

OPTICAL FIBRE CABLES

for very-high bit transmission
and FTTx networks

OPTICAL FIBRE CABLES

SILEC CABLE REFERENCES AND KNOW-HOW

Since 1983, Silec Cable has successfully supplied the major telecom operators, contractors and distributors in more than 70 countries.

All cables described in the present document can accommodate all optical fibre types available on the market (singlemode G 652 d - singlemode G 657x with small bending radius - singlemode G 655 and G 656 for DWDM - multimode 50/125 and 62.5/125 OM1, OM2 OM3 and OM4 types).

The cable designs and the controlled manufacturing processes ensure maintaining the optical characteristics of the bare fibres (for example : no modification of attenuation and PMD values).

Upon request, Silec Cable can offer a technical assistance : choice of solutions, information about laying and jointing of optical fibre cables, etc...

All Silec optical fibre cables can be installed using all existing laying and jointing techniques with no need of specific tools or devices.

COMPREHENSIVE RANGE

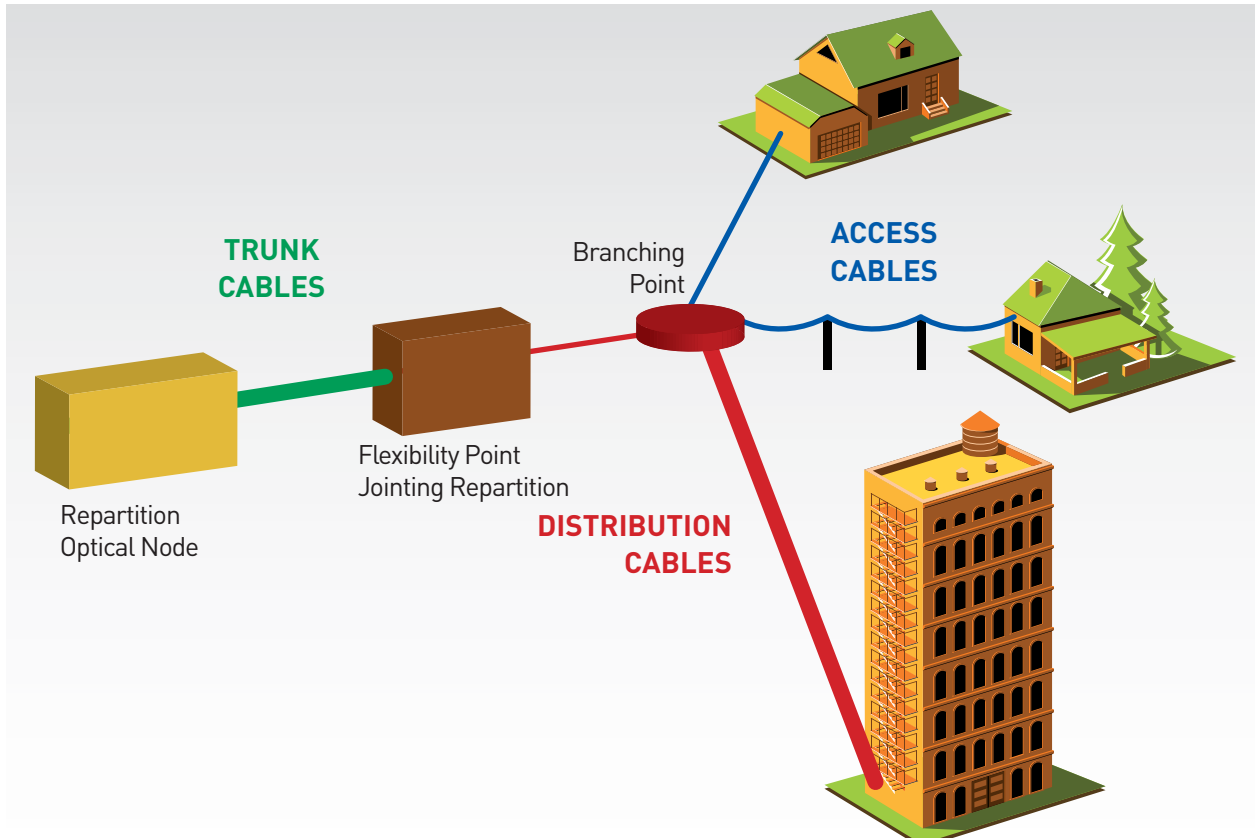
- > **ultra-compact cables** (μ SHEATH® (*), μ SHEATH® ACCESS, μ SHEATH® MS and μ Cables) optimized to minimize installation and jointing costs
- > **standard cables** (loose tubes and UNIGAINÉ)
- > all applications : long haul, distribution networks, FTTx networks, and industrial purposes (installation in ducts, troughs, sewers, direct burial, building front, indoor, tunnels, aerial,...)
- > all environments



(*) μ SHEATH® is a Silec Cable trademark.

FTTx NETWORKS


OUTSIDE CABLE PLANT



TRUNK CABLES **DISTRIBUTION CABLES** **ACCESS CABLES**

μSHEATH® CABLES (up to 864 OF)

- > Non armoured : ducts
- > Armoured (corrugated steel or glass yarns) : troughs, sewers, direct burial
- > Multi-purpose : all application and aerial installation




μSHEATH® ACCESS CABLES (up to 288 OF)

- > Non armoured : ducts and micro-ducts



μCABLES (up to 12 OF)

- > Non armoured : micro-ducts & building fronts
- > Multi-purpose : all application and aerial installation



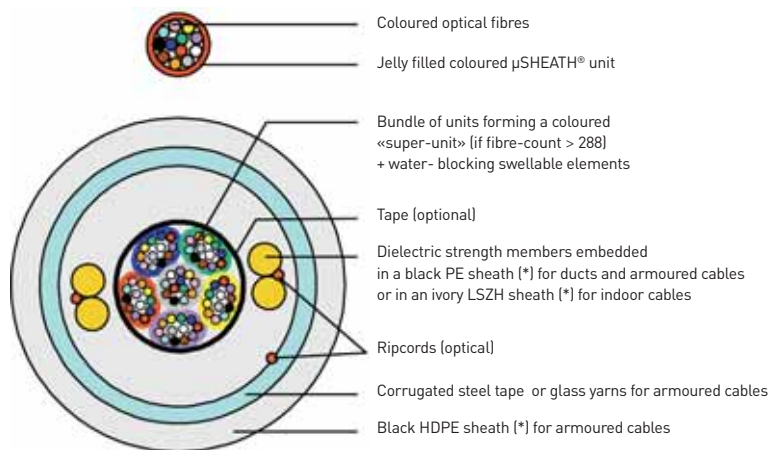
μSHEATH® CABLES FOR LONG HAUL AND FTTx NETWORKS

INNOVATIVE AND COST-EFFICIENT (OUTDOOR CABLE PLANT)

μSHEATH® CABLES ARE SUITABLE FOR ALL TELECOMMUNICATION NETWORKS : LONG HAUL BACKBONES, METRO RINGS, DISTRIBUTION AND LOCAL ACCESS.

As compared to conventional cables, the μSHEATH® design brings unique benefits inducing significant time- and cost-savings at all levels (engineering, civil works, laying, jointing), e.g. :

- > suitable to any type of fibre and environment,
- > ultra-compactness, lightweight, handleability,
- > modular design and easy entry/fibre access (both at cable end and mid-span),
- > suitable to all current laying and jointing techniques,
- > suitable to individual and mass splicing.



[*] For specific requirements : please contact us.



DUCT DIELECTRIC μSHEATH® CABLES



Fibre-count (1)		12	24 - 36	48	60 - 72	96 - 144	156 - 216	288	456	876
Weight	kg/km	21	36	48	67	95	125	175	275	420
Outer diameter	mm	≤ 5.5	≤ 7.0	≤ 8.0	≤ 10.0	≤ 11.5	≤ 13.0	≤ 16.0	≤ 20.0	≤ 25.0
Bending radius	mm	55	70	80	100	115	130	160	200	245
Max. installation tensile load	daN	70	120	160	255	330	415	600	790	1040
Delivery length (2)	km	12 km			8 km			Upon request		

STEEL TAPE ARMoured μSHEATH® CABLES



Fibre-count (1)		12	24 - 36	48	60 - 72	96 - 144	156 - 216	288	456	876
Weight	kg/km	95	122	150	190	242	290	390	560	750
Outer diameter	mm	9.6	11.0	12.5	14.3	16.5	18.0	21.5	26.5	31.0
Bending radius	mm	105	130	150	175	200	215	265	345	405
Max. installation tensile load	daN	90	135	170	235	300	375	500	650	830
Delivery length (2)	km	6 km			4 km			Upon request		

GLASS YARNS ARMoured μSHEATH® CABLES



Fibre-count (1)		12	24 - 36	48	60 - 72	96 - 144	156 - 216	288	456	876
Weight	kg/km	65	90	110	140	180	215	305	Upon request	
Outer diameter	mm	9.2	10.6	11.6	13.5	15.5	17.0	21.2		
Bending radius	mm	110	130	150	170	195	215	260		
Max. installation tensile load	daN	225	320	405	545	670	820	1035		
Delivery length (2)	km	12 km			8 km		6 km	4 km		

MULTI-PURPOSE (aerial, direct burial, ducts,...) μSHEATH® CABLES (rigid flat FRP armoured)



Fibre-count (1)		12	24 - 36	48	60 - 72	84 - 144	288
Weight	kg/km	106	135	160	190	255	275
Outer diameter	mm	11.0	12.7	13.6	15.1	17.4	18.5
Bending radius	mm	145	165	180	200	230	240
Max. installation tensile load (*)	daN	550	700	780	930	1160	1450
Delivery length (2)	km	≤ 5 km					

(*) for underground installation.

HALOGEN-FREE ARMoured μSHEATH® CABLE PROTECTED AGAINST FIRE HAZARDS



Fibre-count (1)		Up to 48	60 up to 72	84 up to 216	228 up to 288
Weight	kg/km	210	320	400	520
Outer diameter	mm	12.8	16.1	18.4	21.4
Bending radius	mm	165	210	240	280
Max. installation tensile load	daN	150	237	360	470
Delivery length (2)	km	2 or 4 km			

(1) The maximum fibre-count is given for a 12 modularity. Other fibre-counts and modularities possible upon request.

(2) Other delivery lengths possible depending on fibre types and reels required by customer.

These cables can be tailored for specific requirements or to comply with Operator's Technical Specifications. Please contact us.

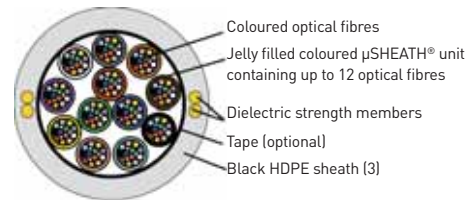
μSHEATH® ACCESS CABLES, BLOWN μSHEATH® MODULE and μCABLES FOR FTTx NETWORKS (OUTDOOR CABLE PLANT)

μSHEATH® ACCESS CABLES AND BLOWN μSHEATH® MODULE FOR FTTx NETWORKS

- > μSHEATH® ACCESS cables are downsized μSHEATH® cables targeting low cost « last mile ».
- > The Blown μSHEATH® module is a micro-cable for indoor and outdoor installation, designed for subscriber access.
- > μCables are central tube micro-cables containing up to 12 optical fibres optimized for low-cost subscriber access and for all applications (ducts, building fronts, indoor, plinths,...).

These 3 cable families are optimized for laying in micro-ducts.

μSHEATH® ACCESS CABLES FOR MICRO-DUCTS STANDARD μSHEATH ACCESS CABLES



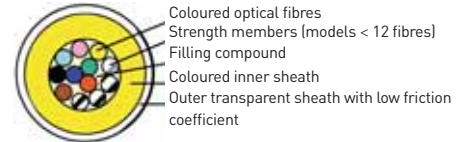
Fibre count (1)	Weight, kg/km	Outer diameter (4), mm	Bending radius, mm	Maximum installation tensile load, daN	Delivery length (2), km
≤ 24	11	≤ 4.0	40	20	6
≤ 48	25	≤ 6.0	60	45	6
≤ 96	45	≤ 8.0	80	95	4
≤ 144	63	≤ 9.5	100	125	4
≤ 288	95	≤ 12.0	120	190	4

μSHEATH® ACCESS CABLES FOR MICRO-DUCTS μSHEATH ACCESS II CABLES



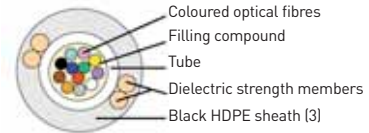
Fibre count (1)	Weight, kg/km	Outer diameter (4), mm	Bending radius, mm	Maximum installation tensile load, daN	Delivery length (2), km
≤ 72	25	≤ 6.0	60	50	4
≤ 96	40	≤ 8.0	80	60	4
≤ 144	Please contact us				

BLOWN μ SHEATH® MODULE (MICRO-DUCTS)



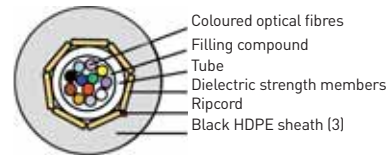
Fibre count	Weight, kg/km	Outer diameter (4), mm	Bending radius, mm	Maximum installation tensile load, daN	Watertightness	Halogen free	Delivery length (2), km
1 up to 12	4	2.0	30	7	YES	YES	≤ 2.05

μ CABLES (DUCTS, BUILDING-FRONT,...)



Fibre count	Weight, kg/km	Outer diameter (4), mm	Bending radius, mm	Maximum installation tensile load, daN	Watertightness	Stapling ability	Delivery length (2), km
1 up to 12	13	3.8	40	23	YES	YES	≤ 5

μ CABLES MULTI-PURPOSE CABLE (AERIAL, DUCTS, BUILDING-FRONT,...)



Fibre count	Weight, kg/km	Outer diameter (4), mm	Bending radius, mm	Maximum installation tensile load, daN	Watertightness	Span	Delivery length (2), km
1 up to 12	26	5.0	40	140	YES	40 up to 60 M	≤ 4.10

(1) The maximum fibre-count is given for a 12 modularity. Other fibre-counts and modularities possible upon request.

(2) Other delivery lengths possible depending on fibre types and reels required by customer.

(3) For specific requirements : please contact us.

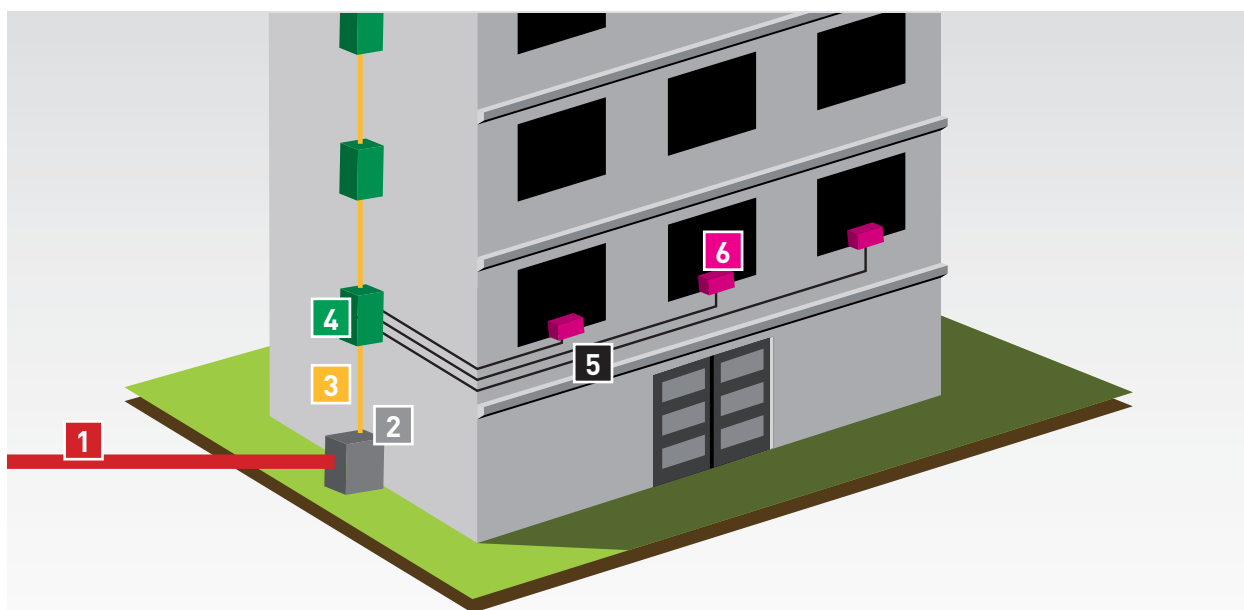
(4) For other diameter values : please contact us.

These cables can be tailored for specific requirements or to comply with Operator's Technical Specifications. Please contact us.



FTTx NETWORKS

BUILDING CABLE PLANT



1 DISTRIBUTION CABLE

2 LEVEL 0 / BUILDING CLOSURE

3 RISER CABLE

Flame-retardant, halogen-free μ SHEATH® cable up to 288 OF
 or Flame-retardant, halogen-free μ SHEATH® MS cable (optimized for mid-span access) up to 144 OF
 or Flame-retardant, halogen-free μ Cable up to 12 OF
 or Blown μ SHEATH® module up to 12 OF
 or Outdoor cable suitable for building front installation

4 FLOOR CLOSURE

5 SUBSCRIBER CABLE

Flame-retardant, halogen-free subscriber μ Cable with 1, 2 or 4 OF
 or Blown μ SHEATH® module with 1, 2 or 4 OF

6 SUBSCRIBER PLUG AND/OR HOME CABLING ACCORDING TO APPLICABLE STANDARDS

STANDARD μ SHEATH[®] CABLES, μ SHEATH[®] MS CABLES AND μ CABLES FOR FTTX NETWORKS (INDOOR CABLE PLANT)

STANDARD μ SHEATH[®] INDOOR CABLES FOR FTTX NETWORKS

Standard μ SHEATH[®] indoor cables are dedicated to classical short-length mid-span access applications. They can be optimized for low bending radius applications requiring G 657 single mode optical fibres.

INDOOR HALOGEN FREE (LSZH) μ SHEATH[®] CABLES

Fibre-count (1)		12	24 - 36	48	60 - 72	96 - 120	144 - 216	288	456	876
Weight	kg/km	26	51	68	130	155	170	255	Upon request	
Outer diameter	mm	≤ 5.0	≤ 7.0	≤ 8.0	≤ 11.0	≤ 13.0	≤ 13.0	≤ 16.0		
Bending radius	mm	50	70	80	110	130	130	160		
Max. installation tensile load	daN	65	115	155	250	395	420	585		
Delivery length (2)	km	12 km			8 km			6 km		

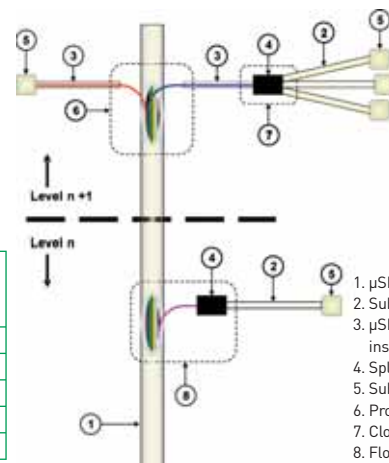
μ SHEATH[®] MS CABLES FOR FTTX NETWORKS

μ SHEATH[®] MS cables are dedicated to long-length mid-span access applications. They can be optimized for low bending radius applications requiring G 657 single mode optical fibres.

μ SHEATH[®] MS CABLES FOR MID-SPAN ACCESS



Fibre count (1)	Weight, kg/km	Outer diameter (4), mm	Bending radius, mm (3)	Maximum installation tensile load, daN	Delivery length (2), km
≤ 24	Please contact us				
≤ 48	61	8.5	85	60	6
≤ 96	80	10.5	105	80	4
≤ 144	143	14.0	140	150	4
≤ 288	Please contact us				



1. μ SHEATH[®] MS cable
2. Subscriber μ Cable
3. μ SHEATH[®] module inside a micro-duct
4. Splice(s)
5. Subscriber plug
6. Protection & routing
7. Closure
8. Floor closure

μ CABLES AND μ SHEATH[®] SUBSCRIBER CABLES

These 2 cable families can be optimized for low bending radius applications requiring G 657 single mode optical fibres.



	INDOOR SUBSCRIBER FLAT μ CABLE	INDOOR SUBSCRIBER μ CABLE	μ SHEATH [®] SUBSCRIBER CABLE	INDOOR μ CABLE
Fibre-count	1 up to 4	1 up to 4	1 up to 4	1 up to 12
Weight, kg/km	11	13	18	16
Outer diameter, mm (4)	2.5 x 3.5	3.2	4.2	3,8
Bending radius (3), mm	25	30	40	40
Max. installation tensile load, daN	35	15	40	20
Fire performance (LSZH) (3)	YES	YES	YES	YES
Stapling ability	YES	YES	YES	YES
Watertightness	OPTIONAL	OPTIONAL	YES	OPTIONAL
Delivery length (2), km	≤ 5 km	≤ 5 km	≤ 5 km	≤ 5 km

(1) The maximum fibre-count is given for a 12 modularity. Other fibre-counts and modularities possible upon request.

(2) Other delivery lengths possible depending on fibre types and reels required by customer.

(3) Smaller bending radius possible with G 657 optical fibres.

(4) For other diameter values : please contact us.

These cables can be tailored for specific requirements or to comply with Operator's Technical Specifications. Please contact us.

STANDARD LOOSE TUBE CABLES AND UNIGAINÉ CABLES

Silec manufactures standard loose tube cables for all applications (duct, direct burial, tunnels, indoor, aerial,...) and an optimized family of central tube cables (UNIGAINÉ cables).

LOOSE TUBE CABLES FOR LONG HAUL NETWORKS

These cables are used for transport networks and long haul networks.

Silec cable range includes the following models : dielectric cables for ducts, dielectric cables for direct burial, multi-purpose dielectric cables, steel armoured cables, cables protected against fire hazards (tunnels), self-supported and ADSS cables for aerial installation, underwater cables, and dual-purpose cables with metallic conductors.

LOOSE TUBE CABLES FOR DUCTS



Fibre-count (1)	Weight, kg/km	External diameter, mm	Bending radius, mm	Max. installation tensile load, daN (3)	Delivery length (2), km
6 up to 72	105	11.5	115	315 / 105	≤ 10 km
up to 144	210	17.0	170	630 / 210	≤ 7 km

GLASS YARNS ARMOURÉD LOOSE TUBE CABLES FOR DIRECT BURIAL AND DUCTS



Fibre-count (1)	Weight, kg/km	External diameter, mm	Bending radius, mm	Max. installation tensile load, daN (3)	Delivery length (2), km
6 up to 72	170	14.5	200	660 / 220	Consult us
up to 144	Consult us				

STEEL ARMOURÉD LOOSE TUBE CABLES



Fibre-count (1)	Weight, kg/km	External diameter, mm	Bending radius, mm	Max. installation tensile load, daN (3)	Delivery length (2), km
6 up to 72	220	15.5	200	200 / 100	Consult us
up to 144	380	20.5	240	300 / 150	Consult us

FIGURE « 8 » AERIAL LOOSE TUBE CABLES



Fibre-count (1)	Weight, kg/km	External diameter, mm	Bending radius, mm	Max. installation tensile load, daN (3)	Delivery length (2), km
6 up to 72	160	11 x 19	150	250 (permanent)	Consult us
up to 144	Consult us				

MULTIPURPOSE (AERIAL, DUCTS, BURIAL) LOOSE TUBE CABLES (FLAT FRP ARMOUR)



Fibre-count (1)	Weight, kg/km	External diameter, mm	Bending radius, mm	Max. installation tensile load, daN	Delivery length (2), km
6 up to 72	230	16.0	200	1350 / 770	Consult us
up to 144	Consult us				

ALL DIELECTRIC SELF-SUPPORTING (ADSS) CABLES



Fibre-count (1)	Weight, kg/km	External diameter, mm	Bending radius, mm	Max. installation tensile load, daN	Delivery length (2), km
6 up to 72	Consult us (design & performance optimized versus climatic conditions and span up to 250 m or more)				
up to 144	Consult us				

LOOSE TUBES CABLES FOR TUNNELS



Fibre-count (1)	Weight, kg/km	External diameter, mm	Bending radius, mm	Max. installation tensile load, daN	Delivery length (2), km
6 up to 72	220	12.5	150	200 / 100	Consult us
up to 144	Consult us				

(1) The maximum fibre-count is given for a 12 modularity. Other fibre-counts and modularities possible upon request.
 (2) Other delivery lengths possible depending on fibre types and reels required by customer.
 (3) Other values possible.
These cables can be tailored for specific requirements or to comply with Operator's Technical Specifications. Please contact us.

UNIGAINÉ CABLES

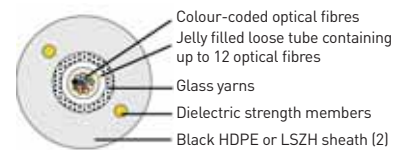
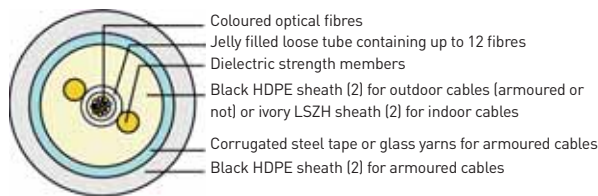
UNIGAINÉ CABLES FOR LONG HAUL NETWORKS AND INDUSTRIAL APPLICATIONS.

UNIGAINÉ CABLES ARE DOWNSIZED AND COST-EFFICIENT CENTRAL TUBE CABLES CONTAINING UP TO 12 OPTICAL FIBRES.

EXAMPLE : GLASS YARNS ARMOURÉD CABLE



		CABLE FOR DUCTS	INDOOR / OUTDOOR CABLE (LSZH)	STEEL TAPE ARMOURÉD CABLE	GLASS YARNS ARMOURÉD CABLE	DIELECTRIC UNIGAINÉ® TT CABLES	
						FOR DUCTS, DIRECT BURIAL, WIND-FARMS,...	FOR INDOOR / OUTDOOR INSTALLATION (LSZH)
Fibre-count		1 up to 12	1 up to 12	1 up to 12	1 up to 12	1 up to 12	1 up to 12
Weight	kg/km	36	50	120	75	35	50
Outer diameter	mm	≤ 6.5	≤ 6.5	10.4	9.4	6.5	6.5
Bending radius	mm	70	70	135	120	65	65
Max. installation tensile load	daN	60	60	120	265	95	90
Crush test	daN/cm	30	20	45	40	45	20
Impact test	N.m	10	5	20	20	30	5
Watertightness		YES	OPTIONAL	YES	YES	YES	OPTIONAL
Delivery length (1)	km	1 up to 10 km	1 up to 10 km	1 up to 6 km	1 up to 6 km	1 up to 6 km	1 up to 6 km



(1) Other delivery lengths possible depending on fibre types and reels required by customer.

(2) For specific requirements : please contact us.

These cables can be tailored for specific requirements or to comply with Operator's Technical Specifications. Please contact us.

OTHER CABLES FOR INSTALLATION ON AERIAL HIGH-VOLTAGE POWER-LINES

CABLES FOR WRAPPING (COE) AROUND HIGH / EXTRA-HIGH VOLTAGE AERIAL POWER LINES

Fiber optic cable wrapping on phase or ground wires of aerial power lines (from low voltage to very-high voltage) is an interesting alternative for very-high bit rate communications in rural areas or between cities. Compared with traditional solutions (all dielectric self supporting cables,...), this solution brings cost-savings : no need of new civil-works, no need of poles' reinforcement,...

OPTICAL PHASE GROUND WIRE (OPGW) FOR HIGH / EXTRA-HIGH VOLTAGE AERIAL POWER LINES

General Cable group can offer a large range of OPGW cables up to 144 optical fibres.



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