

## Outdoor HDPE Unarmoured Unitube Optical Fibre Cable

ITU-T G.652.D (OS2) | Unitube (UT) | Unarmoured (UA) | UV-Stabilised HDPE Black Sheath | Variants: 6F + 12F.

### 1. Product Description

This datasheet covers the 6-fibre and 12-fibre variants of the outdoor UV-stabilised HDPE unarmoured unitube optical fibre cable carrying ITU-T G.652.D single-mode fibres (OS2 per ISO/IEC 11801). Both variants house fibres in a single gel-filled PBT loose tube, protected by a water swellable tape and a UV-stabilised black HDPE outer sheath. The all-dielectric construction is designed for installation in ducts, sub-ducts, and micro-ducts. Absence of metallic elements provides EMI immunity and lightning protection.

- Duct, sub-duct and micro-duct installation (pulling or air-blown deployment)
- FTTx feeder cables, GPON / XGS-PON last-mile links
- Campus backbone and inter-building connections in duct systems
- High-voltage corridor / power utility right-of-way (all-dielectric, EMI-immune)
- Outdoor-indoor transition in riser-to-campus topologies
- Low-count, lightweight point-to-point connectivity

### 2. Product Cross-Sections

All variants share the same material build; only fibre count, tube/ring arrangement and cable OD differ. Cross-sections shown below to a common scale.

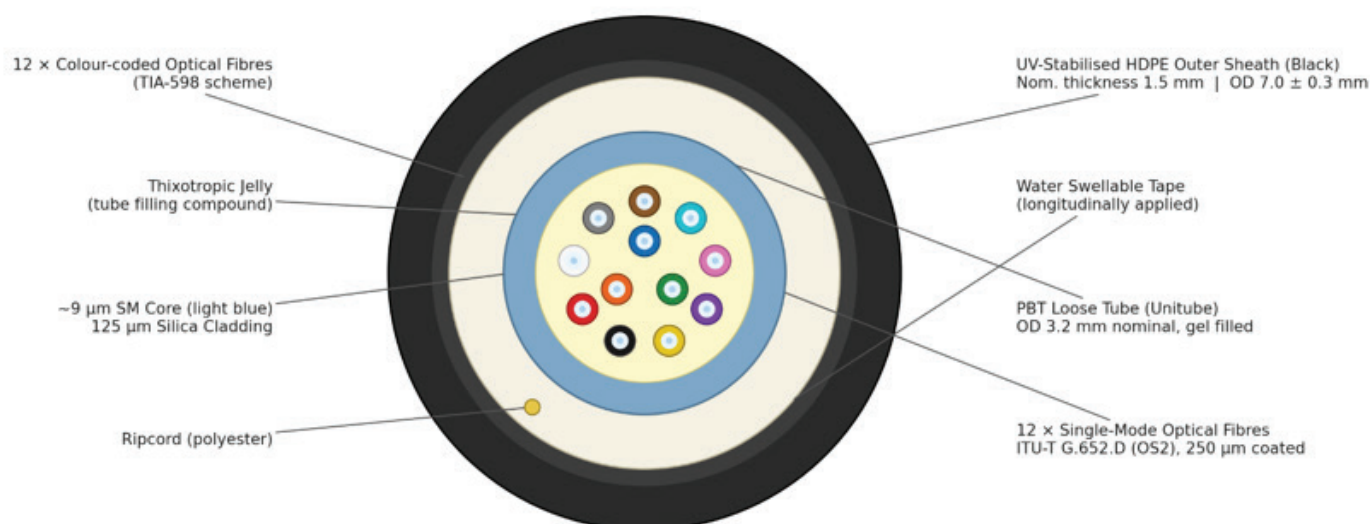


Figure — 12F Unitube Unarmoured OS2 Cross-Section (OD 7.0 mm)



### 3. Cable Construction Details

All variants share the same material specification. Construction tables below are representative of the series; variant-specific dimensions are in Section 3.2.

#### 3.1 Common Construction — All Variants

| S. No. | Element               | Material / Description                                                                                                                          | Nominal Value    |
|--------|-----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1      | Optical fiber         | Single-mode, ITU-T G.652.D / IEC 60793-2-50 B-652.D (OS2 per ISO/IEC 11801); dual-layer UV-curable acrylate coating; colour coded per TIA-598-D | 250 µm coated    |
| 2      | Tube filling compound | Thixotropic jelly, hydrogen-scavenging, non-dripping                                                                                            | Per tube         |
| 3      | Loose tube (unitube)  | Polybutylene terephthalate (PBT), single gel-filled tube                                                                                        | OD 3.2 mm nom.   |
| 4      | Water blocking tape   | Water swellable tape, longitudinally applied with overlap                                                                                       | 0.25 mm thick    |
| 5      | Outer sheath          | UV-stabilised HDPE, black (carbon black $\geq 2.3\%$ ); sequentially marked; no armour — all-dielectric construction                            | 1.5 mm thick     |
| 6      | Ripcord               | Polyester ripcord beneath sheath                                                                                                                | 1 no.            |
| 7      | Cable OD              | Overall nominal                                                                                                                                 | $7.0 \pm 0.3$ mm |
| 8      | Cable weight          | Approximate                                                                                                                                     | See Sec. 3.2     |

#### 3.2 Variant-Specific Physical Dimensions

| Parameter              | 6F                                       | 12F                                      |
|------------------------|------------------------------------------|------------------------------------------|
| Fibre count            | 6                                        | 12                                       |
| Colour scheme (1–6)    | Blue, Orange, Green, Brown, Slate, White | Blue, Orange, Green, Brown, Slate, White |
| Colour scheme (7–12)   | —                                        | Red, Black, Yellow, Violet, Rose, Aqua   |
| Cable OD (nominal)     | 7.0 mm                                   | 7.0 mm                                   |
| Cable weight (approx.) | 60 kg/km                                 | 62 kg/km                                 |
| Part number            | 06SMD09-UA                               | 12SMD09-UA                               |

#### 4. Optical Characteristics — ITU-T G.652.D / OS2 (Common to All Variants)

Optical performance is identical across all variants; only the construction changes.

| Parameter                                   | Condition                                                                            | Specified Value                                                                             |
|---------------------------------------------|--------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| Fibre type                                  | -                                                                                    | Single-mode, ITU-T G.652.D / IEC 60793-2-50 B-652.D (OS2 per ISO/IEC 11801 and TIA-568-C.3) |
| Attenuation (cabled)                        | @ 1310 nm<br>@ 1383 nm (water-peak)<br>@ 1550 nm<br>@ 1625 nm                        | $\leq 0.36$ dB/km<br>$\leq 0.40$ dB/km<br>$\leq 0.22$ dB/km<br>$\leq 0.25$ dB/km            |
| Mode field diameter (MFD)                   | @ 1310 nm<br>@ 1550 nm                                                               | $9.2 \pm 0.4$ $\mu$ m<br>$10.4 \pm 0.8$ $\mu$ m                                             |
| Cladding diameter                           | -                                                                                    | $125.0 \pm 0.7$ $\mu$ m                                                                     |
| Core/cladding concentricity error           | -                                                                                    | $\leq 0.5$ $\mu$ m                                                                          |
| Cable cut-off wavelength ( $\lambda_{cc}$ ) | -                                                                                    | $\leq 1260$ nm                                                                              |
| Zero dispersion wavelength ( $\lambda_0$ )  | -                                                                                    | 1300 – 1324 nm                                                                              |
| Zero dispersion slope (S <sub>0</sub> )     | -                                                                                    | $\leq 0.092$ ps/(nm <sup>2</sup> ·km)                                                       |
| Chromatic dispersion                        | @ 1550 nm<br>@ 1625 nm                                                               | $\leq 18$ ps/(nm·km)<br>$\leq 22$ ps/(nm·km)                                                |
| PMD (link design value, PMDQ)               | -                                                                                    | $\leq 0.20$ ps/ $\sqrt$ km                                                                  |
| Macrobend loss                              | 100 turns, $\varnothing$ 60 mm @ 1550 nm<br>100 turns, $\varnothing$ 60 mm @ 1625 nm | $\leq 0.10$ dB<br>$\leq 0.20$ dB                                                            |
| Proof test level                            | -                                                                                    | $\geq 0.69$ GPa ( $\geq 1\%$ strain)                                                        |
| CWDM / DWDM compatibility                   | -                                                                                    | All ITU-T G.694.1/G.694.2 channels; C+L-band DWDM                                           |
| Supported link length (info.)               | 1000BASE-LX / 10GBASE-LR @ 1310 nm<br>40GBASE-LR4 / 100GBASE-LR4 (CWDM4)             | $\geq 10$ km each                                                                           |
| Compatible connectors                       | -                                                                                    | SC/UPC, SC/APC, LC/UPC, LC/APC, FC/UPC, FC/APC, ST                                          |

#### 5. Mechanical Characteristics

Identical across both variants — same OD and sheath construction.

| Parameter         | Test Method (IEC 60794-1-21) | Value           |
|-------------------|------------------------------|-----------------|
| Crush resistance  | Method E3                    | 1000 N / 100 mm |
| Impact resistance | Method E4                    | 3 Nm, 3 impacts |

Acceptance criteria: fibre attenuation change  $\leq 0.05$  dB at test wavelength during and after each test; no fibre breakage; no sheath cracking

## 6. Environmental Characteristics

Common to all variants.

| Parameter                       | Test Method                            | Specified Value                                      |
|---------------------------------|----------------------------------------|------------------------------------------------------|
| Operating temperature           | IEC 60794-1-22, F1                     | -40 °C to +70 °C                                     |
| Installation temperature        | —                                      | -10 °C to +50 °C                                     |
| Storage / transport temperature | —                                      | -40 °C to +70 °C                                     |
| Temperature cycling             | IEC 60794-1-22, F1 (2 cycles)          | $\Delta\alpha \leq 0.05$ dB/km @ 1310 nm and 1550 nm |
| Water penetration               | IEC 60794-1-22, F5B                    | No leakage, 3 m / 1 m head / 24 h                    |
| Compound flow (tube jelly)      | IEC 60794-1-21, E14                    | No drip @ +70 °C, 24 h                               |
| UV resistance (HDPE sheath)     | Carbon black $\geq 2.3\%$ , ASTM D1603 | Well dispersed                                       |
| Environmental stress cracking   | ASTM D1693                             | No cracking                                          |
| RoHS compliance                 | EU Directive 2011/65/EU                | Fully compliant                                      |

## 7. Packing and Delivery

Standard delivery: 2,000 m / 4,000 m ( $\pm 5\%$ ) on returnable wooden drums. Both cable ends sealed with end caps. Drum flange marked with product code, fibre type, variant (fibre count), length, gross weight, drum number, direction of rotation and traceability code. Non-standard lengths available on request.

## 8. ORDERING DETAILS

| TVARA FIBER CONNECTOR HOUSING - LIU PANNEL ORDERING DETAILS |                                |                                 |             |
|-------------------------------------------------------------|--------------------------------|---------------------------------|-------------|
| AA                                                          | BBBBB                          | CCC                             | DDD         |
| ↓                                                           | ↓                              | ↓                               | ↓           |
| TVARA FIBER                                                 | Out Door (OD) Type Single mode | Cable Type                      | Fiber count |
| TF                                                          | S2OD                           | UTD - Uni tube,<br>Die electric | 006         |
|                                                             |                                |                                 | 012         |

### EXAMPLE:

|                 |                                                                                                          |
|-----------------|----------------------------------------------------------------------------------------------------------|
| TF-S2OD-UTD-006 | <b>DHRUVA Connect</b> – TVARA FIBER, Single-mode<br>Out door, Unitube unarmored, 6 Fiber optic<br>cable. |
|-----------------|----------------------------------------------------------------------------------------------------------|

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