TECHNICAL SPECIFICATION FOR X-LINKED POLYETHYLENE INSULATED AND PVC SHEATHED H.T. CABLES.

1. **SCOPE**:

This specification briefly provides for the manufacture, testing before despatch, transportation, supply and delivery of ISI marked 33 KV grade XLPE insulated screened armoured all aluminium conductor and the sheathed power cables conforming to IS-7098 (Part-II) / 1985 with upto date amendment suitable for solidaly earthed system manufactured with dry cure nitrogen gas i.e. with inet gas curing using CCV system.

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| 2. | Climatic condition | |  |
| i) | Min. temperature (deg. Celsius) | | - 5 deg. C |
| ii) | Maximum variation between day and | |  |
|  | night temperature (deg. Celsius) | |  |
|  | a) | Winter | 10 |
|  | b) | Summer | 12 |
| iii) | Maximum day temperature (deg. Celsius) | | 45 |
| iv) | Maximum relative humidity (%) | | 95 |
| v) | Average annual rainfall (mm) | | 2200 |
| vi | Is the terrain subjected to Fog. | | Yes |
| vii | Intensity of pollution | | Moderate |
| 3 | **Conductors**:- | |  |
|  | The aluminium conductors shall comply with the requirements as specified in IS-8130-1984 | | |
|  | with upto date amendments. The stranded conductor shall be clean and reasonably uniform in | | |
|  | size and shape and its surfaces shall be free from sharp edges. Not more that two joints shall | | |
|  | be allowed in any of the wires forming every complete length of conductor and no joint shall | | |
|  | be within 300 mm of any other joint in the same layer. Joint shall be brazed, silver soldered or | | |
|  | electric or gas welded. No joint shall be made in the conductor once it has been stranded. | | |
| 4 | The insulation shall be chemically cross link polyethylene conforming to the physical, | | |
|  | electrical and ageing properties as required in the specification. Cross linking may be done by | | |
|  | exposure to organize peroxide with nitrogen curing CCV line, method with the intention to | | |
|  | ensure lowest tree formation. Only natural unfilled compound shall be used for insulation of | | |
|  | cables. The average thickness of insulation when specification shall not be less than the | | |
|  | standard thickness value specified. The smallest of the measured value of thickness shall not | | |
|  | fall below the standard thickness value as specified in IS:7098 (Part-II)/1985. | | |
| 5 | **Screening** | |  |

The screening of insulated cables shall consist of conductor screening and insulation screening.

1. **Screening material**

Two types of materials may be used for screening of cables non-metallic and metallic.

1. **Conductor screening**

Conductor screening shall be non-metallic and shall consist of either semi-conducting

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compound or a layer or extruded –semi- conducting compound or combination of the two.

1. **Insulation Screening**

The insulation screening shall consist of non-metallic semi-conducting part in combination with a metallic part. Non-metallic part shall be applied either directly over the insulation of each core and shall consist of either a semi –conducting tape or a layer of extruded semi-conducting compound or a combination of these materials. The metallic part shall be applied over the individual core. Metallic screening shall consist of either tape or braid or concentric

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|  | serving of wires or a sheath and shall be non-magnetic and applied over the non-metallic part |
|  | either, in single core or multi core cables. For single core armoured cables, armouring shall |
|  | constitute the metallic part of the screening. |
| 6 | In multi –core cables, the individual core shall be laid up and they be surrounded by common |
|  | covering applied either by extrusion or wrapping of a filling material containing thermoplastic |
|  | material. A proofed or plastic tape may be applied over the common covering is employed; it |
|  | shall be ensured that the circularity of the cable is maintained. The material used for inner |
|  | sheath may be softer than the XLPE insulation of PVC used for outer sheath. |
|  | **Armouring**: |
|  | The armouring shall be arranged over the core in the case of single core cables and over the |
|  | inner in the case of thee core cables. In the case of single core cables, the armouring shall be |
|  | of non-magnetic material. The armour shall consist of either galvanized round steel wires or |
|  | galvanized steel strips depending upon the nominal diameter under the armouring. The |
|  | dimensions of galvanized steel wire or strip shall be specified in the IS and shall conform to |
|  | IS-3975-1979, for all requirements. |
| 8 | **Outer sheath**:- |
|  | Over the armouring, the cable shall be provided with extruded PVC outer sheath. The |
|  | composition of the PVC compound for outer sheath shall be pre-type ST2 of IS-5831-1984. |
|  | The colour of the outer sheath shall be black. The average thickness of the sheath shall not be |
|  | less than the standard values specified in the IS when measured as laid in IS-7098 (part- |
|  | II)/1985. The smallest thickness of the measured values of sheath shall not fall below the |
|  | standard value (ts) specified by more than 0.2 to 0.2 (ts) mm. |
| 9 | **Tests**:- |

1. Copies of the type test certificates in respect of all the type-tests as per IS-7098 (part-II)/1985 for similar type of XLPE cables from any Government recognized testing labs, shall be submitted alongwith the tender.

**List of type tests:-**

A **Tests on conductor**:-

I Annealing test (for copper)

II Tensile test (for aluminium)

III Wrapping test (for aluminium)

IV Resistance test

b Tests for armouring wires/strips

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| c |  | Test for thickness of insulation and sheath |
| d |  | Physical tests for insulation |
|  | I | Tensile strength and elongation at break |
|  | II | Ageing in air oven |
|  | III | Hot test |
|  | IV | Shrinkage test |
|  | V | Water absorption (Gravimetric) |
| e |  | Physical tests for outer sheath |
|  | I | Tensile strength and elongation at break |
|  |  | Ageing in air oven |
|  |  | Shrinkage test |
|  |  | Hot deformation |
| f | i | Bleeding and blooming test (for outer sheath) |
|  | ii | Loss of mass in air over, heat shock and thermal stability tests will be carried out as per IS- |
|  |  | 7098 (part-II)/1985 |
| g |  | Partial discharge test |
| h |  | Bending test |
| i |  | Dielectric power factor test |
|  | i | As a function of voltage |
|  | ii | As a function of temperature |
| j |  | Insulation resistance (volume resistivity) test |
| K |  | Hearing cycle test |
| i |  | Impulse withstand test |
| m |  | High voltage test |
| n |  | Flammability test |
| o |  | Cold impact test |