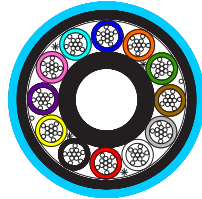


MINI LOOSETUBE - SINGLE MODE

External Mini Loose Tube Optical Cable for use in micro ducts

DESCRIPTION

This loose tube dielectric optical cable is designed for external underground installations in (micro) ducts by pulling, blowing or floating techniques. Polyamide provides anti-termite protection. Optimised for blowing in mini ducts of 10mm diameter (internal).



STANDARDS

- IEC/EN 60793-2-50 Category B-652.D
- ITU-T Recommendation G.652.D
- EN 50 173-1: Category OS2 and OS1a
- ISO / IEC 11801: Category OS2 and OS1a

FEATURES

- Multi-loose tube construction – Single layer 2 to 144 fibres
- Central strength member (CSM): Glass fibre reinforced plastic material (GRP) with or without over-sheathing
- Tube: Thermoplastic material, containing up to 12 optical fibres filled with a low viscosity, thixotropic, non-melting gel fully compatible with fibre coating and tube material
- Stranding: The required numbers of elements (tubes and fillers) are SZ stranded around the central strength member
- Longitudinal water tightness: Water swellable elements (dry-core)
- Sheath: UV stabilised polyethylene in compliance with AS 1049. Two ripcords provided beneath the sheath for easy removal
- Outer jacket: UV stabilised polyamide (Nylon) in compliance with AS 1049 integrally bonded to PE sheath

TECHNICAL DATA

Number of Fibres		2 to 72	96	114
Number of elements		6	8	12
Tube / Filler diameter	mm	1.55		1.35
Cable nominal diameter	mm	6.3	7.4	8.4
Cable nominal weight	kg/km	33	49	62
Max. installation tension	kN	1.0	2.0	2.0
Max. crush resistance	kN/100mm	2.0	2.0	2.0
Min. bending radius	mm			
At full load		130	220	220
At no load		65	110	110
Temperature range	°C	Installation -0 -> +50	Transport & Storage -20 -> +70	Operation -10 -> +70

IDENTIFICATION

Fibre and Buffer Tube Colours

No.	1	2	3	4	5	6	7	8	9	10	11	12
Colour	blue	orange	green	brown	grey	white	red	black	yellow	violet	pink	aqua

Fillers are either natural (opaque) or black.

Sheath Colour:

The outer sheath colour is blue.

MAIN MECHANICAL CHARACTERISTICS

Parameter	Test method	Test conditions	Acceptance criteria*
Tensile strength	IEC 60794-1-21-E1	Load: As per cable maximum installation tension in technical data table above	Fibre strain $\leq 0.6\%$. No physical damage and no change in attenuation after test.
Crush	IEC 60794-1-21-E3	Load: As per maximum crush resistance in technical data table above Duration: 10 min	No physical damage. No change in attenuation after test.
Impact	IEC 60794-1-21-E4	Impact energy: 1 J Anvil radius: 300 mm	No physical damage. No change in attenuation after test.
Torsion	IEC 60794-1-21-E7	Sample length: 1 m Rotation: ± 180 degree, 10 cycles	No physical damage. No change in attenuation after test.
Bend	IEC 60794-1-21-E11	Mandrel radius: As per Min. bending radius at no load in technical data table above No. of turns/helix: 4, No. of cycles: 3	No physical damage. No change in attenuation after test.
Bend under tension	Concurrent to tensile test	Mandrel radius: As per Min. bending radius at full load in technical data table above Bend: 360° , 1 turn	No physical damage. No change in attenuation after test.
Temperature cycling	IEC 60794-1-22-F1	Sample length: 1000 m (minimum) Temperature range: As per Operation temperature range in technical data table above	No change in attenuation between 10°C & 30°C . Max. change in attenuation $\leq 0.15\text{dB/km}$ between Min. & Max. operation temperatures.
Cable aging	IEC 60794-1-22-F9	85°C for 168 h followed by Temperature cycling	Max. change in attenuation $\leq 0.10\text{dB/km}$ after test
Water penetration	IEC 60794-1-22-F5C	Sample length=3m, Water height=1m	No water leakage after 24 hours
* All optical measurements for singlemode fibres performed at 1550 nm.			

CABLE PROPERTIES

Optical Properties

Attribute	Measurement	Units	Limits
Mode field diameter at 1310 nm	IEC/EN 60793-1-45	µm	9.0 ± 0.4
Mode field diameter at 1550 nm		µm	10.1 ± 0.5
Chromatic dispersion coefficient: In the interval 1285 nm – 1330 nm At 1550 nm At 1625 nm	IEC/EN 60793-1-42	ps/km • nm ps/km • nm ps/km • nm	≤ 3.5 ≤ 18 ≤ 22
Zero dispersion wavelength, λ ₀		nm	1302-1322
Zero dispersion slope		ps/(nm ² • km)	≤ 0.092
Cut-off wavelength	IEC/EN 60793-1-44	λ _{cc} nm	≤ 1260 *
Polarisation mode dispersion (PMD) coefficient	IEC/EN 60793-1-48	ps/√km	≤ 0.1
PMDQ Link Design Value (computed with Q=0.01%, N=20)	IEC/EN 60794-3	ps/√km	≤ 0.06
* guaranteed value according to ITU-T (ATM G650) method			

Attenuation

Attribute	Measurement	Units	Limits
Maximum attenuation cabled fibre at 1310 nm	IEC/EN 60793-1-40	dB/km	≤ 0.35
Maximum attenuation cabled fibre at 1383 nm**	IEC/EN 60793-1-40	dB/km	≤ 0.35
Maximum attenuation cabled fibre at 1550 nm	IEC/EN 60793-1-40	dB/km	≤ 0.21
Maximum attenuation cabled fibre at 1625 nm	IEC/EN 60793-1-40	dB/km	≤ 0.24
Local discontinuity at 1310 and 1550 nm	IEC/EN 60793-1-40	dB	± 0.1
** Including H2-ageing according to IEC 60793-2-50, type B.1.3, @1383 nm			

Attenuation variation vs Bending

Attribute	Measurement	Units	Limits
100 Turns on a R = 25 mm mandrel @ 1310 & 1550 nm	IEC/EN 60793-1-47	dB	≤ 0.05
100 Turns on a R = 30 mm mandrel @ 1625 nm	IEC/EN 60793-1-47	dB	≤ 0.05

Group index of refraction

Attribute	Measurement	Units	Values
1310 nm	IEC/EN 60793-1-22	-	1.467
1550 nm	IEC/EN 60793-1-22	-	1.468
1625 nm	IEC/EN 60793-1-22	-	1.468

Rayleigh Backscatter coefficient (1ns pulse width)

Attribute	Measurement	Units	Values
1310 nm	-	dB	-79.4
1550 nm	-	dB	-81.7
1625 nm	-	dB	-82.5

Geometrical properties

Attribute	Measurement	Units	Limits
Cladding diameter	IEC/EN 60793-1-20	μm	125.0 ± 0.7
Cladding non-circularity	IEC/EN 60793-1-20	%	≤ 0.7
Core-cladding concentricity error	IEC/EN 60793-1-20	μm	≤ 0.5
Coating nominal diameter - ColorLockXS	IEC/EN 60793-1-21	μm	245
Coating non-circularity	IEC/EN 60793-1-21	%	≤ 5
Coating-cladding concentricity error	IEC/EN 60793-1-21	μm	≤ 12

Mechanical properties

Attribute	Measurement	Units	Limits
Proof stress level	IEC/EN 60793-1-30	GPa	≥ 0.7 (≈ 1 %)
Strip force (average)	IEC/EN 60793-1-32	N	1 ≤ Faverage.strip ≤ 3
Strip force (peak)	IEC/EN 60793-1-32	N	1.2 ≤ Fpeak.strip ≤ 8.9
Dynamic Fatigue Resistance aged and unaged	IEC/EN 60793-1-33	-	nd ≥ 20