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1. **GENERAL DATA AND INFORMATION:**

Project no: Contractor no

Circuit: Manufacturer:

Cable size Rated voltage

Route length: Rated current:

Cable type: Test date:

1. **MECHANICAL CHECKS & VISUAL INSPECTION:**

As per TCS – P – 105, Rev – 01Item no 3.20.1., 3.22.1.

|  |  |  |  |
| --- | --- | --- | --- |
| Item | Description | Checked | |
| 1 | Inspect For Physical Damage or Defects | ❑Yes | ❑N/A |
| 2 | Verify all cable connections as per drawing | ❑Yes | ❑N/A |
| 3 | Check all cables and cores are labeled correctly | ❑Yes | ❑N/A |
| 4 | Check tightness of terminals and confirm the cables are secured | ❑Yes | ❑N/A |
| 5 | Check cable size against rating required | ❑Yes | ❑N/A |
| 6 | Check cable entry path trench or ducts are to be properly sealed | ❑Yes | ❑N/A |
| 7 | Check for proper cable support ,clamping trays, blocking | ❑Yes | ❑N/A |
| 8 | Check cable bends to ensure that the bending radius is equal to or greater than that specified | ❑Yes | ❑N/A |
| 9 | Visual inspection, size and rating confirmation | ❑Yes | ❑N/A |
| 10 | Check that phases are identified and color  Coded | ❑Yes | ❑N/A |
| 11 | Check tightness of all bolted connections (torque wrench method) | ❑Yes | ❑N/A |
| 12 | Link Box tightness check | ❑Yes | ❑N/A |
| 13 | Check / inspect the cable outer jacket for any physical damage or irregularities | ❑Yes | ❑N/A |
| 14 | Check / inspect the transposition of cable phases | ❑Yes | ❑N/A |
| 15 | Check for the cross connection of cable metallic sheath in cross bonding system | ❑Yes | ❑N/A |
| 16 | Check the rubber seals in the cable clamp to avoid any damage to cable outer jacket | ❑Yes | ❑N/A |
| 17 | Single core cable connected between power Transformer and switchgear shall be single point earthed at switchgear side and at floating side SVL (Sheath voltage Limiter) | ❑Yes | ❑N/A |
| 18 | Check that all ground points are securely connected to ground grid as specified | ❑Yes | ❑N/A |
| 19 | Verify that shields are terminated as specified (through Link Box or directly grounded) | ❑Yes | ❑N/A |
| 20 | For accessories (sealing termination, instrument panels and Link Boxes), check the following as applicable.  1.Name plate installed and data is correct  2.condition of paint work  3.All bolted connections | ❑Yes | ❑N/A |
| 21 | Check irregularities of outer jacket formed by non uniform shield wire distribution. | ❑Yes | ❑N/A |

1. **ELECTRICAL TESTS:**

As per TCS – P – 105, Rev – 01Item no 3.20.2., 3.22.2.

* 1. **CONDUCTOR PHASING AND CONTINUITY CHECK:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Phase | Red | | Yellow | | Blue | |
| Phasing  Check | At far end | Result | At far end | Result | At far end | Result |
| Red -Earthed |  | Red – Open |  | Red – Open |  |
| Yellow- Open |  | Yellow -Earthed |  | Yellow - Open |  |
| Blue – Open |  | Blue – Open |  | Blue – Earthed |  |

Criteria**:**

* 1. **OUTER JACKET INTEGRITY TEST:**

|  |  |  |  |
| --- | --- | --- | --- |
| Test | Red | Yellow | Blue |
| Shield IR at 5 K.V. for 1 Min |  |  |  |
| Jacket Test at 10 K.V. for 1Min |  |  |  |
| Shield IR at 5 K.V. for 1 Min |  |  |  |

Criteria:

* 1. **CONDUCTOR CAPACITANCE TEST:**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Test | Red | | Yellow | | Blue | |
| Capacitance | µf | µf / Km | µf | µf / Km | µf | µf / Km |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Criteria:

* 1. **CONDUCTOR RESISTANCE TEST:**

Conductor size:

Conductor material:

Air temperature: ºc

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Phase | Measured value = Rt ºC | | Ambient temperature | Recalculated values for 20 ºc = R | |
| (Ω) | (Ω / km) | (ºC) | (Ω) | (Ω / km) |
| Red |  |  |  |  |  |
| Yellow |  |  |  |  |  |
| Blue |  |  |  |  |  |

Recalculated = R 20 ºC = Rt ºC \* 1 / 1 + 0.00393 (t - 20) Ω

Criteria:

* 1. **CONDUCTOR INSULATION RESISTANCE TEST:**

|  |  |  |  |
| --- | --- | --- | --- |
| Test | Insulation Resistance for 1Min at 5 KV | | |
| Red | Yellow | Blue |
| Conductor |  |  |  |

Criteria:

* 1. Sheath voltage Limiter Insulation Resistance:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Joint bay number | Link box serial no | SVL insulation resistance for 1min at 2.5 k.V... | | |
| Red | Yellow | Blue |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |
|  |  |  |  |  |

Criteria:

* 1. **LINK BOX GROUND RESISTANCE MEASUREMENT:**

|  |  |  |  |
| --- | --- | --- | --- |
| Joint bay number | Link box serial no | Link box type | Earth resistance |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

Criteria:

* 1. **LINK BOX CONTACT RESISTANCE TEST:**

Link Box Location: Link Box Type:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Location | Link Box Type | | | | |
| Contact face | Resistance (µΩ) | Contact face | Resistance  (µΩ) | Contact face | Resistance (µΩ) |
| Red top |  | Red bottom |  | Ground top |  |
| Yellow top |  | Yellow bottom |  |  |  |
| Blue top |  | Blue bottom |  |  |  |
|  | | | | | |
| Location | Link box type | | | | |
| Contact face | Resistance (µΩ) | Contact face | Resistance  (µΩ) | Contact face | Resistance (µΩ) |
| Red top |  | Red bottom |  | Ground top |  |
| Yellow top |  | Yellow bottom |  |  |  |
| Blue top |  | Blue bottom |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Location | Link box type | | | | |
| Contact face | Resistance (µΩ) | Contact face | Resistance  (µΩ) | Contact face | Resistance (µΩ) |
| Red top |  | Red bottom |  | Ground top |  |
| Yellow top |  | Yellow bottom |  |  |  |
| Blue top |  | Blue bottom |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Location | Link box type | | | | |
| Contact face | Resistance (µΩ) | Contact face | Resistance  (µΩ) | Contact face | Resistance (µΩ) |
| Red top |  | Red bottom |  | Ground top |  |
| Yellow top |  | Yellow bottom |  |  |  |
| Blue top |  | Blue bottom |  |  |  |

Criteria:

* 1. **CROSS BONDING VERIFICATION TEST:**

Current Injected at: Injected current:

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Location | X – Bond Link Box | | Grounding Link Box | | |
| ( S / s ------ ) | Current (A) | Volts to gnd (V) |  | Current (A) | Volts to gnd (V) |
| Red - blue |  |  | Red phase |  |  |
| Yellow - red |  |  | Yellow phase |  |  |
| Blue -yellow |  |  | Blue phase |  |  |
| Ground |  |  | Ground |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Location | X – Bond Link Box | | Grounding Link Box | | |
| ( S / s ------ ) | Current (A) | Volts to gnd (V) |  | Current (A) | Volts to gnd (V) |
| Red - blue |  |  | Red phase |  |  |
| Yellow - red |  |  | Yellow phase |  |  |
| Blue - yellow |  |  | Blue phase |  |  |
| Ground |  |  | Ground |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Location | X – bond link box | | Grounding link box | | |
| ( S / s ------ ) | Current (A) | Volts to Gnd (V) |  | Current (A) | Volts to Gnd (V) |
| Red - Blue |  |  | Red Phase |  |  |
| Yellow - Red |  |  | Yellow Phase |  |  |
| Blue - Yellow |  |  | Blue phase |  |  |
| Ground |  |  | Ground |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Location | X – bond link box | | Grounding link box | | |
| ( S / S ------ ) | Current (A) | Volts to Gnd (V) |  | Current (A) | Volts to Gnd (V) |
| Red - Blue |  |  | Red Phase |  |  |
| Yellow - Red |  |  | Yellow phase |  |  |
| Blue - Yellow |  |  | Blue Phase |  |  |
| Ground |  |  | Ground |  |  |

Criteria:

* 1. **ZERO AND POSITIVE SEQUENCE IMPEDANCE MEASUREMENT TEST:**

First method:

* + 1. **ZERO SEQUENCE IMPEDANCE:**

|  |  |  |  |
| --- | --- | --- | --- |
| U0 (v) | I ph (A) | cos Φ | Z0 = 3 u0 / i ph |
|  |  |  |  |
|  |  |  |  |
| Mean values = | | cos Φ = | |Z0| = |
| Φ = |
| sin Φ = |

* + 1. Positive sequence impedance:

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Phase | U0 (V) | | I Ph (A) | | cos Φ | | | Z0 = 3 U0 / I Ph | | |
| 1 | 2 | 1 | 2 | 1 | 2 | Avg | 1 | 2 | Avg |
| Red |  |  |  |  |  |  |  |  |  |  |
| Yellow |  |  |  |  |  |  |  |  |  |  |
| Blue |  |  |  |  |  |  |  |  |  |  |
|  | Sys mean value = | | | | cos Φ = | | | |Z+| = | | |
| Φ = | | |
| sin Φ = | | |

Second method:

* + 1. **POSITIVE SEQUENCE IMPEDANCE :**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Phase | Volt (V) | Current (A) | Phase | Phase impedance |
| Red + yellow (forward)  (reverse) |  |  |  | Red  + j |
|  |  |  |
| Yellow + blue (forward)  (reverse) |  |  |  | Yellow  + j |
|  |  |  |
| Blue + red (forward)  (reverse) |  |  |  | Blue  + j |
|  |  |  |

* + 1. **ZERO SEQUENCE IMPEDANCE:**

|  |  |
| --- | --- |
| Volt (v) (Forward)  (Reverse) |  |
|  |
| Current (A) (forward)  (reverse) |  |
|  |
| Phase (forward)  (reverse) |  |
|  |

Check value Z1+Z2+Z0

(Inject current in yellow phase, return via same paths as for Z0 measurement)

|  |  |  |
| --- | --- | --- |
|  | Volt (V) | Current (A) |
| Forward |  |  |
| Reverse |  |  |
| Z = 3 v/i |  | Ωs (1) |
| + + |  | Ωs (2) |

(1) & (2) should be similar values

* + 1. **ZERO SEQUENCE IMPEDANCE::**

Z0 = + j Ω

Z0 = + j Ω / Km

* + 1. **POSITIVE SEQUENCE IMPEDANCE :**

Z+ = + j Ω

Z+ = + j Ω / Km

* + 1. **INSULATION RESISTANCE BEFORE AND AFTER HV TEST:**

|  |  |  |  |
| --- | --- | --- | --- |
| Phase | Insulation resistance before HV test (5000v) | Insulation resistance after HV test (5000v) | Remarks |
|
| R |  |  |  |
| Y |  |  |  |
| B |  |  |  |

Criteria:

* + 1. **A.C. HIGH VOLTAGE TEST :**

AC Equipment Manufacture = Model / Type:

Megohmmeter Type = Manufacture

Temp / Hum % =

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Phase color | Red | Yellow | Blue | Result |
| Cable length in meters |  |  |  |  | |
| Test Duration |  |  |  |  | |
| Voltage Set |  |  |  |  | |
| Actual Voltage |  |  |  |  | |
| Resonant freq (HZ) |  |  |  |  | |
| Charging Current (A) |  |  |  |  | |
| Capacitance (n f) |  |  |  |  | |

Criteria**:**