

**Laboratory** Ultra High Voltage Research Laboratory, Central Power Research Institute, Medipally PO, Hyderabad, Telangana

**Accreditation Standard** ISO/IEC 17025: 2005

**Certificate Number** TC-6198 (in lieu of T-0098)

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

**ELECTRICAL TESTING**

| I. | <b>SWITCHGEAR EQUIPMENT</b>   |  |  |   |
|----|---|--|--|---|
| 1. | <b>High Voltage switchgear &amp; control gear and AB switches ratings upto 1200 kV system</b> | Lightning Impulse voltage                                    | IEC 62271- 102 (Cl.6.2)<br>IEC 62271-1 (Cl.6.2)  | 25 kV <sub>p</sub> to 4200 kV <sub>p</sub>    |
|    |   | Switching impulse voltage test (Dry & Wet )                  | IEC 62271-203 (Cl.6.2)<br>IS 9921 (Part-1) (Cl. 4.5) (Part-2, 3 & 4) (Cl. 3.1)<br>IS 9920,Part 1 (Cl.6.2)<br>IS 9920, Part 2<br>IS 9920, Part 3 (Cl.6.2)<br>IS 9920, Part 4 (Cl.3.1)                         | 100 kV <sub>p</sub> to 3200 kV <sub>p</sub>   |
|    |   | Power frequency voltage (Dry & Wet)                          | IEC 62271-1 (Cl.6.2)<br>IEC 62271-100 (Cl.6.2)<br>IEC 62271-102 (Cl.6.2)<br>IEC 62271-200 (Cl.6.2)<br>IEC 62271-203 (Cl.6.2)<br>IS 9920 (Part 4) (Cl.3.1)<br>IS 9921 (Part 4) (Cl.3.1)                       | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
|    |   | (EMC) Radio Interference voltage                             | IEC 62271-1 (Cl.6.3 & 6.9)<br>IEC 62271-100 (Cl.6.3&6.9)<br>IEC 62271-102 (Cl.6.3&6.9)<br>IEC 62271-200 (Cl.6.3&6.9)<br>IEC 62271-203 (Cl.6.3&6.9)<br>IS 9921 (Part 4) (Cl.3.8)<br>IS 9920 (Part 4) (Cl.3.1) | 100 μV to 1 V                                 |
|    |   | Mechanical Endurance   | IEC 62271-200 (Cl.7.102)<br>IS 9921 (Part 4) (Cl.3.5)<br>IS 9920 (Part -4) (Cl.3.5)  | Qualitative                                   |
|    |   | Corona inception and extinction voltage<br>Visible discharge | SOP 1 /SOP 2 (Issue No 01 dated: 04.09.2015)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |

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|-----|--|---|--|---|
|     |  | Artificial pollution by Salt-fog method on insulators up to 800 kV System | IEC 60507 (Cl. 5.0)<br>IS 8704 (Sec. 3.0)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
| 2.  | Alternating current circuit breakers ratings upto 1200 kV system | Lightning Impulse voltage   | IEC 62271-100<br>IEC 62271-200   | 25 kVp to 4200 kVp                            |
|     |  | Switching impulse voltage (Dry & Wet )                                    | IEC 62271-203<br>IEC 62271-1 (Cl.6.2)<br>IS 12729 (Cl.6)<br>IS 13118 (Cl.8)  | 100 kVp to 3200 kVp                           |
|     |  | Power frequency voltage test (Dry & Wet)                                  | IEC 62271-1 (Cl.6.2),<br>IEC 62271-100, (Cl.6.2)<br>IEC 62271-200(Cl.6.2)<br>IEC 62271-203 (Cl.6.2)<br>IS 13118 (Cl.6.1)<br>IS 12729 (Cl.6.2)                        | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
|     |  | (EMC) Radio Interference voltage  | IEC 62271-1 (Cl.6.3 & 6.9)<br>IEC 62271-100 (Cl.6.3&6.9)<br>IEC 62271-200 (Cl.6.3&6.9)<br>IEC 62271-203 (Cl.6.3&6.9)<br>IS 13118 (Cl.6.1)<br>IS 12729 (Cl.6.2 & 6.3) | 100 μV to 1 V                                 |
|     |  | Corona inception and extinction voltage                                   | SOP 1 /SOP 2 (Issue No 01 dated: 04.09.2015)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
|     |  | Visible discharge   |  |   |
|     |  | Artificial pollution by Salt-fog method on insulators up to 800 kV System | IEC 60507 (Cl. 5.0)<br>IS 8704 (Sec.3.0)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |

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|-----|--|---|--|---|
| II. | <b>INDUCTORS AND TRANSFORMERS</b>                            |   |  |   |
| 1.  | <b>Reactors up to 1200 kV system</b>                         | Lightning impulse voltage withstand               | IEC 60076-4 (Cl.8)<br>IS 5553 (Part-1 to 4) (Cl.9.0)<br>IS 5553 (Part-5) (Cl.5.0),<br>IS 5553 (Part-6 & Part 7) (Cl.8.0)<br>IS 5553 (Part-8) (Cl.7.0)  | 25 kVp to 4200 kVp                            |
| 2.  | <b>Combined Instrument Transformer (upto 1200 kV system)</b> | Lightning Impulse voltage                         | IEEE C57.13 (Cl.7)<br>IEC 61869-1 (Cl.7.2 & 7.4)<br>IEC 61869-2 (Cl.7.2 & 7.4)<br>IEC 61869-3 (Cl.7.2 & 7.4)<br>IS 2705 Part-1 (Cl.9.1)<br>IS 2705 Part-2<br>IS 2705 Part-3, (Cl.9.1)<br>IS 3156 Part-I to IV (Cl.9) | 25 kVp to 4200 kVp                            |
|     |  | Power frequency voltage (Dry & Wet)               | IS 2705 (Part 1) (Cl.9.1)<br>IS 3156 (Part 1) to IS 3156 (Part 4) (Cl.9)<br>IEC 61869-1 (Cl.7.2 & 7.3)<br>IEC 61869-2 (Cl.7.2 & 7.3)<br>IEC 61869-3 (Cl.7.2 & 7.3)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
| 3.  | <b>Current Transformer (Upto 1200 kV system)</b>             | Accuracy  | IEC 61869-2 (Cl. 7.2.6 & Cl. 7.3.5)<br>IS 2705 (Part-2) (Cl. 7.0)<br>IS 2705 (Part-3) (Cl. 7.0)  | 0.1 Class and above (100 A to 5 kA)           |
|     |  | Temperature rise                                  | IEC 61869-2 (Cl. 7.2.2)<br>IS 2705 (Part-1) (Cl. 9.7)  | 1 °C to 75 °C                                 |
|     |  | Enclosure tightness at ambient temperature        | IEC 61869 -1 (Cl. 7.2.8 & Cl. 7.3.7)   | Qualitative                                   |
|     |  | Lightning impulse voltage test on primary winding |  | 25 kVp to 4200 kVp                            |

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|     |                            | Chopped Lightning impulse voltage test on primary winding                              | IS 2705 (Part-1)<br>IS 2705 (Part-2)<br>IS 2705 (Part-3) (Cl.9)                              | 100 kVp to 3200 kVp                                 |
|     |                            | Measurement of transmitted over voltage  | IEC 61869-1<br>IEC 61869-2 (Cl.7)  | 100 Vp to 250 Vp                                    |
|     |                            | Switching impulse voltage withstand test on primary winding (Dry & Wet)                |  | 100 kVp to 3200 kVp                                 |
|     |                            | Chopped wave test/Fast transient test  |  | 25 kVp to 4200 kVp                                  |
|     |                            | High voltage Wet power frequency voltage withstand test for outdoor transformers (RIV) | IEC 61869-1<br>IEC 61869-2 (Cl.7.2.4)<br>IS 2705 (Part 1) (Cl.9.1)                           | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
|     |                            |  | IEC 61869-1<br>IEC 61869-2 (Cl.7.2.5)  | 100 μV to 1 V                                       |
|     |                            | High voltage Power frequency withstand test on primary winding                         | IEC 61869-1<br>IEC 61869-2 (Cl.7.3)<br>IS 2705 (Part 1) (Cl.9.1)                             | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
|     |                            | High voltage Power frequency withstand test on secondary wdg.                          | IS 2705 (Part-1) (Cl. 9.1)<br>IEC 61869-2 (Cl. 7.3)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
|     |                            | Over voltage inter turn  | IEC 61869-2 (Cl. 7.3.204)<br>IS 2705 (Part-2) (Cl. 9.5)                                      | Upto 10 kV <sub>rms</sub><br>Up to 5 A              |
|     |                            | Measurement of capacitance and dielectric dissipation factor                           | IEC 61869-1<br>IEC 61869-2 (Cl.7.4.3)<br>IS 2705 (Part 1) (Cl.9.1.3)<br>IEC 60358-1 (Cl.9.2) | 0.01 pF to 75 nF<br>Tan δ 1×10 <sup>-4</sup> to 100 |
|     |                            | Corona Test  | SOP 1/ SOP 2 (Issue No 01 dated : 04.09.2015)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |

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|-----|--|--|--|---|
|     |  | Verification of marking and polarity   | IEC 61869-2 (Cl.7.3.6)   | Qualitative                                   |
| 4.  | Voltage Transformer and capacitor voltage transformers (Upto 1200 kV system) | Accuracy   | IS 3156 (Part-2), (Cl. 8.1.1 & Cl. 8.2.1)<br>IS 3156 (Part-3) (Cl. 10)<br>IEC 61869 (Part-3) (Cl. 7.3.5 & Cl. 7.2.6) | 0.1 class and above (5kVrms to 1200 kVrms)    |
|     |  | Temperature rise   | IEC 61869- 1, 3 & 5 (Cl. 7.2.2)<br>IS 3156 (Part-1)<br>IS 3156 (Part-2) (Cl. 9.1)<br>IS 3156 (Part-4) (Cl. 9.2)      | 1 °C to 75 °C (Temp rise)                     |
|     |  | High voltage Wet power frequency voltage withstand test for outdoor transformers | IEC 61869-1<br>IEC 61869- 1, 3 & 5 (Cl.7.2.4)<br>IS 3156 (Part 1) (Cl.9.1)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
|     |  | RIV test   | IEC 61869-1<br>IEC 61869-3 & 5 (Cl.7.2.5)  | 100 µV to 1 V                                 |
|     |  | Enclosure tightness test at ambient temperature                                  | IEC 61869-1, 3 & 5 (Cl. 7.2.8 & Cl. 7.3.7)   | Qualitative                                   |
|     |  | Short circuit withstand capability test (except PD measurement)                  | IEC 61869-3 & 5 (Cl.7.2.301 & 7.2.502)<br>IS 3156 (Part 1) (Cl.7.3 & 9.9)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
|     |  | Verification of terminal marking and polarity                                    | IEC 61869 -1, 3 & 5 (Cl. 7.3.6)<br>IS 3156 (Part-1) (Cl. 9.2)  | Qualitative                                   |
|     |  | High voltage Power frequency voltage withstand test on primary terminals         | IEC 61869-3 & 5 (Cl.7.3.1)<br>IS 3156 (Part 1) (Cl.9.1)  |   |

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|     |                            | High voltage Power frequency voltage withstand test on secondary terminals   | IEC 61869-1<br>IEC 61869-3 & 5 (Cl.7.3.4)<br>IS 3156 (Part 1) (Cl.9.1 & 9.4)                      | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>   |
|     |                            | Measurement of capacitance and dielectric dissipation factor test  | IEC 61869-1<br>IEC 61869-3 & 5 (Cl.7.4.3 & 7.2.501)<br>IEC 60358-1 (Cl.9.2)                       | 0.01 pF to 75 nF<br>Tan δ 1×10 <sup>-4</sup> to 100   |
|     |                            | Corona Test  | SOP 1/ SOP 2 (Issue No 01 dated: 04.09.2015)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>   |
|     |                            | Chopped Lightning impulse voltage test on primary winding  | IEC 61869-1 (Cl.7)  | 25 kVp to 4200 kVp  |
|     |                            | Switching impulse voltage withstand test on primary winding (Dry & Wet)  | IEC 61869-3 (Cl.7)<br>IEC 61869-5 (Cl.7).<br>IS 3156 (Part-I to IV) (Cl.9)<br>IEC 60358-1 (Cl.10) | 100 kVp to 3200 kVp   |
|     |                            | Measurement of transmitted over voltage  |   | 100 Vp to 300 Vp  |
|     |                            | Lightning impulse voltage test on primary winding  |   | 25 kVp to 4200 kVp  |
|     |                            | Measurement of High frequency capacitance & Equivalent series resistance measurement<br>Measurement of stray capacitance and conductance measurement | IEC 60358 (Cl. 9, 11 & 12)<br>IS 9348 (Cl. 9)   | HFC: 20 pF to 20 nF<br>ESR: 0.2Ω to 200 Ω<br>Stray C: 2 pF to 1 nF<br>Stray conductance: 0.2 μS to 200 mS |
|     |                            | Ferro-resonance  | IEC 61869-5 (Cl.7.2.503)<br>IS 3156 (Part 4) (Cl.9.2.3)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>   |

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|------|---|--|---|---|
|      |   | Transient response   | IEC 61869-5 (Cl.7.2.504)<br>IS 3156 (Part 4) (Cl.9.2.4)   | 2 kV <sub>rms</sub> to 30 kV <sub>rms</sub>         |
| 5.   | Power, Distribution, traction and auto transformers Upto 1200 kV system | Separate source voltage withstand  | IS 2026 (Part 3) (Cl.10)<br>IEC 60076-3<br>IEC 60076-11 (Cl.11)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
|      |   | capacitance and dielectric dissipation factor (Tan δ)                    | IEC 60076-1 (Cl.10.1.3)<br>IEC 60358-1 (Cl.9.2)   | 0.01 pF to 75 nF<br>Tan δ 1×10 <sup>-4</sup> to 100 |
|      |   | Lightning impulse voltage withstand test (dry)<br>Chopped lightning test | IS 2026 (Part-3) (Cl.13&14)<br>IS 11171 (Cl.16)<br>IEC 60076-3 (Cl.13)<br>IEC 60076-11 (Cl.13)<br>IEC 60310-1<br>BS 171 (Part III)<br>ANSI C-57.12.00, (Cl.5.10)<br>ANSI:C.57.12.90 (Cl.10) | 25 kVp to 4200 kVp                                  |
|      |   | Transfer Surge   | IEC 60076-3 (Cl B.2)  | 25 kVp to 4200 kVp                                  |
| III. | <b>TRANSMISSION LINE EQUIPMENT AND LINE ACCESSORIES</b>                 |  |   |   |
| 1.   | Hollow insulator, post insulator (Indoor /outdoor) up to 1200 kV system | Lightning Impulse voltage withstand                                      | IEC 60168 (Cl.4)<br>IS 5621 (Cl.3.1)  | 25 kVp to 4200 kVp                                  |
|      |   | Switching impulse voltage withstand (Dry & Wet)                          | IS 5350 (Part-1) (Cl.6.3)<br>IS 5350 (Part-2) (Cl.7.3)<br>IS 5350 (Part-3) (Cl.7.3)   | 100 kVp to 3200 kVp                                 |
|      |   | Dry or wet power frequency voltage withstand test or flashover           | IEC 60168 (Cl.4)<br>IS 5350 (Part 1) (Cl.2)<br>IS 5350 (Part 2) (Cl.2)<br>IS 5350 (Part 3) (Cl.2)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
| 2.   | HV Fuses (Horn gap) upto 33 kV system                                   | Lightning impulse voltage Dry  | IEC 60282-1&2 (Cl.6 & 8.4)<br>IS 9385 (Part-II) (Cl.7.3)<br>ANSI C37.41 (Cl.5)<br>IEC 60282-1 (Cl.6.4)<br>IEC 60282-2 (Cl.8.4)  | 25 kVp to 4200 kVp                                  |

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|     |  | Power frequency voltage (Dry & Wet)                 | IEEE C37.40 (Cl.4)<br>IS 9385 (Part 2) (Cl.7.3)<br>IEC 60282-1 (Cl.6.4)<br>IEC 60282-2 (Cl.8.4)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
| 3.  | <b>Porcelain insulators for overhead power lines with nominal voltage greater than 1000 V,</b><br><br><b>Insulator string, post insulators, solid core insulator, composite insulators, pin insulator, polycrystalline housing upto 1200 kV system</b> | Visual examination verification of dimensions       | IEC 60168 (Cl.5.)<br>IEC 60383-1 (Cl.17)<br>IEC 61109 (Cl.12 & 13)<br>IEC 62217 (Cl.9)<br>IEC 62231 (Cl.9)<br>IS 2544 (Cl.9.1.1)<br>IS 731 (Cl.10.1.1)<br>IS 1445 (Cl.7.1) | 100 mm to 15000 mm                            |
|     |  | Visible discharge                                   | IS 2544 (Cl.9.1.1)<br>IS 731 (Cl.10.1.1)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
|     |  | Dry Power frequency voltage withstand and flashover | IS 1445 (Cl.7.6)<br>IS 2544 (Cl.9.4)<br>IEC 60168 (Cl.4)<br>IEC 62217 (Cl.9)<br>IEC 62231 (Cl.9)   | 5 kV <sub>rms</sub> to 1200 kV rms            |
|     |  | Wet Power frequency voltage withstand and flashover | IS 1445 (Cl.7.7)<br>IS 2544 (Cl.9.5)<br>IS 731 (Cl.10.1.1)<br>IEC 60168 (Cl.4)<br>IEC 61109 (Cl.11.1)<br>IEC 60383-1 (Cl.3)<br>IEC 60383-2 (Cl.3)                          |   |
|     |  | Voltage distribution                                | SOP 5 (Issue No 01 dated: 04.09.2015)  |   |
|     |  | Power frequency puncture                            | IS 1445 (Cl.7.10)<br>IS 2544 (Cl.9.9)<br>IS 731 (Cl.10.1.1)<br>IEC 60383-1 (Cl.3)<br>IEC 60168 (Cl.4)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |

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|     |   | Corona inception and extinction voltage                                      | SOP 1/ SOP 2 (Issue No 01 dated: 04.09.2015)  |   |
|     |   | Lightning impulse voltage withstands (dry) and 50% impulse voltage flashover | IEC 60168 (Cl.4)<br>IEC 60383-1 Cl.3)<br>IEC 60383-2 (Cl.3)<br>IEC 62231 (Cl.7)     | 25 kVp to 4200 kVp                            |
|     |   | Switching impulse voltage withstand (dry & wet)                              | IEC 61109 (Cl.11)<br>IEC 60433 (Cl.4)<br>IS 2544 (Cl.9)<br>IS 731<br>IS 1445 (Cl.7) | 100 kVp to 3200 kVp                           |
|     |   | Artificial pollution test by Salt-fog method                                 | IEC 60507 (Cl. 5.0)<br>IS 8704 (Sec.3.0)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
| 4.  | High voltage insulators upto 1200 kV system                       | Radio interference voltage   | IEC 60437   | 100 μV to 1 V                                 |
| 5.  | Surge arrester for alternating current system upto 1200 kV system | Power frequency voltage withstand of arrester housing (Dry and Wet)          | IEC 60099-4 (Cl.11.8)<br>IS 3070 (Part-3) (Cl.6.2)                                  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
|     |   | RIV  | IEC 60099-4 (Cl.8.14)   | 100 μV to 1 V                                 |
|     |   | Corona   | SOP 1/ SOP 2 (Issue No 01 dated: 04.09.2015)  | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub> |
|     |   | Lightning impulse voltage on arrester housing (Dry)                          | IEC 60099-4 (Cl.8.2).<br>IS 3070 (Part-III) (Cl.7)                                  | 25 kVp to 4200 kVp                            |
|     |   | Switching impulse voltage test on arrester housing (Dry & wet)               |   | 100 kVp to 3200 kVp                           |
|     |   | Contamination/ Pollution on Lightning Arrester                               | ANSI/IEEE C62.11 (Cl. 8.8)<br>IS 3070 (Part-3) (Annex J)                            | 5 kV rms to 1200 kV rms                       |

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| 6.  | Bushings for alternating voltage upto 1200 kV system   | Power frequency voltage withstand (Dry and Wet)                             | IEC 60137 (Cl.8)<br>IS 2099 (Cl.11.2)<br>IEEE C57.19.01 (Cl.4)<br>IEEE C57.19.100<br>IEEE C57.19.00    | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
|     |  | EMC (RIV)   | IEC 60137 (Cl.8.6)   | 100 μV to 1 V                                       |
|     |  | Capacitance and Dissipation factor at ambient temperature                   | IEC 60137 (Cl.9.1)<br>IS 2099 (Cl.11.12)<br>IEEE C57.19.01 (Cl.4)<br>IEEE C57.19.100<br>IEEE C57.19.00 | 0.01 pF to 75 nF<br>Tan δ 1×10 <sup>-4</sup> to 100 |
|     |  | Corona  | SOP 1/ SOP 2 (Issue No 01 dated: 04.09.2015)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
|     |  | Lightning impulse voltage withstand (dry) and 50% impulse voltage flashover | IEC 60137 (Cl.8).<br>IS 2099 (Cl.11)<br>IEEE C 57.19.01 (Cl.4)   | 25 kVp to 4200 kVp                                  |
|     |  | Switching impulse voltage withstand (Dry & wet)                             |  | 100 kVp to 3200 kVp                                 |
|     | Artificial pollution by Salt-fog method  | IEC:60507 (Cl. 5.0)<br>IS: 8704 (Sec.3.0)                                   | 5 kV rms to 1200 kV rms  |   |
| 7.  | Aluminium conductor for overhead transmission lines, connectors and clamps upto 1200 kV system | Radio interference voltage  | IS 398 (Part 5) (Cl.13.1.1)<br>IEC 60437<br>IEC 61284 (Cl.14)  | 100 μV to 1 V                                       |
|     |  | Corona inception and extinction voltage                                     | SOP 1/ SOP 2 (Issue No 01 dated: 04.09.2015)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
| 8.  | On-load tap changers and Tap Changer   | Power frequency voltage   | IS 8468 (Cl.8.10)<br>IEC 60214 -1 (Cl.5.2.6)   | 5 kV <sub>rms</sub> to 1200 kV <sub>rms</sub>       |
|     |  | Lightning impulse voltage withstand   | IS 8468 (Cl.4.0).<br>IEC 60214 (Cl.7.2).   | 25 kVp to 4200 kVp                                  |

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| Sl. | Product / Material of Test  | Specific Test Performed  | Test Method Specification against which tests are performed | Range of Testing / Limits of Detection                                    |  |
|-----|---|--|---|---|--|
| 9.  | Coupling Capacitors & Dividers upto 1200 kV system  | Radio interference voltage   | IEC 60358-1 (Cl.6.3)<br>IS 9348 (Cl.10.3)                   | 100 $\mu$ V to 1 V  |  |
|     |   | capacitance and dielectric dissipation factor (Tan $\delta$ )                    | IEC 60358-1<br>IS 9348 (Cl.9.2)                             | Capacitance<br>0.01 pF to 75 nF<br>Tan $\delta$ $1 \times 10^{-4}$ to 100 |  |
|     |   | Lightning impulse voltage  | IEC 60358 (Cl.9)<br>IS 9348 (Cl.9)                          | 25 kVp to 4200 kVp  |  |
|     |   | Switching impulse voltage withstand test (Dry & Wet)                             | IEC 61869-5 (Cl.12)   | 100 kVp to 3200 kVp   |  |
|     |   | Discharge  |   |   |  |
|     |   | High frequency capacitance and ESR   | IEC 60358 (Cl.11 & 12)<br>IS 9348 (Cl.11)                   | HFC: 20 pF to 20 nF<br>ESR: 0.2 $\Omega$ to 200 $\Omega$                  |  |
|     |   | Stray capacitance and conductance  | IEC 61869-5 (Cl.12)   | Stray C: 2 pF to 1 nF<br>Stray conductance: 0.2 $\mu$ S to 200 mS         |  |
| 10. | Insulators (Polymeric, Porcelain, Glass based, Epoxy, Fiber glass, insulating materials) valves, Disconnectors, Circuit Breakers, Conductors, Power Connectors & Line accessories upto 800 kV DC System | Dry DC voltage withstand and flashover<br>Wet DC voltage withstand and flashover | IEC 61325 (Cl.15),<br>IEC 60060-1 (Cl.5.3)                  | $\pm$ 8 kV to $\pm$ 1200 kV DC  |  |
|     |   | Dry DC voltage long duration withstand<br>Wet DC voltage long duration withstand | IEC 60060-1 (Cl.4 &5)                                       | $\pm$ 8 kV to $\pm$ 1200 kV DC  |  |
|     |   | RIV  | IEC 60437<br>IEC 61284 (Cl.14)<br>CISPR 18-2                | 100 $\mu$ V to 1 V  |  |
|     |   | Corona   | SOP3/SOP4 (Issue No 01 dated: 04.09.2015)                   | $\pm$ 8 kV to $\pm$ 1200 kV DC  |  |
|     |   | Lightning impulse voltage  | IEC 61325 (Cl.15)<br>IEC 60060-1 (Cl. 4 & 5)                | 25 kVp to 4200 kVp  |  |
|     |   | Dry and Wet switching impulse voltage  |   | 100 kVp to 3200 kVp   |  |
|     |   |  |   |   |  |
|     |   |  |   |   |  |