Fire Resistant Central Loose Tube Fiber Optic Cables

APPLICATION

These cables are characterized by light weight and small diameter, suitable for both aerial and duct installation. They are mainly installed inside buildings, tunnels, subways or closed areas in general, specially designed to guarantee the signal transmission even in case of fire. The cable can also be used for direct burial for armoured version.

STANDARDS

Basic design to Telcordia GR-20 / RUS 7 CFR 1755.900 (REA PE-90) / ICEA S 87-640

FIRE PERFORMANCE

<table>
<thead>
<tr>
<th>Standard</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Circuit Integrity</td>
<td>IEC 60331-25; BS 6387 CWZ; DIN VDE 0472-814(FE180); CEI 20-36/2-1; SS229-1; NBN C 30-004 (cat. F3); NF C32-070-2.3(CR1)</td>
</tr>
<tr>
<td>System circuit integrity</td>
<td>DIN 4102-12, E30 depending on lay system</td>
</tr>
<tr>
<td>Flame Retardance (Single Vertical Wire Test)</td>
<td>EN 60332-1-2; IEC 60332-1-2; BS EN 60332-1-2; VDE 0482-332-1; NBN C 30-004 (cat. F1); NF C32-070-2.1(C2); CEI 20-35/1-2; EN 50265-2-1*; DIN VDE 0482-265-2-1*</td>
</tr>
<tr>
<td>Reduced Fire Propagation (Vertically-mounted bundled wires &amp; cable test)</td>
<td>EN 60332-3-24 (cat. C); IEC 60332-3-24; BS EN 60332-3-24; VDE 0482-332-3; NBN C 30-004 (cat. F2); NF C32-070-2.2(C1); CEI 20-22/3-4; EN 50266-2-4*; DIN VDE 0482-266-2-4</td>
</tr>
<tr>
<td>Halogen Free</td>
<td>IEC 60754-1; EN 50267-2-1; DIN VDE 0482-267-2-1; CEI 20-37/2/1 ; BS 6425-1*</td>
</tr>
<tr>
<td>No Corrosive Gas Emission</td>
<td>IEC 60754-2; EN 50267-2-2; DIN VDE 0482-267-2-2; CEI 20-37/2-2 ; BS 6425-2*</td>
</tr>
<tr>
<td>Minimum Smoke Emission</td>
<td>IEC 61034-1&amp;2; EN 61034 -1&amp;2; DIN VDE 0482-1034-1&amp;2; CEI 20-37/3-1&amp;2; EN 50268-1&amp;2*; BS 7622-1&amp;2*</td>
</tr>
<tr>
<td>No Toxic gases</td>
<td>NES 02-713; NF C 20-454</td>
</tr>
</tbody>
</table>

Note: Asterisk * denotes superseded standard.

CABLE CONSTRUCTION

Fibers: Singlemode and multimode fibers, with loose tube technology.
Structure: Central loose tube cable contains one tube with 2-24 single or multimode fibers, which are filled with water blocking gel.
Fire barrier: The jelly filled tube with up to 24 fibers is wrapped with a fire blocking mica glass tapes.
Water blocking: The jelly filled tube is waterblocked by using swellable tape and thread.
Reinforcement: Either aramid yarn or fiber glass is wound around the tube to provide physical protection and tensile strength, with added fire protection.
Inner Sheath (optional): The cable can be jacketed with either PE or thermoplastic LSZH inner sheath. PE is the preferred option in outdoor environment for water protection purpose.
Moisture Barrier Tape (optional): An aluminum moisture tape can be incorporated under the sheath for water blocking and shielding purpose.
Armouring optional:
For direct burial, either galvanized steel wire braid, corrugated steel tape armour or galvanized steel wire armour is applied over an inner polyethylene or LSZH sheath. For steel tape armour, the 0.15mm thick steel tape is coated with a copolymer and applied with an overlap. For steel wire braid or armour, single layer of galvanized steel wire braid or armour is applied.

Ripcord (optional): An optional ripcord can be located under the jacket to facilitate jacket removal.

Outer Sheath: Thermoplastic LSZH compound type LTS3 as per BS 7655-6.1 (Thermosetting LSZH compound type SW2-SW4 as per BS 7655-2.6 can be offered.)

**FIBER COLOUR CODE**

<table>
<thead>
<tr>
<th>Fiber colour code</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiber</td>
<td>Red</td>
<td>Green</td>
<td>Blue</td>
<td>Yellow</td>
<td>White</td>
<td>Grey</td>
<td>Black</td>
<td>Orange</td>
<td>Pink</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**CONSTRUCTION**

**UNARMOURED TYPE**

**CONSTRUCTION PARAMETERS**

<table>
<thead>
<tr>
<th>Cable Code</th>
<th>Fiber Count</th>
<th>Tube Diameter</th>
<th>Nominal Overall Diameter</th>
<th>Approx. Weight</th>
<th>Tension load</th>
<th>Crush</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA-B-C-H-J-FR</td>
<td>02-06</td>
<td>2.7</td>
<td>8.0</td>
<td>70</td>
<td>1000</td>
<td>1500</td>
</tr>
<tr>
<td>CLA-B-C-H-J-FR</td>
<td>08-16</td>
<td>3.5</td>
<td>9.0</td>
<td>90</td>
<td>1200</td>
<td>1500</td>
</tr>
<tr>
<td>CLA-B-C-H-J-FR</td>
<td>18-24</td>
<td>4.2</td>
<td>10.0</td>
<td>100</td>
<td>1500</td>
<td>1500</td>
</tr>
</tbody>
</table>
STEEL WIRE Braid

CONSTRUCTION PARAMETERS

<table>
<thead>
<tr>
<th>Cable Code</th>
<th>Fiber Count</th>
<th>Tube Diameter</th>
<th>Nominal Overall Diameter</th>
<th>Approx. Weight</th>
<th>Tension load</th>
<th>Crush</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA-B-C-2Y(SWB)H-J-FR</td>
<td>02-06</td>
<td>2.7</td>
<td>11.5</td>
<td>160</td>
<td>1000</td>
<td>2000</td>
</tr>
<tr>
<td>CLA-B-C-2Y(SWB)H-J-FR</td>
<td>08-16</td>
<td>3.5</td>
<td>12.0</td>
<td>180</td>
<td>1200</td>
<td>2000</td>
</tr>
<tr>
<td>CLA-B-C-2Y(SWB)H-J-FR</td>
<td>18-24</td>
<td>4.2</td>
<td>13.0</td>
<td>200</td>
<td>1500</td>
<td>2000</td>
</tr>
</tbody>
</table>

CORRUGATED STEEL TAPE ARMOUR

CONSTRUCTION PARAMETERS

<table>
<thead>
<tr>
<th>Cable Code</th>
<th>Fiber Count</th>
<th>Tube Diameter</th>
<th>Diameter</th>
<th>Approx. Weight</th>
<th>Tension load</th>
<th>Crush</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA-B-C-2Y(STA)H-J-FR</td>
<td>02-06</td>
<td>2.7</td>
<td>13.0</td>
<td>200</td>
<td>1000</td>
<td>2500</td>
</tr>
<tr>
<td>CLA-B-C-2Y(STA)H-J-FR</td>
<td>08-16</td>
<td>3.5</td>
<td>14.0</td>
<td>220</td>
<td>1200</td>
<td>2500</td>
</tr>
<tr>
<td>CLA-B-C-2Y(STA)H-J-FR</td>
<td>18-24</td>
<td>4.2</td>
<td>14.5</td>
<td>250</td>
<td>1500</td>
<td>2500</td>
</tr>
</tbody>
</table>
STEEL WIRE ARMOUR

CONSTRUCTION PARAMETERS

<table>
<thead>
<tr>
<th>Cable Code</th>
<th>Fiber Count</th>
<th>Tube Diameter</th>
<th>Nominal Overall Diameter</th>
<th>Approx. Weight</th>
<th>Tension load</th>
<th>Crush</th>
</tr>
</thead>
<tbody>
<tr>
<td>CLA-B-C-2Y(SWA)H-J-FR</td>
<td>02-12</td>
<td>2.7</td>
<td>10.5</td>
<td>180</td>
<td>2500</td>
<td>4000</td>
</tr>
<tr>
<td>CLA-B-C-2Y(SWA)H-J-FR</td>
<td>16-24</td>
<td>3.5</td>
<td>11.0</td>
<td>210</td>
<td>2500</td>
<td>4000</td>
</tr>
</tbody>
</table>

PHYSICAL AND THERMAL PROPERTIES

Temperature range during operation (fixed state): -20°C - +60°C  
Temperature range during installation (mobile state): 0°C - +50°C  
Minimum Operation Bending Radius: 10 times the outer diameter for unarmoured cables  
20 times the outer diameter for armoured cables  
Minimum Installation Bending Radius: 20 times the outer diameter

MECHANICAL PROPERTIES

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
</table>
| Maximum Compressive Load        | 4000N for unarmoured cables  
                                           5000N for armoured cables  |
| Repeated Impact                 | 4.4 N.m (J)                                       |
| Twist (Torsion)                 | 180×10 times, 125×OD                              |
| Cyclic Flexing                  | 25 cycles for armoured cables;  
                                           100 cycles for unarmoured cables.  |
| Crush Resistance                | 263N/cm (150lb/in)                                |

FIBER COMPLIANCE

<table>
<thead>
<tr>
<th>Property</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Temperature Cycling</td>
<td>IEC60794-1-2-F2</td>
</tr>
<tr>
<td>Tensile Strength</td>
<td>IEC60794-1-2-E1A</td>
</tr>
</tbody>
</table>
Caledonian Fire Resistant Optic Fiber Cables

Crush
- IEC60794-1-2-E3

Impact
- IEC60794-1-2-E4

Repeated Bending
- IEC60794-1-2-E6

Torsion
- IEC60794-1-2-E7

Kink
- IEC60794-1-2-E10

Cable Bend
- IEC60794-1-2-E11

Cool Bend
- IEC60794-1-2-E11

**TYPE CODES**

<table>
<thead>
<tr>
<th>CLA</th>
<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
<th>FR</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Fire Resisting</td>
</tr>
</tbody>
</table>

**Water blocking gel in tubes**
- X: No water-blocking
- J: Water blocking gel between jackets;
- D: Dry water-blocking between cable jackets

**Outer Sheath**
- 2Y: PE
- Y: PVC
- H: LSZH

**Armour**
- Blank: No armour
- STA: Corrugated steel tape armour
- SWA: Steel wire armour
- SWB: Steel wire braid

**Inner Sheath**
- 2Y: PE
- Y: PVC
- H: LSZH

**C No of Fibers**
- 4: 50/125 um (OM3)
- 5: 50/125 um (OM2)
- 6: 62.5/125um (OM1)
- 7: NZDS SM fiber per ITU-T G.656
- 8: NZDS SM fiber per ITU-T G.655
- 9: Standard SM fiber per ITU-T G.652.D

**Tube Diameter**
- A: 2.7mm
- B: 3.5mm
- C: 4.2mm

**Standard**
- GR-20/RUS 7
- CFR1755.900
- (REA PE-90)

**ICEA S 87-640**

**Circuit Integrity**
- IEC 60331/BS 6387
- NF C32-070-2.3(CR1)

**Reduced Fire Propagation**
- NF C32-070-2.2(C1)
- IEC60332-3-24/EN50266-2-4

**Flame Retardancy**
- NF C32-070-2.1(C2)
- IEC60332-1-2/EN50265-2-1

**Low Toxicity**
- NES 02-713/NF C 20-454

**Low Corrosivity**
- EN50267-2-2/3
- NF C 32-074

**Low Smoke Emission**
- IEC 61034-1&2
- EN 50268-1&2/NF C32-073

**Zero Halogen Free**
- IEC60754-1
- EN50267-2-1

**DIN 4102-12**

**Functional Integrity**
- EN 4102-12