

## OUTDOOR, DIELECTRIC, LOOSE-TUBE, SINGLE MODE FIBER OPTIC CABLES G.652D for MICRO DUCTS

**Specification:** The cables are manufactured and tested according to international specification IEC60794-5 and ITU-T G652D recommendation. Our technical data herebelow presented will also be valid.

**Description of cable:** Fiber Optic Cables, loose tube type. Each tube contains 12 single mode ITU-T G.652D fibers and jelly-filling compound. Tubes and polyethylene filler(s) will be SZ stranded around a dielectric central strength member (FRP: fiber reinforced plastic) to form the cable core. Water-blocking yarns are applied inside and over the cable core to prevent penetration of water. Overall, a black high-density polyethylene (PE) sheath protects the cables. Under the sheath, a ripcord of sufficient strength is applied.

**Particulars:**

<i>No of fibers</i>	12	24	36	48	72
<i>No of tubes</i>	1	2	3	4	6
<i>No of fibers per tube</i>	12	12	12	12	12
<i>Fibers type</i>	SM G.652D				
<i>No of PE fillers</i>	5	4	3	2	0
<i>PE sheath thickness (average) (mm)</i>	0.5	0.5	0.5	0.5	0.5
<i>Cable outer Diameter (mm)</i>	6±0.2	6±0.2	6±0.2	6±0.2	6±0.2
<i>Cable weight (approx.) (kg/km)</i>	30	30	30	30	30
<i>Proposed length per drum (m)</i>	4000±200	4000±200	4000±200	4000±200	4000±200
<i>Drum Dimensions (approx.) (mm) (Outer Diameter x Outer Width)</i>	1000x750	1000x750	1000x750	1000x750	1000x750
<i>Installation temperature range (°C)</i>	-15 to +50	-15 to +50	-15 to +50	-15 to +50	-15 to +50
<i>Operation temperature range (°C)</i>	-30 to +70	-30 to +70	-30 to +70	-30 to +70	-30 to +70
<i>Cable minimum bending radius (static) (mm)</i>	12 x D*	12 x D*	12 x D*	12 x D*	12 x D*
<i>Cable maximum bending radius (dynamic) (mm)</i>	20 x D*	20 x D*	20 x D*	20 x D*	20 x D*
<i>Cable maximum tensile strength (short term) (N)</i>	600	600	600	600	600
<i>Cable crush resistance (N/10cm)</i>	1000	1000	1000	1000	1000

**Packing:** The cables are delivered in wooden drums appropriate for fiber optic cables and suitable for safe transport, storage and installation. The length of cable per drum is 4000±200m but a limited quantity of drums may be delivered with reduced length (not less than 1000m).

**Fibers / tubes identification:**

Fibers will be colour coded according to the following table:

No	1	2	3	4	5	6	7	8	9	10	11	12
Fiber colour	Blue	Orange	Green	Brown	Grey	White	Red	Black	Yellow	Violet	Pink	Turquoise

Tubes will be colour coded according to the following table:

No	First	Intermediate	Last	PE fillers
Tube colour	Red	White	Blue	Natural

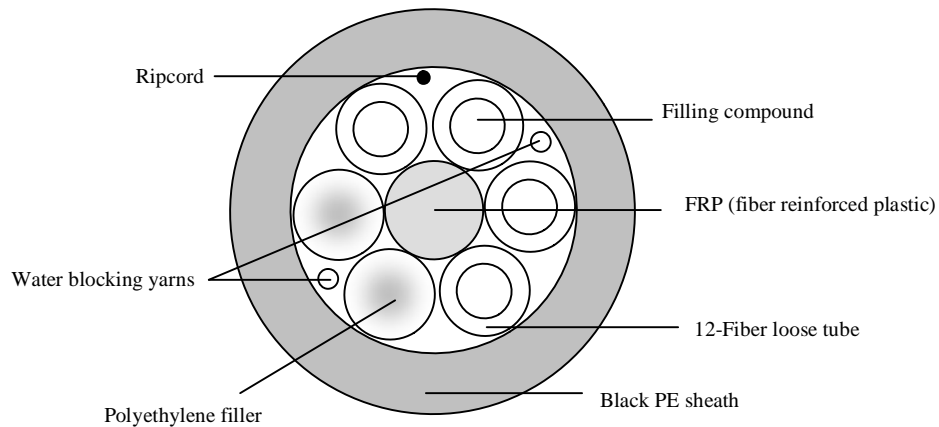
Other colours are available upon request.

### MECHANIC AND ENVIRONMENTAL CHARACTERISTICS

TEST	LIMIT	RESULT
<i>Tensile</i> IEC 60794-1-E1	$L > 50m$ $D = 1\ m$ $F = 600\ N$	Maximum fiber elongation: 0.33%. Practical zero change of attenuation (< 0.05 db).
<i>Crasch</i> IEC 60794-1-E3	$N = 3$ $F = 1000\ N$	No destruction in the fibers and in the structural elements of cable. Practical zero change of attenuation (< 0.05 db).
<i>Impact</i> IEC 60794-1-E4	$N = 3, D = 50mm$ $W = 3\ N.m$	No destruction in the fibers and in the structural elements of cable. Practical zero change of attenuation (< 0.05 db).
<i>Bending (static)</i> IEC 60794-1-E11	$R = 12xD^{**}$ $N = 3$ $T = 20^{\circ}\ C$	No destruction in the fibers and in the structural elements of cable. Practical zero change of attenuation (< 0.05 db).
<i>Bending (dynamic)</i> IEC 60794-1-E6	$R = 20xD^{**}$ $N = 100$ $B = 10\ cycles/min$ $F = 100N$	No destruction in the fibers and in the structural elements of cable. Practical zero change of attenuation (< 0.05 db).
<i>Compound Drip Test</i> IEC 60794-1-E14	$T=24h$ $\theta=70^{\circ}C$	No jelly drops are detected.
<i>Temperature cycling</i> IEC 60794-1-2F1	$L > 1000m$ $T = -30 + 70^{\circ}C$	Practical zero change of attenuation (< 0.05 db).
<i>Water Penetration</i> IEC 60794-1-2F5b	$H = 1m\ **$ $L = 3m\ **$ $T = 1\ day$	No water detection with UV light.

\*\* : D = cable outer diameter, H = height of column of water, L = length of cable under test

### CROSS- SECTION OUTDOOR, DIELECTRIC, LOOSE-TUBE SINGLE MODE FIBER OPTIC CABLES G.652D for MICRO DUCTS (48-fiber cable illustrated)



**Note:** Drawing is not to scale.

**Characteristics of single-mode optical fibers (ITU Recommendation G. 652D):**

<b>DIMENSIONAL CHARACTERISTICS</b>	<b>Value</b>
<b>Mode field diameter, (<math>\mu\text{m}</math>)</b>	
at 1310 nm	9.2 $\pm$ 0.4
at 1550 nm	10.4 $\pm$ 0.5
<b>Core concentricity max. error (<math>\mu\text{m}</math>)</b>	0.5
<b>Cladding diameter, (<math>\mu\text{m}</math>)</b>	125 $\pm$ 0.7
<b>Cladding non-circularity, max. value (%)</b>	1
<b>Primary coating diameter, (<math>\mu\text{m}</math>)</b>	245 $\pm$ 10
<b>Coating - Cladding Concentricity error, max. value (<math>\mu\text{m}</math>)</b>	12
<b>MECHANICAL &amp; ENVIROMENTAL CHARACTERISTICS</b>	
<b>Bending Attenuation max. value (dB/km)*</b>	
at 1310 nm	$\leq$ 0.05
at 1550 nm	$\leq$ 0.05
<b>Temperature Dependance of Attenuation in the range of -60°C to +85°C, max. value (dB/km)</b>	
at 1310 nm	0.05
at 1550 nm	0.05
<b>Proof Test, min. value (Gpa)</b>	0.7
<b>TRANSMITTING CHARACTERISTICS</b>	
<b>Attenuation max. value (dB/km)</b>	
at 1310 nm	0.36
at 1383 $\pm$ 3 nm	0.33
at 1550 nm	0.23
at 1625 nm	0.25
<b>Chromatic Dispersion, max. value (ps/(nm.km))</b>	
at 1285-1330 nm	$\leq$ 3.5
at 1550 nm	$\leq$ 18
<b>Cable Cut-off wavelength <math>\lambda_{cc}</math>, nm</b>	<1260
<b>Zero Dispersion Wavelength <math>\lambda_0</math> (nm):</b>	1302-1322
<b>Zero dispersion Slope <math>S_0</math>, nom. (ps/(nm<sup>2</sup>.km))</b>	0.092
<b>Uncabled Fiber PMD max. (ps/(km<sup>0,5</sup>))</b>	0.2

\*: 100 turns, 50mm diameter