SPECIFIC REQUIREMENT'S (Section- Project)

C/ENGG/SPEC/SEC-PROJECT/SPECIFIC REQUIREMENT REV NO 05

Employer has standardized its Specific Requirement for various equipments and works for different voltage levels. Items or clauses, which are not applicable for the scope of this package as per schedule of quantities described in BPS or as per scope defined elsewhere in Section Project, the technical specification/clauses for the items specified below should not be referred to.

S.No.	Model Section & Clause No.	Amended As (As per Specific Requirement Rev 05)
1.	**Section Switchgear-INST Rev 11** **Clause No. 9.2 Para 3 & 4**	CTs must have adequate provision for taking oil samples from the bottom of the CT without exposure to atmosphere. Manufacturer shall recommend the frequency at which oil samples should be taken and norms for various gases in oil after being in operation for different durations. Manufacturer should also indicate the total quantity of oil which can be withdrawn from CT for gas analysis before refilling or further treatment of CT becomes necessary. Manufacturer/Contractor shall supply 2 nos. of oil sampling device for every 20 nos. of oil filled CT supplied with a minimum of 2 nos. of oil sampling device for each substation.
2.	**Section Switchgear-INST Rev 11** **Clause No. 9.3**	**Voltage Transformers** a) Insulation Resistance test for primary (if applicable) and secondary winding b) Polarity test c) Ratio test d) Dielectric test of oil (wherever applicable) e) Tan delta and capacitance measurement of individual capacitor stacks f) Secondary winding resistance measurement g) DGA of oil (for IVT/PT) Dissolved Gas Analysis (DGA) shall be carried out twice within the first year of service, first within the first month of commissioning/charging and second between six months to one year from the date of commissioning/charging. IVTs/PTs must have adequate provision for taking oil samples from the bottom of the IVT/PT without exposure to atmosphere. Manufacturer shall recommend the frequency at which oil samples should be taken and norms for various gases in oil after being in operation for different durations. Manufacturer should also indicate the total quantity of oil which can be withdrawn from IVT/PT for gas analysis before refilling or further treatment of IVT becomes necessary. Manufacturer/Contractor shall supply 2 nos. of oil sampling device for every 20 nos. of oil filled IVT/PT supplied with a minimum of 2 nos. of oil sampling device for each substation.
3.	**Section Switchgear-INST Rev 11** **Clause No. 10.0**	**Defect Liability** The actions required to be taken by contractor in case of defects observed in CT/CVT**/IVT/PT** of ratings 145kV & above during the warranty period (defect liability period) shall be as per enclosed **Annexure-V (Revised)** of this specification. Further, the replaced/repaired/refurbished equipment (or part of equipment) shall have Two (2) years warranty without prejudice to contractual warranty period (defect liability period).
4.	**Section Switchgear – CB Rev 11** **Clause no. 2.6 Para 2**	The CSD shall be provided in Circuit breaker of switchable line reactor bay and in Main & Tie bay circuit breakers of Transformers (**required for 765/400kV transformers only**), line with non-switchable line reactors and Bus reactors. The CSD shall be supplied as per bid price schedules.
5.	**Section Switchgear – CB Rev 11**	For Circuit breaker with CSD controlling a Transformer following is applicable

	New Clause no. 2.6.1(n)	"The limit for inrush current for switching of Transformer by CSD shall be 1.0 p.u. of rated current of transformer after fine tuning of CSD settings during pre-commissioning checks. For site acceptance of CSD, during online CSD test after fine tuning inrush current should be less than 1.0 P.U. of rated current in five consecutive operations".
6.	**Section Switchgear – CB Rev 11** **Clause No. 11.4**	Separate cables shall be used for AC, DC-I, DC-II and selected DC. **Each control cable shall include minimum 10% spare cores (subject to minimum 1 no. of spare core).**
7.	**Section Switchgear – CB Rev 11** **Clause No. 11.5**	Requirement of Plug-In type connector for Inter-pole cabling is deleted
8.	**Section Switchgear – CB Rev 11** **Clause No. 11.6**	Vertical run of cables to the operating mechanism box shall be properly supported by providing the perforated closed type galvanized cable tray (Cable tray also to be supplied along with the Circuit Breaker) to be fixed as an integral part of the structures. The load of the cable shall not be transferred to the mechanism box/terminal arrangement in any circumstances. Hanging or loose run of cable is not permitted. The drawing of cable tray including fixing arrangement shall be incorporated in the GA drawing of CB also.
9.	**Section GIS Rev 5A** **Clause no. 6.8.2**	The CSD shall be provided in 765kV/400kV Circuit breakers for controlling transformers (**required for 765/400kV transformers only**) and reactors (ie for breakers of switchable line reactor and in Main& Tie circuit breakers of Transformers, Transmission lines with non-switchable line reactors and Bus reactors). The requirement of CSD shall be explicitly specified in price schedule
10.	**Section GIS Rev 5A** **New Clause no. 10.1.3(n)**	For 400kV & above voltage class GIS bay module, CT cores shall be duly distributed on both side of circuit breaker. For 220 kV and below voltage level GIS bay module, CT on one side of the circuit breaker is also acceptable.
11.	**Section GIS Rev 5A** **New Para added under Clause no.20**	During detailed engineering, the type test reports of GIS equipment of the parent company/subsidiary company/group company shall also be acceptable provided that the design of offered GIS is same as that of type tested GIS equipment.
12.	**Section GIS Rev 5A** **New Clause no. 15.2.14**	All 765kV & 400kV Circuit Breaker control schematics shall be finalized in such a way, that it may operate with or without CSD by using a suitable selector switch irrespective of whether circuit breakers to be supplied are envisaged along with CSD or not as per bid price schedules.
13.	**Section GIS Rev 5A** **New Clause no. 5.41(10)**	The price of Bus-duct inside the GIS hall shall be integral part of the respective bay module and it will not be paid separately. However, the payment of bus-duct for outside the GIS hall along with support structure shall be paid as per running meters in line with provision of Bid Price schedule.
14.	**Section Air Conditioner Rev 04** **New Annexure-S3**	Annexure S3 – Air Conditioning & Ventilation System for GIS Building
15.	**Section CRP Rev 09** **New Clause No. 21.8**	Back-up Impedance protection function shall be provided for 765kV & 400kV sides of 765/400/33kV ICT and for 400kV side of 400kV class ICT. This protection function and Differential Protection function shall not be combined in the same IED.
16.	**Section CRP Rev 09**	Line Differential relays used as both Main –I & Main-II protection of a line, shall be of either different make & model or shall be on different hardware platform.

	New para added under Clause no.18.8	
17.	**Section CRP Rev 09** **New Para added under Clause No.5.1**	Requirement of Shrouding shall not be applicable to TB's where live parts are concealed.
18.	**Section CRP Rev 09** **Clause No. 32.9**	The equipment offered shall have six (6) output ports. Various combinations of output ports shall be selected by the customer, during detailed engineering, from the following : • Potential free contact (Minimum pulse duration of 50 milli seconds.) • IRIG-B • RS232C • SNTP Port **(at least 4 ports)** • IEEE 1588 PTP (Applicable only for Process bus automation station)
19.	**Section CRP Rev 09** **Clause No. 21.1 (e)**	be suitable for individual input from associated CTs with rated CT secondary current of 1 Amp.
20.	**Section SAS Rev 09** **Typical Architectural Drawing of SAS (Without Process Bus)**	TYPICAL ARCHITECTURAL DRAWING OF SUBSTATION AUTOMATION SYSTEM (Without Process Bus) stands replaced by Annexure-S5
21.	**Section SAS Rev 4** **Para 2 under Clause No. 3.3.1**	The Substation Automation System shall have communication ports on each gateway (two gateways per station) as follows: (a) Three ports for Remote Control Centres on Secure IEC60870-5-104 protocol. **(b) Two port on IEC 60870-5-104 for Regional System Coordination Centre (RSCC)**
22.	**Section SAS Rev 4** **New Para Added Under Clause No.4.1.5**	The bidder shall also provide 2 Nos. managed Ethernet switches with at least 16 copper RJ45 ports on each switch to form managed "Redundant System LAN" for connecting different NTAMC sub-systems devices (SCADA Gateways, VMS, VOIP etc.) as per revised system architecture (attached as Annexure S5). The specification of the switches is enclosed at Annexure-S6.
23.	**Section SAS Rev 4** **Para 2 Under Clause No.4.1.6**	The substation firewall shall have the following features: - IP firewall features such as Address/port inspection and filtering - Shall be stateful firewall - Shall support upto 8 Ethernet switches 10/100 Mbps - Shall support IPv4 and IPv6 - Shall have IP sec/VPN with 3DES/AES encryption - Shall have NAT - Shall have syslog capability - Shall be NERC compliant - Shall have hot- standby operation with similar router **- Shall support SNTP & SNMPv3 protocols**
24.	**Section SAS Rev 4** **Para 3 Under Clause No.4.1.6**	The substation routers shall have the following features: - Routing protocols such as OSPF and support for IPv4 and IPv6 **- 8 Ethernet interfaces of 10/100 Mbps** - 2 E1 interfaces - Hot standby operation with a similar router - Support IEEE 802.3u, 802.1p, 802.1Q, 802.1d, 802.1w, - Traffic prioritization for routed IP flows/ports

25.	**Section SAS Rev 4** **Bullet no.4 under Clause No. 4.2.1**	Each BCU shall be equipped with Local HMI (display) facilities, enabling control of each particular bay from BCU whenever required. The Local HMI facilities shall be accomplished by means of Graphical LCD display embedded into the front panel of the BCU. Display will show the SLD (with device identification number) showing status of bay switching equipment (such as circuit breaker, isolators, earth switches) and enabling issuance of switching controls. Other display type will be multiple displays of analog values readings / reports, displays for controls other than switching, Alarm panel displays, Diagnostic/ online configuration displays etc. **Bay control unit shall have inbuilt metering CVT supervision function. It shall have feature to give alarm in case of CVT/PT metering core fuse fail.**
26.	**Section SAS Rev 4** **Clause No. 16.0 (v)**	**LIST OF EQUIPMENTS** v) **Two nos. Disturbance Recorder/Engineering Work Station where atleast one workstation shall have Linux based operating system.**
27.	**Section PLCC Rev 05** **New Clause no. 10.4.13**	All protection couplers (Analog protection coupler, digital protection coupler) shall be equipped with direct reading type counter facility for all the codes (Tx & Rx).
28.	**Section PLCC Rev 05** **New Clause no.10.5**	Digital protection coupler (DPC) shall be used as one of the two tele-protection channel on the lines between the stations having Optical Fiber link alongwith SDH Equipment. Specification of digital protection coupler is enclosed as Annexure-S2. The DPC can be housed either in offered Control & Protection Panel / PLCC Panel or in separate panel. Generally SDH Equipment are placed in communication room of Control room where as DPC is placed in panel room. The connection between SDH equipment and each DPC shall be through Optical fiber. Necessary converter(s) for converting E1 signal to optical fiber at both ends (at Panel Room as well as at Control room) along with FODP shall be in the scope of the contractor. Further sharing of additional spare ports of converter for DPC placed in other Panel Room or in same Panel Room is also permitted. Necessary optical fiber for interconnection of DPC is to be provided by the contractor. Further any copper wiring for ensuring the protection signaling/data/speech shall be in the scope of the contractor.
29.	**Section PLCC Rev 05** **New Clause No. 6.12.4**	For 765 kV Wave Trap, cantilever strength of BPIs used for Wave Trap shall be 10 kN.
30.	**Section: Power & Control Cable Rev 06** **New Para added under Clause 1.1.4**	The cable sizes specified at clause no. 1.1.4 of Section-Power & Control Cables Rev-6 are minimum required. In case, more nos. of runs or larger sizes of cables are required between two points based on design calculations, same shall deemed to be included in the scope of bidder.
31.	**Section: Power & Control Cable Rev 06** **Clause No. 4.2**	Standard lengths for each size of power and control cables shall be 500/1000 meters. However, to avoid cable wastage and cable jointing at site, non-standard lengths of each size of Power & Control cable may also be acceptable subject to maximum length of 1000meters (+ 5% tolerance)
32.	**Section Fire Protection Rev 06** **Appendix-I**	Appendix-I (Rev 4) **s**tand replaced by following Appendix-I (Rev 5)

33.	**Section: Fire Protection Rev 06** **Clause No.9.01.00(c) & Appendix-V**	Deleted
34.	**Section Fire Protection Rev 06** **New para added at Clause no.2.03.00**	Fire detection and alarm system shall also be provided in the GIS Hall using beam type smoke detectors to be installed at suitable mounting height, and in the Relay Panel room with ionization/optical type smoke detectors to be installed on the ceiling.
35.	**Section Fire Protection Rev 06** **New Clause no.2.01.02**	Adequate no. of Hydrant posts and Fire extinguishers (CO2 and DCP type) shall also be provided for GIS Building.
36.	**Section Fire Protection Rev 06** **Clause No. 2.04.02 & 10.00.00**	Mechanical foam type fire extinguishers wherever specified as 50 litre capacity, conforming to IS:13386, shall be read as 60 litre capacity conforming to IS 16018 Further in case of non-availability of any type of fire extinguisher (i.e. water, CO2, DPC, foam type) of a particular size as specified in BPS or technical specification, next available higher size conforming to IS shall be supplied.
37.	**Section DG Set Rev 05** **New para added under Clause no. 7.1(a)**	Alternatively, AMF Panel for DG Set may be installed outside the acoustic enclosure near the DG Set. In such cases, AMF panel with or without additional enclosure shall meet IP-55 degree of protection.
38.	**Section: Lighting System Rev 07** **Clause no. 6.2.1(ii)**	All Outdoor Lighting Panels shall be Stainless sheet steel of Grade 304 and shall be dust, weather and vermin proof. Panels shall be of thickness not less than 1.5 mm smoothly finished, leveled and free from flaws. Stiffeners shall be provided wherever necessary. **Alternatively, outdoor lighting panels of Aluminum shall also be acceptable as per provisions stipulated in Section GTR.**
39.	**Section: Lighting System Rev 07** **Clause no. 6.6(i) (b)**	The outdoor junction boxes shall be complete with conduit knockouts/threaded nuts and provided with terminal strips. The junction boxes shall be suitable for termination of Cable glands of required size. The junction boxes shall be provided with 4 way knockouts suitable for street lighting/switchyard lighting terminals suitable for 2 numbers 4C x 16 Sq.mm Al. cable or as per requirement. All Outdoor Junction boxes shall be of Stainless Steel of thickness 1.5mm of grade 304. Outdoor Junction Boxes shall be suitable for mounting on columns, structures etc for Outdoor Lighting. The outdoor Junction shall have IP 55 protection. **Alternatively, outdoor junction boxes of Aluminum shall also be acceptable as per provisions stipulated in Section GTR.**
40.	**Section: LT Switchgear Rev 05 Clause no. 1.21.2**	Contractor shall submit type test reports for the Lighting transformers as per IS:2026 for which test conducted once are acceptable (i.e. The requirement of test conducted within last ten years shall not be applicable)
41.	**Section LT Switchgear Rev 05** **Clause no. 1.6.1**	MCCB shall in general conform to IS: 13947 Part-2. All MCCB offered shall have Ics = 100% Icu rating.
42.	**Section: Battery and Battery Charger Rev 06** **Clause no. 1.2.12**	The battery shall be capable of giving 1200 or more charge/discharge cycles at 80% Depth of discharge (DOD) at an average temperature of 27^{o} Celsius. DOD (Depth of Discharge) is defined as the ratio of the quantity of electricity (in Ampere-hour) removed from a cell or battery on discharge to its rated capacity.

<table>
<tr><td>43.</td><td>Section: Structure
Rev 06

New Clause No.
3.2.4 Added</td><td>POWERGRID will issue the fabrication drawings of the standard structures to the successful bidder. The contractor shall do the proto assembly of the structures as per the issued fabricated drawings. Employer may opt to witness such proto assembly. The bidder shall follow the fabrication drawing for preparing the proto assembly and do the minor adjustments if necessary, without affecting the strength of the structure. In case of equipment support structure the attachment of stool and fixing of MOM box etc. shall be taken care by the contractor as per the requirement of the equipment. The contractor however shall not submit the proto corrected drawings and BOM for approval of the employer. The arrangement shall however not absolve the contractor from the responsibility of supply and erection of safe sound and durable structure.</td></tr>
<tr><td>44.</td><td>Section: Structure
Rev 06

New
Clause no. 3.4</td><td>Nuts, Bolts and washers for all non standard structures shall be payable as per BPS.</td></tr>
<tr><td>45.</td><td>Section Civil Works
Rev 11A

New
Clause No. 21.0</td><td>The dewatering pump shall be Portable, Self Priming, Non clog, horizontal type monobloc pump. The Pump shall be driven by electric motor suitable for outdoor application with IP-55 degree of protection. Following are the major technical parameters for the pumps to be supplied as per BPS:

(A) Pump Rating : 2 HP
Flow Rate : 200-400 LPM
Minimum Total Head : 12 Mtrs
Voltage Range : 415 ± 10% Volts (Three Phase)

(B) Pump Rating : 5 HP
Flow Rate : 1000-1400 LPM
Minimum Total Head : 10 Mtrs
Voltage Range : 415 ± 10% Volts (Three Phase)</td></tr>
<tr><td>46.</td><td>Section Switchyard Erection Rev 10

Clause No. 9.4(j) & (k)</td><td>
<table>
<tr><th>S.No</th><th>Item</th><th>Size</th><th>Material</th></tr>
<tr><td>j)</td><td>Isolator MOM Box</td><td>50X6 mm GS flat & Flexible copper braid</td><td>Galvanised steel and copper braid</td></tr>
<tr><td>k)</td><td>Insulator Guy Arrangement</td><td>75x12mm G.S. flat</td><td>Galvanised Steel</td></tr>
</table>
</td></tr>
<tr><td>47.</td><td>Section: Switchyard Erection
Rev 10

New
Clause no. 20.1</td><td><u>Neutral formation for Transformer(s), DELTA formation and making connection arrangement to connect spare unit in place of any unit of the bank without physical shifting and Earthing Arrangement :</u>

For Spare Unit connection to form 3-ph bank of 765kV Class Transformers with isolator based switching arrangement without physical shifting of spare unit along with necessary Neutral Formation, Earthing Arrangement & Tertiary (DELTA) formation for 3-ph bank formation with 1-ph units shall be under present scope as per the details mentioned below:

i. <u>Neutral Formation including Neutral auxiliary bus and Earthing Arrangement</u>

The contractor shall connect the neutrals of three (3) 1-phase transformers by overhead connection using 3" IPS Al tube. The neutral formation shall be such that neutral winding of single-phase spare transformer can be disconnected or connected to the three phase banks. The connection from the neutral bushing to neutral bus shall be through 3" IPS Al tube and wherever flexible jumper needs to be provided, same shall be through twin conductor. All material like Bus post insulator, Aluminium tube, conductor, clamps & connectors, earthing materials, support structure, hardware etc. required for neutral formation and connection with</td></tr>
</table>

		neutral CT and earthing of neutral shall be provided by contractor. **ii. <u>Tertiary Delta Formation including Tertiary auxiliary bus(Insulation level 52 kV) .</u>** The contractor shall connect 33kV tertiary of single-phase auto-transformers in DELTA configuration by overhead connection to operate in 3-Ph Bank. The Delta shall be formed by 3" IPS Al tube, which shall be insulated with heat shrinkage insulating sleeve of at least 52kV class and shall be supported by structure mounted bus post insulators at suitable intervals. Jumpers (twin conductors) wherever provided shall also be insulated using suitable insulation tape or sleeve at least 52kV class at site. The minimum phase to phase horizontal spacing for delta formation shall be 1.5meter. All associated materials like bus post insulators, Aluminium tube, conductor, clamps & connectors, support structures, hardware, earthing materials etc. required for tertiary delta formation shall be provided by the contractor. **iii. <u>HV & IV Auxiliary Buses (Applicable for AIS Substation)</u>** Formation of HV & IV auxiliary buses for connection of transformer 3-Phase bank with 1-Phase Spare transformer unit is under the present scope of the bidder. All associated materials like Bus post insulators, Aluminium tube, conductors, clamps & connectors, insulator strings, hardware, earthing materials, support structures, required for the above-mentioned arrangement shall be provided by the contractor.
48.	**Section: Switchyard Erection** **Rev 10** **New** **Clause no. 20.2**	**<u>Neutral formation for Reactor banks, connection to neutral grounding reactor through 132kV Surge arrester, connection to ground through neutral CTs and connection arrangement to connect spare reactor unit in place of any other units of the bank without physical shifting and Earthing Arrangement :</u>** For Spare Unit connection to 3-ph bank of 765kV Class Reactors with isolator based switching arrangement without physical shifting of spare unit along with necessary Neutral Formation, Earthing Arrangement for 3-ph bank formation with 1-ph units shall be under present scope as per the details mentioned below: **i. <u>Neutral Formation including Neutral auxiliary bus and Earthing Arrangement</u>** The contractor shall connect the neutrals of three (3) 1-phase reactors by overhead connection using 3" IPS Al tube. The neutral formation shall be such that neutral winding of single-phase spare reactor can be disconnected or connected to the three phase banks. Neutral Connections of spare unit shall be extended upto the other unit(s) by forming Neutral auxiliary bus. The connection from the neutral bushing to neutral bus shall be through 3" IPS Al tube and wherever flexible jumper needs to be provided, same shall be through twin conductor. All material like Bus post insulator, Aluminum tube, conductor, clamps & connectors, earthing materials, support structure, hardware etc. required for neutral formation and connection with neutral CT and earthing of neutral shall be provided by contractor. Required Insulation level is 145 kV from individual reactor neutral to point of neutral formation. However after neutral formation, the insulation level is 36kV. Connection of each Line reactor bank formed under present scope to Neutral grounding reactor through 132kV Surge Arrester including NGR by passing arrangement is also under present scope. **ii. <u>HV Auxiliary Bus (Applicable for AIS Substation)</u>** Formation of HV auxiliary bus for connection of reactor 3-Phase bank with 1-Phase Spare reactor unit is under the present scope of the bidder. All associated materials like Bus post insulators, Aluminium tube, conductors, clamps & connectors, insulator strings, hardware, earthing materials, support structures, required for the above-

		mentioned arrangement shall be provided by the contractor.
49.	**Section: Switchyard Erection Rev 10** **New Clause no. 20.3**	Supply & Laying of Power, Control Cables & Special Cables (if any) (including all cabling works for spare unit of transformer/reactor) along with accessories for power supply, alarm, trip, control & indication, status and monitoring signals & contacts made available at MB/CMB of Transformers/Reactors upto Control & Relay Panels and BCUs located in the Switchyard Panel Room/Control Room and successful integration of same with Station Control, Protection & SAS System is in the scope of the contractor.
50.	**Section: Switchyard Erection Rev 10** **New Clause no. 20.4**	3½Cx300 Sq. mm XLPE power cable for oil filtration units of reactors & transformers shall be provided. The cable shall be terminated at 250A receptacle near Reactor & Transformer in the switchyard. XLPE Power cables shall be looped in & out for 250A Power receptacles.
51.	**Section: Switchyard Erection Rev 10** **New Clause no. 20.5**	Neutral of spare transformer/reactor is to be connected to station grounding system through a jumper/copper flat. This shall be applicable for single phase transformer/reactor wherever spare unit have been provided.
52.	**Section: Switchyard Erection Rev 10** **New Clause no. 20.6**	Tertiary connections made for tertiary loading of LT Transformer shall be insulated using suitable insulation tape or sleeve of at least 52kV class at site
53.	**Section Switchyard Erection Rev 10** **New Clause No. 2.5**	Transmission line side insulator string along with hardware for line termination shall be in the scope of substation contractor.
54.	**Section Switchyard Erection Rev 10** **New Clause No. 21**	Connection arrangement of 765kV equipment's shall be done as per the conceptual drawing (Drawing No. C/ENGG/SS/CONCEPTUAL 765KV BAY CONNECTIONS, Rev-01) enclosed as Annexure-S1of this Section.
55.	**Section Switchyard Erection Rev 10** **New Clause No. 22**	For connection to HV bushing of LT Transformer, insulated copper rod/strip of at least 75 sq.mm cross sectional area shall be used.
56.	**Section Switchyard Erection Rev 10** **New Clause No. 23**	**23.0 VISUAL MONITORING SYSTEM** (if specified in BPS) Visual Monitoring System for watch and ward of substation premises shall be provided for area under present scope as per Annexure-S7
57.	**Section: Auto-transformer Rev-07** **Clause no. 10.2**	Bushing for voltage of 800kV & 420kV shall be of porcelain or polymer housing and hermetically sealed Oil filled condenser type. Bushing for tertiary shall be RIP (Resin Impregnated paper) / RIS (Resin Impregnated Synthetic) / RIF (Resin Impregnated Fiberglass) condenser type with composite polymer insulator (housing) / OIP (Oil Impregnated Paper) with porcelain insulator is also acceptable.

		36kV Neutral bushing shall be solid or oil communicating type with porcelain housing.
58.	**Section: Auto-transformer Rev-07** **Clause no. 10.14**	Deleted
59.	**Section: Auto-transformer Rev-07** **Clause no. 10.15**	Tan δ value of RIP / RIS / RIF condenser bushing shall be 0.005 (max.) in the temperature range of 20°C to 90°C. The measured Tan δ value at site of in-service bushing should not exceed by 0.001 w.r.t. factory results (measured at approx. similar temperature conditions) during warrantee period. Tan delta value of OIP Bushing shall be 0.004 (Max) measured at ambient temperature. The measured Tan δ value at site of in-service bushing should not exceed by 0.001 w.r.t. factory results during warrantee period.
60.	**Section: Auto-transformer Rev-07** **New Clause no. 18.00 (cc)**	Canopy arrangement shall be provided for Pressure Relief Device, Sudden Pressure Relay and Buchholz Relay to prevent ingress of rain water.
61.	**Section: Auto-transformer Rev-07** **New Clause no. 18.00 (dd)**	Plug & socket type arrangement with factory fitted cable of adequate length shall be supplied by OEM for Pressure Relief Device, Sudden Pressure Relay, Magnetic Oil Level Gauge and Buchholz Relay. Connection of plug and socket with cable is not acceptable at site
62.	**Section: Auto-transformer Rev-07** **New Clause no. 6.1.5(f)**	04 nos. of Gate valves (minimum size 50NB) for UHF sensors for PD Measurements at various locations. Location of valves shall be finalized during design review.
63.	**Section: Auto-transformer Rev-07** **New Para added under Clause No. 6.4**	Fixing of cooler bank support shall be provided through Anchor Fastener with chemical grouting and no pockets for bolting shall be provided. Further, metallic support structure (for cooler pipe supports, Buchholz pipe (if required) shall be fixed directly in the pit through Anchor Fastener with chemical grouting. Further, these support structures shall be encased with concrete to prevent rusting. No foundation block for these support structures are envisaged. Specific area shall not be provided for jacking pad in the foundation as jacking shall be done by laying temporary metal plates size 400 mm x 400 mm x 32 mm (min) thick. One set of metal plates for jacking of Transformer shall be provided by manufacturer.
64.	**Section: Auto-transformer Rev-07** **New Para added under Clause no. 8.0**	Manufacturer may also offer Gas to Liquid (GTL) based insulating oil. The technical parameters of this oil is attached at Annexure-S8
65.	**Section: Auto-transformer Rev-07** **Clause No. 18.v & 18.x**	v) On-line insulating oil drying system (Cartridge type) (if specified in BPS) as per Annexure-L x) Deleted

<table>
<tr><td>66.</td><td>Section: Auto-transformer Rev-07

Clause No. 6.14</td><td>Deleted</td></tr>
<tr><td>67.</td><td>Section: Auto-transformer Rev-07

New Clause no. 6.1.5(g)</td><td>Suitable provision (valves, etc.) shall be provided for installation of Nitrogen Injection Fire Protection System in transformer.</td></tr>
<tr><td>68.</td><td>Section: Auto-transformer Rev-07

Clause no. 13.4.8(c)</td><td>When the flow from conservator to main tank is more than the normal operating conditions, the valve shall shut off by itself and will have to be reset manually. It shall be provided with valve open/close position indicator along with alarm contact indication in control room during closing operation of valve. This valve shall be provided with locking arrangement for normal position and oil filling / filtration position. Glass window for visual inspection similar to Buchholz glass inspection window shall be provided for physical checking of status of valve. It shall have IP 67 class degree of protection. A suitable platform or ladder (if required) shall be provided to approach the valve for manual reset.</td></tr>
<tr><td>69.</td><td>Section: Auto-transformer Rev-07

Clause No. 1.21 Annexure –A, Technical Particulars / Parameters of Transformers</td><td>
<table>
<tr><th>1.21</th><th>Maximum Permissible Losses of Transformers</th><th>Unit</th><th>333MVA</th><th>500 MVA</th></tr>
<tr><td>i)</td><td>Max. No Load Loss at rated voltage and frequency</td><td>kW</td><td>60</td><td>70</td></tr>
<tr><td>ii)</td><td>Max. Load Loss between HV & IV at rated current and frequency and at 75^{O} C</td><td>kW</td><td>400</td><td>450</td></tr>
<tr><td>iii)</td><td>Max. I^2R Loss at rated current at 75^{O} C</td><td>kW</td><td>295</td><td>330</td></tr>
<tr><td>iv)</td><td>Max. Auxiliary Loss at rated voltage and frequency</td><td>kW</td><td>9</td><td>10</td></tr>
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</td></tr>
<tr><td>70.</td><td>Section: Auto-transformer Rev-07

Annexure –B, Test Plan Sr. No. 17</td><td>Section: Auto-transformer Rev-07

Annexure –B, Test Plan Sr. No. 17 - Deleted</td></tr>
<tr><td>71.</td><td>Section: Auto-transformer Rev-07

Annexure – C Test Procedures</td><td>Annexure-C: Test Procedures stands replaced by STANDARD TEST PROCEDURE FOR TRANSFORMER & REACTOR (DOC. No.: POWERGRID/STD/TEST PROCEDURE/TR-RT/REV 01) attached as Annexure to this Section.</td></tr>
<tr><td>72.</td><td>Section: 765kV Shunt Reactor Rev-07

Clause No.11.14</td><td>Deleted</td></tr>
</table>

73.	**Section: 765kV Shunt Reactor Rev-07** **Clause No.11.15**	Tan δ value of RIP / RIS / RIF condenser bushing shall be 0.005 (max.) in the temperature range of 20°C to 90°C. The measured Tan δ value at site of in-service bushing should not exceed by 0.001 w.r.t. factory results (measured at approx. similar temperature conditions) during warrantee period. The measured Tan δ value at site of in-service bushing should not exceed by 0.001 w.r.t. factory results during warrantee period.
74.	**Section: 765kV Shunt Reactor Rev-07** **Clause No.7.1.5 (d)**	04 nos. of Gate valves (minimum size 50NB) for UHF sensors for PD Measurements at various locations. Location of valves shall be finalized during design review.
75.	**Section: 765kV Shunt Reactor Rev-07** **New Para added under Clause No. 7.4**	Cooler bank shall be tank mounted. Further, specific area shall not be provided for jacking pad in the foundation as jacking shall be done by laying temporary metal plates size 400 mm x 400 mm x 32 mm (min) thick. One set of metal plates for jacking of reactor shall be provided by the manufacturer.
76.	**Section: 765kV Shunt Reactor Rev-07** **Annexure-I**	Annexure-I stands replaced as Annexure-I (Rev 1)
77.	**Section: 765kV Shunt Reactor Rev-07** **New para added under Clause No.9**	Manufacturer may also offer Gas to Liquid (GTL) based insulating oil. The technical parameters of this oil is attached at Annexure-S8
78.	**Section: 765kV Shunt Reactor Rev-07** **Clause No.7.14**	Deleted
79.	**Section: 765kV Shunt Reactor Rev-07** **New Clause No.7.1.5 (f)**	Suitable provision (valves, etc.) shall be provided for installation of Nitrogen Injection Fire Protection System in transformer.
80.	**Section: 765kV Shunt Reactor Rev-07** **Clause No.14.8 (c)**	When the flow from conservator to main tank is more than the normal operating conditions, the valve shall shut off by itself and will have to be reset manually. It shall be provided with valve open/close position indicator along with alarm contact indication in control room during closing operation of valve. This valve shall be provided with locking arrangement for normal position and oil filling / filtration position. Glass window for visual inspection similar to Buchholz glass inspection window shall be provided for physical checking of status of valve. It shall have IP 67 class degree of protection. A suitable platform or ladder (if required) shall be provided to approach the valve for manual reset.
81.	**Section: 765kV Shunt Reactor Rev-07** **New Clause** **Clause No.22.1 (xxiii)**	Deleted
82.	**Section: 765kV Shunt Reactor Rev-**	Plug & socket type arrangement with factory fitted cable of adequate length shall be supplied by OEM for Pressure Relief Device, Sudden Pressure Relay, Magnetic Oil