SPECIFICATIONS OF FIRE RETARDANT LOW SMOKE (FRLS) CABLES

A. SIGNAL CABLES

1.1 Type : 0.75 Sq. mm, multistrand (24/0.2 mm), high conductivity annealed bare electrolytic copper conductor 650/1100V grade, PVC insulated, pair twisted & screened, armoured, both inner and outer FRLS PVC sheathed with proper pair identification.

1.2 Standard : As per IS 1554, part -1 & IS 5831 latest and any other relevant standard.

1.3 Conductor : High conductivity annealed bare electrolytic copper conductor having 24 strands of 0.2 mm each.

1.4 Conductor insulation : Extruded 85°C Type C PVC of IS 5831-1984. Thickness: As per IS 1554.

1.5 Pair twisting (Lay of twisting) : Minimum 30 twist per meter

1.6 Colour of pair : White and Black.

1.7 Individual pair shielding : 100% coverage using (25+25 micron) aluminium backed Mylar tape, helically applied with 25% minimum overlap. A tinned multi-strand copper drain wire (7/0.25 mm) laid in the Mylar tape having continuous contact with aluminium foil.

1.8 Binder tape : A non-hygrosopic tape of minimum thickness 25 micron applied with minimum of 25% overlap on individual pair shielding.

1.9 Overall shield : 100% coverage using (50+25 micron) aluminium backed Mylar tape, helically applied with 25% minimum overlap. A tinned multi-strand copper drain wire (7/0.25 mm) laid in the Mylar tape in continuous contact with aluminium foil.

1.10 Inner sheath : Extruded, Type ST2 FRLS PVC as per IS 5831-1984. FRLS thickness: As per IS 1554, Color: BLACK

1.11 Armouring : Galvanised steel wires as per IS 3974.

1.12 Outer sheath : Extruded, Type ST2 FRLS PVC as per IS 5831-1984. FRLS Thickness: As per IS 1554. Outer sheath shall also be resistant to termites, fungus and rodent attack. Color: GREY
1.13 Conductor resistance : Less than 25 ohms / Km @ 20°C

1.14 Insulation resistance : 100 M ohms minimum @ 500 V DC. Better value preferred. Supplier shall clearly mention the value in their offer.

1.15 Capacitance
   a) Core- Core : Less than 100 nf / Km
   b) Core- shield : Less than 250 nf / Km

1.16 Inductance : Less than 1000 micro Henry / Km

1.17 L/R ratio : Less than 25 micro Henry / Ohms

1.18 Identification of pair : Numbers should be printed at an interval not more than 150 mm each.

1.19 Marking of cable length : At an interval of 01 meter each by non-erasable ink throughout the cable length (on overall sheath).

1.20 Cable type and quantity

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Cable Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>6 pairs</td>
<td>500 mtrs</td>
</tr>
</tbody>
</table>
B. CONTROL CABLES

1.1 Type : Multi-core armoured 1 Sq. mm, multistrand (32/0.2 mm), annealed copper conductor 650/1100V grade, PVC insulated conductor, armoured, both inner and outer FRLS PVC sheathed.

1.2 Standard : As per IS 1554, part -1 & IS 5831 latest and any other relevant standard.

1.3 No. of cores and quantity : As per table 2.

1.4 Conductor : High conductivity annealed bare electrolytic copper conductor having 32 strands of 0.2 mm each.

1.5 Conductor insulation : Extruded 85°C Type C PVC of IS 5831-1984. Thickness: As per IS 1554 Colour: GREY

1.6 Insulation grade : 1.1 KV

1.7 Identification of cores : By numbers at a maximum interval of 150 mm.

1.8 Inner sheath : Extruded, Type ST2 FRLS PVC as per IS 5831-1984. FRLS thickness: As per IS 1554, Color: BLACK

1.9 Armouring : Galvanised steel wires as per IS 3974.

1.10 Outer sheath : Extruded, Type ST2 FRLS PVC as per IS 5831-1984. FRLS thickness: As per IS 1554. Outer sheath shall also resistant to termites, fungus and rodent attack. Color: BLACK

1.11 Marking of cable length on overall sheath : At an interval of 01 meter each by non-erasable ink throughout the cable length.

1.12 Cable type and quantity:

<table>
<thead>
<tr>
<th>Sr.No.</th>
<th>Cable Description</th>
<th>Quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>3 cores</td>
<td>1000 mtrs</td>
</tr>
<tr>
<td>2.</td>
<td>37 cores</td>
<td>500 mtrs</td>
</tr>
</tbody>
</table>
C. Notes:

1. Bidder should quote only for FRLS PVC (inner and outer) sheathing. The following tests will be witnessed by the purchaser, on the finished cables, same at the time of inspection at no additional cost.
   a. Flammability test by Swedish Chimney Method as per SS 424-14-75 Class F-3.
   b. Oxygen Index test as per ASTM D 2863.
   c. Smoke density test as per ASTM D 2843 / 77.
   d. Temperature Index test as per ASTM D 2863.
   e. Acid gas generation test as per IEC 754 - 1.
   f. Other routine tests like tensile strength test, elongation at break test, conductor resistant test, insulation resistance test and flammability test as per IS-5831 and IS-1554.

2. Quotation should contain the following information in duplicate
   a) Origin of raw materials
   b) Insulation resistance between cores at 500V dc
   c) Insulation thickness of core, inner sheath & outer sheath
   d) Overall diameter, diameter over armour, bending radius etc
   e) Loop resistance
   f) Capacitance between cores
   g) Inductance and L/R ratio
   h) Testing facilities and tests offered

3. The following details have to be printed on the cable at every ONE meter length
   a) Number of pairs and type
   b) Voltage grade
   c) Length information.

4. Cable should be supplied in non-returnable, duly painted, **MS drums** (maximum 500 meter per drum) of heavy duty construction. Each MS drum shall have a aluminum tag indicating voltage grade, size, core / pair, type (FRLS) and length of the cable.

5. Information to be provided by the bidder along with the quotation:
   i. Overall diameter of the cable
   ii. Cable diameter over and below armour.
   iii. Bending radius
   iv. Maximum DC resistance of each core in Ohms/ Km
   v. Cable gland size required.

6. Quotation:- Quotations shall be submitted in duplicate along with technical leaflet, detailed drawing / sketch indicating constructional details, dimensions of the cable. Details of the company’s profile, in-house manufacturing and testing facilities, sources of raw material and Quality Assurance Plan followed shall also accompany the offer. Vendor approvals obtained from reputed companies, third party inspection agencies as well as any previous supply to any of DAE units and / or Private / Corporate sector shall be mentioned with documentary evidence. All the specifications shall be answered and any deviation in the quoted item from the above specifications shall be clearly brought out. Silence on any of the
specification would indicate non-conformity of the quoted item with our tender specifications. Such offers are likely to be rejected.

7. Offer evaluation: - Offers will be evaluated on the basis of overall total cost of all the various types evaluation of cable offered.

8. Factory evaluation: - Purchaser reserves the right to evaluate supplier's work himself or by his authorized representative.

9. Inspection:- In-house detailed inspection reports shall be sent prior to giving inspection call. Supplier shall have to present the items to the purchaser for his inspection and shall also carry out, in his presence, necessary tests free of cost to demonstrate performance of the item as per ordered specifications (Quotations will not be considered if prescribed tests are not offered). Material Test Certificates from Govt. recognized laboratory are to be provided at the time of inspection.

10. Documentation:- All the test reports / certificates their proper format shall be submitted at the time of inspection.

11. Guarantee:- All the cables shall be guaranteed against faulty material, defective design & poor workmanship for a period of 12 months from the date of supply.