Integrating Global Communications . . .
Index

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>M. P. Birla Group Profile</td>
<td>5</td>
</tr>
<tr>
<td>Birla Cable Ltd. Profile</td>
<td>6</td>
</tr>
<tr>
<td>Vindhya Telelinks Ltd. Profile</td>
<td>7</td>
</tr>
<tr>
<td>Fibre Optic Cables</td>
<td></td>
</tr>
<tr>
<td>Central-tube Unarmoured Cable</td>
<td>10</td>
</tr>
<tr>
<td>Multi-tube Single Sheath Unarmoured Cable</td>
<td>11</td>
</tr>
<tr>
<td>Multi-tube Double Sheath Unarmoured Cable</td>
<td>12</td>
</tr>
<tr>
<td>Multi-tube Double Layer Unarmoured Cable</td>
<td>13</td>
</tr>
<tr>
<td>Central-tube Steel Tape Armoured Cable</td>
<td>14</td>
</tr>
<tr>
<td>Multi-tube Single Sheath Armoured Cable</td>
<td>15</td>
</tr>
<tr>
<td>Multi-tube Double Sheath Armoured Cable</td>
<td>16</td>
</tr>
<tr>
<td>Dielectric Rodent Protected Cable</td>
<td>17</td>
</tr>
<tr>
<td>Multi-tube FRP Rod Armoured Cable</td>
<td>18</td>
</tr>
<tr>
<td>Multi-tube Ribbon Type Cable</td>
<td>19</td>
</tr>
<tr>
<td>All Di-electric Self Supporting Aerial Cable</td>
<td>20</td>
</tr>
<tr>
<td>Central-tube Figure-8 Type Aerial Cable</td>
<td>21</td>
</tr>
<tr>
<td>Multi-tube Figure-8 Type Aerial Cable</td>
<td>22</td>
</tr>
<tr>
<td>Hybrid (Optical &amp; Copper) Under Ground Armoured Cable</td>
<td>23</td>
</tr>
<tr>
<td>Drop Cable</td>
<td>24</td>
</tr>
<tr>
<td>Indoor Drop Cable</td>
<td>25</td>
</tr>
<tr>
<td>Central-tube Micro Cable</td>
<td>26</td>
</tr>
<tr>
<td>Multi-tube Micro Cable</td>
<td>27</td>
</tr>
<tr>
<td>Interconnect Cable</td>
<td>28</td>
</tr>
<tr>
<td>Breakout Tight Buffered Unarmoured Cable</td>
<td>29</td>
</tr>
<tr>
<td>Fan out Tight Buffered Unarmoured Cable</td>
<td>30</td>
</tr>
<tr>
<td>Copper Cables</td>
<td></td>
</tr>
<tr>
<td>Foam Skin / Solid PE Insulated Jelly Filled Telephone Cable</td>
<td>34</td>
</tr>
<tr>
<td>Self Supporting Aerial (Figure 8 Type) Telephone Cable</td>
<td>35</td>
</tr>
<tr>
<td>Underground Jelly Filled Quad Cable</td>
<td>36</td>
</tr>
<tr>
<td>Signaling Cable</td>
<td>37</td>
</tr>
<tr>
<td>Jumper Wire</td>
<td>38</td>
</tr>
<tr>
<td>Electroplated Tinned Copper Wire</td>
<td>39</td>
</tr>
<tr>
<td>Power Cables</td>
<td></td>
</tr>
<tr>
<td>LT Aerial Bunched Cable</td>
<td>42</td>
</tr>
<tr>
<td>Instrumentation Cable</td>
<td>43</td>
</tr>
<tr>
<td>Control Cable</td>
<td>44</td>
</tr>
<tr>
<td>PVC Insulated Industrial Cable (Unsheathed)</td>
<td>46</td>
</tr>
<tr>
<td>PVC Insulated Industrial Cable (Sheathed)</td>
<td>47</td>
</tr>
<tr>
<td>Speciality Cables</td>
<td></td>
</tr>
<tr>
<td>Stainless Steel Wire Armoured Tactical Cable</td>
<td>52</td>
</tr>
<tr>
<td>Fibre to Antenna</td>
<td>53</td>
</tr>
<tr>
<td>4 Pair UTP CAT 5e Cable</td>
<td>54</td>
</tr>
<tr>
<td>4 Pair FTP CAT 5e Cable</td>
<td>55</td>
</tr>
<tr>
<td>4 Pair SFTP CAT 5e Cable</td>
<td>56</td>
</tr>
<tr>
<td>Hybrid 4 Pair CAT 5e with 2 F Cable</td>
<td>57</td>
</tr>
<tr>
<td>4 Pair CAT 5e armoured LSZH Cable</td>
<td>58</td>
</tr>
<tr>
<td>4 Pair UTP CAT 6 Cable</td>
<td>59</td>
</tr>
<tr>
<td>2/4 Pair CAT 5e Drop Cable - Single Sheath</td>
<td>60</td>
</tr>
<tr>
<td>2/4 Pair CAT 5e Drop Cable - Double Sheath</td>
<td>61</td>
</tr>
<tr>
<td>2/4 Pair Data Communication Cable</td>
<td>62</td>
</tr>
<tr>
<td>24 Pair Data Communication Cable</td>
<td>63</td>
</tr>
<tr>
<td>Switchboard Cables (Screened / Unscreened)</td>
<td>64</td>
</tr>
<tr>
<td>Screened PCM Cable</td>
<td>65</td>
</tr>
<tr>
<td>50 Ohm Coaxial Cable</td>
<td>66</td>
</tr>
<tr>
<td>Automobile Wires</td>
<td>67</td>
</tr>
<tr>
<td>EPC Division</td>
<td>68</td>
</tr>
<tr>
<td>FRP Rods</td>
<td>70</td>
</tr>
<tr>
<td>Fibre Properties</td>
<td>72</td>
</tr>
<tr>
<td>Drum Handling Instruction and Packaging</td>
<td>74</td>
</tr>
</tbody>
</table>
M. P. Birla Group

Profile

The M. P. Birla Group came into being with the establishment of its flagship venture in 1919, Birla Jute Manufacturing (better known today as Birla Corporation Ltd. or Birla Corp). From these humble beginnings, over the last 90 years the M. P. Birla Group has branched out into various industries which include textiles, man made fibres, cables, automobiles, shipping, etc. This ever growing industrial giant already has over 500 factories which manufacture a host of products like cement, sugar, paper, jute, telecommunications cables, aluminium, copper, fertilizers, chemicals, etc.

Today, thanks to the vision, commitment and effort of its late Chairman Madhav Prasad Birla and the able team under him, the M. P. Birla Group has become one of India’s largest industrial houses. It has even made its mark in the international business scenario with over 40 joint ventures and management contracts across the globe.

Some of the major companies that fall under the umbrella of the M. P. Birla Group are:

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>PRODUCT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Birla Corporation Limited</td>
<td>Cement, Jute, Carbide, etc.</td>
</tr>
<tr>
<td>Birla Cable Limited (Formerly Birla Ericsson Optical Limited)</td>
<td>Optical and Copper Telecommunication Cables, etc.</td>
</tr>
<tr>
<td>Vindhya Telelinks Limited</td>
<td>Copper and Optical Telecommunication Cables, etc.</td>
</tr>
<tr>
<td>Universal Cables Limited</td>
<td>EHV, HT and LT Power Cables and Capacitators, etc.</td>
</tr>
<tr>
<td>Birla Furukawa Fibre Optics Limited</td>
<td>Optical Fibres</td>
</tr>
<tr>
<td>Hindustani Gum and Chemicals Limited</td>
<td>Guar Gum and Allied Products</td>
</tr>
<tr>
<td>Birla Financial Corporation Limited</td>
<td>Non-Banking Financial Services</td>
</tr>
<tr>
<td>Birla DLW Limited</td>
<td>Linoleum Floor Covering</td>
</tr>
</tbody>
</table>

The M. P. Birla Group emphasizes its commitment to quality and customer satisfaction, with every company in the group holding an ISO 9001:2008 Certification for Quality Management Systems. Focussing on continuous improvement and technological innovation, the M. P. Birla Group companies continue to collaborate with major industrial players of international repute in order to develop the latest, most advanced products.

All the M. P. Birla Group companies take corporate social responsibility very seriously. A major portion of the group’s CSR initiatives revolve around maintaining a healthy ecological balance and a secure work environment, in keeping with all the statutory requirements of the ISO 14001:2004 Certification for Environmental Management Systems.

The group is also known for its contributions to philanthropic and educational activities, donating millions every year in support of institutions, relief funds, hospitals and not-for-profit organisations.

The M. P. Birla Group is the perfect example of how a responsible, modern day leader can change the course of industry in our great nation, thereby changing the course of life for the millions who stand for India – a shining jewel amongst the countries of the world.
Birla Cable Limited  
(Formerly Birla Ericsson Optical Ltd.)

Profile

Birla Cable Limited (Formerly known as Birla Ericsson Optical Limited) is a premier company in the field of Telecommunication Cables, which offers one of the widest portfolio of Copper and Fibre Optic cables under its umbrella. A division under India’s one of the most trusted M. P. Birla Group, Birla Cable Limited has come a long way to establish itself as one of the most admirable player in Global arena among users of Telecom cables due to its superior product quality, stringent quality control systems and flawless performance across all the segments of Telecom users.

It all started in the year 1992, having technology collaboration and financial partnership with globally renowned Ericsson Network Technologies AB of Sweden as a Joint Venture Company. This Cable manufacturing company of M.P. Birla Group has crossed leaps and bounds during the last, almost 3 decades of association with Ericsson, in not only equipping itself as one of the versatile cable manufacturing and total solutions providing company but also kept abreast with latest technology trends from time to time on a continuous basis. This unique and disruptive approach followed by the company catapulted it as a qualified globally certified company having various approvals with renowned certifying bodies and institutions in the field of Oil & Gas, Power and Telecom segments.

By way of acquiring the shares of Ericsson recently, Birla Cable Limited has become a truly global Indian Company which has a reach of more than 60 countries, fully capable to cater to all the needs of communication cables across the segments. A competent team in all functional areas backed up by strong and experienced management, sound financial and technical strength makes Birla Cable Limited, a trusted name among the users of Telecom Cables.

The company possess all the required quality certifications like Quality Management System, Environment and Health & Safety Management Systems in an integrated manner with its state of the art cable manufacturing facilities located in Rewa, Madhya Pradesh, India and always on the drive to expand its Product base and Market reach.
Vindhya Telelinks Limited

Profile

Jelly-filled telecommunication cable manufacturing as well as optic fibre cable manufacturing is a crucial sector for the Indian telecommunication industry. When the M.P. Birla Group chose to set up its specialised manufacturing unit in this sector in 1983, the intention was to make it a stalwart in the industry, a trendsetter, a benchmark for other companies. Today, Vindhya Telelinks Limited (VTL) is proud to be the leader in the fiercely competitive communications sector within the Indian market.

Vindhya Telelinks Limited is a major supplier to a variety of highly reputed clients like BSNL, MTNL, NTPC, SAIL and other leading user organisations in various industries - like the railways, the defence sector, coalfields and atomic power plants. It also supplies cables to private sector telecom players such as Bharti Telecom, Tata Teleservices, Reliance Communications and many others.

VTL’s main facility, located in Rewa (Madhya Pradesh), is equipped with the most advanced technology, sourced from internationally renowned cable and machinery manufacturers. VTL, with its state-of-the-art manufacturing facility is capable of producing the full range of optical fibre cables (OFC).

VTL specialises in the production of complete range of copper telecommunication cables. The facility is fully capable of manufacturing ranging up to 2400 pairs. VTL also manufactures world-class optic fibre ribbon which is used in manufacturing of high count optical cable.

The EPC (Engineering, Procurement, Contract), division of VTL started in order to provide customers with comprehensive turnkey solutions such as trenching, laying, jointing, installation and other such activities which are required in telecom networking.

VTL has received IS/ISO 9001:2008 and IS/ISO-14001:2004 certification and is an organisation that consistently adheres to a sophisticated, world-class quality assurance system that covers every stage of the manufacturing process. At every stage, rigorous quality testing ensures complete customer satisfaction.

World standard manufacturing facilities, a robust distribution system, and a well-trained, qualified and committed workforce are the backbone of this organisation. Through its dedication to excellence, Vindhya Telelinks Limited has successfully exceeded all expectations, setting the bar high with superior quality products and excellent service standards.
Travel towards the future at the speed of light

Fibre Optic Cables
Applications

- Suitable for Duct Installation
- For CATV application, aerial application along with messenger wire

Typical Cross section of 48 Fibre

![Typical Cross section of 48 Fibre]

Cable Construction Details

- Up to 48 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- Metallic, anti-buckling Steel rod as Strength Member, embedded in outer sheath (also available with non metallic strength member, FRP rod)
- Loose buffer tube fully filled and Centrally placed in the cable
- UV Stabilized PE outer sheath, black (also available with HFFR / FR PVC)

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPTO 12F</td>
<td>6.0</td>
<td>40</td>
<td>1000</td>
<td>500</td>
<td>Installation: -10° to +50°C, Operating: -40° to +70°C</td>
</tr>
<tr>
<td>24F</td>
<td>8.0</td>
<td>60</td>
<td>1000</td>
<td>500</td>
<td>Installation: -10° to +50°C, Operating: -40° to +70°C</td>
</tr>
<tr>
<td>48F</td>
<td>9.5</td>
<td>80</td>
<td>1000</td>
<td>500</td>
<td>Installation: -10° to +50°C, Operating: -40° to +70°C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre

- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Violet
- Pink
- Aqua

* For Fibre count more than 12F, bundles in multiple of 12F will be formed with color identification binder (Blue, Orange, Green & Brown)

Special Features

Lighter weight cable for faster and easier installation

Drum Length

2000/ 3000/ 4000 meters ± 5%

Mechanical Characteristics

- Repeated Bending (IEC 60794-1-2-E6): 30 Cycle, r = 20 X D, 5 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7): 10 Cycle (± 360°) 5 Kg Load, L = 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3): 1000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4): Height 100 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10): 10 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-FSB): 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours

www.vtlrewa.com | www.birlacable.com
MULTI-TUBE SINGLE SHEATH UNARMORED CABLE (2-144 F)

Applications
- Suitable for Duct Installation, pulled & blown

Typical Cross section of 72 Fibre

Primary Coated Fibre
Tube Filling Compound
Loose Tube(s)
Central Strength Member
Rip Cords
Cable Filling Compound
Peripheral Strength Member
Core Wrapping
Outer Sheath

Cable Construction Details
- Up to 144 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- 2/4/6/8/12 fibre per tube combinations are available in 6/8/12 element construction
- Non metallic, anti-buckling FRP rod as Central Strength Member (also available with steel rod).
- Loose buffer tubes fully filled, S-Z Stranded
- Cable core fully filled with jelly (also available in dry core)
- Glass yarn can be used as peripheral strength member
- S-Z core wrapped with polyester tape / water swellable tape
- UV Stabilized PE outer sheath, black (also available with FR PVC & HFFR

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Installation</td>
<td>Operating</td>
<td>Installation Operating</td>
</tr>
<tr>
<td>UPTO 48F</td>
<td>9.2</td>
<td>74</td>
<td>1500</td>
<td>750</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>72F</td>
<td>9.6</td>
<td>80</td>
<td>1500</td>
<td>750</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>96F</td>
<td>10.9</td>
<td>100</td>
<td>1500</td>
<td>750</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>144F</td>
<td>13.4</td>
<td>150</td>
<td>2000</td>
<td>1000</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

Special Features
- Single layer S-Z stranded construction
- Flexible buffer tubes provide easy fibre routing inside closure
- Light in weight, hence easy to install

Drum Length
2000/ 3000/ 4000 meters ± 5%

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, r = 20 X D, 5 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 360°) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 2000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10) 1 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5B) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours
MULTI-TUBE DOUBLE SHEATH UNARMOURED CABLE (2-144 F)

Applications
- Suitable for Duct Installation, pulled & blown

Cable Construction Details
- Up to 144 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- 2/4/6/8/12 fibre per tube combinations are available in 6/8/12 element construction
- Non metallic anti-buckling FRP rod as Central Strength Member (also available with Steel rod)
- Loose buffer tubes fully filled, S-Z Stranded
- Cable core fully filled with jelly (also available in dry core)
- Glass yarn can be used as peripheral strength member
- S-Z core wrapped with polyester tape / water swellable tape
- UV Stabilized HDPE inner sheath, Black
- Insect & termite resistant PA-12 outer sheath, Orange

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km)</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
<td>Nominal</td>
<td>Installation Operating</td>
<td>Temporary</td>
<td>Permanent</td>
</tr>
<tr>
<td>UPTO 48F</td>
<td>10.2</td>
<td>90</td>
<td>1500</td>
<td>750</td>
<td>15D</td>
</tr>
<tr>
<td>72F</td>
<td>10.6</td>
<td>95</td>
<td>1500</td>
<td>750</td>
<td>15D</td>
</tr>
<tr>
<td>96F</td>
<td>11.9</td>
<td>120</td>
<td>1500</td>
<td>750</td>
<td>15D</td>
</tr>
<tr>
<td>144F</td>
<td>14.4</td>
<td>170</td>
<td>2000</td>
<td>1000</td>
<td>15D</td>
</tr>
</tbody>
</table>

Special Features
- Single layer S-Z stranded construction
- Flexible buffer tubes provide easy fibre routing inside closure
- Light in weight, hence easy to install
- Insect & termite resistant

Drum Length
2000/ 3000/ 4000 meters ± 5%

Color Coding - Fibre & Tube

Color | Description
--- | ---
Blue | Fibre & Tube
Orange |
Green |
Brown |
Grey |
White |
Red |
Black |
Yellow |
Violet |
Pink |
Aqua |
MULTI-TUBE DOUBLE LAYER UNARMOURCED CABLE (192-288F)

Applications
- Suitable for Duct Installation, pulled & blown

Typical Cross section of 240 Fibre

Primary Coated Fibre
Tube Filling Compound
Loose Tube(s)
Central Strength Member
Core Wrapping over first layer of loose tube
Peripheral strength member
Core Wrapping over second layer of loose tube
Rip cords
Outer Sheath

Cable Construction Details
- Upto 288 enhance low water peak single mode fibers in full compliance with ITU-T.G.652.D
- Non-metallic anti-buckling FRP rod as Central Strength Member.
- Loose buffer tubes fully filled, S-Z Stranded in two layers
- Cable core fully filled (also available in dry core)
- S-Z core wrapped with polyester tape / waterswellable tape
- UV Stabilized PE Outer sheath, black (also available with FR PVC & HFFR)

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Installation Operating</td>
<td>Temporary Permanent</td>
<td>Installation Operating</td>
</tr>
<tr>
<td>192F</td>
<td>13.9</td>
<td>160</td>
<td>1000</td>
<td>2000</td>
<td>15D 20D</td>
</tr>
<tr>
<td>288F</td>
<td>16.3</td>
<td>225</td>
<td>1500</td>
<td>3000</td>
<td>15D 20D</td>
</tr>
</tbody>
</table>

Color Coding - Fibre

Blue Orange Green Brown Grey White Red Black Yellow Violet Pink Aqua

* Tube coding: Blue (Marker), Orange(Tracer), remaining all natural

Special Features
- Double layer S-Z stranded construction
- Flexible buffer tubes provide easy fibre routing inside closure

Drum Length
2000/ 3000 meters ± 5%

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, r= 20 X D, S Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 360°) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 2000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10) 15 x D, D = Cable D 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours

www.vtlrewa.com | www.birlacable.com
OUTDOOR CABLES

CENTRAL-TUBE ARMOURED CABLE (2 - 48F)

Applications
- In areas where high mechanical load is required
- Suitable in area of rodent menace
- Direct burial & Inside duct - PE Outer Sheath
- Inside duct - FR PVC / HFFR / LSZH Outer Sheath

Typical Cross section of 24 Fibre

Cable Construction Details
- Up to 48 enhanced low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- Metallic anti-buckling steel rod as strength member. Embedded in outer sheath (also available with non metallic strength member FRP rod)
- Loose buffer tube fully filled and centrally placed in the cable
- Water blocking tape wrapping
- Electrolyte chrome plated, corrugated steel tape armoured
- UV Stabalized PE Outer sheath, black (also available with FR PVC & HFFR)

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Installation</td>
<td>Operating</td>
<td>Installation</td>
</tr>
<tr>
<td>12F</td>
<td>8.3</td>
<td>75</td>
<td>1500</td>
<td>750</td>
<td>-10° to +50°C</td>
</tr>
<tr>
<td>24F</td>
<td>9.8</td>
<td>100</td>
<td>1500</td>
<td>750</td>
<td>-10° to +50°C</td>
</tr>
<tr>
<td>48F</td>
<td>11.3</td>
<td>130</td>
<td>1500</td>
<td>750</td>
<td>-10° to +50°C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre

* For Fibre count more than 12F, bundles in multiple of 12F will be formed with color identification binder (Blue, Orange, Green & Brown)

Special Features
- Lighter weight cable for faster and easier installation
- Robust construction.
- Corrugated steel tape acts as protection against rodents and mechanical protection

Drum Length
2000/ 3000/ 4000 meters ± 5%

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, r= 20 X D, 5 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 360° ) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 2500 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10) 10 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5B) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours

www.vtlrewa.com | www.birlacable.com
MULTI-TUBE SINGLE SHEATH ARMoured CABLE (2 - 144F)

Applications
- In areas where high mechanical load is required
- Suitable in area of rodent menace
- Direct burial & Inside duct - PE Outer Sheath
- Inside duct - FR PVC / HFFR / LSZH Outer Sheath

Cable Construction Details
- Up to 144 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- 2/4/6/8/12 fibre per tube combinations are available in 6/8/12 element construction
- Non metallic anti-buckling FRP rod as Central Strength Member. (also available with metallic strength member)
- Loose buffer tubes fully filled, S-Z Stranded
- Cable core fully filled with Thixotropic jelly (also available in dry core design)
- Glass yarn can be used as peripheral strength member
- Cable core is wrapped with polyester tape & water swellable tape
- Electrolytic chrome plated & Corrugated steel tape armouring
- UV Stabilized HDPE outer sheath, black (also available with FR PVC & HFFR)

Typical Cross section of 72 Fibre

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km)</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
<td>Installation</td>
<td>Operating</td>
<td>Installation</td>
<td>Operating</td>
</tr>
<tr>
<td>UPTO 48F</td>
<td>10.9</td>
<td>120</td>
<td>2500</td>
<td>15D</td>
<td>-10° to +50°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-40° to +70°C</td>
</tr>
<tr>
<td>72F</td>
<td>11.3</td>
<td>125</td>
<td>2500</td>
<td>15D</td>
<td>-10° to +50°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-40° to +70°C</td>
</tr>
<tr>
<td>96F</td>
<td>12.6</td>
<td>155</td>
<td>2500</td>
<td>15D</td>
<td>-10° to +50°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-40° to +70°C</td>
</tr>
<tr>
<td>144F</td>
<td>15.1</td>
<td>210</td>
<td>3000</td>
<td>15D</td>
<td>-10° to +50°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-40° to +70°C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

Blue Orange Green Brown Grey White Red Black Yellow Violet Pink Aqua

Special Features
- Single layer S-Z stranded construction
- Corrugated steel tape acts as protection against rodents and mechanical damage.
- Robust construction
- Flexible buffer tubes provide easy fibre routing inside closure

Drum Length
2000/ 3000/ 4000 meters ± 5%

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, r= 20 X D, 5 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 360° ) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 3000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10) 10 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5B) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours
MULTI-TUBE DOUBLE SHEATH, ARMoured Cable (2-144 F)

Applications
• In areas where high mechanical load is required
• Suitable in area of rodent menace
• Direct burial & Inside duct - PE Outer Sheath
• Inside duct - FR PVC / HFFR / LSZH Outer Sheath

Cable Construction Details
• Up to 144 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
• 2/4/6/8/12 fibre per tube combinations are available in 6/8/12 element construction
• Non metallic anti-buckling FRP rod as Central Strength Member (also available with metallic strength member)
• Loose buffer tubes fully filled, S-Z Stranded
• Cable core fully filled with jelly (also available in dry core design)
• Glass yarn can be used as peripheral strength member
• S-Z core wrapped with polyester tape / water swellable tape
• Electrolytic chrome plated & Corrugated steel tape armouring
• UV Stablized HDPE outer sheath, black (also available with FR PVC & HFFR)

Typical Cross section of 72 Fibre

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Installation</td>
<td>Operating</td>
<td>Temporary</td>
</tr>
<tr>
<td>UPTO 48F</td>
<td>12.6</td>
<td>155</td>
<td>2750</td>
<td>1375</td>
<td>15D</td>
</tr>
<tr>
<td>72F</td>
<td>13.0</td>
<td>165</td>
<td>2750</td>
<td>1375</td>
<td>15D</td>
</tr>
<tr>
<td>96F</td>
<td>14.3</td>
<td>195</td>
<td>2750</td>
<td>1375</td>
<td>15D</td>
</tr>
<tr>
<td>144F</td>
<td>16.8</td>
<td>260</td>
<td>3250</td>
<td>1625</td>
<td>15D</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

Special Features
• Single layer S-Z stranded construction
• Corrugated steel tape acts as protection against rodents and mechanical damage.
• Robust construction
• Flexible buffer tubes provide easy fibre routing inside closure

Drum Length
2000/ 3000/ 4000 meters ± 5%

Mechanical Characteristics

Repeateed Bending (IEC 60794-1-2-E6) 30 Cycle, r= 20 X D, 10 Kg Load, D = Cable D
Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 360° ) 10 Kg Weight, L= 2 Mtr
Crush Resistance (IEC 60794-1-2-E3) 4000 N (100 x 100 mm) for 600 sec
Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 10 Nos
Kink Resistance (IEC 60794-1-2-E10) 10 x D, D = Cable D
Water Penetration (IEC 60794-1-2-F5B) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours
Applications
- Direct burial / Inside Duct
- In areas with particularly high mechanical loads
- In areas with rodents

Cable Construction Details
- Upto 144 enhance low water peak single mode fibers in full compliance with ITU-T-G.652.D (also available with G653 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- 2/4/6/8/12 fibre per tube combinations are available in 6/8/12 element construction
- Non-metallic and anti-buckling element FRP rod used as Central Strength Member.
- Loose buffer tubes fully filled Thixotropic Jelly
- Loose buffer tubes S-Z Stranded
- Cable core is fully filled with Thixotropic Jelly (also available in dry core design)
- Cable core is wrapped with Polyester Tape / Water swellable tape
- UV Stabilized PE inner sheath, Black
- Glass Yarns used as dielectric armour
- UV Stabilized PE outer sheath, Black

Special Features
- Single layer stranded construction
- Particularly robust cable
- Flexible buffer tubes provide easy fibre routing inside closure
- All dielectric armoured

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, r = 20 X D, 10 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 360°) 10 Kg Weight, L = 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 2500 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10) 10 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5B) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours

Color Coding - Fibre & Tube
- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Violet
- Pink
- Aqua
MULTI-TUBE STEEL WIRE ARMORED CABLE (2-144 F)

Applications
- In areas where high pulling force is required
- In areas where complex cable run is required
- Direct burial & Inside duct - PE Outer Sheath
- Inside duct - FR PVC / HFFR / LSZH Outer Sheath

Typical Cross section of 48 Fibre

Primary Coated Fibre
Tube Filling Compound
Loose Tube(s)
Central Strength Member
Cabling Filling Compound
Rip Cord
Filler
Core Wrapping over S-Z core
Moisture Barrier
Inner Sheath
Armouring
Core Wrapping over steel wire armour
Outer Sheath

Cable Construction Details
- Up to 144 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- Phosphate coated metallic anti-buckling steel rod as central strength member (also available with non metallic strength member, FRP rod)
- 2/4/6/8/12 fibre per tube combinations are available in 5/6/8/12 element constructions
- Loose buffer tubes fully filled S-Z Stranded
- Cable core fully filled with jelly
- PE coated Aluminium foil as moisture barrier
- UV Stabilized PE inner sheath, black
- Galvanized Steel wire armour, wrapped with polyester tape
- UV stabilized HDPE outer sheath, black (also available with FR PVC & HFFR)

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km)</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
<td>Nominal</td>
<td>Installation Operating Temporary Permanent Installation Operating</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPTO 60F</td>
<td>14.5</td>
<td>350</td>
<td>6000 3000</td>
<td>15D 20D</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>72F</td>
<td>15.0</td>
<td>375</td>
<td>6000 3000</td>
<td>15D 20D</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>96F</td>
<td>17.0</td>
<td>425</td>
<td>6000 3000</td>
<td>15D 20D</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>144F</td>
<td>18.7</td>
<td>520</td>
<td>10000 5000</td>
<td>15D 20D</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

Blue Orange Green Brown Grey White Red Black Yellow Violet Pink Aqua

Special Features
- Single layer S-Z stranded construction.
- Phosphate coating over steel wire CSM prevent Hydrogen generation.
- Aluminium Foils provides excellent protection against Moisture.
- Rugged & robust design

Drum Length
2000 meters ± 5%

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, 20 X D, 10 Kg Load, D = Cable D
- Crush Resistance (IEC 60794-1-2-E3) 6000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 10 Nos at Different Place
- Kink Resistance (IEC 60794-1-2-E10) 20 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours
OUTDOOR CABLES

MULTI-TUBE FRP ROD ARMOURED CABLE (2-144 F)

Applications
- In areas where high pulling force is required
- In areas where complex cable run is required
- Direct burial & Inside duct - PE Outer Sheath
- Inside duct - FR PVC / HFFR / LSZH Outer Sheath

Typical Cross section of 72 Fibre

Primary Coated Fibre
Tube Filling Compound
Loose Tube(s)
Central Strength Member
Cabling Filling Compound
Core Wrapping over S-Z core
Inner Sheath
Armouring
Core Wrapping over FRP Rod armour
Outer Sheath

Cable Construction Details
- Up to 144 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- 2/4/6/8/12 fibre per tube combinations are available in 6/8/12 element construction
- Non-metallic anti-buckling FRP rod as Central Strength Member.
- Loose buffer tubes fully filled, S-Z Stranded
- Cable core is fully filled with Thixotropic Jelly (also available in dry core design)
- Cable core is wrapped with Polyester Tape and water swellable tape
- UV Stabilized PE inner sheath, black
- FRP rods for armouring
- UV stabilized PE outer sheath, black (also available with FR PVC & HFFR)

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km)</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
<td>Nominal</td>
<td>Installation Operating</td>
<td>Temporary Permanent</td>
<td></td>
</tr>
<tr>
<td>UPTO 48F</td>
<td>14.0</td>
<td>180</td>
<td>5000 2500</td>
<td>15D 20D</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>72F</td>
<td>15.0</td>
<td>210</td>
<td>5000 2500</td>
<td>15D 20D</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>96F</td>
<td>16.5</td>
<td>240</td>
<td>5000 2500</td>
<td>15D 20D</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>144F</td>
<td>19.5</td>
<td>340</td>
<td>5000 2500</td>
<td>15D 20D</td>
<td>-10° to +50°C -40° to +70°C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Violet
- Pink
- Aqua

Special Features
- Single layer S-Z stranded construction.
- Completely dielectric construction
- Rugged & robust design

Drum Length
2000/ 3000/ 4000 meters ± 5%

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, 20 X D, 10 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 360°) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 3000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 10 Nos at Different Place
- Kink Resistance (IEC 60794-1-2-E10) 20 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours
MULTI-TUBERIBBON TYPE CABLE (48-576F)

Applications
- Suitable for Duct Installation, pulled & blown

Typical Cross section of 288 Fibre

<table>
<thead>
<tr>
<th>FIBRE CNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N) Installation Operating</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1) Installation Operating</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPTO 96F</td>
<td>19.0</td>
<td>280</td>
<td>3000 1500</td>
<td>15D</td>
<td>-10° to +50° C -40° to +70° C</td>
</tr>
<tr>
<td>144F</td>
<td>20.5</td>
<td>340</td>
<td>3000 1500</td>
<td>15D</td>
<td>-10° to +50° C -40° to +70° C</td>
</tr>
<tr>
<td>288F</td>
<td>24.0</td>
<td>525</td>
<td>3000 1500</td>
<td>15D</td>
<td>-10° to +50° C -40° to +70° C</td>
</tr>
<tr>
<td>576F</td>
<td>30.0</td>
<td>740</td>
<td>3000 1500</td>
<td>15D</td>
<td>-10° to +50° C -40° to +70° C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Violet
- Pink
- Aqua

Special Features
- Single layer S-Z stranded construction
- Flexible buffer tubes provide easy fibre routing inside closure
- Insect & Termite resistant

Drum Length
- 2000/ 3000/ 4000 meters ± 5%

Technical Characteristics

- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, r= 20 X D, 10 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 360° ) 10 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 2500 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10) 10 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5B) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours

Mechanical Characteristics

www.vtlrewa.com | www.birlacable.com
ALL DI-ELECTRIC SELF SUPPORTING AERIAL CABLE (2-144 F)

Applications
- Suitable for self supporting aerial installation with rigorous load conditions, including heavy wind and ice
- Suitable for span length of 100 mtrs (also available for other span length)

Cable Construction Details
- Up to 144 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- Non metallic anti-buckling FRP rod as Central Strength Member
- Loose buffer tubes fully filled, S-Z Stranded
- Cable core fully filled (also available in dry core design)
- Cable core is wrapped with Polyester Tape/water swellable tape
- UV Stabilized PE inner sheath, Black
- High modulus, Aramid peripheral strength member
- UV Stabilized PE Outer sheath, Orange

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Installation</td>
<td>Operating</td>
<td>Installation</td>
</tr>
<tr>
<td>UPTO 48F</td>
<td>12.5</td>
<td>125</td>
<td>5000</td>
<td>2000</td>
<td>15D</td>
</tr>
<tr>
<td>UPTO 72F</td>
<td>13.5</td>
<td>145</td>
<td>5000</td>
<td>2000</td>
<td>15D</td>
</tr>
<tr>
<td>96F</td>
<td>15.0</td>
<td>180</td>
<td>5000</td>
<td>2000</td>
<td>15D</td>
</tr>
<tr>
<td>144F</td>
<td>18.0</td>
<td>250</td>
<td>5000</td>
<td>2000</td>
<td>15D</td>
</tr>
</tbody>
</table>

Special Features
- Single layer S-Z stranded construction
- Offers exceptional strength and corrosion resistance for aerial application
- Flexible buffer tubes provide easy fibre routing inside closure

Drum Length
2000/ 3000/ 4000 meters ± 5%

Color Coding - Fibre & Tube
- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Violet
- Pink
- Aqua

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6): 30 Cycle, 20 X D, 5 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7): 10 Cycle (± 180°) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3): 3000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4): Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10): 20 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5): 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours

OUTDOOR CABLES

Vindhya Telelinks Ltd. Birla Cable Ltd.
**SINGLE-TUBE FIGURE-8 TYPE AERIAL CABLE (2-24 F)**

**Applications**
- Lashed aerial installation with rigorous load conditions, including heavy wind and ice
- Suitable for span length of 100 mtrs

**Technical Characteristics**

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km)</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Upto 12F</td>
<td>6.5x6.0</td>
<td>100</td>
<td>Installation 2000, Operating 1000</td>
<td>15D 20D</td>
<td>-10°C to +50°C, -40°C to +70°C</td>
</tr>
<tr>
<td>16/24F</td>
<td>7.5x6.0</td>
<td>110</td>
<td>Installation 2000, Operating 1000</td>
<td>15D 20D</td>
<td>-10°C to +50°C, -40°C to +70°C</td>
</tr>
<tr>
<td>48F</td>
<td>10.0x6.0</td>
<td>150</td>
<td>Installation 2000, Operating 1000</td>
<td>15D 20D</td>
<td>-10°C to +50°C, -40°C to +70°C</td>
</tr>
</tbody>
</table>

*For fibre count more than 12F, bundles in multiple of 12F will be formed with color identification binder (Blue, Orange, Green & Brown)*

**Color Coding - Fibre & Tube**

- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Violet
- Pink
- Aqua

**Special Features**
- Central Loose tube construction
- Offers exceptional strength and corrosion resistance for aerial application
- Integrated High tensile messenger for superior strength and corrosion resistance.

**Mechanical Characteristics**

- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, 20 x D, 10 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 180° ) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 1000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10) 20 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5) 1 Mtr Water Head, 3 Meter Water Sample, 24 Hours

**Drum Length**

2000/ 3000/ 4000 meters ± 5%
MULTI-TUBE FIGURE-8 TYPE
AERIAL CABLE (2-144 F)

Applications
- Lashed aerial installation with rigorous load conditions, including heavy wind and ice
- Suitable for span length of 100 mtrs

Typical Cross section of 72 Fibre

Cable Construction Details
- Upto 144 enhance low water peak single mode fibers in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- 2/4/6/8/12 fibre per tube combinations are available in 6/8/12 element construction
- Non-metallic anti-buckling FRP rod as Central Strength Member.
- Loose buffer tubes fully filled, S-Z Stranded
- Cable core fully filled (also available in dry core)
- S-Z core wrapped with polyester tape / water swellable tape
- UV Stabilized PE outer sheath, black
- High tensile, galvanised, stranded steel wire used as integrated messenger wire

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Nominal</td>
<td></td>
<td>Installation Operating Temporary Permanent</td>
<td></td>
<td></td>
</tr>
<tr>
<td>UPTO 72F</td>
<td>10.6/6.5</td>
<td>170</td>
<td>6000</td>
<td>2500</td>
<td>15D 20D -10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>96F</td>
<td>12.3/6.5</td>
<td>200</td>
<td>8000</td>
<td>4000</td>
<td>15D 20D -10° to +50°C -40° to +70°C</td>
</tr>
<tr>
<td>144F</td>
<td>14.7/6.5</td>
<td>250</td>
<td>9000</td>
<td>5000</td>
<td>15D 20D -10° to +50°C -40° to +70°C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

Special Features
- Single layer S-Z stranded construction
- Offers exceptional strength and corrosion resistance for aerial application
- Integrated High tensile messenger for superior strength and corrosion resistance.
- Flexible buffer tubes provide easy fibre routing inside closure

Drum Length
2000/ 3000/ 4000 meters ± 5%

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, 20 X D, 5 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 180° ) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 2000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos
- Kink Resistance (IEC 60794-1-2-E10) 20 x D, D = Cable D
- Water Penetration (IEC 60794-1-2-F5) 1 Mtr Water Head, 3 Meter Cable Sample, 24 Hours

www.vtlrewa.com | www.birlacable.com
Applications
- Suitable for Under Ground Armoured Cable Upto 24F
- Axle Counting
- Signaling

Typical Cross section of Hybrid Cable

Central Strength Member: Upcoated Fibre Reinforced Plastic-FRP (Non-metallic)
Loose tube: 2 No. PBT Loose tube filled with Thixotropic Jelly
No. of Quads: 6 Quads with Identification binders
Core wrapping: Polyester Tape applied helically
Moisture Barrier: Aluminium Foil
Inner Sheath: PE Inner Sheath
Screening: Aluminium wire screening
Tape: Barrium Chromate Tape
Intermediate Sheath: PE Intermediate Sheath
Armouring: Double Steel tape armouring
Outer Sheath: PE Outer Sheath

Special Features
- Suitable for underground installation on pathways or roads
- Rodent & Termite proof.
- Robust under all conditions of operation, adjustment, replacement, storage and transport.
- Suitable for lightning prone areas.
- Better tensile strength.

Mechanical Characteristics
- Tensile strength: 5000 N
- Cable Bend Test: 20D
- Repeated Bending test: 5 kg, 30 Cycles
- Torsion Test: 400 N
- Crush Resistance: 4000 N, 600 Sec
- Impact Test: 50 N, 10 Impact
- Kink Test: 20 D
- Operating Temp.: -20°C to +70°C
- Water Penetration Test: 3mtrs sample, 1mtr Height

Physical Characteristics
- Cable Outer Diameter: 30.0 + 4.0 mm
- Nominal Cable Weight: 1500 Kg/KM

Color Coding for Quad:
- No1 - White, Orange, Red, Green
- No2 - White, Blue, Red, Green
- No3 - White, Brown, Red, Green
- No4 - White, Green, Red, Green
- No5 - White, Yellow, Red, Green
- No6 - White, Black, Red, Green
Applications
- Drop Cable suitable for aerial application.

Typical Cross section of 2 Fibre

- Fibre (250 µm)
- Strength Member
- Sheath
- Outer Sheath over messenger wire
- Messenger Wire

Cable Construction Details
- Up to 2 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- FRP / ARP rod as strength member
- Steel wire as integrated messenger wire
- LSZH sheath

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2F</td>
<td>2.0 X 5.0</td>
<td>20</td>
<td>130</td>
<td>30</td>
<td>Installation: -20° to +70°C, Operating: -40° to +70°C</td>
</tr>
</tbody>
</table>

Special Features
- Easy access to the fibres
- Quick Cable Entry & Easy-Peel
- Easy Seal in Closures
- Low insertion and back reflection loss
- Good durability
- High Return Loss
- High temperature stability
- Clean, Gel-Free, Dry Design

Mechanical Characteristics
- Torsion Resistance (IEC 60794-1-2-E11): 50 N (± 180°) 10 Cycles
- Impact Resistance (IEC 60794-1-E4): Height 1 mtr., Weight = 0.3 Kg. 3 Nos at different location

Drum Length
- 500 meters ± 5%
Applications
- Low bending Cable suitable for Indoor Application.

INDOOR DROPCABLE (1/2 F)

Cable Construction
- Up to 2 enhanced low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- FRP / ARP rod as strength member
- LSZH sheath

TECHNICAL CHARACTERISTICS

<table>
<thead>
<tr>
<th>FIBRE COUNTRY</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2F</td>
<td>2.0 X 3.0</td>
<td>8</td>
<td>40</td>
<td>20</td>
<td>-20°C to +70°C</td>
</tr>
</tbody>
</table>

Variations:
- Installation Operating Temporary Permanent

Color Coding - Fibre
- Blue
- Orange

Special Features
- Easy access to the fibres
- Fast Installation
- Quick Cable Entry & Easy-Peel
- Easy Seal in Closures
- Maximization of Duct Space
- Flame Retardant Sheath
- Good durability
- Clean, Gel-Free, Dry Design

Mechanical Characteristics
- Torsion Resistance (IEC 60794-1-2-E1) 40 N (± 180°) 10 Cycles
- Impact Resistance (IEC 60794-1-E4) Height 1 mtr., Weight = 0.3 Kg, 3 Nos at different location

Drum Length
500 meters ± 5%
FTTH Cables

CENTRAL-TUBE AIRBLOWN MICRO CABLE (2-12F)

Applications
- Inside building, suitable for Indoor use

Typical Cross Section Of 4 F Air Blown Cable
- Jelly Filled Loose tube (Thixotropic Jelly)
- Fibers
- Strength Member
- Outer Sheath

Typical Cross Section Of 12f Unitube Micro Cable
- Jelly Filled Loose tube
- Fibers
- Aramid Yarn
- Outer Sheath
- Rip Cord

Cable Construction Details
- Up to 4 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SMFibre)
- Loose buffer tube fully filled
- ARP/KRP/FRP rod as a strength member inside the loose tube
- Insect & Termite resistance PA-12 outer sheath, Orange

Cable Construction Details (Available in 2.5mm & 3.8mm Dia)
- Up to 12 enhance low water peak single mode fibres in full compliance with ITU-T-G.652.D (also available with G655 / G656 / G657 SMFibre)
- Loose buffer tubes fully filled
- Aramid yarns as flexible peripheral strength member
- Rip cords for ripping outer jacket
- Insect & Termite resistance PA-12 outer sheath, Orange

Technical Characteristics - Air Blown & Unitube Micro Cable

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N) Installation Operating Temporary Permanent</th>
<th>BENDING RADIUS (mm) Installation Operating Temporary Permanent</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1) Installation Operating Temporary Permanent</th>
<th>CRUSH RESISTANCE (N) (IEC 60794-1-2-E3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2F</td>
<td>1.7</td>
<td>2.3</td>
<td>40 20</td>
<td>10D 20D</td>
<td>-20° to +50°C -40° to +70°C</td>
<td>100 N/(10x10cm)</td>
</tr>
<tr>
<td>4F</td>
<td>1.9</td>
<td>2.9</td>
<td>40 20</td>
<td>10D 20D</td>
<td>-20° to +50°C -40° to +70°C</td>
<td>100 N/(10x10cm)</td>
</tr>
<tr>
<td>UP TO 12F</td>
<td>2.5</td>
<td>6</td>
<td>150 75</td>
<td>10D 20D</td>
<td>-20° to +50°C -40° to +70°C</td>
<td>500 N/(10x10cm)</td>
</tr>
<tr>
<td>UP TO 12F</td>
<td>3.8</td>
<td>12</td>
<td>200 100</td>
<td>10D 20D</td>
<td>-20° to +50°C -40° to +70°C</td>
<td>1000 N/(10x10cm)</td>
</tr>
</tbody>
</table>

Color Coding - Fibre
- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Purple
- Aqua

Special Features
- Completely dielectric cable / non metallic cable immune to electromagnetic interferences
- Suitable for Micro duct Installation

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, 20 X D, 1 Kg Load, D = Cable Diameter
- Torsion Resistance (IEC 60794-1-2-E7) 2 Cycle (± 180°) 1 Kg Weight, L = 2 Mtr
- Kink Resistance (IEC 60794-1-2-E10) 15 x D, D = Cable D

Drum Length
- 2000/3000/4000 meters ± 5%

www.vtlrewa.com | www.birlacable.com
Applications

- Suitable for installation in Micro Ducts

Cable Construction

- Upto 144 fibers in full compliance with ITU-T-G 652 D (also available with G655 / G656 / G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- Non metallic, anti-buckling FRP rod as Central Strength Member (PE upcoated for 144F)
- Loose buffertubes fully filled, S-Z Stranded
- Rip cords for easy stripping
- Insect and Termite resistant PA-12 outer sheath, Orange (also available with PE outer sheath)

Typical Cross Section of 48 F

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm) Nominal</th>
<th>WEIGHT (Kg./Km) Nominal</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPTO 72F</td>
<td>5.7</td>
<td>27</td>
<td>Installation: 650</td>
<td>15D</td>
<td>-20° to +70° C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operating: 400</td>
<td>20D</td>
<td>-40° to +70° C</td>
</tr>
<tr>
<td>96F</td>
<td>6.8</td>
<td>45</td>
<td>Installation: 1500</td>
<td>15D</td>
<td>-20° to +70° C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operating: 1000</td>
<td>20D</td>
<td>-40° to +70° C</td>
</tr>
<tr>
<td>144F</td>
<td>8.9</td>
<td>70</td>
<td>Installation: 1500</td>
<td>15D</td>
<td>-20° to +70° C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operating: 1000</td>
<td>20D</td>
<td>-40° to +70° C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Violet
- Pink
- Aqua

Special Features

- Completely dielectric cable / non metallic cable immune to electromagnetic interferences
- High level bend capacity
- Low friction jacket design
- Easy access and breakout of Fibers

Mechanical Characteristics

- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, 20 X D, 1 Kg Load, D = Cable Diameter
- Torsion Resistance (IEC 60794-1-2-E7) 2 Cycle (± 360° ) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 1000 N (100 X 100 mm) for 600 sec
- Kink Resistance (IEC 60794-1-2-E10) 15 x D, D = Cable D

Drum Length

2000/ 3000/ 4000 meters ± 5%
Applications

- Communication racks and wiring closets, walls, ceilings, floor ducts, etc
- In the final connection to terminal devices such as workstation and computer terminals for high-speed voice, video, data, and FTTx applications
- Short run office & computer room cabling
- Patch cords, Pigtailed & Jumpers

Cable Construction Details - Simplex

A single optical fibre is tight buffered and surrounded by aramid yarn strength member and jacketed with riser or plenum or LSZH grade jacketing to 2.0/3.0 mm diameter.

Cable Construction Details - Duplex

Two Simplex cables 2.0/3.0 mm are joined as a figure-8 design.

Cable Construction Details - Flat Twin

Duplex Zip cable (2.0/3.0 mm) is jacketed with riser, plenum or LSZH grade jacketing.

Drum Length

1000/ 2000 meters ± 5%
Applications

- Rugged multi fibre cross connect
- Intra building backbone
- Fibre backbone to communication closets

Cable Construction Details

- 4/6/8/12/16 Fibre of Single mode fibre in full compliance with ITU-T G652D (also available with G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- FRP and Aramid Yarns as Strength Member
- PA-12 tight coating on Fibre
- LSZH Compound for sheathing for simplex subunits & outer sheath of cable

Typical Cross Section of 8F

- Simplex Subunits
- LSZH Sheath
- Water Swellable Tape
- Up coated FRP

**FIBRE COUNT** | **DIAMETER (mm)** | **WEIGHT (Kg./Km)** | **TENSILE STRENGTH (N)** | **BENDING RADIUS (mm)** | **TEMPERATURE RANGE (IEC 60794-1-2-F1)**
--- | --- | --- | --- | --- | ---
4F | 8.0 | 60 | Installation 800 Operating 400 | Temporary 15D Permanent 20D | -20° to +70° C | -40° to +70° C |
6F | 9.0 | 79 | Installation 800 Operating 400 | Temporary 15D Permanent 20D | -20° to +70° C | -40° to +70° C |
8F | 10.2 | 95 | Installation 800 Operating 400 | Temporary 15D Permanent 20D | -20° to +70° C | -40° to +70° C |
12F | 12.0 | 120 | Installation 800 Operating 400 | Temporary 15D Permanent 20D | -20° to +70° C | -40° to +70° C |
16F | 13.5 | 160 | Installation 800 Operating 400 | Temporary 15D Permanent 20D | -20° to +70° C | -40° to +70° C |

Special Features

- Individual cores are printed at every 200 mm for identification
- Tight buffer & simplex jacket are available in variety of colours.
- Easy access to the fibres
- Quick Cable Entry

Drum Length

1000 meters ± 10%

Mechanical Characteristics

- Torsion Resistance (IEC 60794-1-2-E7) 2 Cycle (± 360° ) 1 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 1000 N (100 X 100 mm) for 60 sec
- Kink Resistance (IEC 60794-1-2-E10) 15 x D, D = Cable D
Applications
- Rugged multi fibre cross connect
- Intra building backbone
- Fibre backbone to communication closets

Cable Construction Details
- Upto 48 Fibre of Single mode fibre in full compliance with ITU-TG652D (also available with G657 SM Fibre and OM1 / OM2 / OM3 & OM4 MM Fibre)
- Aramid Yarns as Strength Member
- PA-12 / LSZH tight coating on Fibre
- LSZH Compound for outer sheathing

Special Features
- Tight buffer & jacket are available in variety of colours.
- Easy access to the fibres
- Quick Cable Entry

Mechanical Characteristics
- Torsion Resistance (IEC 60794-1-2-E7) 2 Cycle (± 360°) 1 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 1000 N (100 X 100 mm) for 600 sec

Drum Length
1000 meters ± 10%

Table:

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km)</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Installation</td>
<td>Operating</td>
<td>Temporary</td>
<td>Permanent</td>
<td>Installation Operating</td>
</tr>
<tr>
<td>UPTO 6F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-10° to +70° C</td>
</tr>
<tr>
<td>8/12F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-40° to +70° C</td>
</tr>
<tr>
<td>36/48F</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-10° to +70° C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-40° to +70° C</td>
</tr>
</tbody>
</table>

Color Coding - Fibre
- Blue
- Orange
- Green
- Brown
- Grey
- White
- Red
- Black
- Yellow
- Violet
- Pink
- Aqua

* For Fibre count more than 12F, bundles in multiple of 9/12F will be formed with color identification binder (Blue, Orange, Green & Brown)
Copper Telecommunications Cables
**Applications:**
- Local distribution networks - Primary & Secondary
- Junction between exchanges

**Typical Cross section for Armoured Cable**

**Conductor**
- Conductors are made of annealed high conductivity copper.

**Insulation**
- Insulation is made of extruded Foam Skin or Solid PE. Foam Skin consists of an inner layer of uncoloured foam covered by an outer coloured skin.
- Solid PE insulation is made of high density polyethylene.

**Twining**
- Insulated conductors are twisted with a uniform lay to form a pair. The length of the limbs of the pairs is chosen to minimize cross talk.

**Units & Super Units**
- Twisted pairs/super units are stranded together to form a group which constitutes a unit.

**Filling**
- The cable core is filled with a water-resistant compound compatible with the polythene insulation.

**Core**
- The filled core is covered with a helical or longitudinal plastic tape.

**Screening**
- An aluminium tape, coated with a copolymer, is longitudinally applied over the cable core with a specified overlap.

**Sheathing**
- The screened cable core is sheathed with black polythene compound.

**Bedding tape**
- If the cable is required to be armoured, two helical layers of polythene bedding tape are applied over the polythene sheath.

**Armouring**
- The cable is then armoured with two applications of galvanized steel tape applied helically with a specified gap. The second tape covers the gap left by the first tape.

**Jacketing**
- The armoured cable is finally jacketed with black polythene compound.

**Technical Details**

<table>
<thead>
<tr>
<th>Conductor Diameter</th>
<th>Conductor Resistance at 20°C (Solid or Foam Skin Cable)</th>
<th>Attenuation at 150KHz.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40 mm</td>
<td>135 ± 8 Ω/Km</td>
<td>12.00 dB/Km (max.avg.)</td>
</tr>
<tr>
<td>0.50 mm</td>
<td>86 ± 6 Ω/Km</td>
<td>8.25 dB/Km (max. avg.)</td>
</tr>
<tr>
<td>0.63 mm</td>
<td>58 ± 4 Ω/Km</td>
<td>6.30 dB/Km (max. avg.)</td>
</tr>
<tr>
<td>0.90 mm</td>
<td>28 ± 2 Ω/Km</td>
<td>4.40 dB/Km (max. avg.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mutual Capacitance</th>
<th>Capacitance Unbalance</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>52 +/- 3 nF/Km (avg.)</td>
<td>Pair to Pair</td>
<td>Pair to Earth</td>
</tr>
<tr>
<td>52 +/- 4.5 nF/Km (individual)</td>
<td>50 pF/Km (Max. Avg.)</td>
<td>750 pF/Km (max. avg.)</td>
</tr>
<tr>
<td></td>
<td>200 pF/Km (Max.)</td>
<td>3000 pF/Km (max.)</td>
</tr>
</tbody>
</table>

**Insulation Resistance:**
- ELFEXT: 55 dB/Km (min) at 150 KHz
- 67.8 dB/Km (RMS) at 150 KHz
- NEXT: 55 dB (min.) at 150 KHz.
SELF SUPPORTING AERIAL (FIGURE 8 TYPE) TELEPHONE CABLE

Applications:
- Suitable for Aerial Installation
- Local distribution networks - Secondary networks

Features:
- Availability of standard conductor sizes of 0.4, 0.5, 0.6 & 0.9mm diameter
- Figure-8 construction
- Availability upto 200 pairs
- Suitable for installation in Hilly areas/areas where digging is not possible

Technical Details

<table>
<thead>
<tr>
<th>Conductor Diameter</th>
<th>Conductor Resistance at 20°C (Solid or Foam Skin Cable)</th>
<th>Attenuation at 105KHz.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40 mm</td>
<td>135 ± 8 Ω/Km</td>
<td>12.00 dB/Km (max.avg.)</td>
</tr>
<tr>
<td>0.50 mm</td>
<td>86 ± 6 Ω/Km</td>
<td>8.25 dB/Km (max. avg.)</td>
</tr>
<tr>
<td>0.63 mm</td>
<td>58 ± 4 Ω/Km</td>
<td>6.30 dB/Km (max. avg.)</td>
</tr>
<tr>
<td>0.90 mm</td>
<td>28 ± 2 Ω/Km</td>
<td>4.40 dB/Km (max. avg.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mutual Capacitance</th>
<th>Capacitance Unbalance</th>
</tr>
</thead>
<tbody>
<tr>
<td>52 ± 3 nF/Km (avg.)</td>
<td>Pair to Pair</td>
</tr>
<tr>
<td>52 ± 4.5 nF/Km (individual)</td>
<td>50 pF/Km (Max. Avg.)</td>
</tr>
<tr>
<td></td>
<td>200 pF/Km (Max.)</td>
</tr>
<tr>
<td></td>
<td>Pair to Earth</td>
</tr>
<tr>
<td></td>
<td>750 pF/Km (max. avg.)</td>
</tr>
<tr>
<td></td>
<td>3000 pF/Km (max.)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Insulation Resistance : 2500 mega ohms / Km (Min).</th>
</tr>
</thead>
<tbody>
<tr>
<td>ELXT : 55 dB/Km (min) at 150 KHz.</td>
</tr>
<tr>
<td>67.8 dB/Km (RMS) at 150 KHz.</td>
</tr>
</tbody>
</table>
UNDERGROUND JELLY FILLED QUADCABLES

Applications
- Axle counter
- Signalling

Cable Construction Details

Conductor
Round wire of annealed high conductivity copper

Insulation
Each conductor is insulated with solid PE

Quadding
Four insulated conductors stranded to form a star quad.

Laying Up
The quads are assembled to form a symmetrical core with a right hand lay. Polyethylene strings of required diameter may be used as fillers, if necessary.

Filling & core wrapping
The cable core is fully filled with water resistant compound and wrapped with polyethylene.

Moisture Barrier
Aluminium tape coated with co-polymer on both sides is applied longitudinally over the cable core with a specified overlap.

Filling & core wrapping
The cable core is sheathed with black polythenecompound as per BS:6234.

Screening & protection
The cable core with inner sheath is surrounded by a reasonably close fitted screen of Aluminium in the form of wires/ strips. The aluminium screen is wrapped with a single layer of woven tape impregnated with Barium chromate with overlap.

Intermediate sheath
Further protection of screening is provided by extruded PVC/PE sheath over screening.

Armouring
Armouring with two applications of Galvanized steel tape each applied helically with a specified gap.

Jacketing
The armoured cable is finally jacketed with black PVC/PE compound.

Features:
- Suitable for Direct burial application
- Armoured construction
- Availability of standard conductor sizes of 0.9 mm & 1.4 mm diameter.
- Available in 4 and 6 quads.
- Suitable for use on AC systems (earthed or unearthed) for rated voltage up to and including 1100 volts.
- These cables may be used on DC systems for rated voltages up to and including 1500 volts on earth.

Conductor Diameter | Conductor Resistance at 20°C | Attenuation at 20°C
---|---|---
0.90mm | 28 (Each Core) | 4.40 dB/Km (Max. Avg.) at 150KHz
| 56 (loop) | 2 dB/Km (Max. Avg.) at 300-3400 Hz
1.4mm | 11.6 (Each Core) | 0.3 dB/Km (Max. Avg.) at 0.8KHz
| 23.2 (loop) | 0.8 dB/Km (Max. Avg.) at 5KHz
| | 1.3 dB/Km (Max. Avg.) at 21KHz
| | 2.5 dB/Km (Max. Avg.) at 150KHz

Mutual Capacitance | Capacitance Unbalance (800Hz to 1000Hz)
---|---
50 ± 2.5 nF/Km (avg.) | Pair to Pair 300 pf/Km (max.)
50 ± 6 nF/Km (individual) | Pair to Earth 1500 pf/Km (max. avg.)

Insulation Resistance 5000 mega Ωs / Km (min.)
- 0.90mm: ELFEXT: 150 KHz, NEXT: 55 dB (min.) at 150KHz
- 1.4mm: ELFEXT: at 0.8KHz, 5KHz

Reduction Factor ( Field intensity of 50v to 450v): 0.10 (Max)

Characteristic Impedance (Ω)
- 0.90mm: 470 +/- 15% at 0.8KHz
- 195 +/- 15% at 5.0 KHz
- 1.4mm: 310 +/- 15% at 0.8KHz
- 150 +/- 15% at 5.0 KHz
- 110 +/- 15% at 21.0 KHz
- 100 +/- 15% at 150.0 KHz

Color Coding for Quad:
- No1 - White, Orange, Red , Green
- No2 - White, Blue, Red , Green
- No3 - White, Brown, Red , Green
- No4 - White, Green, Red , Green
- No5 - White, Yellow, Red , Green
- No6 - White, Black, Red , Green
Applications

- Railway Signalling

**Cable Construction Details**

**Conductor**

Each conductor shall consist of a solid round/stranded wire(s) of annealed high conductivity copper, smoothly drawn, nominally circular in section, uniform in quality and resistance and free from defects.

**Insulation**

Insulation shall be of PVC Compound conforming to requirements of Type-A compound of IS 5831:1984. Insulation color shall be as per customer specification.

**Core Formation**

The insulated cores shall be laid up together with suitable lay. The outer most layer shall have right hand lay and the successive layers shall be laid with opposite lay. A polyester tape of suitable thickness shall be helically applied normally in cables with double steel tape with suitable overlap.

**Inner Sheath**

The inner sheath shall be of PVC Compound conforming to requirements of Type-ST1 as per IS 5831:1984.

**Armouring**

Armouring shall consist of the either Galvanised Round Wire strip/Double Steel Tape.

**Jacket**

The outer sheath shall be of PVC Compound conforming to requirements of Type-ST1 as per IS 5831:1984.

**Features:**

- Availability of conductor sizes ranging from 1.13 mm to 2.80 mm diameter. Cable size ranging from 2 core to 100 cores with 1.0 Sqmm to 50 Sqmm.
- Suitable for use on AC systems (Earthed or unearthed) for rated voltage upto 1100 volts
- Suitable for use on DC systems for rated voltage upto 1500 volts

**Technical Details**

<table>
<thead>
<tr>
<th>Nominal Cross Sectional Area (Sqmm)</th>
<th>No. of Wires in Conductors</th>
<th>Nom. Dia of Wire (mm)</th>
<th>Max. Resistance at 20°C (Ω/Km)</th>
<th>Nom. Thickness of Insulation (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single Core</td>
<td>Multi Core</td>
<td>Single Core</td>
<td>Multi Core</td>
<td></td>
</tr>
<tr>
<td>1.0</td>
<td>1</td>
<td>1.13</td>
<td>17.689</td>
<td>18.04</td>
</tr>
<tr>
<td>1.5</td>
<td>1</td>
<td>1.4</td>
<td>11.54</td>
<td>11.77</td>
</tr>
<tr>
<td>2.5</td>
<td>1</td>
<td>1.80</td>
<td>6.978</td>
<td>7.118</td>
</tr>
<tr>
<td>2.5</td>
<td>3</td>
<td>1.06</td>
<td>6.843</td>
<td>6.980</td>
</tr>
<tr>
<td>4</td>
<td>1</td>
<td>2.24</td>
<td>4.506</td>
<td>4.596</td>
</tr>
<tr>
<td>4</td>
<td>7</td>
<td>0.85</td>
<td>4.591</td>
<td>4.683</td>
</tr>
<tr>
<td>6</td>
<td>1</td>
<td>2.8</td>
<td>2.884</td>
<td>2.942</td>
</tr>
<tr>
<td>10</td>
<td>7</td>
<td>1.4</td>
<td>1.660</td>
<td>1.693</td>
</tr>
<tr>
<td>16</td>
<td>7</td>
<td>1.70</td>
<td>1.124</td>
<td>1.149</td>
</tr>
<tr>
<td>25</td>
<td>7</td>
<td>2.24</td>
<td>0.6484</td>
<td>0.6614</td>
</tr>
<tr>
<td>35</td>
<td>7</td>
<td>2.50</td>
<td>0.5205</td>
<td>0.5309</td>
</tr>
<tr>
<td>50</td>
<td>19</td>
<td>1.8</td>
<td>0.3706</td>
<td>0.3780</td>
</tr>
</tbody>
</table>

**Insulation Resistance (M-Ω/Km)**

(Dry) (500 V DC for 1 Min. at 50° C) 10 M-Ω/Km upto 2.5 mm² Conductor 5 M-Ω/Km More than 2.5 mm² Conductor

Insulation Resistance (M-Ω/Km) (Wet) (500 V DC for 1 Min. at 50° C) 7.5 M-Ω/Km upto 2.5 mm² Conductor 5 M-Ω/Km More than 2.5 mm² Conductor

**HV Test at Room Temp.** 4 KV AC (rms) or 12 KV DC (for 5 Min.)
Applications

- Indoor Telephone wiring & Signal distribution

Typical Cross section for Armoured Cable

Electrical Parameters At 20ºc

For 0.50 mm Jumper Wire

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit</th>
<th>Tol.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance (Ω/Km)</td>
<td>89</td>
<td>+/- 4</td>
<td></td>
</tr>
<tr>
<td>Re. Unbalance %</td>
<td>Ind 2.5 Ω/Km (Max.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>Min 500 (Ω/Km)</td>
<td>For 1 Minutes with 250-500 V DC</td>
<td></td>
</tr>
<tr>
<td>Dielectric Strength</td>
<td>10KVDC</td>
<td>For 3 Seconds</td>
<td></td>
</tr>
</tbody>
</table>

For 0.65 mm Jumper Wire

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Limit</th>
<th>Tol.</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance (Ω/Km)</td>
<td>62</td>
<td>+/- 4</td>
<td></td>
</tr>
<tr>
<td>Re. Unbalance %</td>
<td>Ind 2.5Ω/Km (Max.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>Min 500 (Ω/Km)</td>
<td>For 1 Minutes with 250-500 V DC</td>
<td></td>
</tr>
<tr>
<td>Dielectric Strength</td>
<td>10KVDC</td>
<td>For 3 Seconds</td>
<td></td>
</tr>
</tbody>
</table>

Colour Code For Conductor Insulation(*)

<table>
<thead>
<tr>
<th>Cond. Size Insulation</th>
<th>Colour 1st Wire(Tip)</th>
<th>Colour 2nd Ring</th>
<th>Dia Over</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50 mm</td>
<td>Black</td>
<td>White</td>
<td>1.40 mm (Nom.)</td>
</tr>
<tr>
<td>0.60 mm</td>
<td>Black</td>
<td>White</td>
<td>1.10 mm (Nom.)</td>
</tr>
</tbody>
</table>

(*) or as desired by the customer

Cable Construction Details

Conductor
Each conductor shall consist of a solid round wire of annealed high conductivity copper, smoothly drawn, nominally circular in section, uniform in quality and resistance and free from defects. The quality of copper shall confirm to IEC-28 or IS-12444.

Insulation
Each conductor shall be insulated with solid polyethylene.

Pairing
Two Insulated conductors shall be twisted together with uniform lay to form a pair.

Length & Tolerance:
500 Mtr. (± 5 %)

Packing:
In Coils, wrapped with polyethylene sheets, packed in Cartons or Plastic Reels
ELECTROPLATED TINNED COPPER WIRE

Applications

- Copper wire armouring & soldering power sectors
- Screening applications in telecom & signaling cables

Data Sheet

A) Electroplated Tinned Wires Suitable for Drawing to Fine Wire [UN-ANNEALED]

<table>
<thead>
<tr>
<th>WIRE SIZE</th>
<th>PARAMETER</th>
<th>SPECIFIED VALUES</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.80 mm</td>
<td>Diameter (Mom)</td>
<td>2.80</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td>Tin Coating (Min)</td>
<td>As per Requirement*</td>
<td>Microns</td>
</tr>
<tr>
<td></td>
<td>Persulphate Test</td>
<td>Should Pass</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WIRE SIZE</th>
<th>PARAMETER</th>
<th>SPECIFIED VALUES</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.60 mm</td>
<td>Diameter (Mom)</td>
<td>1.60</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td>Tin Coating (Min)</td>
<td>As per Requirement*</td>
<td>Microns</td>
</tr>
<tr>
<td></td>
<td>Persulphate Test</td>
<td>Should Pass</td>
<td></td>
</tr>
</tbody>
</table>

*Depends on the Tin Coating Thickness required at finely Drawn Copper Wire
Above Sizes Shall be packed in Returnable MS Baskets.

B) Drawn Tinned Copper [ANNEALED]

<table>
<thead>
<tr>
<th>WIRE SIZE</th>
<th>PARAMETER</th>
<th>SPECIFIED VALUES</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50 mm</td>
<td>Resistance (max)</td>
<td>91</td>
<td>Ω/Km</td>
</tr>
<tr>
<td></td>
<td>Diameter (Nom)</td>
<td>0.492</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td>Elongation (Min)</td>
<td>20</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Tin Coating (Min)</td>
<td>1</td>
<td>Microns</td>
</tr>
<tr>
<td></td>
<td>Persulphate Test</td>
<td>Should Pass</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>WIRE SIZE</th>
<th>PARAMETER</th>
<th>SPECIFIED VALUES</th>
<th>UOM</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.40 mm</td>
<td>Resistance (max)</td>
<td>142</td>
<td>Ω/Km</td>
</tr>
<tr>
<td></td>
<td>Diameter (Nom)</td>
<td>0.392</td>
<td>mm</td>
</tr>
<tr>
<td></td>
<td>Elongation (Min)</td>
<td>18</td>
<td>%</td>
</tr>
<tr>
<td></td>
<td>Tin Coating (Min)</td>
<td>1</td>
<td>Microns</td>
</tr>
<tr>
<td></td>
<td>Persulphate Test</td>
<td>Should Pass</td>
<td></td>
</tr>
</tbody>
</table>

Above Sizes Shall be packed in Returnable 630 mm MS Reels.
Pershulphate Test: Shall be done as per IS 10810 Part 4: 1994
We can make as per customer specifications
Note: Tinned copper wire of other specific wire sizes also available on request.

Advantages of Electro-tinned Wire Over Hot Dip Tinned Wire

- Uniform & Controlled Tin coating
- Better tin bonding with base metal i.e. copper
- Uniform wire elongation
- Re-drawable to finer sizes offering flexibility to customer

www.vtlrewa.com | www.birlacable.com
Powering the world

Power Cables
L.T. AERIAL BUNCHEC CABLE

Applications:
Aerial Bunched Cables are suitable for the following functions:
- In power theft prone areas.
- As replacement of bare lines in rural areas, in woods, other localities & narrow street where space is limited.
- As replacement of bare lines where reliability of supply is of prime importance and where high degree of stability of supply voltage is of importance.
- In hilly terrains where cost of erection of overhead lines of under ground cable becomes very high.
- Where space is limited like those in densely populated area, dense forests.
- As reinforcement of existing system without increasing voltage.
- For temporary supplies.

Cable Construction Details

Conductor
The phase conductor and neutral/street lighting conductors is of H2 or H4 grade aluminium complying with the requirements of IS 8130:1984 and conforms to flexibility class 2 of IS 8130:1984. The size of the street lighting conductor is 16 mm².

Messenger (Neutral Conductor or Otherwise)
The conductor is heat treated aluminium magnesium-silicon alloy wire conforming to IS 398 (Part 4):1979. It is either stranded circular or compacted circular type and has minimum 7 strands with smooth surface.

Insulation
The conductor is insulated with crosslinked polyethylene applied by extrusion. The insulation so applied fits closely on the conductor and it is possible to remove without damaging the conductor. The color of insulation is black, offering UV protection.

Core Identification
The phase conductors is provided with one, two or three ‘ridges’ and outer neutral insulated conductor, if provided, has four ‘ridges’ for quick identification. The street lighting conductor and messenger conductor (if insulated) does not have any identification mark.

Assembly (Laying up)
The required number of insulated phase conductors, one insulated neutral conductor (if required) and a street lighting conductor (if required) is twisted around the bare (or insulated) as required messenger conductor without fillers with a lay not exceeding 35 times the diameter of the insulated phase conductor. The direction of lay is right hand.
Advantages

Aerial Bunched Cables Lines have very high reliability in maintaining services because conductors are insulated with the best dielectric. The benefits of using this line are:

- Safest system because phase conductors are insulated, no risk of danger of accidental touching live conductor.
- Less fault rage on account of good protection against line and ground fault by high winds or falling trees or bird especially in hilly areas & forests as encountered in rural distribution networks.
- High insulation resistance to earth in all seasons and polluted atmospheres. Negligible leakage currents and low losses.
- Multiple circuits of power and telephone cables could be strung in the same set of poles or any other supports like walls etc.
- Better adaptability to run concurrently with existing over-head bare conductor system without any interference.
- High capacitance and low inductance leading to low impedance of lines.
- Total lines costs are reduced and maintenance is very easy.
- Insulation of conductors also helps in preventing corrosion of the conductor.
- Cores being insulated, the chances of power thefts are eliminated.
- These are cheaper than underground power cables.
- Life of Transformers increased as the supply interruptions are minimized.

Technical Particulars (as Per Is: 14255 - 1995)

<table>
<thead>
<tr>
<th>Phase Conductor</th>
<th>Street Lighting Conductor</th>
<th>Messenger Conductor</th>
</tr>
</thead>
<tbody>
<tr>
<td>As per IS 8130 : 1984</td>
<td>As per IS 8130 : 1984</td>
<td>As per IS 398 (Part-4) : 1979</td>
</tr>
</tbody>
</table>

Composition & Designation Of L.t. Aerial Bunched Cables

<table>
<thead>
<tr>
<th>Designation</th>
<th>Complete Bunched Cable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Approx. Overall Dia (mm)</td>
<td>Approx. Total Mass (Kg/Km)</td>
</tr>
<tr>
<td>3C x 16 mm² + 25 mm² + 16 mm²</td>
<td>20</td>
</tr>
<tr>
<td>3C x 25 mm² + 25 mm² + 16 mm²</td>
<td>23</td>
</tr>
<tr>
<td>3C x 35 mm² + 25 mm² + 16 mm²</td>
<td>25</td>
</tr>
<tr>
<td>3C x 50 mm² + 35 mm² + 16 mm²</td>
<td>30</td>
</tr>
<tr>
<td>3C x 70 mm² + 50 mm² + 16 mm²</td>
<td>34</td>
</tr>
<tr>
<td>3C x 95 mm² + 70 mm² + 16 mm²</td>
<td>39</td>
</tr>
<tr>
<td>3C x 120 mm² + 70 mm² + 16 mm²</td>
<td>44</td>
</tr>
</tbody>
</table>

Notes

We can manufacture Aerial Bunched cable as per customer's requirement meeting the National/ International specifications.
OUTDOOR CABLES

INSTRUMENTATION CABLE
Generally to BS:5308 Part-1 (Polyethylene Insulation)

Typical Cross section for Armoured Cable

Outer Sheath
Armour
Inner Sheath
Overall Scrn.
Individual pair Scrn.
Core Insulation
Copper Conductor
Drain Wire

Resistance, as per BS 6360

<table>
<thead>
<tr>
<th>Cross Sectional Area (Sqmm)</th>
<th>Class - 1 (Solid Copper Conductor)</th>
<th>Class - 2 (Stranded Copper Conductor)</th>
<th>Class - 5 (Flexible Copper Conductor)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Maximum Resistance at 20°C/Km</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Plain</td>
<td>Tinned</td>
<td>Plain</td>
</tr>
<tr>
<td>0.50</td>
<td>36.0</td>
<td>36.7</td>
<td>36.0</td>
</tr>
<tr>
<td>0.75</td>
<td>24.5</td>
<td>24.8</td>
<td>24.5</td>
</tr>
<tr>
<td>1.00</td>
<td>18.1</td>
<td>18.2</td>
<td>18.1</td>
</tr>
<tr>
<td>1.50</td>
<td>12.1</td>
<td>12.2</td>
<td>12.1</td>
</tr>
</tbody>
</table>

Max. Mutual Capacitance

<table>
<thead>
<tr>
<th>Cross Sectional Area (Sqmm)</th>
<th>Requirement as per BS:5308 Part-1</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Cable without screen</td>
</tr>
<tr>
<td></td>
<td>Cables with only collective screen (except 1 &amp; 2 pair)</td>
</tr>
<tr>
<td></td>
<td>1 Pair &amp; 2 Pair with collective screen &amp; all cables with individual pair screen</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sqmm</th>
<th>(nF/Km)</th>
<th>(nF/Km)</th>
<th>(nF/Km)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>75</td>
<td>75</td>
<td>115</td>
</tr>
<tr>
<td>1.0</td>
<td>75</td>
<td>75</td>
<td>115</td>
</tr>
<tr>
<td>1.5</td>
<td>85</td>
<td>85</td>
<td>120</td>
</tr>
</tbody>
</table>

L/R ratio (Max):

- 1.5 Sqmm: 40 Micro Henry/Ω
- 0.5/0.75/1.0 Sqmm: 25 Micro Henry/Ω

Note:
1. Type 1 – Unarmoured,
2. Type 2 – Armoured
3. Other conductor Sizes and Types, Alternative Colour Codes, Higher Pair Count and Sheath Material – FR/FRLS/Zero Halogen compounds are available on request.
4. As an alternate, armoured cables shall be supplied with Flat Strip/ Double Steel Tape/ Wire Braided as per customer requirement.

Power Cable
www.vtlrewa.com | www.birlacable.com

Cable Construction Details
Operating Voltage: 300/500V
Size: Available in following no of pairs: 1, 2 (1 Quad), 5, 10, 15, 20, 30 and 50 Pairs
Conductor: Solid/Stranded/Flexible Annealed Bare/Tinned copper class 1/2/5 to BS:6360
Insulation: Conductors are insulated with solid & Pairing/
Quading: Polyethylene Type 03 as per BS:6234, uniformly twisted together to form a pair / quad with a max. lay length of 100 mm, and colour coded for identification.

Colour Code: As per BS:5308 Part-1
Pair shield: Each twisted pair shielded with aluminium backed polyester tape and a tinned copper drain wire of size 0.5mm².
Assembly: Twister pairs are cabled with non-hygroscopic fillers if necessary
Overall shield: The entire assembly is shielded with aluminium polyester tape and a tinned copper drain wire of size 0.5mm².
Bedding: Extruded Black Polyethylene Type 2 C or 03 as per BS:6234.
Wire Armouring: A serving of round galvanized steel wires (applicable for Type 2 Cables)
Sheath: Type 1 & 2 Extruded Black PVC Type TM1 of BS:6746.
Typical Cross section for Armoured Cable

---

### Resistance, as per BS 6360

<table>
<thead>
<tr>
<th>Cross Sectional Area (Sqmm)</th>
<th>Class - 1</th>
<th>Class - 2</th>
<th>Class - 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Solid Copper Conductor</td>
<td>Plain</td>
<td>Tinned</td>
<td>Plain</td>
</tr>
<tr>
<td>Stranded Copper Conductor</td>
<td></td>
<td></td>
<td>Plain</td>
</tr>
<tr>
<td>Flexible Copper Conductor</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0.50</td>
<td>36.0</td>
<td>36.7</td>
<td>36.0</td>
</tr>
<tr>
<td>0.75</td>
<td>24.5</td>
<td>24.8</td>
<td>24.5</td>
</tr>
<tr>
<td>1.00</td>
<td>18.1</td>
<td>18.2</td>
<td>18.1</td>
</tr>
<tr>
<td>1.50</td>
<td>12.1</td>
<td>12.2</td>
<td>12.1</td>
</tr>
</tbody>
</table>

**Max. Mutual Capacitance at 1 kHz.**

- Core to Core: 250 nF/Km
- Core to Screen: 450 nF/Km

**L/R ratio (Max):**

- 1.5 Sqmm: 40 Micro Henry/Ω
- 0.5/0.75/1.0 Sqmm: 25 Micro Henry/Ω

---

### Cable Construction Details

**Operating Voltage:** 300/500V

**Size:** Available in following no of pairs: 1, 2 (1 Quad), 5, 10, 15, 20, 30 and 50 Pairs

**Conductor:** Solid/Stranded/Flexible Annealed Bare/Tinned copper class 1/2/S to BS:6360

**Insulation:** Conductors are insulated with solid Polyethylene Type 03 as per BS:6234, uniformly twisted together to form a pair / quad with a max. lay length of 100 mm, and colour coded for identification.

**Colour Code:** As per BS:5308 Part-1 (for individual pair Shielded cables only)

**Pair shield:** Each twisted pair shielded with aluminium backed polyester tape and a tinned copper drain wire of size 0.5mm².

**Assembly:** Twister pairs are cabled with non-hygroscopic fillers if necessary

**Overall shield:** The entire assembly is shielded with aluminium polyester tape and a tinned copper drain wire of size 0.5mm².

**Bedding:** Extruded Black Polyethylene Type 2 C or 03 as per BS:6234.

**Wire Armouring:** A serving of round galvanized steel wires (applicable for Type 2 Cables) as per BS:1442 is applied.

**Sheath:** Type - 1 & 2 Extruded Black PVC Type TM1 of BS:6746.

---

**Note:**

1. Type 1 – Unarmoured,
2. Type 2 – Armoured
3. Other conductor Sizes and Types, Alternative Colour Codes, Higher Pair Count and Sheath Material – FR/FRLS/Zero Halogen compounds are available on request.
4. As an alternate, armoured cables shall be supplied with Flat Strip/ Double Steel Tape/ Wire Braided as per customer requirement.
### Voltage:
These cables can be used on AC voltage up to & including 1100 V or DC up to & including 1500 V.

### Size:
1.5 Sq.mm. & 2.5 Sq.mm. up to 37 Cores

### Conductor:
Annealed Bare Electrolytic Copper/Aluminum Conductor conforming to IS:8130:1984.

### Insulation:
Conductors are insulated with PVC Compound as per IS:5831:1984.

### Colour of Cores:
- 2 Cores - Red & Black
- 3 Cores - Red, Yellow & Blue
- 3½ & 4 Cores - Red, Yellow, Blue & Black (Reduced Neutral Core in case of 3½ Core).
- 5 Cores - Red, Yellow, Blue, Black and Grey

In case of cable exceeding five cores, two adjacent (counting and direction cores) in each layer shall be colored Blue, Yellow and remaining cores grey, or identification by numbers printed over insulation as per IS:1554 (pt-1):1988.

### Laying of Cores:
Cores are laid up with a suitable lay. The final layer direction shall be kept right hand lay.

### Inner Sheath:
The Inner Sheath is applied over laid up of cores by extrusion/wrapping of thermoplastic material.

### Armouring:
It is applied over inner sheath. It may consist of galvanized Round Steel wires or galvanized Flat Steel Strips conforming to IS 3975. Round Wire armouring is provided, where the calculated diameter under armour is 13.0 mm. Above this, armouring is either round wire/steel strip.

### Outer Sheath:
A final covering of PVC Compound, conforming to IS:5831:1984, is applied over Armouring in case of Armoured Cable or over Inner Sheath in case of Unarmoured cable, called as “Outer Sheath”.

### Construction Variants
1. Solid / Stranded annealed copper conductor & Tinned / Bare
2. General Purpose / HR PVC insulation
3. Cores laid up (filled if needed)
4. FRLS / General Purpose PVC inner sheath
5. FRLS / General purpose PVC outer sheath

### Max. Conductor D.C. Resistance at 20 Deg C - Conductor Size:
- 1.5 sq.mm - 12.1 Ω / km (Bare), 12.2 Ω / km (Tinned)
- 2.5 sq.mm - 7.41 Ω / km (Bare), 7.56 Ω / km (Tinned)

---

**Typical Cross section for Armoured Cable**

<table>
<thead>
<tr>
<th>No. of Cores &amp; Cross Sectional Area</th>
<th>Thickness of PVC Insulation (Nom.)</th>
<th>Thickness of Inner Sheath (min.)</th>
<th>Thickness of Outer Sheath (Nom.)</th>
<th>Approx. O.D.</th>
<th>Approx. Net Weight of Cable</th>
<th>Standard Delivery Length in Mtrs</th>
<th>Current Rating in Ground Direct in Air/ Duct in Ground Duct</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>11.5</td>
<td>155</td>
<td>500/1000</td>
<td>23</td>
</tr>
<tr>
<td>3 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>12.0</td>
<td>177</td>
<td>500/1000</td>
<td>21</td>
</tr>
<tr>
<td>4 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>13.0</td>
<td>208</td>
<td>500/1000</td>
<td>21</td>
</tr>
<tr>
<td>5 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>14.0</td>
<td>243</td>
<td>500/1000</td>
<td>16</td>
</tr>
<tr>
<td>6 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>15.0</td>
<td>261</td>
<td>500/1000</td>
<td>15</td>
</tr>
<tr>
<td>7 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>15.0</td>
<td>271</td>
<td>500/1000</td>
<td>14</td>
</tr>
<tr>
<td>10 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>18.0</td>
<td>368</td>
<td>500/1000</td>
<td>13</td>
</tr>
<tr>
<td>12 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>18.5</td>
<td>416</td>
<td>500/1000</td>
<td>12</td>
</tr>
<tr>
<td>14 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>19.0</td>
<td>466</td>
<td>500/1000</td>
<td>11</td>
</tr>
<tr>
<td>16 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>1.8</td>
<td>20.0</td>
<td>521</td>
<td>500/1000</td>
<td>11</td>
</tr>
<tr>
<td>19 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>2.0</td>
<td>21.5</td>
<td>607</td>
<td>500/1000</td>
<td>10</td>
</tr>
<tr>
<td>24 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>2.0</td>
<td>24.5</td>
<td>749</td>
<td>500/1000</td>
<td>9</td>
</tr>
<tr>
<td>27 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>2.0</td>
<td>25.0</td>
<td>817</td>
<td>500/1000</td>
<td>9</td>
</tr>
<tr>
<td>30 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>2.0</td>
<td>26.0</td>
<td>890</td>
<td>500/1000</td>
<td>9</td>
</tr>
<tr>
<td>37 x 1.5</td>
<td>0.8</td>
<td>0.3</td>
<td>2.0</td>
<td>28.0</td>
<td>1058</td>
<td>500/1000</td>
<td>8</td>
</tr>
<tr>
<td>2 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>13.0</td>
<td>200</td>
<td>500/1000</td>
<td>32</td>
</tr>
<tr>
<td>3 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>13.5</td>
<td>234</td>
<td>500/1000</td>
<td>27</td>
</tr>
<tr>
<td>4 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>14.5</td>
<td>281</td>
<td>500/1000</td>
<td>27</td>
</tr>
<tr>
<td>5 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>15.5</td>
<td>331</td>
<td>500/1000</td>
<td>23</td>
</tr>
<tr>
<td>6 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>16.5</td>
<td>356</td>
<td>500/1000</td>
<td>21</td>
</tr>
<tr>
<td>7 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>16.5</td>
<td>374</td>
<td>500/1000</td>
<td>20</td>
</tr>
<tr>
<td>8 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>18.0</td>
<td>434</td>
<td>500/1000</td>
<td>19</td>
</tr>
<tr>
<td>9 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>19.0</td>
<td>492</td>
<td>500/1000</td>
<td>18</td>
</tr>
<tr>
<td>10 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>1.8</td>
<td>20.5</td>
<td>512</td>
<td>500/1000</td>
<td>18</td>
</tr>
<tr>
<td>12 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>2.0</td>
<td>21.5</td>
<td>602</td>
<td>500/1000</td>
<td>17</td>
</tr>
<tr>
<td>14 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>2.0</td>
<td>22.5</td>
<td>680</td>
<td>500/1000</td>
<td>16</td>
</tr>
<tr>
<td>16 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>2.0</td>
<td>23.5</td>
<td>764</td>
<td>500/1000</td>
<td>15</td>
</tr>
<tr>
<td>19 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>2.0</td>
<td>24.5</td>
<td>870</td>
<td>500/1000</td>
<td>14</td>
</tr>
<tr>
<td>24 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>2.0</td>
<td>28.5</td>
<td>1077</td>
<td>500/1000</td>
<td>13</td>
</tr>
<tr>
<td>27 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>2.0</td>
<td>29.0</td>
<td>1182</td>
<td>500/1000</td>
<td>12</td>
</tr>
<tr>
<td>30 x 2.5</td>
<td>0.9</td>
<td>0.3</td>
<td>2.0</td>
<td>30.0</td>
<td>1292</td>
<td>500/1000</td>
<td>12</td>
</tr>
<tr>
<td>37 x 2.5</td>
<td>0.9</td>
<td>0.4</td>
<td>2.2</td>
<td>32.5</td>
<td>1588</td>
<td>500/1000</td>
<td>11</td>
</tr>
</tbody>
</table>
### Construction Variants

1. Solid / Stranded annealed copper conductor & Tinned / Bare
2. General Purpose / HR PVC insulation
3. Cores laid up (filled if needed)
4. FRLS / General Purpose PVC inner sheath
5. Armouring round Galvanised Steel wires / strips
6. FRLS / General purpose PVC Outersheath

**Max. Conductor D.C. Resistance at 20 Deg C - Conductor Size:**

- 1.5 sq.mm - 12.1 Ω / km (Bare), 12.2 Ω / km (Tinned)
- 2.5 sq.mm - 7.41 Ω / km (Bare), 7.56 Ω / km (Tinned)
PVC INSULATED INDUSTRIAL CABLE (UNSHEATHED)

These are Single cables/cords with rigid as well as flexible annealed bare/tinned copper and aluminium conductors, insulated with PVC.

Applications

These wires are rated for voltages upto and including 450/750 V AC, 50Hz and used for electric power and lighting including cables for outdoor and low temperature use. These cables may be used on DC system for rated voltages upto and including 1500 V to earth.

Features:

- Categories of Cables: Indoor, Outdoor, FR and FR-LSH.
- Temperature Range: -10°C to +70°C or +85°C.
- Available in different colors and stripes.
- Available in Leaded or Lead free grades.
- Packed in Coils of suitable standard lengths.
- BIS Certification vide IS 694 Licence No. CM/L 3050333

Typical Cross section

PVC Insulation

Bunched Copper Conductor

Technical Details

<table>
<thead>
<tr>
<th>Nominal Cross Section Sq mm</th>
<th>Diameter of Single Wire Max mm</th>
<th>Maximum Electrical Resistance @ 20°C (Ω/Km)</th>
<th>Insulation Wall Thickness Nominal mm</th>
<th>Cable Outer Diameter Nominal mm</th>
<th>Maximum mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50</td>
<td>0.21</td>
<td>39.0</td>
<td>0.60</td>
<td>2.3</td>
<td>2.6</td>
</tr>
<tr>
<td>0.75</td>
<td>0.21</td>
<td>26.0</td>
<td>0.60</td>
<td>2.5</td>
<td>2.8</td>
</tr>
<tr>
<td>1.0</td>
<td>0.21</td>
<td>19.5</td>
<td>0.60</td>
<td>2.7</td>
<td>3.0</td>
</tr>
<tr>
<td>1.5</td>
<td>0.26</td>
<td>13.30</td>
<td>0.70</td>
<td>3.1</td>
<td>3.4</td>
</tr>
<tr>
<td>2.5</td>
<td>0.26</td>
<td>7.98</td>
<td>0.80</td>
<td>3.8</td>
<td>4.1</td>
</tr>
<tr>
<td>4.0</td>
<td>0.31</td>
<td>4.95</td>
<td>0.80</td>
<td>4.3</td>
<td>4.8</td>
</tr>
<tr>
<td>6.0</td>
<td>0.31</td>
<td>3.30</td>
<td>0.80</td>
<td>4.9</td>
<td>5.3</td>
</tr>
<tr>
<td>10.0</td>
<td>0.41</td>
<td>1.91</td>
<td>1.00</td>
<td>6.6</td>
<td>7.0</td>
</tr>
<tr>
<td>16.0</td>
<td>0.41</td>
<td>1.21</td>
<td>1.00</td>
<td>7.3</td>
<td>8.1</td>
</tr>
<tr>
<td>25.0</td>
<td>0.41</td>
<td>0.41</td>
<td>0.78</td>
<td>9.0</td>
<td>10.2</td>
</tr>
<tr>
<td>35.0</td>
<td>0.41</td>
<td>0.554</td>
<td>0.65</td>
<td>10.2</td>
<td>11.7</td>
</tr>
<tr>
<td>50.0</td>
<td>0.41</td>
<td>0.386</td>
<td>0.393</td>
<td>12.2</td>
<td>13.9</td>
</tr>
</tbody>
</table>

Note:

Cables upto 300 Sqmm with Flexible conductor (Class 5 of Copper Conductor as per IS 8130) can be supplied.

Cables upto 630 Sqmm with Rigid conductor (Class 1 or 2 of Copper or Aluminium Conductor as per IS 8130) can be supplied.
PVC INSULATED INDUSTRIAL CABLE (SHEATHED)

These are Single and multicore cables/cords with rigid as well as flexible annealed bare/tinned copper and aluminium conductors, insulated and sheathed with PVC.

Applications

These wires are rated for voltages up to and including 450/750 V AC, 50 Hz and used for electric power and lighting including cables for outdoor and low temperature use. These cables may be used on DC system for rated voltages up to and including 1500 V to earth.

Technical Details

<table>
<thead>
<tr>
<th>Nominal Cross Section Sq mm</th>
<th>Diameter of Single Wire Max mm</th>
<th>Maximum Electrical Resistance @ 20°C (Ω/Km)</th>
<th>Insulation Wall Thickness Nominal mm.</th>
<th>Sheath Thickness Nominal mm.</th>
<th>Cable Outer Diameter Nominal mm.</th>
<th>Maximum mm.</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.50</td>
<td>0.21</td>
<td>39.0</td>
<td>0.60</td>
<td>0.90</td>
<td>7.0</td>
<td>7.3</td>
</tr>
<tr>
<td>0.75</td>
<td>0.21</td>
<td>26.0</td>
<td>0.60</td>
<td>0.90</td>
<td>7.4</td>
<td>7.7</td>
</tr>
<tr>
<td>1.0</td>
<td>0.21</td>
<td>19.5</td>
<td>0.60</td>
<td>0.90</td>
<td>7.8</td>
<td>8.1</td>
</tr>
<tr>
<td>1.5</td>
<td>0.26</td>
<td>13.30</td>
<td>0.60</td>
<td>0.90</td>
<td>8.3</td>
<td>9.4</td>
</tr>
<tr>
<td>2.5</td>
<td>0.26</td>
<td>7.98</td>
<td>0.70</td>
<td>1.00</td>
<td>9.9</td>
<td>10.9</td>
</tr>
<tr>
<td>4.0</td>
<td>0.31</td>
<td>4.95</td>
<td>0.80</td>
<td>1.00</td>
<td>11.5</td>
<td>12.4</td>
</tr>
<tr>
<td>6.0</td>
<td>0.31</td>
<td>3.30</td>
<td>0.80</td>
<td>1.00</td>
<td>13.1</td>
<td>13.8</td>
</tr>
<tr>
<td>10.0</td>
<td>0.41</td>
<td>1.91</td>
<td>1.00</td>
<td>1.40</td>
<td>16.5</td>
<td>17.69</td>
</tr>
<tr>
<td>16.0</td>
<td>0.41</td>
<td>1.21</td>
<td>1.00</td>
<td>1.40</td>
<td>18.8</td>
<td>20.6</td>
</tr>
<tr>
<td>25.0</td>
<td>0.41</td>
<td>0.780</td>
<td>1.20</td>
<td>1.50</td>
<td>22.6</td>
<td>25.6</td>
</tr>
<tr>
<td>35.0</td>
<td>0.41</td>
<td>0.554</td>
<td>1.20</td>
<td>1.60</td>
<td>25.3</td>
<td>29.3</td>
</tr>
<tr>
<td>50.0</td>
<td>0.41</td>
<td>0.386</td>
<td>1.40</td>
<td>2.00</td>
<td>30.2</td>
<td>34.6</td>
</tr>
</tbody>
</table>

Note:

a) Multicore Cables up to 120 Sqmm with Rigid conductor (Class 1 or 2 of Copper or Aluminium Conductor as per IS 8130) can be supplied
b) Multicore Cables up to 300 Sqmm with Flexible conductor (Class 5 Copper Conductor as per IS 8130) can be supplied.

Features:

- Categories of Cables: Indoor, Outdoor, FR and FR-LSH.
- Temperature Range: -10° C to +70° C or +85° C.
- Available in different colors and stripes.
- Available in Leaded or Lead free grades.
- Packed in Coils of suitable standard lengths.
- BIS Certification vide IS 694 Licence No. CM/L 3050333

www.vtlrewa.com | www.birlacable.com
Communication....... made simple in a special way

Speciality Cables
STAINLESS STEEL WIRE ARMoured TACTICAL CABLE
FOR MILITARY APPLICATION
Tactical Optical Fibre Cables

Applications
- Indoor / Outdoor
- Suitable for rapid deployment in extreme environmental conditions.
- For military application
- Temporary robust communication lines and mobile applications with Rodent protection

Typical Cross section of 4 Fibre

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>SHEATH</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>UPTO 6F</td>
<td>Double Sheath</td>
<td>6.0 Max. 70</td>
<td>1SD 20D</td>
<td>-10° to +50°C</td>
<td>Operating (-40° to +70°C)</td>
</tr>
<tr>
<td>UPTO 6F</td>
<td>Single Sheath</td>
<td>6.0 Max. 45</td>
<td>1SD 20D</td>
<td>-10° to +50°C</td>
<td>Operating (-40° to +70°C)</td>
</tr>
</tbody>
</table>

Color Coding - Fibre & Tube

Special Features
- Cut resistant, Polyurethane outer jacket
- Flexible construction for multiple deployment
- Performance in wide temp range
- High permissible tensile strength
- Excellent protection against rodents and termites
- Durable in high traffic areas
- Ruggedized cable and easy to use in the field
- High impact and crush resistance

Mechanical Characteristics
- Tensile Strength Permanent: 900 N max.
- Crush Strength: 1000 N/cm
- Impact Resistance: 200 (Min.)
- Flex Resistance: 2000 Cycle (Min.)
- Storage Temperature: -30°C to +65°C
- Breaking Load: >3500 N
- Water Pressure: >500 Bar

Drum Length
500/1000/2000 meters ± 5%
Applications
- For connection of radio based stations

Special Features
- Fiber-fed remote radios (RRs) offer significant power savings
- Reduces wind and weight load on towers; avoid costly tower upgrades.
- Reduces installation cost through fewer cable sheaths (70% less) compared to coax.
- Reduces installation time through fewer cable sheaths.
- Fast and easy connection and upgrade via tower-top terminal.
- Pre-provision for future equipment additions (spare ports).
- Ruggedized cable with corrugated steel tape armoured providing termite resistance, protection against rodents, birds, squirrels & monkey bite.

Cable Construction Details
- Enhance low water peak single mode fibers in full compliance with ITU-T G.652.D (also available with G657 SM Fibre and OM1 /OM2 /OM3 & OM4 MM Fibre)
- Tight coated fiber with Ny-12/LSZH
- Aramid Yarn over tight coated fiber
- LSZH Sheath over Aramid yarn
- Polyester tape wrapping
- Corrugated Steel tape armouring
- Outer Sheath of UV resistant PE, Black

Typical Cross section of 2 Fibre

Technical Characteristics

<table>
<thead>
<tr>
<th>FIBRE COUNT</th>
<th>DIAMETER (mm)</th>
<th>WEIGHT (Kg./Km)</th>
<th>TENSILE STRENGTH (N)</th>
<th>BENDING RADIUS (mm)</th>
<th>TEMPERATURE RANGE (IEC 60794-1-2-F1)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2F</td>
<td>8.5</td>
<td>70</td>
<td>Installation 350</td>
<td>15D</td>
<td>-20° to +50°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Operating 300</td>
<td>20D</td>
<td>-40° to +70°C</td>
</tr>
</tbody>
</table>

Drum Length
1000/2000 meters ± 5%

Mechanical Characteristics
- Repeated Bending (IEC 60794-1-2-E6) 30 Cycle, 20 X D, 5 Kg Load, D = Cable D
- Torsion Resistance (IEC 60794-1-2-E7) 10 Cycle (± 180° ) 5 Kg Weight, L= 2 Mtr
- Crush Resistance (IEC 60794-1-2-E3) 2000 N (100 X 100 mm) for 600 sec
- Impact Resistance (IEC 60794-1-2-E4) Height 500 mm, Weight = 5 Kg, 3 Nos at different points
- Kink Resistance (IEC 60794-1-2-E10) 20 x D, D = Cable D
4 PAIR UTP CAT 5e CABLE
4 Pair Unshielded Twisted Pair (UTP) Data Cable, 24 AWG (0.5mm) Solid Bare Copper Conductors, Polyethylene Insulation, PVC Jacket, Rip Cord.

Applications
These are structured cables suitable for Ethernet Applications and compatible with all known connection systems.

Features:
- Fully Complies to the requirements of TIA/EIA 568 C.2.
- Enhanced performance specification up to 100 MHZ.
- Cables verified for performance with UL Certification and shipped with UL authorized markings and Labels

Colour Code:
Pair 1 : White/Blue - Blue;
Pair 2 : White/Orange - Orange;
Pair 3 : White/Green - Green;
Pair 4 : White/Brown - Brown

Cable Diameter, Standard Length & Packing:
Cable Diameter : 5.5 ± 0.5 mm
Available Packaging : 305 mtr Pull box Or 500 / 1000 mtr spool
Available Colour : Grey or As Per Customer Requirement

Typical Cross section

Characteristics Impedance:
- Conductor Resistance : Max. 9.38 Ω/100m
- Conductor Resistance Unbalance : Max. 5%
- Mutual Capacitance : Max. 5.6 nF/100m
- Capacitance Earth Unbalance : Max. 330 pF/100m
- Propagation Delay @ 1 MHz, 10 MHz & 100 MHz : Max. 570, 545, 538 ns/100 m
- Propagation Delay Skew 1 – 100 MHz : Max. 45 ns/100 m

Technical Details

<table>
<thead>
<tr>
<th>Freq (MHZ)</th>
<th>Return Loss (dB)</th>
<th>Insertion Loss (dB/100m)</th>
<th>NEXT (dB)</th>
<th>PSNEXT (dB)</th>
<th>ACRF/ ELEFEXT (dB)</th>
<th>PSACRF/ ELEFEXT (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>20.0</td>
<td>2.0</td>
<td>65.3</td>
<td>62.3</td>
<td>63.8</td>
<td>60.8</td>
</tr>
<tr>
<td>4.0</td>
<td>23.0</td>
<td>4.1</td>
<td>56.3</td>
<td>53.3</td>
<td>51.8</td>
<td>48.8</td>
</tr>
<tr>
<td>8.0</td>
<td>24.5</td>
<td>5.8</td>
<td>51.8</td>
<td>48.8</td>
<td>45.7</td>
<td>42.7</td>
</tr>
<tr>
<td>10.0</td>
<td>25.0</td>
<td>6.5</td>
<td>50.3</td>
<td>47.3</td>
<td>43.8</td>
<td>40.8</td>
</tr>
<tr>
<td>16.0</td>
<td>25.0</td>
<td>8.2</td>
<td>47.2</td>
<td>44.2</td>
<td>39.7</td>
<td>36.7</td>
</tr>
<tr>
<td>20.0</td>
<td>25.0</td>
<td>9.3</td>
<td>45.8</td>
<td>42.8</td>
<td>37.8</td>
<td>34.8</td>
</tr>
<tr>
<td>25.0</td>
<td>24.3</td>
<td>10.4</td>
<td>44.3</td>
<td>41.3</td>
<td>35.8</td>
<td>32.8</td>
</tr>
<tr>
<td>31.25</td>
<td>23.6</td>
<td>11.7</td>
<td>42.9</td>
<td>39.9</td>
<td>33.9</td>
<td>30.9</td>
</tr>
<tr>
<td>62.5</td>
<td>21.5</td>
<td>17.0</td>
<td>38.4</td>
<td>35.4</td>
<td>27.9</td>
<td>24.9</td>
</tr>
<tr>
<td>100</td>
<td>20.1</td>
<td>22.0</td>
<td>35.3</td>
<td>32.3</td>
<td>23.8</td>
<td>20.8</td>
</tr>
</tbody>
</table>

Note:
Bi-directional Testing for Return Loss, NEXT & PSNEXT

www.vtlrewa.com | www.birlacable.com
4 PAIR FTP CAT 5e CABLE
4 Pair Foil Screened Twisted Pair (FTP) Data Cable, 24 AWG (0.5mm)
Solid Bare Copper Conductors, Polyethylene Insulation, Overall 100% Screened, PVC Sheath

Applications
- Local area network
- Wide area network
- Broadband Connectivity

Typical Cross section

Colours and Coding:
- Pair 1: White/Blue - Blue
- Pair 2: White/Orange - Orange
- Pair 3: White/Green - Green
- Pair 4: White/Brown - Brown

Standard Length & Packing:
- Cable Diameter: 6.0 ± 0.5 mm
- Available Packaging: 305 mtr Pull box Or 500 / 1000 mtr spool

Electrical Characteristics:
- Conductor Resistance: Max. 9.38 Ω/100m
- Conductor Resistance Unbalance: Max. 5 %
- Mutual Capacitance: Max. 5.6 nF/100m
- Capacitance Earth Unbalance: Max. 330 pF/100m
- Propagation Delay @ 1 MHz, 10 MHz & 100 MHz: Max. 570, 545, 538 ns/100 m
- Propagation Delay Skew 1 – 100 MHz: Max. 45 ns/100 m

Typical Cross section

Technical Details

<table>
<thead>
<tr>
<th>Freq (MHz)</th>
<th>Return Loss (dB)</th>
<th>Insertion Loss (dB/100m)</th>
<th>NEXT (dB)</th>
<th>PSNEXT (dB)</th>
<th>ACRF (dB)</th>
<th>PSELFEXT (dB)</th>
<th>PSACRF (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>20.0</td>
<td>26.0</td>
<td>65.3</td>
<td>62.3</td>
<td>63.8</td>
<td>60.8</td>
<td></td>
</tr>
<tr>
<td>4.0</td>
<td>23.0</td>
<td>41.1</td>
<td>56.3</td>
<td>53.3</td>
<td>51.8</td>
<td>48.8</td>
<td></td>
</tr>
<tr>
<td>8.0</td>
<td>24.5</td>
<td>51.8</td>
<td>51.8</td>
<td>48.8</td>
<td>45.7</td>
<td>42.7</td>
<td></td>
</tr>
<tr>
<td>10.0</td>
<td>25.0</td>
<td>6.5</td>
<td>50.3</td>
<td>47.3</td>
<td>43.8</td>
<td>40.8</td>
<td></td>
</tr>
<tr>
<td>16.0</td>
<td>25.0</td>
<td>8.2</td>
<td>47.2</td>
<td>44.2</td>
<td>39.7</td>
<td>36.7</td>
<td></td>
</tr>
<tr>
<td>20.0</td>
<td>25.0</td>
<td>9.3</td>
<td>45.8</td>
<td>42.8</td>
<td>37.8</td>
<td>34.8</td>
<td></td>
</tr>
<tr>
<td>25.0</td>
<td>24.3</td>
<td>10.4</td>
<td>44.3</td>
<td>41.3</td>
<td>35.8</td>
<td>32.8</td>
<td></td>
</tr>
<tr>
<td>31.25</td>
<td>23.6</td>
<td>11.7</td>
<td>42.9</td>
<td>39.9</td>
<td>33.9</td>
<td>30.9</td>
<td></td>
</tr>
<tr>
<td>62.5</td>
<td>21.5</td>
<td>17.0</td>
<td>38.4</td>
<td>35.4</td>
<td>27.9</td>
<td>24.9</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>20.1</td>
<td>22.0</td>
<td>35.3</td>
<td>32.3</td>
<td>23.8</td>
<td>20.8</td>
<td></td>
</tr>
</tbody>
</table>

Note:
Bi-directional Testing for Return Loss, NEXT & PSNEXT

www.vtlrewa.com | www.birlacable.com
4 Pair Foil & Braid Screened Twisted Pair (SFTP) Data Cable, 24 AWG (0.5mm) Solid Bare Copper Conductors, Polyethylene Insulation, Overall 100% Screened, Braided with Tinned Copper PVC Sheath

**Applications**
These are structured cables suitable for Ethernet Applications and compatible with all known connection systems.

**Typical Cross section**
- FR PVC Jacket
- Tinned Copper Braid
- HF Screen (Al-PET) (with 24AWG ATC drain wire)
- Plastic Foil Wrapping
- Insulation PE Solid
- Solid Annealed Bare Copper Conductor

**Electrical Characteristics:**
- Conductor Resistance Max. 9.38 Ω/100m
- Conductor Resistance Unbalance Max. 5%
- Mutual Capacitance Max. 5.6 nF/100m
- Capacitance Earth Unbalance Max. 330 pF/100m
- Propagation Delay @ 1 MHz, 10 MHz & 100 MHz
- Propagation Delay Skew 1 – 100 MHz Max. 45 ns/100 m

**Technical Details**

<table>
<thead>
<tr>
<th>Freq (MHZ)</th>
<th>Return Loss (dB)</th>
<th>Insertion Loss (dB/100m)</th>
<th>NEXT (dB)</th>
<th>PSNEXT (dB)</th>
<th>ACRF ELFEXT (dB)</th>
<th>PSACRF PSELFEXT (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>20.0</td>
<td>2.0</td>
<td>65.3</td>
<td>62.3</td>
<td>63.8</td>
<td>60.8</td>
</tr>
<tr>
<td>4.0</td>
<td>23.0</td>
<td>4.1</td>
<td>56.3</td>
<td>53.3</td>
<td>51.8</td>
<td>48.8</td>
</tr>
<tr>
<td>8.0</td>
<td>24.5</td>
<td>5.8</td>
<td>51.8</td>
<td>48.8</td>
<td>45.7</td>
<td>42.7</td>
</tr>
<tr>
<td>10.0</td>
<td>25.0</td>
<td>6.5</td>
<td>50.3</td>
<td>47.3</td>
<td>43.8</td>
<td>40.8</td>
</tr>
<tr>
<td>16.0</td>
<td>25.0</td>
<td>8.2</td>
<td>47.2</td>
<td>44.2</td>
<td>39.7</td>
<td>36.7</td>
</tr>
<tr>
<td>20.0</td>
<td>25.0</td>
<td>9.3</td>
<td>45.8</td>
<td>42.8</td>
<td>37.8</td>
<td>34.8</td>
</tr>
<tr>
<td>25.0</td>
<td>24.3</td>
<td>10.4</td>
<td>44.3</td>
<td>41.3</td>
<td>35.8</td>
<td>32.8</td>
</tr>
<tr>
<td>31.25</td>
<td>23.6</td>
<td>11.7</td>
<td>42.9</td>
<td>39.9</td>
<td>33.9</td>
<td>30.9</td>
</tr>
<tr>
<td>62.5</td>
<td>21.5</td>
<td>17.0</td>
<td>38.4</td>
<td>35.4</td>
<td>27.9</td>
<td>24.9</td>
</tr>
<tr>
<td>100</td>
<td>20.1</td>
<td>22.0</td>
<td>35.3</td>
<td>32.3</td>
<td>23.8</td>
<td>20.8</td>
</tr>
</tbody>
</table>

**Note:**
Bi-directional Testing for Return Loss, NEXT & PSNEXT

**Colour Code:**
- Pair 1 : White/Blue - Blue;
- Pair 2 : White/Orange - Orange;
- Pair 3 : White/Green - Green;
- Pair 4 : White/Brown - Brown

**Cable Diameter, Standard Length & Packing:**
- Cable Diameter : 7.0 ± 0.5 mm
- Standard Length : 500mtrs ± 10% spools
- Available Packaging : Spools packed in carton box
HYBRID CABLE
4 PAIR Unshielded Twisted Pair (UTP) 100 Ohm Data Cable, 24 AWG (0.5mm)
Solid Bare Copper Conductors, Polyethylene Insulation along with 2 Fibre as per G-652 D Rec placed inside loose tube made of PBTP filled with thixotropic jelly, Core wrapped with polyester tape, PVC /FRLSZH Jacket, Rip Cord.

Applications
The cable is particularly suitable for indoor star-network and internal wiring in connector. Suitable for Ethernet Applications and compatible with all known connection systems.

Typical Cross section

- PVC Sheath (with Rip Cord)
- Central Strength Member
- HDPE Insulation
- Loose tube with fibre and jelly
- Solid Annealed Bare Copper Conductor
- Core Wrapping of Polyester Tape

Electrical Characteristics:
- Conductor Resistance: Max. 9.38 Ω/100m
- Conductor Resistance Unbalance: Max. 5%
- Mutual Capacitance: Max. 5.6 nF/100m
- Capacitance Earth Unbalance: Max. 330 pF/100m
- Propagation Delay @ 1 MHz: Max. 570, 545, 538 ns/100 m
- 10 MHz & 100 MHz Propagation Delay Skew 1 – 100 MHz: Max. 45 ns/100 m

Optical Characteristics:
- Attenuation @ 1310 nm: Max. 0.38 dB/Km
- Attenuation @ 1550 nm: Max. 0.25 dB/Km
- Dispersion, 1288 – 1339 nm: Max. 3.5 ps/nm.km
- Dispersion, 1550 nm: Max. 18 ps/nm.km
- PMD: Max. 0.2 ps/sqrt(km)

Other Characteristics:
- Tensile Force Installation: Max. 0.20 KN
- Tensile Force Installed: Max. 0.10 KN
- Temperature range – Operation: -40° C to + 60° C
- Temperature range – Storage: -40° C to + 70° C
- Temperature range – Installation: -15° C to + 40° C

Features:
- Copper pairs fully Complies to the requirements of TIA/EIA 568 C.2.
- Enhanced performance specification up to 100 MHz.
- Available in Lead Free form as well.
- Fibre used fully complies to ITU-T Rec G652D

Colour Code:
- CU. Pair
- Pair 1: White/Blue
- Fibe 1: White
- Pair 2: White/Orange
- Fibre 2: Red
- Pair 3: White/Green
- Pair 4: White/Brown

Cable Diameter, Standard Length & Packing:
- Cable Diameter: 6.0 ± 0.5 mm
- Cable Weight: 40 Kg/Km Nominal
- Available Packaging: 500 mtr spool ± 10%
- Available Colour: Grey or As Per Customer Requirement
4 PAIR UTP CAT 5e ARMOURED LSZH CABLE

4 Pair Unshielded Twisted Pair (UTP) 100 Ohm Data Cable, 24 AWG (0.5mm) Solid Bare Copper Conductors, Polyethylene Insulation, LSZH Sheath, Steel Wire Armour, LSZH Jacket

Applications
These are structured cables suitable for Ethernet Applications and compatible with all known connection systems.

Features:
- Fully Complies to the transmission requirements of TIA/EIA 568 C.2.
- Enhanced performance specification up to 100 MHz.
- Excellent Mechanical protection with Galvanised Steel Wire Armouring

Colour Code:
Pair 1 : White/Blue -Blue;
Pair 2 : White/Orange -Orange;
Pair 3 : White/Green -Green;
Pair 4 : White/Brown -Brown

Cable Diameter, Standard Length & Packing:
- Cable Diameter : 9.0 ± 0.5 mm
- Available Packaging : 500 mtr ± 10%

Electrical Characteristics:
- Conductor Resistance Max. 9.38 Ω/100m
- Conductor Resistance Unbalance Max. 5 %
- Mutual Capacitance Max. 5.6 nF/100m
- Capacitance Earth Unbalance Max. 330 pF/100m
- Propagation Delay @ 1 MHZ, 10 MHz & 100 MHz
- Propagation Delay Skew 1 – 100 MHz Max. 45 ns/100 m

Technical Details

<table>
<thead>
<tr>
<th>Freq (MHz)</th>
<th>Return Loss (dB)</th>
<th>Insertion Loss (dB)</th>
<th>NEXT (dB)</th>
<th>PSNEXT (dB)</th>
<th>ACRF ELFEXT (dB)</th>
<th>PSACRF PSELFEXT (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>20.0</td>
<td>2.0</td>
<td>65.3</td>
<td>62.3</td>
<td>63.8</td>
<td>60.8</td>
</tr>
<tr>
<td>4.0</td>
<td>23.0</td>
<td>4.1</td>
<td>56.3</td>
<td>53.3</td>
<td>51.8</td>
<td>48.8</td>
</tr>
<tr>
<td>8.0</td>
<td>24.5</td>
<td>5.8</td>
<td>51.8</td>
<td>48.8</td>
<td>45.7</td>
<td>42.7</td>
</tr>
<tr>
<td>10.0</td>
<td>25.0</td>
<td>6.5</td>
<td>50.3</td>
<td>47.3</td>
<td>43.8</td>
<td>40.8</td>
</tr>
<tr>
<td>16.0</td>
<td>25.0</td>
<td>8.2</td>
<td>47.2</td>
<td>44.2</td>
<td>39.7</td>
<td>36.7</td>
</tr>
<tr>
<td>20.0</td>
<td>25.0</td>
<td>9.3</td>
<td>45.8</td>
<td>42.8</td>
<td>37.8</td>
<td>34.8</td>
</tr>
<tr>
<td>25.0</td>
<td>24.3</td>
<td>10.4</td>
<td>44.3</td>
<td>41.3</td>
<td>35.8</td>
<td>32.8</td>
</tr>
<tr>
<td>31.25</td>
<td>23.6</td>
<td>11.7</td>
<td>42.9</td>
<td>39.9</td>
<td>33.9</td>
<td>30.9</td>
</tr>
<tr>
<td>62.5</td>
<td>21.5</td>
<td>17.0</td>
<td>38.4</td>
<td>35.4</td>
<td>27.9</td>
<td>24.9</td>
</tr>
<tr>
<td>100</td>
<td>20.1</td>
<td>22.0</td>
<td>35.3</td>
<td>32.3</td>
<td>23.8</td>
<td>20.8</td>
</tr>
</tbody>
</table>

Note:
Bi-directional Testing for Return Loss, NEXT & PSNEXT

www.vtlrewa.com | www.birlacable.com
4 PAIR UTP CAT 6 CABLE
4 Pair Unshielded Twisted Pair (UTP) Data Cable, 23 AWG (0.56mm) Solid Bare Copper Conductors, Polyethylene Insulation, Separator, PVC Jacket, Rip cord

Applications
These are structured cables for campus, riser and horizontal installations. Suitable for Ethernet Applications and compatible with all known connection systems. Ideal for high performance workstation applications including voice/ data systems, digital video, broadband and voice over internet protocol, etc.

Typical Cross section

Features:
- Fully Complies to the requirements of TIA/EIA 568 C.2.
- Enhanced performance specification up to 250 MHz.
- Cables verified for performance with UL Certification and shipped with UL authorized markings an Labels

Colour Code:
Pair 1 : White/Blue -Blue;
Pair 2 : White/Orange -Orange;
Pair 3 : White/Green -Green;
Pair 4 : White/Brown -Brown

Cable Diameter, Standard Length & Packing:
Cable Diameter : 6.35 mm (Max.)
Available Packaging : 305 mtr Pull box Or 500 / 1000 mtr spool
Available Colour : Grey or As Per Customer Requirement

Electrical Characteristics:
Conductor Resistance Max. 9.38 Ω/100m
Conductor Resistance Unbalance Max. 5 %
Mutual Capacitance Max. 5.6 nF/100m
Capacitance Earth Unbalance Max. 330 pF/100m
Propagation Delay @ 1,10,100,250MHz Max. 570,545,538 & 536 ns/100 m
Propagation Delay Skew 1 – 250 MHz Max. 45 ns/100 m

Technical Details

<table>
<thead>
<tr>
<th>Freq (MHz)</th>
<th>Attenuation (dB/100m)</th>
<th>NEXT (dB)</th>
<th>PSNEXT (dB)</th>
<th>ACRF (ELFEXT) (dB)</th>
<th>PSACRF (PSSELFEXT) (dB)</th>
<th>Return Loss (dB)</th>
<th>TCL (dB)</th>
<th>ETCL (dB)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>2.0</td>
<td>74.3</td>
<td>72.3</td>
<td>67.8</td>
<td>64.8</td>
<td>20.0</td>
<td>40.0</td>
<td>35.0</td>
</tr>
<tr>
<td>4.0</td>
<td>3.8</td>
<td>65.3</td>
<td>63.3</td>
<td>55.8</td>
<td>52.8</td>
<td>23.0</td>
<td>40.0</td>
<td>23.0</td>
</tr>
<tr>
<td>8.0</td>
<td>5.3</td>
<td>60.8</td>
<td>58.8</td>
<td>49.7</td>
<td>46.7</td>
<td>24.5</td>
<td>40.0</td>
<td>16.9</td>
</tr>
<tr>
<td>10.0</td>
<td>6.0</td>
<td>59.3</td>
<td>57.3</td>
<td>47.8</td>
<td>44.8</td>
<td>25.0</td>
<td>40.0</td>
<td>15.0</td>
</tr>
<tr>
<td>16.0</td>
<td>7.6</td>
<td>56.2</td>
<td>54.2</td>
<td>43.7</td>
<td>40.7</td>
<td>25.0</td>
<td>38.0</td>
<td>10.9</td>
</tr>
<tr>
<td>20.0</td>
<td>8.5</td>
<td>54.8</td>
<td>52.8</td>
<td>41.8</td>
<td>38.8</td>
<td>25.0</td>
<td>37.0</td>
<td>9.0</td>
</tr>
<tr>
<td>25.0</td>
<td>9.5</td>
<td>53.3</td>
<td>51.3</td>
<td>39.8</td>
<td>36.8</td>
<td>24.3</td>
<td>36.0</td>
<td>7.0</td>
</tr>
<tr>
<td>31.25</td>
<td>10.7</td>
<td>51.9</td>
<td>49.9</td>
<td>37.9</td>
<td>34.9</td>
<td>23.6</td>
<td>35.1</td>
<td>5.5@</td>
</tr>
<tr>
<td>62.5</td>
<td>15.4</td>
<td>47.4</td>
<td>45.4</td>
<td>31.9</td>
<td>28.9</td>
<td>21.5</td>
<td>32.0</td>
<td>30MHz</td>
</tr>
<tr>
<td>100</td>
<td>19.8</td>
<td>44.3</td>
<td>42.3</td>
<td>27.8</td>
<td>24.8</td>
<td>20.1</td>
<td>30.0</td>
<td>-</td>
</tr>
<tr>
<td>200</td>
<td>29.0</td>
<td>39.8</td>
<td>37.8</td>
<td>21.8</td>
<td>18.8</td>
<td>18.0</td>
<td>27.0</td>
<td></td>
</tr>
<tr>
<td>250</td>
<td>32.8</td>
<td>38.3</td>
<td>36.3</td>
<td>19.8</td>
<td>16.8</td>
<td>17.3</td>
<td>26.0</td>
<td></td>
</tr>
</tbody>
</table>

Note:
Bi-directional Testing for Return Loss, NEXT & PSNEXT
**Applications**

These are drop cables used for broadband connectivity in residential buildings/houses, inter building cabling etc.

---

**Features:**

- Good Mechanical Protection
- Suitable for use outside buildings with UV resistant sheath
- Enhanced performance specification upto 100 MHz

**Colour Code:**

<table>
<thead>
<tr>
<th>Pair</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pair 1</td>
<td>White -Blue;</td>
</tr>
<tr>
<td>Pair 2</td>
<td>White -Orange;</td>
</tr>
<tr>
<td>Pair 3</td>
<td>White -Green;</td>
</tr>
<tr>
<td>Pair 4</td>
<td>White -Brown</td>
</tr>
</tbody>
</table>

**Cable Diameter, Standard Length & Packaging:**

- Cable Diameter: 4 Pair 5.7 ± 0.5 mm
- 2 Pair 4.5 ± 0.5 mm
- Available Packaging: 305 mtr Pull box Or 500 / 1000 mtr spool

**Electrical Characteristics:**

- Conductor Resistance: 86 ± 6 Ω/Km
- Conductor Resistance Unbalance: Max. 5 % (Individual), Max. 2% (Average)
- Mutual Capacitance: Max. 56 nF/Km
- Capacitance Earth Unbalance: Max. 330 pF/100m
- Characteristics Impedance at 1-100 MHz: 100 ± 15Ω
- Propagation Delay Skew 1-100 MHz: Max. 45 ns/100m

**Technical Details**

<table>
<thead>
<tr>
<th>Freq (MHz)</th>
<th>Attenuation (dB/100m) Max</th>
<th>NEXT (dB) Min</th>
<th>Return Loss (dB) Min</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>2.0</td>
<td>62</td>
<td>20</td>
</tr>
<tr>
<td>4.0</td>
<td>4.1</td>
<td>53</td>
<td>23</td>
</tr>
<tr>
<td>8.0</td>
<td>5.8</td>
<td>48</td>
<td>23</td>
</tr>
<tr>
<td>16.0</td>
<td>8.2</td>
<td>44</td>
<td>23</td>
</tr>
<tr>
<td>20.0</td>
<td>9.3</td>
<td>42</td>
<td>23</td>
</tr>
<tr>
<td>25.0</td>
<td>10.4</td>
<td>41</td>
<td>22</td>
</tr>
<tr>
<td>100</td>
<td>22.0</td>
<td>32</td>
<td>16</td>
</tr>
</tbody>
</table>

**Note:**

Bi-directional Testing for Return Loss, NEXT & PSNEXT
2/4 Pair Unshielded twisted pair (UTP) drop Cable, 24 AWG (0.5mm) Solid bare copper conductors, Polyethylene Insulation, PVC Sheath, Aramid Yarns, PE Jacket, Rip Cord.

Applications
These are drop cables used for broadband connectivity in residential buildings/houses, inter building cabling etc.

Features:
- Good Mechanical Protection
- Suitable for use outside buildings with UV resistant sheath
- Enhanced performance specification upto 100 MHz

Colour Code:
Pair 1 : White - Blue;
Pair 2 : White - Orange;
Pair 3 : White - Green;
Pair 4 : White - Brown

Cable Diameter, Standard Length & Packaging:
Cable Diameter  
4 Pair: 7.0 ± 0.5 mm
2 Pair: 5.9 ± 0.5 mm
Available Packaging  
: 305 mtr Pull box Or 500 / 1000 mtr spool

Electrical Characteristics:
- Conductor Resistance 86 ± 6 Ω/Km
- Conductor Resistance Unbalance Max. 5 % (Individual), Max. 2% (Average)
- Mutual Capacitance Max. 56 nF/100m
- Capacitance Earth Unbalance Max. 330 pF/100m
- Propagation Delay Skew 1-100 MHz Max. 45 ns/100m

Technical Details

<table>
<thead>
<tr>
<th>Freq (MHz)</th>
<th>Attenuation (dB/100m)</th>
<th>NEXT (dB) Min.</th>
<th>Return Loss (dB) Min.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.0</td>
<td>2.0</td>
<td>62</td>
<td>20</td>
</tr>
<tr>
<td>4.0</td>
<td>4.1</td>
<td>53</td>
<td>23</td>
</tr>
<tr>
<td>8.0</td>
<td>5.8</td>
<td>48</td>
<td>23</td>
</tr>
<tr>
<td>16.0</td>
<td>8.2</td>
<td>44</td>
<td>23</td>
</tr>
<tr>
<td>20.0</td>
<td>9.3</td>
<td>42</td>
<td>23</td>
</tr>
<tr>
<td>25.0</td>
<td>10.4</td>
<td>41</td>
<td>22</td>
</tr>
<tr>
<td>100</td>
<td>22.0</td>
<td>32</td>
<td>16</td>
</tr>
</tbody>
</table>

Note:
Bi-directional Testing for Return Loss, NEXT & PSNEXT
2 Pair / 4 Pair Data Communication Cable
These are PE Insulated 0.4mm Annealed Tinned Copper Conductor, Overall Screened, Tinned Copper Braid and Halogen Free Flame Retardant Sheathed Communication Cables.

Applications
- Halogen Free cable intended for Indoor use for data communication

Typical Cross section 2 Pair
Sheath FRPE (Halogen Free)
Tinned Copper Braid
HF Screen (Al-PE-Al)
Drain Wire Solid Tinned
Plastic Foil Wrapping
Insulation PE Solid
Solid Annealed Tinned Copper Conductor

Typical Cross section 4 Pair
Sheath FRPE (Halogen Free)
Tinned Copper Braid
HF Screen (Al-PE-Al)
Plastic Foil Wrapping
Insulation PE Solid
Solid Annealed Tinned Copper Conductor

Features:
- UL Approved Cable (UL 444 Listed)
- Excellent level of fire retardancy (Meets UL CMR requirements)
- Good Flexibility
- RoHS Compliant

Electrical Characteristics:

<table>
<thead>
<tr>
<th>2 Pair</th>
<th>4 Pair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor Resistance</td>
<td>Max. 153 Ω/Km</td>
</tr>
<tr>
<td>Conductor Resistance Unbalance</td>
<td>Max. 2 %</td>
</tr>
<tr>
<td>Mutual Capacitance</td>
<td>Nom. 49 nF/Km</td>
</tr>
<tr>
<td>Capacitance Earth Unbalance</td>
<td>Max. 3000 pF/Km</td>
</tr>
<tr>
<td>Insulation Resistance</td>
<td>Min. 5000 MΩKm</td>
</tr>
<tr>
<td>Dielectric Strength</td>
<td>2.5 KV, 2 Sec</td>
</tr>
</tbody>
</table>

Characteristics
- Impedance at 1 MHz: 120 ± 15 Ω
- Attenuation at 1 MHz: Max. 3.3 dB/100m
- Attenuation at 1, 4, 10, 16, 31.2, 62.5, 100MHz: Max. 3.2, 6.5, 10, 13, 17, 23, 30dB/100m
- Near End Cross Talk at 1 MHz: Min. 52 dB
- Near End Cross Talk at 1, 4, 10, 16, 31.2, 62.5, 100MHz: Min. 62, 53, 47, 44, 40, 35, 32dB
- Far End Cross Talk at 1 MHz: Min 56 dB @ 100m
- Propagation Delay: Min. 4.7ns/m; Max. 5.05ns/m

Mechanical & Environmental Properties:

<table>
<thead>
<tr>
<th>2 Pair</th>
<th>4 Pair</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bending Radius</td>
<td>Min. 27 mm</td>
</tr>
<tr>
<td>Pulling Force</td>
<td>Max. 25 N</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>- 20°C to + 75°C</td>
</tr>
<tr>
<td>Fire Properties</td>
<td>UL 1685 FT4, IEC 60332-3 C</td>
</tr>
<tr>
<td>Cable Diameter</td>
<td>4.5 mm ± 0.5mm</td>
</tr>
</tbody>
</table>

Colour Code:
- Pair 1 : White-Blue;
- Pair 2 : White-Orange;
- Pair 3 : White-Green;
- Pair 4 : White-Brown

Standard Length & Packing:
600 mtrs ± 10% OR in further multiples of 150 mtrs
### 24 PAIR DATA COMMUNICATION CABLE

24 Pair Screened Cables with 0.4 mm Copper Conductor, HDPE Insulation, Core Wrap, Screened, PVC Sheathed Communication Cables.

#### Applications
- This is a Screened Cable used for Linking ADSL Networks

#### Electrical Characteristics:
- **Conductor Resistance**: Max. 148 Ω/Km
- **Mutual Capacitance**: Max. 56 nF/Km
- **Capacitance Unbalance (Pair to Pair)**: Max. 500 pF/Km
- **Capacitance Earth Unbalance**: Max. 1500 pF/Km
- **Dielectric Strength**: 1.0 KV DC, 1 Minute
- **Characteristics Impedance at 1 MHz to 16 MHz**: 100 ± 15 Ω
- **Attenuation at 1, 2, 3, 8, 10, 16 MHz**: Max. 2.8, 3.9, 4.5, 7.5, 8.6, 10.5 dB/100m
- **Near End Cross Talk at 1, 2, 3, 8, 10, 16 MHz**: 37 dB

#### Features:
- **Low Cross talk and excellent Electromagnetic Compatibility**
- **Easy to Install**
- **Guaranteed data speeds through enhanced electrical performance upto 16 MHz**
- **RoHS Compliant**
- **Working temperature from –20° C to +75° C**

#### Mechanical & Environmental Properties:
- **Jacket Cold Bend**: No crack after 4 Hrs test (-20° C)
- **Operating Temperature**: -20° C to +75° C
- **Cable Diameter**: 9.5 ± 0.5 mm

#### Colour Code:
- **Pair 1**: White – Blue
- **Pair 2**: White – Orange
- **Pair 3**: White – Green
- **Pair 4**: White – Brown
- **Pair 5**: White – Grey
- **Pair 6**: Red – Blue
- **Pair 7**: Red – Orange
- **Pair 8**: Red – Green
- **Pair 9**: Red – Brown
- **Pair 10**: Red – Grey
- **Pair 11**: Black – Blue
- **Pair 12**: Black – Orange
- **Pair 13**: Black – Green
- **Pair 14**: Black – Brown
- **Pair 15**: Black – Grey
- **Pair 16**: Yellow – Blue
- **Pair 17**: Yellow – Orange
- **Pair 18**: Yellow – Green
- **Pair 19**: Yellow – Brown
- **Pair 20**: Yellow – Grey
- **Pair 21**: White/Blue – Blue
- **Pair 22**: White/Blue – Orange
- **Pair 23**: White/Blue – Green
- **Pair 24**: White/Blue – Brown

#### Standard Length & Packing:
- 500 mtrs ± 10%
- Wound & Packaged in Wooden Drums

![Typical Cross Section](image-url)
Applications
These Cables are used for Internal wiring in Telephone Exchanges, bay-to-bay wiring, equipment to MDF wiring etc and in subscriber offices in large buildings.

Typical Cross section for Armoured Cable

Sheath (PVC)
Optional Screen (Al-PET)
(with ATC drain Wire)
Plastic Wrapping Tape
Insulation PE/PVC Solid
Solid Annealed Tinned Copper Conductor
Rip Cord

Features:
- Available in standard conductor sizes of 0.4mm, 0.5mm & 0.6mm Diameter.
- Available in 1 Pair to 128Pair & more if required.
- Meets the flammability test requirement as per IEC 332 (Part-1)
- TEC approved cable as per GR/WIR-06/03 Mar 2002

Electrical Characteristics:
- Conductor Resistance 0.4mm Max. 143 Ω/Km
  0.5mm Max 92.2 Ω/Km
  0.6mm Max 64.0 Ω/Km
- Capacitance Unbalance (Pair to Pair) Max. 230 pF/Km
- Insulation Resistance at 50°C Min. 50 MΩ Km
- Dielectric Strength 3.0 KV DC, 1 Minute

Environmental Properties:
- Operating Temperature -20° C to + 75° C
- Flameability IEC 332 (Part 1)

Standard Length & Packing:
As per customer requirement.
Wound & Packed in Wooden Drums / Coils / Spools as per size and standard length

Colour Code:
For Insulation of 1 Pair / 2 Pair / 3 Pair / 4 Pair / 5 Pair / 10 Pair / 20 Pair Unit

<table>
<thead>
<tr>
<th>Pair</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White-Blue</td>
</tr>
<tr>
<td>2</td>
<td>White-Orange</td>
</tr>
<tr>
<td>3</td>
<td>White-Green</td>
</tr>
<tr>
<td>4</td>
<td>White-Brown</td>
</tr>
<tr>
<td>5</td>
<td>White-Grey</td>
</tr>
<tr>
<td>6</td>
<td>Red-Blue</td>
</tr>
<tr>
<td>7</td>
<td>Red-Orange</td>
</tr>
<tr>
<td>8</td>
<td>Red-Green</td>
</tr>
<tr>
<td>9</td>
<td>Red-Brown</td>
</tr>
<tr>
<td>10</td>
<td>Red-Grey</td>
</tr>
<tr>
<td>11</td>
<td>Black-Blue</td>
</tr>
<tr>
<td>12</td>
<td>Black-Orange</td>
</tr>
<tr>
<td>13</td>
<td>Black-Green</td>
</tr>
<tr>
<td>14</td>
<td>Black-Brown</td>
</tr>
<tr>
<td>15</td>
<td>Black-Grey</td>
</tr>
<tr>
<td>16</td>
<td>Yellow-Blue</td>
</tr>
<tr>
<td>17</td>
<td>Yellow-Orange</td>
</tr>
<tr>
<td>18</td>
<td>Yellow-Green</td>
</tr>
<tr>
<td>19</td>
<td>Yellow-Brown</td>
</tr>
<tr>
<td>20</td>
<td>Yellow-Grey</td>
</tr>
</tbody>
</table>

For Insulation Of 8 Pair

<table>
<thead>
<tr>
<th>Pair</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White-Blue</td>
</tr>
<tr>
<td>2</td>
<td>White-Orange</td>
</tr>
<tr>
<td>3</td>
<td>White-Green</td>
</tr>
<tr>
<td>4</td>
<td>White-Brown</td>
</tr>
<tr>
<td>5</td>
<td>Red-Blue</td>
</tr>
<tr>
<td>6</td>
<td>Red-Orange</td>
</tr>
<tr>
<td>7</td>
<td>Red-Green</td>
</tr>
<tr>
<td>8</td>
<td>Red-Brown</td>
</tr>
<tr>
<td>9</td>
<td>Red-Grey</td>
</tr>
<tr>
<td>10</td>
<td>Black-Blue</td>
</tr>
<tr>
<td>11</td>
<td>Black-Orange</td>
</tr>
<tr>
<td>12</td>
<td>Black-Green</td>
</tr>
<tr>
<td>13</td>
<td>Black-Brown</td>
</tr>
<tr>
<td>14</td>
<td>Black-Grey</td>
</tr>
<tr>
<td>15</td>
<td>Yellow-Blue</td>
</tr>
<tr>
<td>16</td>
<td>Yellow-Orange</td>
</tr>
<tr>
<td>17</td>
<td>Yellow-Green</td>
</tr>
<tr>
<td>18</td>
<td>Yellow-Brown</td>
</tr>
</tbody>
</table>

For 8 Pair Sub-unit Binder Colours of 32 Pair

<table>
<thead>
<tr>
<th>Binder</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Blue</td>
</tr>
<tr>
<td>2</td>
<td>Orange</td>
</tr>
<tr>
<td>3</td>
<td>Green</td>
</tr>
<tr>
<td>4</td>
<td>Brown</td>
</tr>
</tbody>
</table>

For 32 Pair Unit Binder Colours of 128 Pair

<table>
<thead>
<tr>
<th>Binder</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>White</td>
</tr>
<tr>
<td>2</td>
<td>Red</td>
</tr>
<tr>
<td>3</td>
<td>Black</td>
</tr>
<tr>
<td>4</td>
<td>Yellow</td>
</tr>
</tbody>
</table>
SCREENED PCM CABLES
Solid / Foam Skin Insulated, Individual Screened Twisted Pairs, PVC Sheathed, Overall Screened Telecommunication Cables

Applications:
- Digital equipment wiring to work up to 2 M bits/sec.

Features:
- Available in standard conductor sizes of 0.5mm diameter.
- Available in 1 Pair to 16 Pair and more if required.
- Meets the flammability test requirement as per IEC 332 (Part-1)
- TEC approved cable as per GR/WIR-04/02 Nov 2001
- Excellent protection to cross-talk and Electromagnetic Induction

Electrical Characteristics:

Resistance
Conductor Resistance at 20°C (Ω/Km) 86 ± 3
Resistance Unbalance (%) 2.5 (Max. Indiv.) 1.0 (Max. Avg.)
Insulation Resistance at 500 V Dc (MΩ/Km) 10,000

Dielectric Strength
4.24 KV Dc for 3 seconds Withstands

Capacitance
Mutual capacitance at 1 KHz (nF/Km) 45 ± 5
Earth capacitance unbalance (pF/500m) 2000 (Max.)

Impedance
Characteristics impedance at 1 MHZ (Ω) 120 ± 10

Attenuation
Attenuation at 20° c at 1 MHz (dB/Km) 20 dB/Km (Max.)

Cross Talk [pair to pair within unit]
Near end cross talk at 1 MHZ (dB) 85 (Min.)
Far end cross talk at 1 MHZ (dB/Km) 67 (Min.)

Colour Coding
Each pair shall be Red for Wire-1 and Blue for Wire-2, with serial number of the pair viz. 1 to 10/16, marked at regular interval, on the outer surface of the Aluminium film used for Pair Screening.

Cable Diameter, Standard Length & Packing:
- Cable Diameter: 10 P: 15 mm (Maximum)
  16 P: 18 mm (Maximum)
- Standard Length: 500 mtr ± 10%
- Packing: Wound and packed in wooden drums

www.vtlrewa.com | www.birlacable.com
50 Ohm COAXIAL CABLE
Foamed PE insulated copper conductor, Al foil shield & braid screened Coaxial cable, PE outer sheathed.

Applications
This is a 50 Ohm Coaxial Cable for telecommunication intended for outdoor use with the frequency range of 4 Ghz.

Cable Diameter, Standard Length & Packing:
Cable Diameter : 7.60 mm (Nominal)
Available Packaging : 500 mtr ± 10% spools

Typical Cross section

Electrical Characteristics:
Characteristics Impedence 50 ± 2Ω
Velocity of propagation 85%
Capacitance 78 nF/Km
Loop Resistance Max. 19.0Ω/Km
Attenuation at 140, 350, 900, 1800 & 2000 MHz ≤ 12, 18, 23, 32, 34 dB /100 Mtr.
Dielectric Strength Withstands 1.5 KV, 2 sec.
AUTOMOBILE WIRES
These are PVC Insulated Single Core Thin-Wall type Low Voltage and Light Weight Auto Wires conforming to International DIN, JIS & JASO Standards. Range of Cables includes FLRY, AV, AVS and AVSS types.

Applications
These wires are used in manufacturing of Wiring Harness for Automobile Industry where high flexibility, thermo and mechanical strength are required.

PVC Insulation
[Single Colour or Dual Colour (Strip on base colour)]
Bunched Copper Conductor

Typical Cross section

Features:
Manufactured within the Quality System certified as per TS 16949:2002
- Resistant to heat, oil, abrasion and cold.
- Excellent flexibility.
- Temperature Range of DIN Wires: –40°C to +105°C.
- Temperature Range of JIS & JASO Wires: –40°C to +85°C.
- Available in different colors and stripes.
- Available in Leaded or Lead free grades.
- Packed in Coils of suitable standard lengths.

FLRY-B Type Wires (DIN 72551 Part 5 & 6)

<table>
<thead>
<tr>
<th>Nominal Cross Section</th>
<th>No. of Strands</th>
<th>Diameter of Single Wire</th>
<th>Diameter of Conductor</th>
<th>Electrical Resistance @ 20°C mΩ/m</th>
<th>Insulation Wall Thickness</th>
<th>Cable Outer Diameter</th>
<th>Cable Weight Approx. Kg/Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.35</td>
<td>12</td>
<td>0.21</td>
<td>0.90</td>
<td>47.8 - 52.0</td>
<td>0.20</td>
<td>1.2 – 1.4</td>
<td>4.5</td>
</tr>
<tr>
<td>0.50</td>
<td>16</td>
<td>0.21</td>
<td>1.00</td>
<td>34.1 - 37.1</td>
<td>0.22</td>
<td>1.4 – 1.6</td>
<td>6.6</td>
</tr>
<tr>
<td>0.75</td>
<td>24</td>
<td>0.21</td>
<td>1.20</td>
<td>22.7 - 24.7</td>
<td>0.24</td>
<td>1.7 – 1.9</td>
<td>9.0</td>
</tr>
<tr>
<td>1.0</td>
<td>32</td>
<td>0.21</td>
<td>1.35</td>
<td>17.0 - 18.5</td>
<td>0.24</td>
<td>1.9 – 2.1</td>
<td>11.0</td>
</tr>
<tr>
<td>1.5</td>
<td>30</td>
<td>0.26</td>
<td>1.70</td>
<td>11.7 - 12.7</td>
<td>0.24</td>
<td>2.2 – 2.4</td>
<td>16.0</td>
</tr>
<tr>
<td>2.5</td>
<td>50</td>
<td>0.26</td>
<td>2.20</td>
<td>7.0 - 7.6</td>
<td>0.28</td>
<td>2.7 – 3.0</td>
<td>26.0</td>
</tr>
<tr>
<td>4.0</td>
<td>56</td>
<td>0.31</td>
<td>2.75</td>
<td>4.32 - 4.70</td>
<td>0.32</td>
<td>3.4 – 3.7</td>
<td>42.0</td>
</tr>
<tr>
<td>6.0</td>
<td>84</td>
<td>0.31</td>
<td>3.30</td>
<td>2.85 - 3.10</td>
<td>0.32</td>
<td>4.0 – 4.3</td>
<td>61.0</td>
</tr>
<tr>
<td>10.0</td>
<td>80</td>
<td>0.41</td>
<td>4.40</td>
<td>1.82 (Max)</td>
<td>0.48</td>
<td>5.5 – 6.0</td>
<td>109.0</td>
</tr>
<tr>
<td>16.0</td>
<td>126</td>
<td>0.41</td>
<td>5.50</td>
<td>1.16 (Max)</td>
<td>0.48</td>
<td>7.0 – 7.5</td>
<td>178.0</td>
</tr>
</tbody>
</table>

AVS Type Wires (JASO D 611)

<table>
<thead>
<tr>
<th>Nominal Cross Section</th>
<th>No. of Strands</th>
<th>Diameter of Single Wire</th>
<th>Diameter of Conductor</th>
<th>Electrical Resistance @ 20°C mΩ/m</th>
<th>Insulation Wall Thickness</th>
<th>Cable Outer Diameter</th>
<th>Cable Weight Approx. Kg/Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5</td>
<td>7</td>
<td>0.32</td>
<td>1.0</td>
<td>32.7</td>
<td>0.32</td>
<td>2.1</td>
<td>8.1</td>
</tr>
<tr>
<td>1.25</td>
<td>16</td>
<td>0.32</td>
<td>1.5</td>
<td>14.3</td>
<td>0.32</td>
<td>2.6</td>
<td>15.2</td>
</tr>
<tr>
<td>1.25f</td>
<td>50</td>
<td>0.18</td>
<td>1.5</td>
<td>14.7</td>
<td>0.32</td>
<td>2.6</td>
<td>14.9</td>
</tr>
<tr>
<td>2.00</td>
<td>26</td>
<td>0.32</td>
<td>1.9</td>
<td>8.81</td>
<td>0.32</td>
<td>3.1</td>
<td>23.3</td>
</tr>
<tr>
<td>3.00</td>
<td>41</td>
<td>0.32</td>
<td>2.4</td>
<td>5.59</td>
<td>0.40</td>
<td>3.8</td>
<td>37.6</td>
</tr>
<tr>
<td>5.00</td>
<td>65</td>
<td>0.32</td>
<td>3.0</td>
<td>3.52</td>
<td>0.48</td>
<td>4.6</td>
<td>58.6</td>
</tr>
</tbody>
</table>

AVSS Type Wires (JASO D 611)

<table>
<thead>
<tr>
<th>Nominal Cross Section</th>
<th>No. of Strands</th>
<th>Diameter of Single Wire</th>
<th>Diameter of Conductor</th>
<th>Electrical Resistance @ 20°C mΩ/m</th>
<th>Insulation Wall Thickness</th>
<th>Cable Outer Diameter</th>
<th>Cable Weight Approx. Kg/Km</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.5f</td>
<td>20</td>
<td>0.18</td>
<td>1.0</td>
<td>36.7</td>
<td>0.48</td>
<td>2.4</td>
<td>8.7</td>
</tr>
<tr>
<td>0.75f</td>
<td>30</td>
<td>0.18</td>
<td>1.20</td>
<td>24.4</td>
<td>0.48</td>
<td>2.6</td>
<td>11.0</td>
</tr>
<tr>
<td>0.85</td>
<td>11</td>
<td>0.32</td>
<td>1.20</td>
<td>20.8</td>
<td>0.48</td>
<td>2.6</td>
<td>12.0</td>
</tr>
<tr>
<td>2.00</td>
<td>26</td>
<td>0.32</td>
<td>1.90</td>
<td>8.81</td>
<td>0.48</td>
<td>3.4</td>
<td>24.9</td>
</tr>
<tr>
<td>3.00</td>
<td>41</td>
<td>0.32</td>
<td>2.40</td>
<td>5.59</td>
<td>0.56</td>
<td>4.1</td>
<td>39.6</td>
</tr>
<tr>
<td>5.00</td>
<td>65</td>
<td>0.32</td>
<td>3.00</td>
<td>3.52</td>
<td>0.64</td>
<td>4.9</td>
<td>60.0</td>
</tr>
<tr>
<td>8.00</td>
<td>50</td>
<td>0.45</td>
<td>3.70</td>
<td>2.32</td>
<td>0.72</td>
<td>5.8</td>
<td>89.5</td>
</tr>
<tr>
<td>10.0</td>
<td>65</td>
<td>0.45</td>
<td>4.25</td>
<td>1.80</td>
<td>0.80</td>
<td>6.5</td>
<td>115.7</td>
</tr>
</tbody>
</table>

www.vtlrewa.com | www.birlacable.com
Complete Solutions
For All Needs

EPC Division
We offer complete turnkey services for Engineering, design, supply, construction, installation, testing & commissioning for:

**Telecom Sector**
- Turnkey projects of Optical fibre cabling.
- Complete Infrastructure for Telecom Towers.
- Intracity HDD – Broadband network.

**Power Sector**
- EHV Cabling Projects.
- Rural Electrification projects.
- Transmission Lines.
- Transmission and Distribution substations.
- Lighting Projects.

www.vtlrewa.com | www.birlacable.com
Strength beyond Imagination

FRP Rods
Applications

- It is a di-electric composite cable strength member widely known as FRP/GRP rod.
- It is designed to provide excellent tensile strength performance while maintaining high degree of stiffness, preventing cable buckling over its entire service life.
- It is most suited for loose tube, uni-tube, slotted core or ribbon cable, typically used as central or peripheral reinforcement in fiber optic cables.
- FRP rods serve a dual purpose.
- It provides cable reinforcement during installation, reduces tension on signal carrying optic fiber/conductor.
- The lightweight FRP prevents the cable from sagging in aerial installations and its rigidity and strength takes on the load of cable.
- FRP combines the properties of high performance glass fibers and polymer resin to give a cost effective and superior strength member for cables.
- FRP strength members are also widely used in various copper cables for last mile connectivity as well as power transmission.

Features:

- Light Weight & Excellent Tensile Strength
- Prevent Cable buckling
- Most Suited for Multi-Loose Tube, Uni Tube, Slotted Core & Ribbon Cable Designs.
- Used as central or peripheral reinforcement in fibre optic cable
- Dual Advantage: Reinforcement during installation as well as reduce stress on signal carrying optic fibre/conductor
- Prevent sagging in aerial installation
- Cost effective solution as a strength member

Description

It is manufactured using E-glass fibre with heat resistant thermal resin system. It is available in various coatings including EAA, Tuff, Mega Bond and HDPE, which allows easy handling. Tuff coating provides very smooth surface, whereas Mega bond is suitable for where high adhesion to up jacketing is desired.

Mechanical Property

<table>
<thead>
<tr>
<th>Property</th>
<th>Unit</th>
<th>Specification</th>
<th>Test Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength at Break</td>
<td>Kg/mm²</td>
<td>&gt; 140</td>
<td>ASTM D 3916</td>
</tr>
<tr>
<td>Tensile modulus</td>
<td>Kg/mm²</td>
<td>&gt; 5000</td>
<td>ASTM D 3916</td>
</tr>
<tr>
<td>Elongation at break</td>
<td>%</td>
<td>&gt; 2.5% &amp; &lt; 4%</td>
<td>ASTM D 3916</td>
</tr>
<tr>
<td>Flexural modulus</td>
<td>Kg/mm²</td>
<td>&gt; 5000</td>
<td>ASTM D 790</td>
</tr>
<tr>
<td>Flexural Strength</td>
<td>Kg/mm²</td>
<td>&gt; 70</td>
<td>ASTM D 790</td>
</tr>
<tr>
<td>Water Absorption</td>
<td>%</td>
<td>&lt; 0.1</td>
<td>ASTM D 570</td>
</tr>
<tr>
<td>Min. Bending</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Radius at 25°C C</td>
<td>mm</td>
<td>(=) &lt; 25 D</td>
<td></td>
</tr>
</tbody>
</table>

Typical Packing

<table>
<thead>
<tr>
<th>Description</th>
<th>Spool Dimensions in mm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Flange Dia</td>
<td>630 800 950 1000</td>
</tr>
<tr>
<td>Barrel Dia</td>
<td>315 400 400 450</td>
</tr>
<tr>
<td>Traverse</td>
<td>450 550 550 620</td>
</tr>
<tr>
<td>O.A Width</td>
<td>510 610 610 680</td>
</tr>
<tr>
<td>Centre Bore</td>
<td>80 80 80 80</td>
</tr>
<tr>
<td>CB to DPC</td>
<td>120 120 120 120</td>
</tr>
</tbody>
</table>

FRP Rod

<table>
<thead>
<tr>
<th>Length in K.M</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.8 mm to 1.2 mm</td>
</tr>
<tr>
<td>1.5 mm to 2.0 mm</td>
</tr>
<tr>
<td>2.1 mm to 2.5 mm</td>
</tr>
<tr>
<td>2.5 mm to 3.5 mm</td>
</tr>
<tr>
<td>3.6 mm to 5.0 mm</td>
</tr>
</tbody>
</table>

Physical Property

| Glass content | 75 to 85% by weight |
| Density       | 2.05 to 2.15 gms/ cc |
| Diameter stability | ±0.05 mm of ordered diameter |
| Ovality       | <(=)0.05 mm        |
| Splices       | None               |

www.vtlrewa.com | www.birlacable.com
### Transmission Properties

<table>
<thead>
<tr>
<th>Unit</th>
<th>Values</th>
<th>OM1(62.5/125 μm)</th>
<th>OM2(50/125 μm)</th>
<th>OM3 Values</th>
<th>OM4 Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attenuation at 850 nm</td>
<td>dB/km</td>
<td>$&lt; f = 3.0$</td>
<td>$&lt; f = 2.9$</td>
<td>$&lt; f = 2.9$</td>
<td>$&lt; f = 2.9$</td>
</tr>
<tr>
<td>Attenuation at 1300 nm</td>
<td>dB/km</td>
<td>$&lt; f = 0.7$</td>
<td>$&lt; f = 0.9$</td>
<td>$&lt; f = 0.9$</td>
<td>$&lt; f = 0.9$</td>
</tr>
<tr>
<td>Bandwidth at 850 nm</td>
<td>MHz/km</td>
<td>$&gt; f = 200$</td>
<td>$&gt; f = 500$</td>
<td>$&gt; f = 1500$</td>
<td>$&gt; f = 3500$</td>
</tr>
<tr>
<td>Bandwidth at 1300 nm</td>
<td>MHz/km</td>
<td>$&gt; f = 500$</td>
<td>$&gt; f = 500$</td>
<td>$&gt; f = 500$</td>
<td>$&gt; f = 500$</td>
</tr>
<tr>
<td>Numerical Aperture</td>
<td></td>
<td>$0.275 ± 0.015$</td>
<td>$0.200 ± 0.015$</td>
<td>$0.200 ± 0.015$</td>
<td>$0.200 ± 0.015$</td>
</tr>
</tbody>
</table>

### Geometrical Properties

<table>
<thead>
<tr>
<th>Unit</th>
<th>Values</th>
<th>OM1(62.5/125 μm)</th>
<th>OM2(50/125 μm)</th>
<th>OM3 Values</th>
<th>OM4 Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Core diameter</td>
<td>μm</td>
<td>$62.5 ± 2.5$</td>
<td>$50.0 ± 3.0$</td>
<td>$50.0 ± 3.0$</td>
<td>$50.0 ± 3.0$</td>
</tr>
<tr>
<td>Cladding diameter</td>
<td>μm</td>
<td>$125 ± 1$</td>
<td>$125 ± 2$</td>
<td>$125 ± 2$</td>
<td>$125 ± 2$</td>
</tr>
<tr>
<td>Core noncircularity</td>
<td>%</td>
<td>$&lt; f = 5$</td>
<td>$&lt; f = 5$</td>
<td>$&lt; f = 5$</td>
<td>$&lt; f = 5$</td>
</tr>
<tr>
<td>Cladding noncircularity</td>
<td>%</td>
<td>$&lt; f = 1$</td>
<td>$&lt; f = 2$</td>
<td>$&lt; f = 2$</td>
<td>$&lt; f = 2$</td>
</tr>
<tr>
<td>Core concentricity error</td>
<td>μm</td>
<td>$&lt; f = 1.5$</td>
<td>$&lt; f = 2.0$</td>
<td>$&lt; f = 2.0$</td>
<td>$&lt; f = 2.0$</td>
</tr>
<tr>
<td>Primary coating diameter</td>
<td>μm</td>
<td>$245 ± 10$</td>
<td>$245 ± 10$</td>
<td>$245 ± 10$</td>
<td>$245 ± 10$</td>
</tr>
</tbody>
</table>

### Mechanical Properties

<table>
<thead>
<tr>
<th>Unit</th>
<th>Values</th>
<th>OM1(62.5/125 μm)</th>
<th>OM2(50/125 μm)</th>
<th>OM3 Values</th>
<th>OM4 Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prooftest form in minimum strain level and Duration of prooftest</td>
<td>kpsi, Sec</td>
<td>$&gt;/ = 100$</td>
<td>$&gt;/ = 100$</td>
<td>$&gt;/ = 100$</td>
<td>$&gt;/ = 100$</td>
</tr>
<tr>
<td>Change in Attenuation with Bending</td>
<td>100 Turns on 75mm Dia. Mandrel at 850</td>
<td>dB</td>
<td>$&lt; f = 0.50$</td>
<td>$&lt; f = 0.50$</td>
<td>$&lt; f = 0.50$</td>
</tr>
<tr>
<td></td>
<td>100 Turns on 75mm Dia. Mandrel at 1300</td>
<td>dB</td>
<td>$&lt; f = 0.50$</td>
<td>$&lt; f = 0.50$</td>
<td>$&lt; f = 0.50$</td>
</tr>
<tr>
<td>Strippability force to remove primary coating of fibre</td>
<td>Newton</td>
<td>1.3 to 8.9</td>
<td>1.3 to 8.9</td>
<td>1.3 to 8.9</td>
<td>1.3 to 8.9</td>
</tr>
<tr>
<td></td>
<td>Radius of curve</td>
<td>Mtr</td>
<td>$/&gt; = 4 Mtr$</td>
<td>$/&gt; = 4 Mtr$</td>
<td>$/&gt; = 4 Mtr$</td>
</tr>
<tr>
<td>Dynamic tensile strength (unaged)</td>
<td>kpsi</td>
<td>$/&gt; = 550$</td>
<td>$/&gt; = 550$</td>
<td>$/&gt; = 550$</td>
<td>$/&gt; = 550$</td>
</tr>
<tr>
<td>Dynamic tensile strength (-aged)</td>
<td>kpsi</td>
<td>$/&gt; = 440$</td>
<td>$/&gt; = 440$</td>
<td>$/&gt; = 440$</td>
<td>$/&gt; = 440$</td>
</tr>
<tr>
<td>Dynamic Fatigue</td>
<td></td>
<td>$/&gt; = 18$</td>
<td>$/&gt; = 18$</td>
<td>$/&gt; = 18$</td>
<td>$/&gt; = 18$</td>
</tr>
</tbody>
</table>

### Environmental Properties

<table>
<thead>
<tr>
<th>Unit</th>
<th>Values</th>
<th>OM1(62.5/125 μm)</th>
<th>OM2(50/125 μm)</th>
<th>OM3 Values</th>
<th>OM4 Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induced attenuation at 850 nm &amp; 1300 nm for Temp. &amp; Humidity cycle from -10°C to +85°C at 90% humidity (min)</td>
<td>dB/Km</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
</tr>
<tr>
<td>Induced attenuation at 850 nm &amp; 1300 nm for Temperature cycle from -60°C to +85°C, ref temp 23°C</td>
<td>dB/Km</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
</tr>
<tr>
<td>Induced attenuation at 850 nm &amp; 1300 nm for Water Immersion at 23 ± 2°C</td>
<td>dB/Km</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
</tr>
<tr>
<td>Induced attenuation at 850 nm &amp; 1300 nm for Accelerated Ageing (Temperature) at 85 ± 2°C, ref temp 23°C</td>
<td>dB/Km</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
<td>$&lt; f = 0.15$</td>
</tr>
</tbody>
</table>
### Transmission Properties

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Attenuation at 1310 nm</strong></td>
<td>dB/km</td>
<td>&lt; / = 0.35</td>
</tr>
<tr>
<td><strong>Attenuation at 1550 nm</strong></td>
<td>dB/km</td>
<td>&lt; / = 0.22</td>
</tr>
<tr>
<td><strong>Attenuation at 1625 nm</strong></td>
<td>dB/km</td>
<td>&lt; / = 0.25</td>
</tr>
<tr>
<td><strong>Attenuation at 1383± 3 nm</strong></td>
<td>dB/km</td>
<td>&lt; / = 0.32</td>
</tr>
<tr>
<td><strong>Point discontinuity</strong></td>
<td>dB</td>
<td>&lt; / = 0.05</td>
</tr>
<tr>
<td><strong>Difference in maximum attenuation in the range from 1285 to 1330 nm w.r.t attenuation at 1310 nm</strong></td>
<td>dB/km</td>
<td>&lt; / = 0.03</td>
</tr>
<tr>
<td><strong>Difference in maximum attenuation in the range from 1530 to 1570 nm w.r.t attenuation at 1550 nm</strong></td>
<td>dB/km</td>
<td>&lt; / = 0.02</td>
</tr>
<tr>
<td><strong>Max. chromatic dispersion at 1285-1330 nm wavelength range</strong></td>
<td>ps/nm.km</td>
<td>&lt; / = 3.5</td>
</tr>
<tr>
<td><strong>Max. chromatic dispersion at 1270-1340 nm wavelength range</strong></td>
<td>ps/nm.km</td>
<td>&lt; / = 5.3</td>
</tr>
<tr>
<td><strong>Max. chromatic dispersion at 1530-1565 nm wavelength range</strong></td>
<td>ps/nm.km</td>
<td>2.0 to 6.0</td>
</tr>
<tr>
<td><strong>Max. chromatic dispersion at 12650-1625 nm wavelength range</strong></td>
<td>ps/nm.km</td>
<td>4.5 to 11.2</td>
</tr>
<tr>
<td><strong>Chromatic dispersion at 1550 nm</strong></td>
<td>ps/nm.km</td>
<td>&lt; / = 18.0</td>
</tr>
<tr>
<td><strong>Zero dispersion wavelength</strong></td>
<td>nm</td>
<td>1302 to 1322</td>
</tr>
<tr>
<td><strong>Zero dispersion slope</strong></td>
<td>nm/2.km</td>
<td>&lt; / = 0.02</td>
</tr>
<tr>
<td><strong>PMD at 1310 &amp; 1550 nm (individual)</strong></td>
<td>ps/√rt.km</td>
<td>&lt; / = 0.2</td>
</tr>
<tr>
<td><strong>Link PMD</strong></td>
<td>ps/√rt.km</td>
<td>&lt; / = 0.06</td>
</tr>
<tr>
<td><strong>Fibre cut-off wavelength</strong></td>
<td>nm</td>
<td>&lt; / = 1320</td>
</tr>
<tr>
<td><strong>Mode field diameter range at 1310 nm</strong></td>
<td>μm</td>
<td>9.2 ± 0.4</td>
</tr>
<tr>
<td><strong>Mode field diameter range at 1550 nm</strong></td>
<td>μm</td>
<td>10.5 ± 0.5</td>
</tr>
</tbody>
</table>

### Geometrical Properties

<table>
<thead>
<tr>
<th>Unit</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cladding diameter</td>
<td>μm</td>
<td>125 ± 0.7</td>
<td>125 ± 0.7</td>
</tr>
<tr>
<td>Cladding noncircularity</td>
<td>%</td>
<td>&lt; / = 0.7</td>
<td>&lt; / = 0.7</td>
</tr>
<tr>
<td>Primary coating diameter (uncoloured)</td>
<td>μm</td>
<td>245 ± 5</td>
<td>245 ± 5</td>
</tr>
<tr>
<td>Core/Clad concentricity error</td>
<td>μm</td>
<td>&lt; / = 0.5</td>
<td>&lt; / = 0.5</td>
</tr>
<tr>
<td>Coating / Cladding Concentricity error</td>
<td>μm</td>
<td>&lt; / = 10</td>
<td>&lt; / = 12</td>
</tr>
</tbody>
</table>

### Mechanical Properties

<table>
<thead>
<tr>
<th>Unit</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Change in Attenuation with Bending</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>100 Turns on 60mm Dia. Mandrel at 1310</td>
<td>dB</td>
<td>&lt; / = 0.05</td>
<td>0</td>
</tr>
<tr>
<td>100 Turns on 60mm Dia. Mandrel at 1550</td>
<td>dB</td>
<td>&lt; / = 0.05</td>
<td>&lt; / = 0.05</td>
</tr>
<tr>
<td>100 Turns on 60mm Dia. Mandrel at 1625</td>
<td>dB</td>
<td>&lt; / = 0.05</td>
<td>&lt; / = 0.01</td>
</tr>
<tr>
<td>1 Turn on 32 mm Dia. Mandrel at 1310</td>
<td>dB</td>
<td>&lt; / = 0.5</td>
<td>0</td>
</tr>
<tr>
<td>1 Turn on 32 mm Dia. Mandrel at 1550</td>
<td>dB</td>
<td>&lt; / = 0.5</td>
<td>&lt; / = 0.5</td>
</tr>
<tr>
<td>1 Turn on 32 mm Dia. Mandrel at 1625</td>
<td>dB</td>
<td>&lt; / = 0.5</td>
<td>&lt; / = 0.5</td>
</tr>
<tr>
<td>1 Turn on 10 mm Dia. Mandrel at 1550</td>
<td>dB</td>
<td>-</td>
<td>&lt; / = 0.2</td>
</tr>
<tr>
<td>1 Turn on 10 mm Dia. Mandrel at 1625</td>
<td>dB</td>
<td>-</td>
<td>&lt; / = 0.5</td>
</tr>
<tr>
<td>Strippability force to remove primary coating of fibre</td>
<td>Newton</td>
<td>1.3 &lt; F &lt; 8.9</td>
<td>1.0 &lt; F &lt; 8.9</td>
</tr>
<tr>
<td>Fibre Curl</td>
<td>Radius of curve</td>
<td>&gt; / = 4 Mtr</td>
<td>&gt; / = 4 Mtr</td>
</tr>
<tr>
<td>Dynamic tensile strength (unaged)</td>
<td>kpsi</td>
<td>&gt; / = 550</td>
<td>&gt; / = 550</td>
</tr>
<tr>
<td>Dynamic tensile strength (Aged)</td>
<td>kpsi</td>
<td>&gt; / = 440</td>
<td>&gt; / = 440</td>
</tr>
<tr>
<td>Dynamic Fatigue</td>
<td>-</td>
<td>&gt; / = 20</td>
<td>&gt; / = 20</td>
</tr>
</tbody>
</table>

### Environmental Properties

<table>
<thead>
<tr>
<th>Unit</th>
<th>Value</th>
<th>Value</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Induced attenuation at 1310 nm &amp; 1550 nm for Temp. &amp; Humidity cycle from -10°C to +85°C at 98 % humidity (min), ref temp 23°C</td>
<td>dB/Km</td>
<td>&lt; / = 0.05</td>
<td>&lt; / = 0.05</td>
</tr>
<tr>
<td>Induced attenuation at 1310 nm &amp; 1550 nm for Temperature cycle from -60°C to +85°C, ref temp 23°C</td>
<td>dB/Km</td>
<td>&lt; / = 0.05</td>
<td>&lt; / = 0.05</td>
</tr>
<tr>
<td>Water Immersion at 23 ± 2°C</td>
<td>dB/Km</td>
<td>&lt; / = 0.05</td>
<td>&lt; / = 0.05</td>
</tr>
<tr>
<td>Accelerated Ageing (Temperature) at 85 ± 2°C, ref temp 23°</td>
<td>dB/Km</td>
<td>&lt; / = 0.05</td>
<td>&lt; / = 0.05</td>
</tr>
</tbody>
</table>

Note: Other values of G655 Fibre such as Dispersion and MFD can also be provided on request.
Optical fibre cables can be easily damaged if they are improperly handled or installed. It is imperative that certain procedure be followed during Handling & Installation of these cables to avoid damage. Optical fibre cable requires special care during Handling & Installation to ensure reliable operation. This information given in the document is for Handling drum at various places from receiving in stores till shipment to the site for installation. Proper handling of cable drum decreases probability of accidental damage of cable and personnel. This document also contain some of the basic safety information applicable to Optical fiber cable. Personnel involved in Optical Fiber Cable installation must be aware of all the applicable occupational and health safety regulations and local regulations along with the company safety practices. Failure to follow the same can lead to fatal consequences to them as well as people in the vicinity.

A) Some of the basic guidelines for Cable Drum Handling

Unloading the Cable Drums:
Cable drums should be properly unloaded from the truck/container. It is important that cable drum should not be dropped on tiers or floor. If cable drums are dropped on tiers or floor, due the weight of cable and wooden drum, flange of cable drum may get damage and also there are chances that cable will also get damage. The cable drum must be rolled from truck/container on to receiving platform, which is at the same height as the tailgate of truck/container or use forklift to unload drums from truck/container. If inclined ramps are used don’t allow drums to roll out of control. Cable drums should be rolled in the direction as indicated on the flange of the drum to avoid any loosing of cable winding. Never step in front of drum rolling down a ramp. Roll each drum away from the bottom of the ramp before handling the next drum otherwise drum may collide to each other.

Storage of Cable Drums:
The drums should always be stored in an upright position i.e on the drum flange edge and not considering flange as base. Storage of drums in an alternative position can lead to winding defects.

Also follow the below shown figure for stacking the cable drums.

If many drums are opened at a time for inspection / testing, they should be arrange in such a way that flange of first drum should touch the flange of next drum. If this is not followed then there is chance that cable may get damage (flange of first drum may hit the cable on next drum). Correct way of arranging the opened cable drums is shown below.

B) Some of the basic guideline for Cable Installation

Drum Opening:
Cable drum are packed using wooden packing material. Packing material is nailed on the flange of cable drums. To further strengthen the packing, steel tape is nailed in circumference pattern over both the flanges. To open the cable drum, first cut the steel tape at 8 to 10 places. Remove the entire steel tape. Remove the nails with proper tools and remove the packing material. Nails should be bend to avoid injury to person handling it. Carry out visible inspection of the cable. Before starting installation check for attenuation value.
Mounting Drum on Pay-off:
For proper installation mount the cable properly on the pay off as shown below. This pay off should be properly lubricated. Height of the pay off should be suitably adjusted so the there is no problem is observed while pulling the cable out of the cable drum.

Pulling Technique:
Always use pulling grip to pull the cable. Pulling grip should be fixed with anti twist device (swivel pulling eye) so that cable is not twisted while pulling. Putting the twist in the cable can stress the fibres. If possible monitor the tension being applied to the cable while pulling. In no case the pulling tension should exceed the maximum rated pulling tension of the cable. If possible, use automated puller with tension control or at least a breakaway-pulling eye. Use cable guide to maintain the recommended bend radius. Do not exceed the cable bend radius, exceeding the bend radius harms the fibres. It may not be immediate, it may even take a few years but eventually by exceeding the recommended bend radius of the cable, useful life of the cable reduces. In general the bending radius of a cable is greater than 20D, where D is the diameter of cable.

Before blowing the cable inside the duct or directly burring inside the ground, lay out the cable in figure 8 pattern as shown below. Turns the figure 8 cable 360 degree (upside down) before continuing. Pull the cable in opposite direction.

(C) Some of the basic safety guideline
1) Never look into a fiber having a laser coupled to it. If eye is accidentally exposed to LASER beam, immediately rush for medical assistance.
2) Do not drop fiber pieces on the floor where they will stick in carpets or shoes and be carried elsewhere. These fibre pieces are extremely sharp and can easily penetrate the skin. And any delay in taking the fiber out of body could lead to infection, which is dangerous. Therefore utmost care must be taken to depose the broken ends of fibers created during termination and splicing.
3) Various chemical cleaners and adhesives are used during preparation of Optical Fibre cable for splicing. The safety instructions defined as defined in MSDS (Material Safety Data Sheet) of these materials should be followed.
4) Electric arc is generated in fusion splicer while splicing of fibre. It should be ensured that there are no flammable gasses in the vicinity.
5) Only work in well ventilated areas.
6) Keep all food and beverages out of the work area. If fiber particles are ingested they can cause internal hemorrhaging
7) Do not touch your eyes while working with fiber optic systems until they have been thoroughly washed.
This is to certify that the management system of

**Vindhya Telelinks Limited**

- LLC, Whip, P.O. Charles, District Rewa - 486 005, Madhya Pradesh, India

has been found to conform to the ISO Management System standards:

- **ISO 9001:2015**
- **ISO 14001:2015**
- **OHSAS 18001:2007**

This certificate is valid for the following scope:

- DESIGN AND MANUFACTURE OF COPPER COMMUNICATION CABLES
- DESIGN AND MANUFACTURE OF OPTICAL FIBER COMMUNICATION CABLES
- DESIGN AND MANUFACTURE OF OCTOPUS CABLES
- DESIGN AND MANUFACTURE OF POWER DISTRIBUTION CABLES
- DESIGN AND MANUFACTURE OF SOLAR ENERGY CABLES

This certificate is issued by DNV-GL.

www.vtlrewa.com | www.birlacable.com
Registered Office & Works:
Udyog Vihar, P.O. Chorhata, Rewa, Madhya Pradesh - 486006 INDIA

Contact For Enquiries:
Sharda Terraces, 9th Floor, Plot No. 65, Sector-11,
CBD Belapur, Navi Mumbai - 400614 INDIA
Tel: +91 22 4126 8855 / 2756 0463 / 2756 0464. Fax: +91 22 4126 8899
Email: info@birlacable.com, info@vtrewa.com

Branches:
New Delhi:
605 & 608, DDA Bldg. No. 2, District Centre,
Janakpuri, New Delhi - 110 058 INDIA

Kolkata:
27-B, Camac Street, 5th Floor,
Kolkata - 700 016 INDIA

Hyderabad:
839/E, Road No. 42, Jubilee Hills,
Hyderabad - 500 033 INDIA

Chennai:
No.76, Nelson Manikem Road, 1st Floor, Aminjikarai,
Chennai - 600 029 INDIA

Bangalore:
No.287, R.M.V. Extn., 15th Main Road, Nr. Nagasena School,
Bangalore - 560 080 INDIA