| 33 kV OPEN TERMINAL SWITCHGEAR | | UNIT | DATA | |
| --- | --- | --- | --- | --- |
|  | |  | REQUIRED | OFFERED |
|  | 33kV Conductors |  |  |  |
|  | General |  |  |  |
| 6.1 | Rated current | A |  |  |
| 6.1.1 | Trans feeders |  | Acc. to SLD |  |
| 6.1.2 | Busbars |  | Acc. to SLD |  |
| 6.1.3 | Busbar Section |  | Acc. to SLD |  |
| 6.1.4 | Busbar Section |  | Acc. to SLD |  |
| 6.2 | Rated frequency | Hz | 50 |  |
| 6.3 | Rated voltage | kV | 36 |  |
| 6.3.1 | Basic insulation level of equipment at site condition | kV peak | 250 |  |
| 6.3.2 | Rated one minute power frequency withstand voltage at site condition | kV rms | 95 |  |
| 6.3.3 | Rated short circuit withstand current and its duration | kA/sec | 25/3 |  |
| 6.4 | Withstanding in load combinations of earthquake, wind, short circuit, as mentioned in Technical Specification? (Yes / No) | (Yes / No) | Yes |  |
| 6.5 | Maximum permissible temperature of conductors at rated current and Max. ambient temperature | °C | 80 Max |  |
| 6.6 | Minimum assumed tension for each stranded conductor at E.D.S condition | % of UTS | 3 |  |
| 6.7 | Minimum assumed tension for each stranded conductor of incoming and outgoing overhead lines (per phase ) | % of UTS | 20 |  |
| 6.8 | Minimum tension of incoming and outgoing shield wires | % of UTS | 10 |  |
| 6.9 | Maximum permissible surface gradient | kV/cm | 16 |  |
| 6.10 | Maximum permissible angle for incoming and outgoing overhead lines |  | ±30 |  |
| 6.11 | Ambient condition |  |  |  |
| 6.11.1 | Minimum ambient temperature |  | Acc. to section 1 |  |
| 6.11.2 | Maximum ambient temperature |  | Acc. to section 1 |  |
| 6.11.3 | Solar radiation |  | Acc. to section 1 |  |
| 6.11.4 | Seismic acceleration |  | Acc. to section 1 |  |
| 6.11.5 | Wind speed |  | Acc. to section 1 |  |
| 6.10.6 | Ice thickness |  | Acc. to section 1 |  |
| 6.12 | Solar radiation absorption coefficient (ϒ) |  | Acc. to section 1 |  |
| 6.13 | Emissivity coefficient in respect to black body (Ke) |  | 0.5 |  |
| 6.14 | Altitude above sea level | m | Acc. to section 1 |  |
|  | Stranded Conductors |  |  |  |
| 6.15 | Manufacturer |  |  |  |
| 6.16 | Place of manufacturing |  |  |  |
| 6.17 | Material and alloy type |  | AAAC/AAC (IEC 61089) |  |
| 6.18 | Nominal cross section | mm² | 921 (AAAC 800) |  |
| 6.19 | Number of strands |  | 61 |  |
| 6.20 | Overall diameter of conductor | mm | 39.42 |  |
| 6.21 | Ultimate strength of conductor | kN |  |  |
| 6.22 | Continuous current rating of conductor at max. ambient temperature and 80° conductor Temperature | A | 543@75 deg and 689@85 deg |  |
|  | Note: The stranded conductor size adequacy shall be determined by calculation. |  |  |  |
|  | Tubular Conductors |  |  |  |
| 6.23 | Manufacturer |  |  |  |
| 6.24 | Place of manufacturing |  |  |  |
| 6.25 | Material and alloy type |  | Aluminum alloy |  |
| 6.26 | Outside diameter | mm |  |  |
| 6.27 | Thickness | mm |  |  |
| 6.28 | Weight | kg/m |  |  |
| 6.29 | Max. deflection after installation | mm |  |  |
| 6.30 | Continuous current rating of conductor at max. ambient temperature at and tube Temperature 80 °C | A |  |  |
| 6.31 | Moment of inertia | cm |  |  |
| 6.32 | Minimum yield strength | kg/cm² |  |  |
|  | Note: The tubular conductor size adequacy shall be determined by calculation. |  |  |  |
|  | Shield wires |  |  |  |
| 6.33 | Manufacturer |  |  |  |
| 6.34 | Place of manufacturing |  |  |  |
| 6.35 | Material |  | Al clad steel |  |
| 6.36 | Cross section | mm² | 58.56 |  |
| 6.37 | Diameter | mm | 9.78 |  |
| 6.38 | Number of strands |  | 7 no.8 |  |
| 6.39 | Resistance (at 20 °C) | ohm/km | 1.463 |  |
| 6.40 | Ultimate strength | kN | 70.76 |  |
| 6.41 | Modulus of elasticity | kg/mm2 | 16000 |  |
| 6.42 | Coefficient of linier expansion | 1/°C | 13\* 10^(−6) |  |
| 6.43 | Aluminium coating thickness | μm |  |  |
|  | Connectors and Hardware |  |  |  |
| 6.44 | Manufacturer |  |  |  |
| 6.45 | Place of manufacturing |  |  |  |
| 6.46 | Material of connectors |  |  |  |
| 6.47 | Material of bolts and nuts |  |  |  |
| 6.48 | Material of washers |  |  |  |
| 6.49 | Applicable standard for connectors |  |  |  |
| 6.50 | Type of contact paste |  |  |  |
|  | Minimum Clearances (Not applicable for equipment subject to impulse voltage tests ) |  |  |  |
| 6.51 | Clearance between live parts and ground (Basic value ) | mm | 350 |  |
| 6.52 | Clearance between different phases in bays | mm | 1000 |  |
| 6.53 | Minimum Spacing between phases of rigid buses | mm | 1000 |  |
| 6.54 | Minimum height of energized parts above ground | mm | 2850 |  |
| 6.55 | Height of energized parts above access roads | mm | 7500 |  |
| 6.56 | Minimum Distance between over-span phases | mm | 1000 |  |
| 6.57 | Shield wire clearance over bus conductors | mm | 2000 |  |
|  | 33kV Insulators |  |  |  |
|  | General |  |  |  |
| 7.1 | Rated current | A |  |  |
| 7.1.1 | Trans feeders |  | Acc. to SLD |  |
| 7.1.2 | Busbars |  | Acc. to SLD |  |
| 7.1.3 | Diameter |  | N.A |  |
| 7.1.4 | Busbars |  | Acc. to SLD |  |
| 7.1.5 | Reactor feeders |  |  |  |
| 7.2 | Rated frequency | Hz | 50 |  |
| 7.3 | Rated voltage | kV | 36 |  |
| 7.2.1 | Basic insulation level of equipment at site condition | kV peak | 250 |  |
| 7.2.2 | Rated one minute power frequency withstand voltage at site condition | kV rms | 95 |  |
| 7.2.3 | Rated short circuit withstand current and its duration | kA/sec | 25/3 |  |
| 7.4 | Withstanding in load combinations of earthquake, wind, short circuit, as mentioned in Technical Specification? ( Yes / No) | ( Yes / No) | Yes |  |
| 7.5 | Maximum permissible temperature of conductors at rated current and Max. ambient temperature | °C | 80 |  |
| 7.6 | Maximum permissible surface gradient | kV/cm | 16 |  |
| 7.7 | Maximum permissible angle for incoming and outgoing overhead lines |  | ±30 |  |
| 7.8 | Ambient condition |  |  |  |
| 7.8.1 | Minimum ambient temperature |  | Acc. to section 1 |  |
| 7.8.2 | Maximum ambient temperature |  | Acc. to section 1 |  |
| 7.8.3 | Solar radiation |  | Acc. to section 1 |  |
| 7.8.4 | Seismic acceleration |  | Acc. to section 1 |  |
| 7.8.5 | Wind speed |  | Acc. to section 1 |  |
| 7.8.6 | Ice thickness |  | Acc. to section 1 |  |
| 7.8.7 | Solar radiation absorption coefficient (ϒ) |  | Acc. to section 1 |  |
| 7.8.8 | Emissivity coefficient in respect to black body (Ke) |  | 0.5 |  |
| 7.9 | Altitude above sea level | m | Acc. to section 1 |  |
| 7.10 | Manufacturer quality system in accordance with ISO 9000 | Yes / No | Yes |  |
| 7.10.1 | Date of issue |  | Latest |  |
| 7.10.2 | Validity |  |  |  |
| 7.10.3 | Certificate attached to the offer | Yes / No | Yes |  |
| 7.11 | Type test certificate to be issued by independent laboratory or independently witnessed type test certificate to be submitted | Yes / No | Yes |  |
| 7.11.1 | Certificate to be attached to the offer |  | Yes |  |
|  | String Insulators |  |  |  |
| 7.12 | Manufacturer |  |  |  |
| 7.13 | Place of manufacturing |  |  |  |
| 7.14 | Type designation |  | ball & socket |  |
| 7.15 | Applicable standard |  |  |  |
| 7.16 | Insulator material |  | Glazed porcelain |  |
| 7.17 | Color |  |  |  |
| 7.18 | Wet power frequency withstand voltage of each unit | kV | 95 |  |
| 7.19 | Lightning impulse withstand voltage of each unit | kV | 250 |  |
| 7.20 | Electromechanical failing load of each unit | kN | 120 |  |
| 7.21 | Puncture voltage of each unit | kV | 130 |  |
| 7.22 | Minimum creepage distance of each unit | mm | 295 |  |
| 7.23 | Total creepage distance of string | mm | 1256 |  |
| 7.24 | Nominal spacing | mm | 146 |  |
| 7.25 | Protected ( 90 ) creepage distance | mm |  |  |
| 7.26 | Size of ball and socket | mm |  |  |
| 7.27 | IEC coupling ball |  |  |  |
| 7.28 | Material of fittings |  |  |  |
| 7.29 | Minimum quantity of disks per string |  | 5 |  |
| 7.30 | Power frequency withstand voltage of complete String | kV rms |  |  |
| 7.30.1 | Dry |  | 95 |  |
| 7.30.2 | Wet |  |  |  |
| 7.31 | Basic Insulation level of complete string | KV peak |  |  |
| 7.31.1 | Positive |  | 250 |  |
| 7.31.2 | Negative |  |  |  |
| 7.32 | Max. R.I.V. at 1MHz as per CISPR no.1 | μ V |  |  |
| 7.33 | Overall length of string with accessories | mm |  |  |
| 7.34 | Ultimate tensile strength of string | kN |  |  |
| 7.35 | Total weight of string | kg |  |  |
| 7.36 | Whether arcing ring at ground side Provided? (Yes / No) | (Yes / No) | Yes |  |
| 7.37 | Whether corona ring at live side Provided? (Yes / No) | (Yes / No) | Yes |  |
| 7.38 | Arcing distance | mm |  |  |
| 7.39 | Whether washable in service? (Yes / No) | (Yes / No) | Yes |  |
|  | Note: The string insulator and each insulator size adequacy shall be determined by calculation. |  |  |  |
|  | String Insulator Accessories |  |  |  |
| 7.40 | Manufacturer |  |  |  |
| 7.41 | Place of manufacturing |  |  |  |
| 7.42 | Material |  |  |  |
| 7.43 | Applicable standard |  |  |  |
| 7.44 | Rated ultimate tensile strength | kN |  |  |
|  | Post Insulators |  |  |  |
| 7.45 | Manufacturer |  |  |  |
| 7.46 | Place of manufacturing |  |  |  |
| 7.47 | Type designation |  | Post type |  |
| 7.48 | Applicable standard |  |  |  |
| 7.49 | One minute power frequency withstand Voltage (at IEC condition ) | kV rms |  |  |
| 7.49.1 | Dry |  | 95 |  |
| 7.49.2 | Wet |  |  |  |
| 7.48 | Basic Insulation level (at IEC condition) | kV peak | 250 |  |
| 7.49 | Basic Insulation level (at site condition) | kV peak |  |  |
| 7.50 | Switching impulse withstand voltage | kV peak | - |  |
| 7.51 | Color |  |  |  |
| 7.52 | Insulator material |  | Ceramic/Polymer |  |
| 7.53 | Top metal fitting material |  |  |  |
| 7.54 | Bottom metal fitting material |  |  |  |
| 7.55 | Bonding material |  |  |  |
| 7.56 | Minimum creepage distance | mm | 1256 |  |
| 7.57 | Protected (90) creepage distance | mm |  |  |
| 7.58 | Maximum cantilever working load (complete post insulator) | kN |  |  |
| 7.59 | Minimum cantilever breaking load, upright (complete post insulator) | kN |  |  |
| 7.60 | Minimum torsion strength | kNm |  |  |
| 7.61 | Minimum compression strength | kN |  |  |
| 7.62 | Total height | mm |  |  |
| 7.63 | Arcing distance | mm |  |  |
| 7.64 | Fixing bolts |  |  |  |
| 7.64.1 | Quantity per post insulator |  |  |  |
| 7.64.2 | Diameter |  |  |  |
| 7.65 | Bolt circle diameter (Top / Bottom ) | mm |  |  |
| 7.66 | Total weight | kg |  |  |
| 7.67 | Maximum R.I.V. at 100 KHz | µv | 500 |  |
| 7.68 | Whether washable in service? ( Yes / No) |  |  |  |
| 7.69 | Maximum weight of one package ready for Shipment | kg |  |  |
| 7.70 | Whether corona ring at live side Provided? (Yes / No) |  | Yes |  |
| 7.71 | Number of units in complete post insulator |  |  |  |
| 7.72 | Length of each unit | mm |  |  |
|  | Note: The post insulator size adequacy shall be determined by calculation. |  |  |  |
|  | Connectors and Hardware |  |  |  |
| 7.73 | Manufacturer |  |  |  |
| 7.74 | Place of manufacturing |  |  |  |
| 7.75 | Material of connectors |  |  |  |
| 7.76 | Material of bolts and nuts |  |  |  |
| 7.77 | Material of washers |  |  |  |
| 7.78 | Applicable standard for connectors |  |  |  |
| 7.79 | Type of contact paste |  |  |  |
|  | Minimum Clearances (Not applicable for equipment subject to impulse voltage tests ) |  |  |  |
| 7.80 | Height of base of post insulator from ground | mm | 2500 |  |
| 7.81 | Clearance between live parts and ground (Basic value ) | mm | 350 |  |
| 7.82 | Minimum height of energized parts above ground | mm | 2850 |  |
| 7.83 | Height of energized parts above access roads | mm | 7500 |  |
|  | 33kV SURGE ARRESTERS |  |  |  |
|  | General |  |  |  |
| 8.1 | Manufacturer of surge arrester: |  |  |  |
| 8.1.1 | Name |  |  |  |
| 8.1.2 | Country |  |  |  |
| 8.2 | Manufacturer of surge counter: |  |  |  |
| 8.2.1 | Name |  |  |  |
| 8.2.2 | Country |  |  |  |
| 8.3 | Type designation for surge arresters |  |  |  |
| 8.4 | Type designation for surge counter (equipped with leakage current measuring device ) |  |  |  |
| 8.5 | Applicable standard |  | IEC 60099-4 |  |
| 8.6 | Rated frequency | Hz | 50 |  |
| 8.7 | Nominal line to line voltage rating | kV | 36 |  |
| 8.8 | Type |  | MOA |  |
| 8.9 | Class of surge arrester |  | Very Heavy |  |
| 8.10 | Maximum and Minimum ambient temperature for design | °C | Acc. to section 1 |  |
| 8.11 | Altitude above sea level | m | Acc. to section 1 |  |
| 8.12 | Design seismic acceleration | g | Acc. to section 1 |  |
| 8.13 | Ice thickness | mm | Acc. to section 1 |  |
| 8.14 | Wind velocity | m/s | Acc. to section 1 |  |
| 8.15 | Maximum overvoltage factor on the system due to any switching duty | pu | 2.3 |  |
| 8.16 | Whether withstanding in load combinations of earthquake , wind , short circuit, as mentioned In Technical Specification? | (Yes / No ) | Yes |  |
|  | Surge Arresters |  |  |  |
| 8.17 | Rated voltage | kV rms | 30 |  |
| 8.18 | Continuous operating voltage | kV rms | 24 |  |
| 8.19 | Long duration discharge class as per IEC 99-1 | Class | 2 |  |
| 8.20 | Number of phases |  | 3 |  |
| 8.21 | Type of system earthing |  | Effective |  |
| 8.22 | Nominal discharge current with 8/20 us wave | kA peak | 10 |  |
| 823 | Arrester designation |  | SL |  |
| 8.24 | Type of housing in the case of utilizing porcelain and its classification acc to Std. 60672 |  | Brown glazed Aluminum porcelain class C130 |  |
| 8.25 | Type of housing in the case of utilizing composite polymer and its resistance classification acc to IEC 60587 |  | Silicon rubber (LSR,HCR or RTV type) class 3.4 |  |
| 8.26 | Earth fault factor |  | 1.4 |  |
| 8.27 | Place of installation |  | Line/Transformer/GIS Feeders |  |
| 8.28 | Pressure relief class |  |  |  |
| 8.28.1 | High current 0.2 sec | kA | 50 |  |
| 8.28.2 | Low current 1 sec |  | 600±200 |  |
| 8.29 | Thermal energy rating (Wth) | (kJ / kV) of  U rated | > 10 |  |
| 8.30 | Repetitive charge transfer rating (Qrs) | C | > 2.4 |  |
| 8.31 | Reference voltage | kV rms |  |  |
| 8.32 | Reference current | mA |  |  |
| 8.33 | TOV capability for |  |  |  |
| 8.33.1 | 1 sec | kV | Acc. to IEC 60099-3 |  |
| 8.33.2 | 10 sec | kV | Acc. to IEC 60099-3 |  |
| 8.34 | Continuous current under ambient temperature | mA |  |  |
| 8.35 | Maximum residual voltage for lightning impulse current with 8/20 microsecond wave for following impulse peaks |  |  |  |
| 8.35.1 | Switching surges-1kA/2kA | kV peak | Acc. to IEC 60099-3 |  |
| 8.35.2 | 5 KA | kV peak | Acc. to IEC 60099-3 |  |
| 8.35.3 | 10 KA | kV peak | Acc. to IEC 60099-3 |  |
| 8.35.4 | 20 KA | kV peak | Acc. to IEC 60099-3 |  |
| 8.36 | Maximum residual voltage for switching impulse current with 30/60 microsecond wave for following impulse peaks |  |  |  |
| 8.36.1 | 500 A | kV peak | Acc. to IEC 60099-3 |  |
| 8.36.2 | 1 KA | kV peak | Acc. to IEC 60099-3 |  |
| 8.36.3 | 2 KA | kV peak | Acc. to IEC 60099-3 |  |
| 8.37 | Maximum residual voltage for steep current impulse with 1/20 microsecond wave and 10 KA peak | kV peak |  |  |
| 8.38 | High current 4/10 microsecond impulse withstand level | kA peak | Acc. to IEC 60099-3 |  |
| 8.39 | Low current 2000 microsecond withstand level | kA peak | Acc. to IEC 60099-3 |  |
| 8.40 | Number of arrester units |  |  |  |
| 8.41 | Rated voltage of each arrester unit | kV rms |  |  |
| 8.42 | Number of parallel non linear MO resistance block |  | 1 |  |
| 8.43 | Power frequency voltage versustime characteristics included? | (Yes/No) |  |  |
| 8.44 | Maximum internal partial discharge | pC | Acc. to IEC 60099 |  |
| 8.45 | Manufacturer quality system in accordance with ISO 9000 | Yes/No | Yes |  |
| 8.45.1 | Date of issue |  | Latest |  |
| 8.45.2 | Validity |  |  |  |
| 8.45.3 | Certificate attached to the offer | Yes/No | Yes |  |
| 8.46 | Type test certificate to be issued by independent laboratory or independently witnessed type test certificate to be submitted | Yes/No | Yes |  |
| 8.46.1 | Certificate to be attached to the offer | Yes/No | Yes |  |
| 8.46.2 | Report to be attached to the offer | Yes/No | Yes |  |
|  | Miscellaneous |  |  |  |
| 8.47 | Insulator |  |  |  |
| 8.47.1 | Manufacturer |  |  |  |
| 8.47.2 | Country |  |  |  |
| 8.47.3 | Type |  |  |  |
| 8.47.4 | Material |  |  |  |
| 8.48 | Creepage distance of insulator | mm | 1256 |  |
| 8.49 | Basic insulation level of insulator at site condition | kV peak | 1.3\*LIPL |  |
| 8.50 | One minute power frequency withstand voltage of insulator at site condition | kV rms | 1.06\*SIWL/ √2 |  |
| 8.51 | Switching Impulse withstand voltage of insulator at site condition | kV peak | 1.25\*SIWL |  |
| 8.52 | Filling medium |  |  |  |
| 8.53 | Method used for sealing test |  |  |  |
| 8.54 | Whether washable in service (Yes/ No) | (Yes/ No) | Yes |  |
| 8.55 | Permissible force at MV terminals |  |  |  |
| 8.55.1 | Static Horizontal | N |  |  |
| 8.55.2 | Static Vertical | N |  |  |
| 8.55.3 | Dynamic Horizontal | N |  |  |
| 8.55.4 | Dynamic vertical | N |  |  |
| 8.56 | Whether isolating pads for surge arresters with surge counter provided? (Yes/No) | (Yes/ No) | Yes, separated |  |
| 8.57 | Non Linear MO resistor |  |  |  |
| 8.57.1 | Manufacturer |  |  |  |
| 8.57.2 | Country |  |  |  |
| 8.57.3 | Type |  |  |  |
| 8.58 | Dimension of each non-linear MO resistance block |  |  |  |
| 8.58.1 | Diameter | mm |  |  |
| 8.58.2 | Height | mm |  |  |
| 8.59 | Total weight of single unit | kg |  |  |
| 8.60 | Total weight of complete surge arrester | kg |  |  |
| 8.61 | Total height of surge arrester | mm |  |  |
| 8.62 | Total width of surge arrester | mm |  |  |
| 8.63 | Whether grading ring for high voltage terminal required? | (Yes/ No) | Yes |  |
| 8.64 | Maximum Package weight ready for shipment | kg |  |  |