In phase transfer c) Residual voltage transfer d) Time delay transfer The detailed specification is attached as S-3/C-5/4.	Fast Bus Transformer: Fast bus transfer scheme is required for 220 KV Bus-coupler. The offered relay shall have all the following options for auto-bus transfer. a) Fast Transfer b) In phase transfer c) Residual voltage transfer d) Time delay transfer The detailed specification is attached as S-3/C-5/4. Fast Bus Transfer scheme be provided for 220 KV system for IOCL's requirements.
147	Section-3 Chapter-9 Clause 1.3	The communication gateways shall facilitate the information flow with remote control centres. The bay level intelligent electronic devices (IED) for protection and control shall provide the direct connection to the switchgear without the need of interposing components and perform control, protection, and monitoring functions. All IEDs shall be compatible for communication IEC-61850 platform without any interfacing hardware. The ring main type of architecture is proposed for the sub-station automation system.	The communication gateways shall facilitate the information flow with remote control centers. The bay level intelligent electronic devices (IED) for protection and control shall provide the direct connection to the switchgear without the need of interposing components and perform control, protection, and monitoring functions. All IEDs shall be compatible for communication IEC-61850 platform without any interfacing hardware. IED connectivity shall be on the redundant ring/ redundant star topology. While the main communication shall be a redundant bus configuration.

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148	Section-3 Chapter-9 Clause 1.4(c)	Lighting control, PF control for new 220 KV GIS switchgear and switchyard area.	Lighting control for new 220 KV GIS switchgear and switchyard area. Lighting control <u>must</u> be done for lighting circuit level. No capacitor bank is envisaged for 220 KV or 33 KV system. For 220 KV GIS auxiliary load, capacitor banks to be provided if new GIS auxiliary system running power factor is less than design limit or else no capacitor bank for PF correction is required.
149	Section-3 Chapter-9 Chapter-1.4 (g)	All modifications including addition of hardware at existing switchboard end is in the scope of LSTK contractor including its installation	All modifications including addition of hardware, control wiring, terminal blocks etc at existing switchboard end as specific to LMS system/SAS system is in the scope of LSTK contractor including its installation.




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Section-3 Chapter-9
Clause 5.1.1.3

Network Management System:

The LSTK contractor shall provide network management system software for following management functions:

- a. Configuration Management
- b. Fault Management
- c. Performance Monitoring

This system shall be used for management of communication devices and other IEDs in the system. This NMS can be loaded in DR work-station and shall be easy to use, user friendly and menu based

The NMS shall monitor all the devices in the SAS and report if there is any fault in the monitored devices.

The NMS shall

(a) Maintain performance, resource usage, and error statistics for all managed links and devices and present this information via displays, periodic reports and on demand reports.

(b) Maintain a graphical display of SAS connectivity and device status. (c) Issue alarms when

error conditions occurs

(d) Provide facility to add and delete addresses and links

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(b) Maintain a graphical display of SAS connectivity and device status. (c) Issue alarms when error conditions occurs

(d) Provide facility to add and delete addresses and links

(e) The capacity of the NMS system shall be such that it must cover all equipments offered in this project plus additional 20% spare capacity shall be available for future additions.

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151	Section-3 Chapter-9 Clause 10.5	Requirement of training: The contractor shall provide training for two batches for two weeks each for following courses. S. No. Name of Course 1 Computer System Hardware 2 Computer System Software 3 Application Software	Requirement of training: The contractor shall provide training for 3-4 batches for two weeks each for following courses. S. No. Name of Course 1 Computer System Hardware 2 Computer System Software 3 Application Software
152	Section-3 Chapter-9 Clause 12.0	List of Inputs The exact number and description of digital inputs shall be as per detailed engineering requirement. Apart from the above mentioned digital inputs, minimum of 500 inputs shall be kept as spare for use in future.	List of Inputs The exact number and description of digital inputs shall be as per detailed engineering requirement. Apart from the above mentioned digital inputs, minimum of 500 inputs shall be kept as spare for use in future. The spare inputs shall be Hard I/O type only.
153	Annexure-S-3/C-9/2 (Additional Point)		Note: The analog signals as identified for SAS can be acquired through numerical relaying metering or separate Transducers output. However for LMS and ECS IOs only hardwired digital inputs and redundant transducer based analog signals shall be considered as specified in respective chapters.
154	Section-3 Chapter-9 Clause 1.1.4.4	The new remote RTU unit shall communicate with the central LMS processing unit through redundant OFC links. The supply of all materials for OFC connectivity including the OFC cable, LIU and splicing etc is in the scope of LSTK contractor including its laying and termination.	The new remote RTU unit shall communicate with the central LMS processing unit through redundant OFC links. The supply of all materials for OFC connectivity including the OFC cable, LIU and splicing etc is in the scope of LSTK contractor including its laying and termination. The central LMS shall be located in 220 KV GIS sub-station in PR area.

155	Section-3 Chapter-9, bullet point-21 under Clause 1.1.6.4	Priority based load control based on the guiding parameters as per the system requirements.	Priority based load control based on the guiding parameters as per the system requirements. The priority selection shall be a user control parameter and shall be available for all generators or PR and PNCP. The user will decide the priorities of the running generators based on the criteria defined by user. The LMS system will carry out automatic load control and voltage control based on the priorities, capacity limits, operating parameter limits and grid operating limits.
156	Section-3 Chapter-9 Part B LMS Clause 3.3 / Page-33	In order to reach the desired short reaction time It must be noted, that the entire Ethernet network must be designed and parameterized in that way to achieve a very fast reaction time typically below 100 ms excluding the field devices operation time. Same needs to be demonstrated during SAT.	In order to reach the desired short reaction time It must be noted, that the entire Ethernet network must be designed and parameterized in that way to achieve a very fast reaction time typically below 1 sec excluding the field devices operation time. Same needs to be demonstrated during SAT.
157	Section-3 Chapter-9 PART-B LMS Clause 3.20	All data transfer shall be on fast data transfer protocol to achieve data resolution of as low as 1ms	All data transfer for the offered hardwired signals shall be on fast data transfer protocol to achieve data resolution of as low as 1ms. For other acquired signals from existing system, the same shall be limited to maximum of as per existing source stamping resolution
158	Section-3 Chapter-11 Clause 4.4	The equipment offered by the Bidder shall be complete in all respects. Any material and component not specifically stated in this specification but which are necessary for trouble free operation of the equipment and accessories specified in this specification shall be deemed to be included unless specifically excluded. All such equipment/	The equipment offered by the Bidder shall be complete in all respects including technical specification and project requirements. Any Addition in the scope of work beyond tender specification shall be dealt with the change order system in line with the tender documents.

		accessories shall be supplied without any extra cost. Also all similar components shall be interchangeable and shall be of same type and rating for easy maintenance and low spare inventory.	
159	Section-3 Chapter-11 Clause 4.7	The Internal Arc withstand shall be in the category IAC AFLR as per IEC62271-200 for 32.5 KA for 0.3 Sec. The bidder to offer the design of the panel in line with the Internal Arc compliance requirements only.	The Internal Arc withstand shall be in the category IAC AFLR as per IEC62271-200 for 31.5 KA for 0.3 Sec or better. The bidder to offer the design of the panel in line with the Internal Arc compliance requirements only.
160	Section-3 Chapter-11 Clause 4.8.3	The Switchboards shall be metal enclosed cubicle type, suitable for indoor installation, floor - mounting and free - standing. The design shall be totally enclosed, dust-tight, damp-proof and vermin proof offering degree of protection not less than IP4X.	The Switchboards shall be metal enclosed cubicle type, suitable for indoor installation, floor - mounting and free - standing. The design for the total enclosure shall be dust-tight, damp-proof, vermin proof and totally enclosed offering degree of protection not less than IP4X.
161	Section-3 Chapter-11 Clause 4.8.7	The switchgear cubicles shall be rigid and robust in design & construction. Sheet steel used for fabrication shall be cold rolled. Cubicles shall be made from rigid welded structural frames made of structural steel sections or of pressed / formed sheet steel of not less than 3 mm thickness. The frames shall be enclosed by sheet steel of at least 2 mm thickness, smoothly finished, leveled and free from	The switchgear cubicles shall be rigid and robust in design & construction. Panel Sheet used for fabrication shall be cold rolled steel or suitable metallurgy material. Cubicles shall be made from rigid welded structural frames made of structural steel or suitable material sections or of pressed / formed sheet of not less than 2 mm thickness. The design shall have to be type tested for full short circuit rating, internal arc resistance and ingress protection..

		flaws. Stiffeners shall be provided wherever necessary.	
162	Section-3 Chapter-11 Clause 4.10.9	The hot spot temperature for bus bars including joints at design ambient temperature shall not exceed 85°C for normal operating conditions.	The hot spot temperature for bus bars including joints at design ambient temperature shall not exceed the limits defined in IEC-62271 for normal operating conditions.
163	Section-3 Chapter-11 Clause 5.12.a.6	One minute power frequency withstand voltage - For type tests: 48 KVrms - For routine tests: 48 KVrms	One minute power frequency withstand voltage - For type tests: 70 KVrms - For routine tests: 70 KVrms
164	Section-3 Chapter-11 Clause 5.12.a.10;	Dynamic withstand rating : 80 KA	Dynamic withstand rating : 78.75 KA or better
165	Section-3 Chapter-11 Clause 5.12.d.3;	Short ckt. Making current: 80 kA (peak)	Short ckt. Making current: 78.75 kA (peak) or better
166	Section-3 Chapter-11 Clause 5.13.A.4	System making capacity: 80 kA (peak)	System making capacity: 78.75 kA (peak) or better
167	Section-3 Chapter-11 Clause 5.12.g.2	Rated output of each core: Adequate for the relays and devices connected, but not less than fifteen (15) VA	Rated output of each core: Adequate for the relays and devices connected, but not less than fifteen (15) VA. Minimum VA requirement shall be mandatory.

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168	Section-3 Chapter-1 Online PD Monitoring System Annexure-S-3/C-2/6 A point-41	Online PD Monitoring system (as per Cl.11.1 and 11.2)	Online PD Monitoring system -Power transformers as per clause 11.1 & 11.2 - 220KV GIS as per Clause 9.12/viii (page no-54of 91)
169	Section-3 Chapter-1 Special Tools Tackles and Equipment Section-3 Chapter-1 clause 8.24/e Section-3 Chapter-1 clause 8.24/g	On line PD monitoring system for 220 kV GIS modules. Portable PD analyzer/measurement kit suitable for GIS along with required accessories	On line PD monitoring system for power transformers Portable PD analyzer/measurement kit suitable for GIS along with required Accessories
170	Section-3 Chapter-1 Mandatory Spares Section-3 Chapter-1 clause-16	MANDATORY SPARE FOR GIS SYSTEM :	MANDATORY SPARE FOR GIS SYSTEM : All the mandatory spares shall be provided as per section-1 chapter-3 clause 6.1

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171	Annexure S-2/C-1/2 Sr. No. 13	Supply, Installation & commissioning of 50/ 65 MVA ONAN/ONAF 220/34.5KV Transformer with 18% impedance at 50 MVA base including firefighting facility, C&R panels, complete earthing , RTCC with digital redundant AVR system, etc	Supply, Installation & commissioning of 50/ 65 MVA ONAN/ONAF 220/34.5KV Transformer with 18% impedance at 50 MVA base including firefighting facility, complete earthing , RTCC with digital redundant AVR system, etc
172	Section-2 Part-A Clause : 9.1.16	All approval and certifications including its liaisoning with state transmission authorities, CEA, statutory bodies shall be in scope of LSTK contractor.	All approval and certifications including its co-ordination with state transmission authorities (HVPNL/UHBVN), CEA, OISD, PESO, statutory bodies shall be in scope of LSTK contractor.
173	Technical Specification for 220kV GIS/ Section-3 Chapter-1 Clause 5.n.ix	Where bus Coupler is specified and in case of any internal arc fault in a busbar, busbar disconnect or sectionalized, repair work must be possible without shutting down the complete substation and at least one half of the substation must remain in operation.	The bus bar system shall be sectionalized for each bay and contained in individual SF6 gas tight bus compartments to prevent contamination of the gas of the whole bus bar due to fault in one bay zone and refill lesser quantity of SF6 gas.

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174	Technical Specification for 220kV GIS/ Section-3 Chapter-1 Clause 7.b	The GIS system shall be suitable for future extension on either end by the addition of extra feeders, bus couplers, bus-bars, circuit breakers, dis-connectors, and other switch gear components. The arrangement of gas sections or compartments shall be such as to facilitate future extension without any drilling, cutting or welding on the existing equipment. To add equipment, it shall not be necessary to move or dislocate the existing switchgear bays	The GIS system shall be suitable for future extension on either end by the addition of extra feeders, bus couplers, bus-bars, circuit breakers, dis-connectors, and other switch gear components. The arrangement of gas sections or compartments shall be such as to facilitate future extension without any drilling, cutting or welding on the existing equipment. To add equipment, it shall not be necessary to move or dislocate the existing switchgear bays
175	Technical Specification for 220kV GIS/ Section-3 Chapter-1 Clause 8.9.1	All gas seals shall be designed to ensure that leakage rates are kept to specified minimum under all normal pressure, temperature, electrical load and fault conditions. Double gas seals with provision to monitor the failure of first seal are preferred.	All gas seals shall be designed to ensure that leakage rates are kept to specified minimum under all normal pressure, temperature, electrical load and fault conditions. Double gas seals with provision to monitor the failure of first seal is preferred.

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176	Technical Specification for 220kV GIS/ Section-3 Chapter-1 Clause 8.23.i.	To limit the effects of an internal arc the switch gear shall be suitably subdivided into individual arc and gas-proof compartments, preferably for i. Bus-bar together with bus-bar isolator and earthing switch ii. Circuit breaker iii. Line isolators and earthing switch, (Line, transformer) iv. Instrument transformers. v. Intermediate compartment	To limit the effects of an internal arc the switch gear shall be suitably subdivided into individual arc and gas-proof compartments, preferably for i. Bus-bar together with bus-bar isolator and earthing switch ii. Circuit breaker iii. Line isolators and earthing switch, (Line, transformer) iv. Instrument transformers. v. Intermediate compartment
177	Technical Specification for 220kV GIS/ Section-3 Chapter-1 Clause 9.1.3	For 220 kV class enclosure shall be phase wise separate metallic type.	For 220 kV class enclosure shall be phase wise separate metallic type.
178	Section-C Page 70/1047 Clause. 8.2	Bus bars shall be of electrolytic grade copper for 220 KV and 33 KV system and for 6.6 KV system electrolytic grade aluminum/copper to be provided.	Bus bars shall be of electrolytic grade copper for 220 KV and 33 KV system and for 6.6 KV system electrolytic grade aluminum/copper to be provided.
179	Section-3 Chapter-9 PART A - TECHNICAL SPECIFICATION FOR SUBSTATION AUTOMATION SYSTEM Clause: 1 (ii)	Station Human Machine Interface (HMI) at Sub-station Operator room (2 Nos.), PR Control Room (2 nos.), PNC Control Room (Total 2 Nos.) and Engineering /Cabinet Room (1 No.)	Station Human Machine Interface (HMI) at Sub-station Operator room (2 Nos.), PR Control Room (2 nos.), PNC Control Room (Total 2 Nos.) and Engineering / Cabinet Room (1 No.) The engineering server shall be a independent system.

180	Section-3 Chapter-9 PART A - TECHNICAL SPECIFICATION FOR SUBSTATION AUTOMATION SYSTEM Clause 1.2	It shall include communication gateways, intelligent electronic devices (IED) for bay control and inter IED communication infrastructure. Indicative architecture drawing for SAS is enclosed at Annexure-S-3/C-9/1.	Inside the sub-station, all communication shall be realized as per IEC 61850 protocol. However the IO configuration shall be taken either as hardwired input or on the soft link through IEC-61850 protocol.
181	Section-3 Chapter-9 PART A - TECHNICAL SPECIFICATION FOR SUBSTATION AUTOMATION SYSTEM Clause 1.4 (d)	Existing generator's MW, MVAR recording and generation summary reports preparation for complete system including PR and PNCP.	New 220 KV GIS system's MW, MVAR recording and generation summary reports preparation for complete system including PR and PNCP.
182	Section-3 Chapter-9 PART A - TECHNICAL SPECIFICATION FOR SUBSTATION AUTOMATION SYSTEM Clause 1.4 (g)	Design, supply, installation, cabling of all required interface is also in the scope of LSTK contractor. i. Modem, switches, Gateway PCs, Ethernet cables, FO cables, media converters etc for Communication interface. ii. Control cablings and Hardware IO interface units for digital IOs. iii. Transducers, CT/PT cabling and analog IO interfaces units for analog IOs. All modifications including addition of hardwares at existing switchboard end is in the scope of LSTK Contractor including its installation.	Design, supply, installation, cabling of all required interface for new 220KV GIS system is also in the scope of LSTK contractor. i. Modem, switches, Gateway PCs, Ethernet cables, FO cables, media converters etc for communication interface. ii. Control cablings and Hardware IO interface units for digital IOs. iii. Transducers, CT/PT cabling and analog IO interfaces units for analog IOs. All modifications including addition of hardwares at existing switchboard end is in the scope of LSTK contractor including its installation.

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183	Section-3 Chapter-9 PART A - TECHNICAL SPECIFICATION FOR SUBSTATION AUTOMATION SYSTEM Clause 3.1.1.4	Raise and lower operation of OLTC taps of transformer shall be facilitated through Bay controller IED.	Raise and lower operation of OLTC taps of transformer shall be facilitated through Bay controller IED based on the input from SAS/LMS/Manual control
184	Section-3 Chapter-9 PART A - TECHNICAL SPECIFICATION FOR SUBSTATION AUTOMATION SYSTEM Clause 3.1.2.2	Each IED should contain an event recorder capable of storing at least 200 time-tagged events. This shall give alarm if 70% memory is full.	Each IED should contain an event recorder capable of storing at least 200 time-tagged events. This shall give alarm if 70% memory is full otherwise IED data can be stored in central system/SAS on continuous online basis to avoid loss of data due to non-availability of memory data.
185	Section-3 Chapter-9 Annexure- S-3/C-9/1- 5	The router to Remote Control Centre (RCC) shall communicate on IEC 60870-5-101 protocol.	The router to Remote Control Centre (RCC) shall communicate on IEC 60870-5-101 protocol. The router or the suitable communication hardware for Remote Control Centre (RCC) communication on IEC 60870-5-101 protocol shall be supplied by BSPK contractor. This communication hardware shall be independent of PLCC communication system.

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186	Section-3 Chapter-9 PART B - LOAD MANAGEMENT SYSTEM (LMS) Clause 1.1.4.1	One no. of redundant RTU unit shall be provided at the PNCP power plant which will acquire all running generator MW, MVAR, voltage, current, ON/OFF status. This RTU will also extend the control commands of central LMS system upto running generators of PNCP power plant for active and reactive power controls as per defined logic. For active control, signal to be extended upto the existing turbine governor system and for reactive control signal to be extended up to the existing DAVR panels.	One no. of redundant RTU unit shall be provided at the PNCP power plant One no. of redundant RTU unit shall be provided at the PNCP power plant which will acquire all running generator MW, MVAR, voltage, current, ON/OFF status. This RTU will also extend the control commands of central LMS system upto running generators of PNCP power plant for active and reactive power controls as per defined logic. For active control, signal to be extended upto the existing turbine governor system and for reactive control signal to be extended up to the existing DAVR panels. The redundancy in RTU shall be maintained for communication hardware, power supply system & controllers. the redundancy shall be provided in all RTUs
187	Section-3 Chapter-9 (all clauses)	(Section-9 part-B 1.1.1) The scope of work under this tender includes design, engineering, manufacturing, supply, erection, testing and commissioning of Power Management System (PMS) for the main purpose of load management for the electrical power generation and distribution at the PR and PNCP complex including grid. The offered system can be configured such that the data acquisition as detailed in this tender document can be suitably integrated with the existing network.	The scope of work under this tender includes design, engineering, manufacturing, supply, erection, testing and commissioning of Load Management System (LMS) for the main purpose of automatic load management for the electrical power generation and distribution at the PR and PNCP complex including grid. The offered system can be configured such that the data acquisition as detailed in this tender document can be suitably integrated with the existing network. The offered LMS system shall be fully independent of SAS system and no common hardware shall be provided for LMS or SAS system.

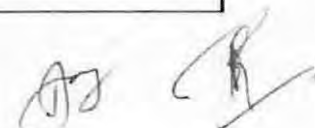
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188	Section-1 Chapter-2 ENGINEERING DESIGN BASIS ELECTRICAL Clause 5.4.4.1	5.4.4.1 The metering devices in EHV, HV and MV switchboards shall be as below (minimum) - Type of metering: multi-function meters & part of the Numerical relay	The metering devices in EHV, HV and MV switchboards shall be as below (minimum) - Type of metering: multi-function meters & part of the Numerical relay for all the bays of 220KV system
189	Section-3 Chapter-5 Technical Specifications for ELECTRICAL SYSTEM STUDY, ELECTRICAL CONTROL & PROTECTION PHILOSOPHY Clause 1.1.7.2 and 1.1.7.3	1.1.7.2 The system study shall be carried out through following reputed consultancy agency or equivalent only. a) TCE b) ABB c) PEARL d) TRACTEBEL e) BECHTEL f) NTPC g) EIL	1.1.7.2 The system study shall be carried out through reputed consultancy agency as listed in CI 10.1.1.29 of SECTION-2 SPECIAL CONDITION OF CONTRACTS - TECHNICAL PART -A.
190	Section-3 Chapter-5 Technical Specifications for ELECTRICAL SYSTEM STUDY, ELECTRICAL CONTROL & PROTECTION PHILOSOPHY Clause 5.11.16 (d)	Necessary licensed copy of software and hardware to up/ down load the data to/from the relay from/to the personal computer installed in the substation shall be provided. Relay shall be looped by Fiber Optic/ twisted wire Cables up to PC.	Necessary licensed copy of software and hardware to up/ down load the data to/from the relay from/to the laptop/handheld HMI shall be provided. Supply of laptops as detailed in the tender shall also in the scope of 10.1.1.29 contrator.

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191	Section-3 Chapter-5 Technical Specifications for ELECTRICAL SYSTEM STUDY, ELECTRICAL CONTROL & PROTECTION PHILOSOPHY Clause 16.A.3.B.6	Bus Differential : Distributed Bus Zone Protection for all Bays With DR in Bay as well as Central Unit (Protocol – 61850) with main zone and check zone facilities for each bus with due overlapping to avoid any blind zones including bus-coupler.	Bus Differential: Distributed Bus Zone Protection for all Bays With DR in Bay or in the Central Unit (Protocol – 61850) with main zone and check zone facilities for each bus with due overlapping to avoid any blind zones including bus-coupler.
192	Section-3 Chapter-5 Technical Specifications for ELECTRICAL SYSTEM STUDY, ELECTRICAL CONTROL & PROTECTION PHILOSOPHY Clause 16.A.3.B.6	*The protections 2,3,4,5 & 6 listed are to be provided through separate islanding relay with DR (Protocol- 61850)	The protections 2,3,4,5 & 6 listed are to be provided through independent single redundant islanding relay with DR (Protocol- 61850)
193	Section-3 Chapter-5 Technical Specifications for ELECTRICAL SYSTEM STUDY, ELECTRICAL CONTROL & PROTECTION PHILOSOPHY Clause 16.A.3.B.6	**Auxiliary protection also shall form a part of transformer protection which includes Oil temperature indicator, Winding temperature, PRV, Buchholz relay, MOG & any other protection suitable and necessary for safe Operation of transformer. The same protections required shall be provided separately for OLTC also.	Auxiliary protection also shall form a part of transformer protection which includes Oil temperature indicator, Winding temperature, PRV, Buchholz relay, MOG & any other protection suitable and necessary for safe operation of transformer. PRV, Buchholz relay, MOG & Oil surge relay shall be provided separately for OLTC also.
194	Section-3 Chapter-5 Technical Specifications for ELECTRICAL SYSTEM STUDY, ELECTRICAL CONTROL & PROTECTION PHILOSOPHY Clause 16.A.3.B.6	***BCU unit may become a part of SCAP for control requirements	*** BCU unit shall be a part of DS and SCAP shall be part of remote control & monitoring. LOCAL CONTROL

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195	Section C/General guideline for civil works/ Clause No. 2	Complete design and engineering of 220/33 kV GIS indoor Substation building Civil & Structural works. Substation building shall have ground floor & first floor including HVAC room, Battery room, ECS & load Manager Room, SCADA room, Relay MMI room, UPS & charger room, DGFAP room, Engineering room, Operator room. Tentative layout of rooms is attached as Annexure- S-3/C-3/1.	Complete design and engineering of 220/33 kV GIS indoor Substation building Civil & Structural works. Substation building shall have ground floor & first floor including HVAC room, Battery room, ECS & load Manager Room, SCADA room, Relay MMI room, UPS & charger room, DGFAP room, Engineering room, Operator room. Tentative layout of rooms is attached as Annexure- S-3/C-3/1. For further description of room sizes, please refer clause 18.1 of his chapter.
196	Section 2/Clause No.10.1.2.12	Site surfacing including leveling and dressing, lean concrete/PCC in areas under scope of contract for all the balance area post gravel fillings in the switchyard.	Site surfacing including leveling and dressing, lean concrete/PCC in areas under scope of contract for all the balance area post gravel fillings in the switchyard. The scope of this work is for 220 KV switchyard, control room extension area, cable route and any other associated area within the ISBL scope of work
197	Section 2/Clause No.10.1.2.15	The available space along with existing 132 KV switchyard to be used for new ISBL facility. The dismantling, removal, levelling, soil filing, scrap removal of existing structure on this plot like store building, any abandon foundations to be done by vendor. The shifting of disposable materials/ dismantled earth work to locations inside/outside the refinery premises shall be in the scope of vendor. Owner shall indicate the location of disposal to the vendor.	The available space along with existing 132 KV switchyard to be used for new ISBL facility. The dismantling, removal, levelling, soil filing, scrap removal of existing structure on this plot like store building, any abandon foundations to be done by vendor. The shifting of disposable materials/ dismantled earth work to locations inside/outside the refinery premises shall be in the scope of vendor. Owner shall indicate the location of disposal to the vendor. The disposal of all scrap, debris, dismantled materials from existing area to the place shown by IOCL within the refinery premises shall be in the scope of LSTK bidder. However the final

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198	Section C/General guideline for civil works/Clause No. 10.1.2.9	Laying of concrete roads leading to switch yard and switch house building from main existing road including earth filling for road and beams if required and PCC in front & rear and of the switch house building as required. Detailed CLO to be prepared and submitted by vendor in line with HVPNL specifications/PWD specifications and other standards for approval of owner.	Laying of concrete roads leading to switch yard (as per GELO; Annex-S-2/C-1/4) and Transformer yard in front of SS-28, distribution transformer area below walkway structure from main existing road including earth filling for road and beams if required. Existing drain needs to be taken care by development of RCC culvert concept at all the approach roads. This approach road shall be suitable for movement of heavy equipments which will be required for new 220 KV GIS sub-station. The design, supply and construction of these approach roads shall be in the LSTK contractor's scope. The size of every approach road will be approximately 7.5 m X 10 m (Width X Length). Detailed CLO to be prepared and submitted by vendor in line with HVPNL specifications/ PWD specifications and other standards for approval of owner. During design, the most stringent standard references shall prevail.
199	Section C/General guideline for civil works/Clause No.2	Painting & Stencilling of GIS building & switchyard as per specification given in Annexure- S-3/C-3/3 for painting	Painting & Stencilling of GIS building & switchyard as per specification given in Annexure- S-3/C-3/3 for painting. The Painting and stenciling works shall be required for identification/tagging of outdoor equipments, piping, valve, building, switchgear and control panels, phase and circuit identifications, SLDs, equipment layout drawings, Safety Instructions, fire fighting facilities installed GIS outdoor area, inside GIS sub-station, ISBL components in SS-63, SS-9 and control rooms. Stenciling shall be of minimum letter size of 2-inch and black color in yellow back ground.
200	Section-1 Chapter-2 Clause 5.4.1/ 5.3 & 5.4	Numerical Protection/Monitoring system For MCC	Numerical Protection/Monitoring system For MCC - All motor feeders shall have digital motor protection relays with CBCTs. All other outgoing feeder could be MCCB/SFU based for outgoing feeders having rating more than 63 Amps, sensitive earth fault protection shall be provided. PMCC incomers and bus-coupler shall be breaker based scheme. However MCC incomers and bus-couplers shall be isolator based schemes.

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201	Section-1 Chapter-2 Clause 5.4.3.3	In case of EHV- Refer relevant section related with GIS & transformer protection. HV switchboards with following additional relays shall be provided: a. One set of 87B (Bus differential) and 95 B (Bus wire supervision) for each bus section. b. 67 and 67N (Directional IDMTL over current and earth fault) relays for the incomers.	In case of EHV- Refer relevant section related with GIS & transformer protection. HV switchboards with following additional relays shall be provided: a. One set of 87B (Bus differential) and 95 B (Bus wire supervision) for each bus section. Bus differential is a mandatory requirement in all EHV and HV systems. b. 67 and 67N (Directional IDMTL over current and earth fault) relays for the incomers.
202	Section-1 Chapter-2 Clause 5.9.6.1	Aviation lighting- Yes (LED type, flashing)	Aviation lighting- No.
203	Section-1 Chapter-2 Clause 5.9.6.2	Security lighting for Required(LED type) peripheral road boundary wall	Security lighting for Required: No.
204	Section-3 Chapter-6. Part B	SCOPE: This specification along with data sheets covers requirements for design, manufacturing, testing at works, third party inspection, supply, laying, termination, jointing dressing, site testing of Flame Retardant High Voltage cables for high voltage systems upto 1.1 KV.	SCOPE: This specification along with data sheets covers requirements for design, manufacturing, testing at works, third party inspection, supply, laying, termination, jointing dressing, site testing of Flame Retardant Low Voltage cables for low voltage systems upto 1.1 KV. Part C of this document will cover specification for signal cables.
205	SECTION-3 Chapter-8A/1 PART A	This specification covers the design, manufacture and testing of lighting fixtures and accessories both normal and emergency lighting to be installed in the ISBL (Inside Battery Limit) jobs for the subject project which includes but not limited to: a. 220 KV Switchyard b. 220 KV GIS building (inside	This specification covers the design, manufacture and testing of lighting fixtures and accessories both normal and emergency lighting to be installed in the ISBL (Inside Battery Limit) jobs for the subject project which includes but not limited to: a. 220 KV Switchyard b. 220 KV GIS building (inside and outside) c. Battery room, VAMP rooms, all office rooms, cabinet rooms etc. d. Transformer yard including all accessories

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		and outside) c. Battery room, VAMP rooms, all office rooms, cabinet rooms etc. d. Transformer yard including all accessories e. Extension control room in PR f. Any other associated power evacuation facility covered under this project. It also covers supply of lighting transformer as per IS 2026 & lighting panels distribution board as per IS 8623 for illumination System to work properly. See Annexure1 & 2 for details	e. Extension control room in PR f. Any other associated power evacuation facility covered under this project. It also covers supply of lighting transformer as per IS 2026 & lighting panels distribution board as per IS 8623 for illumination System to work properly. See Annexure1 & 2 for details. No deviation in technical specification specific to LED lighting system is acceptable.
206	Section-1 Chapter-2 Clause 4.0 (Sr. No.: 1)	Add on system shall be integrated with existing system for PA system, ECS system, telephone exchange , DGFA system , LAN connectivity.	Add on system shall be integrated with existing system for PA system, ECS system, telephone exchange , DGFA system , LAN connectivity. System wise scope of integration is detailed below: a. PA system: Independent system to be provide for new GIS sub-station. Integration with existing system is not required. Minimum 1 No. Manual call point in existing system will be required as listed below: - Local operator room of SS-28. - Control room in PR All associated supply of hardwares, communication cabling shall be in the scope of LSTK contractor. b. ECS system: Please refer Annex-S-3/C-9/3. c. LAN connectivity: GIS sub-station internal LAN network shall be developed by LSTK contractor and for integration with existing LAN, the tie-up point shall be provided in 220 KV GIS sub-station which includes network switches, UTP cabling, media converters, power modules. It should be in

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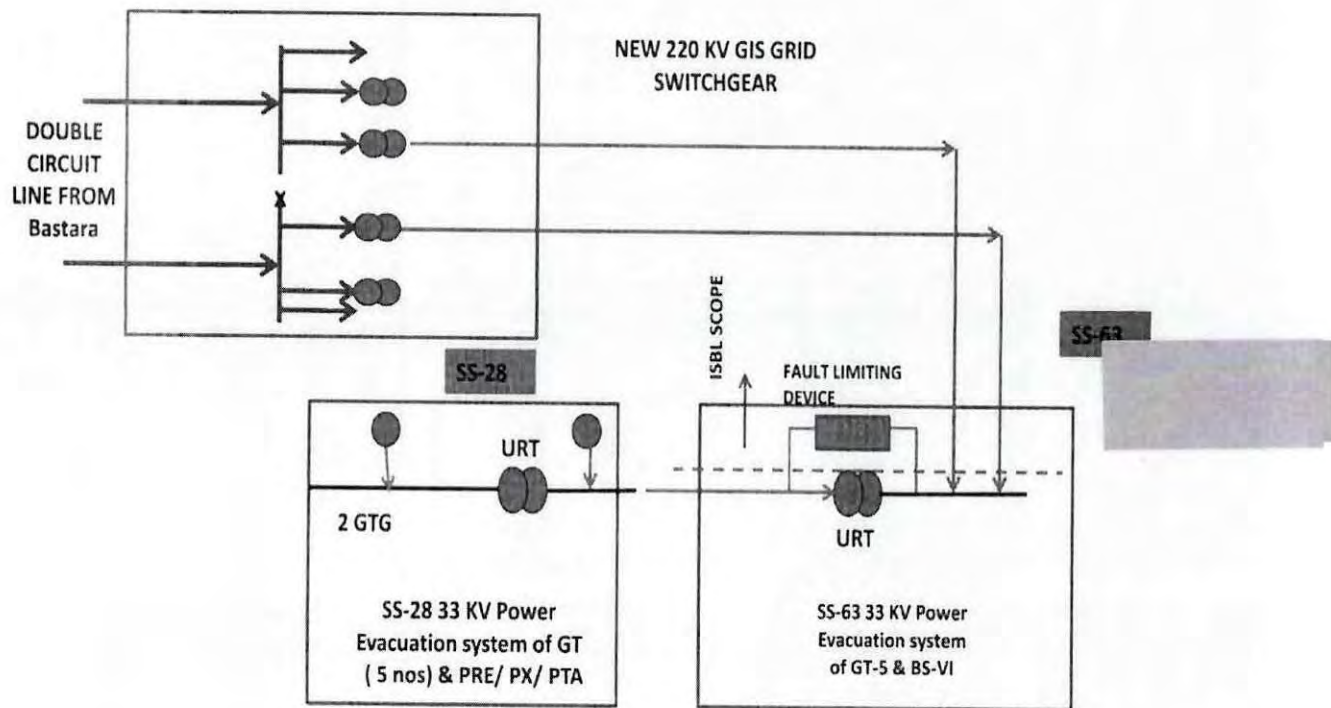
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			ready to use condition for onward connectivity by IOCL with existing LAN network. d. DGFAP system: Independent DGFAP panel for 220 KV GIS sub-station shall be provided as per tender specification. This system needs to be integrated with existing DGFAP system of M/s Siemens Make (Model; MXL panels) installed in SS-28. The scope shall also include supply of all required system extension hardware including associated cabling (Copper cables/ FO cables) for the extension of new system with existing system. However installation of the hardware specific to existing M/s Siemens DGFA panels and associated software modification shall be in the IOCL's scope. e. Tele-communication System: Required telecommunication system in GIS building shall be provided inline tender specification. The required tie-up point for integration with existing telephone exchange shall be provided in 220 KV sub-station which includes provision of telephone JB's and associated cables in 220 KV sub-station shall be in the scope of LSTK contractor. It should be in ready to use condition for onward connectivity by IOCL with existing telephone network.
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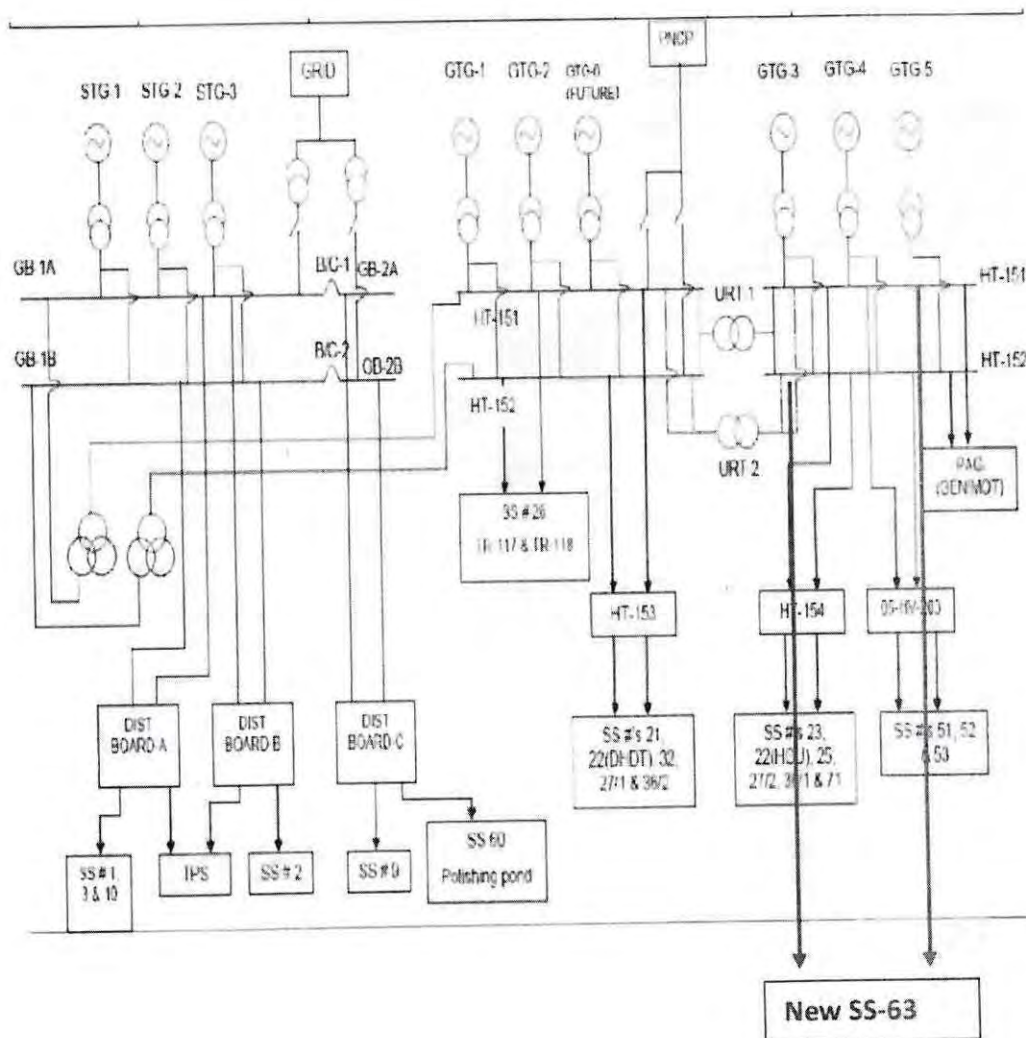


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SS-28 DETAILED SLD

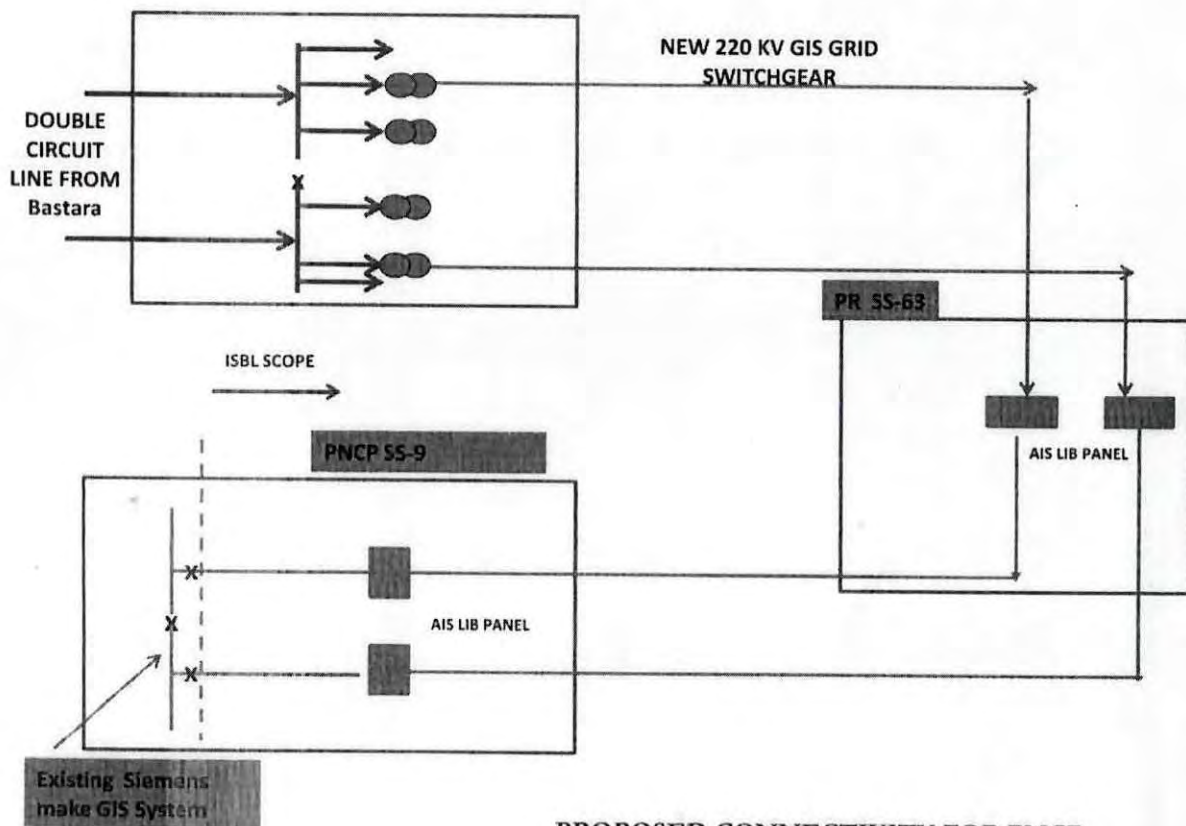
Annex-S-2/C-1/5



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INTERCONNECTION SLD FOR PNCP POWER EVACUATION FACILITY

Annex- S-2/C-1/6



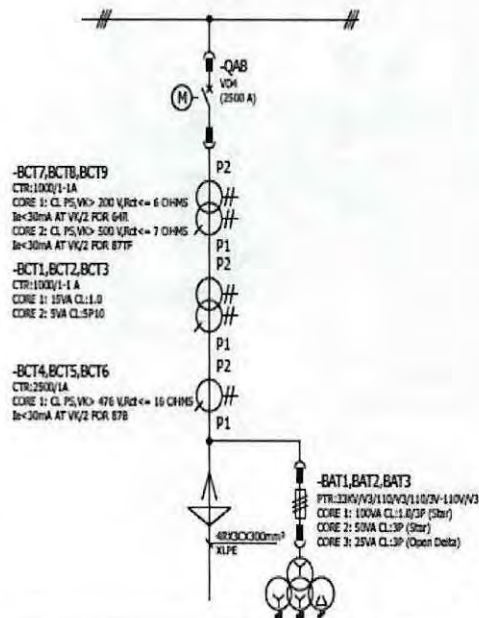
PROPOSED CONNECTIVITY FOR PNCP

SS-63 Grid Incomer – SLD

33kV, 2500 Amps, 31.5 kA /1s, 3PH, 50 Hz, COPPER BUSBAR WITH SLEEVE AMBIENT TEMP: 45 DEG C, TEMP RISE AS PER IEC.

GRID TRAF0 INCOMER

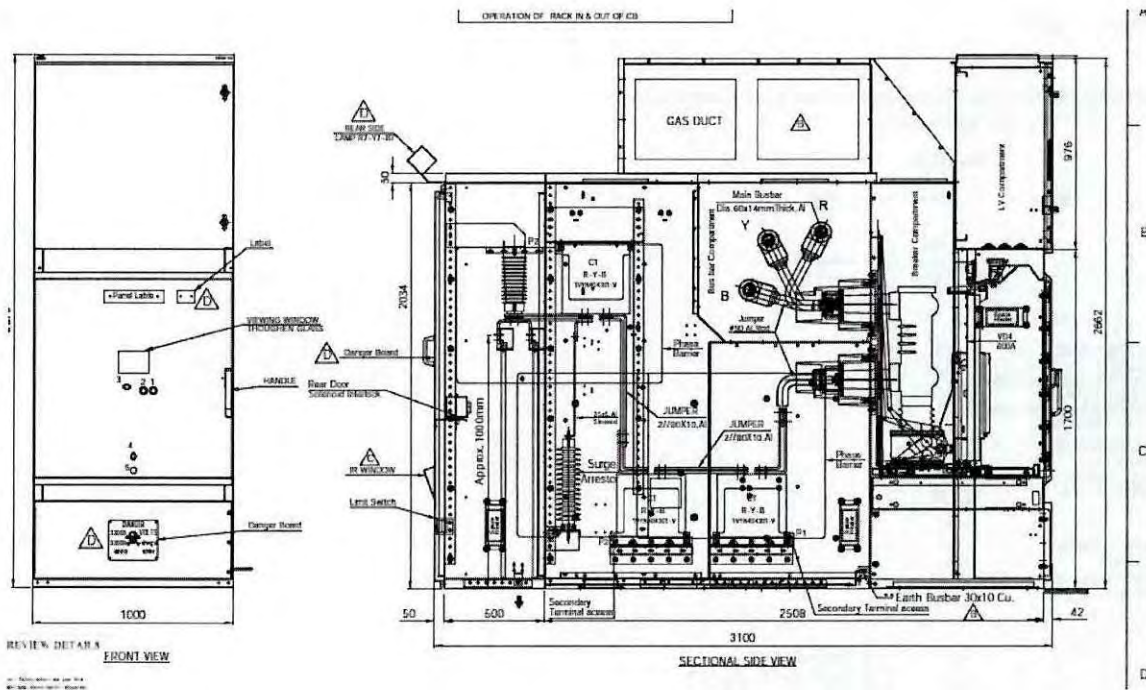
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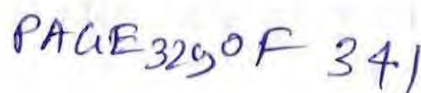


PANEL	H03
SCHEME TYPE	TRIC(DS-0064)
PROT. RELAY	REF615J, REF615H
PROT. FUNCT. RELAY	REF615J -> 51, 51N, 51G, 63X, 27+2, 67, 67N, 95 REF615H -> 64R
METERING FUNCT. RLY	A, V, PF, Hz, MWh, MVAh, MVAR, MVA, MW
COMMUNICATION	IEC61850 WITH 1 X RJ 45 (REAR) PORT
INTERLOCKING, TEST AND CONTROL EQUIPMENT	-PR1 -PRG1 -PFA1 -PFW1 -PFB1 -PFG2 -PFR2 (94) (52) (86) -PR3 -PFY3 -PFB3 (94) (52) (86) -PR14 -PFAS -PFG8 -PFR7 -PFR9 (94) (52) (86)

NOTE:
1.51N INTERNALLY CALCULATED
2.51G FROM REMOTE CT

- (86) TRIP CIRCUIT SUPERVISION PROTECTION
- (64R) RESTRICTED EARTHFAULT PROTECTION
- (59) OVER VOLTAGE PROTECTION
- (63X) BUCHHOLZ RELAY PROTECTION
- (27) UNDER VOLTAGE PROTECTION
- (51G) SENSITIVE E/F PROTECTION
- (51N) IDMT. EARTHFAULT PROTECTION
- (51) IDMT. OVERCURRENT PROTECTION





Feeder Details PNCP – H46 (PNCP ICT incomer)

AS MANUFACTURED [REDACTED] Date [REDACTED] 12T A/C 1V1

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3-50Hz 33KV 40KA 3Sec.

BUS-1 (SS1) L1,L2,L3 →

BUS-2 (SS2) L11,L12,L13 →

T15(L1,L2,L3)

T1(L1,L2,L3)

HC

L.T. CHAMBER DOOR MOUNTING EQUIPMENTS

K55 K21 K93 K24 P10 K61

7SJ 7UT 7UT 7UT 7SJ

632 23 612 31 622

X9-X10

H5 H6 H4 H0 H1 H7 H8 H9

S13 S15 S22 S24 S25

C/N/T L/R ON/OFF ISO-1 C/S ISO-2

L.T. CHAMBER BASE PLATE EQUIPMENTS

F25,F26 F27 F71-F80 F81-F88 F89-F98 F99-F102

K60,K62-K65 K13,K71-K73

S27 E2 PS+S28

X42-X34,X35

X49

1x

ITEM	BOARD DESCRIPTION	QTY.	INDICATE REQUIREMENT OF EQUIPMENT BY (✓) MARK
100	33KV SWITCHBOARD	1	
TECH. DATA AND EQUIP. DETAILS			DESG.
FEEDER TYPE			HZ60
FEEDER RATING			1250A
WIRING DIAGRAM NO.			(3)G71570-V5242-W002
PANEL Nos.-			H46
CLIENT'S FEEDER TYPE			TYPE-6 - INCOMER (ICT) WITH LPT & BUS VT-BUS-1
CIRCUIT BREAKER TYPE VCB.			Q0 ✓ 33KV, 1250A, 40KA / 3Sec. FIXED TYPE
3 POSITION SWITCH + EARTH SWITCH			Q1 ✓ MOTOR : 220V.DC. CLOSING COIL : 220V.DC. TRIPPING COIL : 220V.DC. 2nd TRIPPING : 220V.DC.
DISCONNECTOR			Q2 ✓ 3 POSITION DISCONNECTOR SWITCH
CURRENT TRANSFORMER: PROTECTION CORE 1			T1 ✓ CTR: 1000/1A, BURDEN: 10VA, CLASS: 5P20
PROTECTION CORE 2			✓ CTR: 1000/5A, BURDEN: 10VA, CLASS: 5P10
METERING CORE 3			✓ CTR: 1000/1A, BURDEN: 15VA, CLASS: 1.0
PROTECTION CORE 4			✓ CTR: 2500/1A, BURDEN: 10VA, CLASS: 5P20
BUS ZONE PROTECTION CORE 5			✓ CTR: 2500/1A, BURDEN: 10VA, CLASS: 5P20
POTENTIAL TRANSFORMER:			T5 ✓ PTR : 33KV/RL3 / 110V/RL3 / 110V/3 150VA CL:1.0/3P
POTENTIAL TRANSFORMER:			T15 ✓ PTR : 33KV/RL3 / 110V/RL3 150VA CL:1.0
SAG MAKE PROTECTION RELAY			75M22 K61 ✓ FLUSH MOUNTING, CT SEC: 5A, AUX. SUPP. : 220V.DC.
SAG MAKE 30/C+1E/F PROT. RELAY			75M32 K55 ✓ FLUSH MOUNTING, CT SEC: 5A, AUX. SUPP. : 220V.DC.(51,51N,67,67H,65,27,2,63TX,51G)
GEC-A MAKE TRIPPING RELAY			VAH23 K21 ✓ 1/2NH, 220V.DC. BURDEN HIGH, 6ND+2NC, H/R, FLAG (B6) (APF,V,F,KW,KVA,KVAR)
GEC-A MAKE SUPERVISION RELAY			VAX31 K24 ✓ 1/2NH, 220V.DC. 1NO+2NC, S/R, REVERSE FLAG (B5)
SAG MAKE TRAFD. DIFFERENTIAL RELAY			7UT612 K93 ✓ CT SEC. 1A, AUX. VOLTAGE : 220V.DC. FLUSH MOUNTING (870A,64R)
ABB MAKE CURRENT TRANSUDUCER (DUAL O/P)			V31-V33 ✓ CTR : 1000/1A; O/P : 4-20mA AUX. VOLTAGE : 240V.AC.
ABB MAKE VOLTAGE TRANSUDUCER (DUAL O/P)			V34-V36 ✓ CTR : 1000/1A; O/P : 4-20mA PTR : 33KV/RL3/110V/RL3 AUX. VOLTAGE : 220V DC
ABB MAKE KW TRANSUDUCER (DUAL O/P)			V37 ✓ CTR : 1000/1A; O/P : 4-20mA PTR : 33KV/RL3/110V/RL3 AUX. VOLTAGE : 220V DC
ABB MAKE FREQUENCY TRANSUDUCER (DUAL O/P)			V38,V45 ✓ CTR : 1000/1A; O/P : 4-20mA PTR : 33KV/RL3/110V/RL3 AUX. VOLTAGE : 220V DC
ABB MAKE VOLTAGE TRANSUDUCER (DUAL O/P)			V42-V44 ✓ CTR : 1000/1A; O/P : 4-20mA PTR : 33KV/RL3/110V/RL3 AUX. VOLTAGE : 220V DC
ABB MAKE KVAR TRANSUDUCER (DUAL O/P)			V41 ✓ CTR : 1000/1A; O/P : 4-20mA PTR : 33KV/RL3/110V/RL3 AUX. VOLTAGE : 220V DC
GEC ALST MAKE TEST TERMINAL BLOCK			X9-X10 ✓ WITHOUT PULSE O/P : 220V.DC.
RISHABH MAKE KWH METER (RISH 3430)			P10 ✓ 220V DC
LAMP LED RED ON			H1 ✓ 220V DC
LAMP LED GREEN OFF			H9 ✓ 220V DC
LAMP LED AMBER TRIP			H4 ✓ 220V DC
LAMP LED BLUE SPRING CHARGED			H6 ✓ 220V DC
LAMP LED WHITE 1ST TRIP CKT. HEALTHY			H5 ✓ 220V DC
LED LAMP RED L1-ON			H7,H17 ✓ 63.5V AC
LED LAMP YELLOW L2-ON			H8,H18 ✓ 63.5V AC
LED LAMP BLUE L3-ON			H9,H19 ✓ 63.5V AC
KAYCEE MAKE LOCAL/REMOTE SWITCH			S13 ✓ 16A-4P 2WAY 220V DC
GEC ALST. MAKE CB CONTROL SWITCH C/N/T.			S14 ✓ 4 CONTACTS IN CLOSE + 4 CONTACTS IN TRIP
SWITCH FOR DC SUPPLY			S19 ✓ 220V DC, 16A. 2P
SWITCH FOR AC SUPPLY			S20 ✓ 240V AC, 16A. 2P
DOOR LIMIT SWITCH			S27 ✓ 1NO + 1NC
GEC ALST. MAKE UPSTREAM CB CONT. SW. TRIP			S15 ✓ 16A, 3P 220V.DC. (LOCKABLE)
SWITCH FOR ISOLATOR-1 ON/NEUTRAL/OFF			S22 ✓ 220V DC,16A 2P
EARTH SWITCH ON/NEUTRAL/OFF			S24 ✓ 220V DC,16A 2P
SWITCH FOR ISOLATOR-2 ON/NEUTRAL/OFF			S25 ✓ 220V DC,16A 2P
MCB FOR PT SECONDARY			F27 ✓ 2A, 110V AC, 2NO
MCB FOR PT SECONDARY			F25,F26 ✓ 2A, 110V AC, 4NO WITH A/IX CONTACTS 1NO+1NC
ANUSHUM MAKE FLUO & SAKREI			PS+S28 ✓ 1PH 3PH 5A, 240V.AC. DECORATIVE TYPE
ILLUMINATION LAMP			E2 ✓ 11W. CFL 240V.AC. 50Hz
CONTROL FUSE			F71-F72,F81,F82,F81,F92 ✓ 10A
CONTROL FUSE			F73-F74,F49,F83,F84,F93-F96 ✓ 8A
CONTROL FUSE			F42,F51-F52 ✓ 2A
CONTROL FUSE			F75-F78,F79-F80,K65-F8A ✓ 4A
CONTROL LINK			X42,X49,X34,X35 ✓
SI MAKE AUXILIARY CONTACTOR			K50,K63,K65 ✓ 220V DC- 4NO
SI MAKE AUXILIARY CONTACTOR			K62,K64 ✓ 220V DC- 8NO
SI MAKE AUXILIARY CONTACTOR			K13 ✓ 220V DC- 4NO-1NC
SI MAKE AUXILIARY CONTACTOR			K71-K72 ✓ 220V DC- 3NO-1NC
SI MAKE AUXILIARY CONTACTOR			K73 ✓ 220V DC- 2NO-2NC

3R x 1C x 300 Sq.mm./Phase