FLEXTUBE®

Fully Dry

Aerial ADSS Flextube® Cables

For HFFx installation with dry design and up to 288 fibers

A brand of the

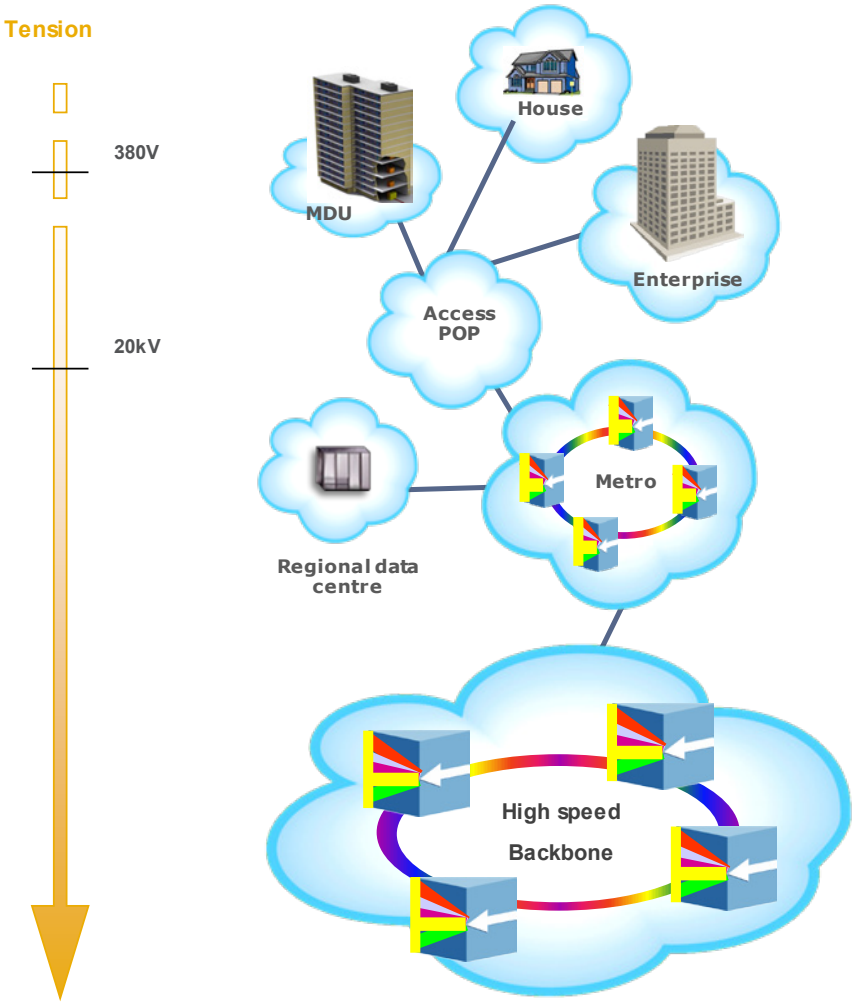
Prysmian Group

Aerial cables have many uses

Access network & FTTx
- Drop
- Distribution
- Branching cables
- Short span

Metropolitain network
- Medium distance
- Medium span

Trunk network
- Long distance
- Long span



Aerial cables in FTTx applications

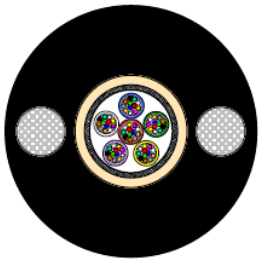
Advantages when choosing Prysmian Group FLEXTUBE® cable technology:

Round shape	• less weight and less wind force
Fully dielectric	• no grounding • no health & satefy electrical risk
Dry watertight	• no gel in cable core • less gel around fibres • easy to clean
Small flexible unit	• easy to handle and to store • lower space requested for storage • smaller closures, especially when combining Flextube and G657A2 fibre • mid-span access to reduce the nb of splices
Access to the fibre	• easy and quick • no tool to access the fibre (removing module) • no risk to cut the fibres when accessing
Design for different applications	• aerial, duct, as well as facade and pole • one cable type over the complete link • available with options, rodents, ballistic

FLEXTUBE®

Aerial cables in FTTx applications

DISTRIBUTION FLEXTUBE ®CABLE DESIGN



Micro-module: Thin wall tubing (Flextube®), filled with a suitable compound, housing the single-mode optical fibes.
Strength members: Glass fibre reinforced plastic material.
Protection/reinforcement: aramid yarns.
Strength members: glass fibre reinforced plastic material.
Outer sheath: HDPE. Ripcoard(s) underheath the sheath.

288 fibers	72 fibers	288 fibers	144 fibers
TF301G	TF301D	TF303G	TF303D

FLEXTUBE®

OPTIMIZATION VS FIBER COUNT: TABLE OF DIAMETERS

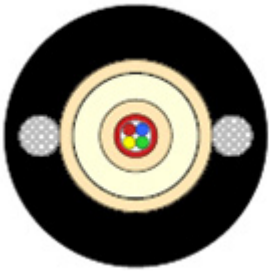
(1) Typical span depending on both installation and climatic conditions.

Typical span(1)	60-80m		40-80m, no ice	
Product family	TF301G	TF301D	TF303G	TF303D
Data Sheet ref.	TS00219	TS00218	TS00221	TS00220
#of	12 f/tb	6 f/tb	12 f/tb	6 f/tb
6	-	10,8	-	6,0
12	10,8	10,8	6,0	8,0
24	10,8	10,8	8,0	8,0
36	11,0	11,0	8,0	10,0
48	12,7	12,9	10,0	11,3
72	12,9	13,9	11,3	12,4
96	13,8	-	12,4	13,3
144	14,2	-	13,3	14,4
288	15,5	-	15,5	-

Aerial cables in FTTx applications

DROP STRIPPABLE IN/OUT CABLE DESIGN

Indoor, once outer sheath stripped



Micro-module: Thin wall tubing (Flextube®), housing the BendBright®xs optical fibes. Without any gel.
Protection/reinforcement: yarns.
Inner sheath: HFFR material.
Reinforcement: aramid yarns around inner sheath.
GFRP rods embedded in the outer sheath.
Outer sheath: HDPE. 2 ripcords beneath the outer sheath.
Standard: IEC/EN 60794

TF562

FLEXTUBE®

OPTIMIZATION VS FIBER COUNT: TABLE OF DIAMETERS

(1) Typical span depending on both installation and climatic conditions.

Typical span(1)	up to 50m	
Product family	TF562	
Data Sheet ref.	TS00018	
#of	2	4
Outoor cable Diameter	6,0	6,0
Subscriber cable Diameter	3,0	3,0

Aerial cables in FTTx applications

SPLICE CLOSURES

Prysmian OAsys Solution:
Compact Multi-function Joint - CMJ

The Compact Multi Function Joint (CMJ) is for jointing optical fibre cables. The joint is ideal for use as a Cable Chamber Joint, Track Joint, Spur Joint or Distribution Joint due to its capacity and compact size. It has a maximum capacity of 144 fibres. The splice trays are factory fitted and each tray can accommodate up to 12 spliced fibres. A multi-functional bracket can be supplied with the joint which enables wall or pole mounting of the joint vertically or horizontally. The joint has four circular ports for mechanical entry glands, one oval port for heat shrink entry and two additional small circular ports also for heat shrink entry.

Features and Benefits

• An ultra compact closure for the splicing of optical cables.
• Supplied with 12 single element trays each able to accommodate 12 splices providing a maximum capacity of 144 fibres, or 12 single circuit splice trays. Each single circuit splice tray has two storage sections providing a total of 24 trays per joint. Each tray can accommodate up to 4 splices providing a total capacity of 96 fibres.
• An input manifold manages the tubes to a common routing channel and has the provision to mount up to four optical splitters.
• The joint is for use with heat shrink splice protectors of either 1.3mm in diameter and 30mm in length or 2.2mm in diameter and 45mm in length.
• The closure base has 4 circular entry ports and an oval port. Cables up to 23mm in diameter can be installed into each port. A further two small ports are available as emergency ports. These ports are for heat shrink entry and can accommodate a cable of up to 12mm in diameter.
• Circular port cables are sealed using a mechanical sealing gland. The gland can be assembled onto the cable away from the joint and is then simply plugged into the base.
• Oval port cables are sealed using adhesive lined heat shrink sleeves or using a mechanical oval port entry kit. See page 3 for more information.
• Multi Way Entry Glands are available to allow the installation of a number of cables into one circular port. See page 3 for more information.
• Splice trays hinge upwards individually, allowing full access to spliced fibres without disturbance to live fibres in adjacent trays.
• Integrated loop storage basket for mid-span applications.
• Can be supplied with a pole/wall mounting bracket.
• Can be supplied with a pressure test valve for both flash testing and cable earthing.

Aerial cables in FTTx applications

SPLICE CLOSURES

Prysmian OAsys Solution
Medium Multi-function Joint - MMJ

The Medium Multi Function Joint (MMJ) is for jointing optical fibre cables. The joint is ideal for use as a Cable, Chamber Joint, Track Joint, Spur Joint or Distribution Joint due to its capacity and compact size. It has a maximum capacity of 288 fibres. The splice trays are factory fitted and each tray can accommodate up to 12 spliced fibres. A multi-functional bracket can be supplied with the joint which enables wall or pole mounting of the joint vertically or horizontally. The joint has four circular ports for mechanical entry glands, one oval port for heat shrink or mechanical entry and two additional small circular ports also for heat shrink entry.

Features and Benefits

• A compact closure for the splicing of optical cables.
• Supplied with 24 single element trays each able to accommodate 12 splices providing a maximum capacity of 288 fibres, or 24 single circuit splice trays. Each single circuit splice tray has two storage sections providing a total of 48 trays per joint. Each tray can accommodate up to 4 splices providing a total capacity of 192 fibres.
• An input manifold manages the tubes to a common routing channel and has the provision to mount up to four optical splitters.
• The joint is for use with heat shrink splice protectors of either 1.3mm in diameter and 30mm in length or 2.2mm in diameter and 45mm in length.
• The closure base has 4 circular entry ports and an oval port. Cables up to 23mm in diameter can be installed into each port. A further two small ports are available as emergency ports. These ports are for heat shrink entry and can accommodate a cable of up to 12mm in diameter.
• Circular port cables are sealed using a mechanical sealing gland. The gland can be assembled onto the cable away from the joint and is then simply plugged into the base.
• Oval port cables are sealed using adhesive lined heat shrink sleeves or using a mechanical oval port entry kit. See page 3 for more information.
• Multi Way Entry Glands are available to allow the installation of a number of cables into one circular port. See page 3 for more information.
• Splice trays hinge upwards individually, allowing full access to spliced fibres without disturbance to live fibres in adjacent trays.
• Integrated loop storage basket for mid-span applications.
• Can be supplied with a pole/wall mounting bracket.
• Can be supplied with a pressure test valve for both flash testing and cable earthing.

Aerial cables in FTTx applications

RECOMMENDED FITTINGS

References of aerial fittings from our main partner SM-CI to be associated with **TF301 cables**
Qualification of the duo cable/fittings to be checked before 1st order. Tensile test at MAT to be performed if any.(1): typical span depending on both installation and climatic conditions
Other fittings from other supplier : please contact your TSS.

Typical span(1)	50-80m			
Product family	TF301G		TF301D	
Data Sheet ref.	TS00219		TS00218	
Fittings ref.	Dead end clamp	Suspension	Dead end clamp	Suspension
6	-	-	PA 120 FO 400 TR	PSR 8-20 ADSS
12	PA 120 FO 400 TR	PSR 8-20 ADSS	PA 120 FO 400 TR	PSR 8-20 ADSS
24	PA 120 FO 400 TR	PSR 8-20 ADSS	PA 120 FO 400 TR	PSR 8-20 ADSS
36	PA 120 FO 400 TR	PSR 8-20 ADSS	PA 120 FO 400 TR	PSR 8-20 ADSS
48	PA 140 FO 400 TR	PSR 8-20 ADSS	PA 140 FO 400 TR	PSR 8-20 ADSS
72	PA 140 FO 400 TR	PSR 8-20 ADSS	PA 140 FO 400 TR	PSR 8-20 ADSS
96	PA 140 FO 400 TR	PSR 8-20 ADSS	-	-
144	PA 140 FO 400 TR	PSR 8-20 ADSS	-	-
288	PA 160 FO 400 TR	PSR 8-20 ADSS	-	-

References of aerial fittings from our main partner SM-CI to be associated with **TF303 cables.**
Qualification of the duo cable/fittings to be checked before 1st order. Tensile test at MAT to be performed if any. (1): typical span depending on both installation and climatic conditions. Other fittings from other supplier : please contact your TSS.

Typical span(1)	30-70m			
Product family	TF303G		TF303D	
Data Sheet ref.	TS00221		TS00220	
Fittings ref.	Dead end clamp	Suspension	Dead end clamp	Suspension
6	-	-	PA FO 200 D6-8	PSB FO D 5-8
12	PA FO 200 D6-8	PSB FO D 5-8	PA FO 200 D6-8	PSB FO D 5-8
24	PA FO 200 D6-8	PSB FO D 5-8	PA FO 200 D6-8	PSB FO D 5-8
36	PA FO 200 D6-8	PSB FO D 5-8	PA FO 200 D8-10	PSR 8-20 ADSS
48	PA FO 200 D8-10	PSR 8-20 ADSS	PA 120 FO 400 TR	PSR 8-20 ADSS
72	PA 120 FO 400 TR	PSR 8-20 ADSS	PA 140 FO 400 TR	PSR 8-20 ADSS
96	PA 140 FO 400 TR	PSR 8-20 ADSS	PA 140 FO 400 TR	PSR 8-20 ADSS
144	PA 140 FO 400 TR	PSR 8-20 ADSS	PA 140 FO 400 TR	PSR 8-20 ADSS
288	PA 160 FO 400 TR	PSR 8-20 ADSS	-	-

Aerial cables in FTTx applications

TELECOM AERIAL SELF-SUPPORTING CABLES

Main characteristics

Breaking strength (RTS : Rated Tensile Strength) 1), 3)

- Max tensile load that the cable shall withstand without mechanical failure.
- Optical consideration left out.

Maximum allowable tension (MAT) 1), 3)

- Max tensile load that may be applied to the cable without detriment to the performance requirements due to fibre strain. Typically less than 60% of the breaking strength.
- It should be regarded as the limit load, to which the cable may be subject to infrequent but probable situations (installation, extreme weather conditions).
- Sometimes called : MRCL: Maximum Rated Cable Load 1) or TM: Short-term tensile load 2)

Maximum Installation Tension (MIT) 1), 3)

- Max tensile force for permanent operation without constraint on fibres.
- Maximum recommended stringing tension during installation 3)
- Sometimes called : TL: Long-term operation load 2) or MOT: Maximum operating tension 3)

Minimum bending radius

- Minimum radius at which the cable can be bent without compromising its optical and mechanical properties.

1) IEEE-1222,
2) IEC 60794-3-20
3) IEC 60794-4-20

PA 160 FO 400 TR | PA 140 FO 400 TR | PA 120 FO 400 TR | PA 100 FO 400 TR | PA- | PSB FO D 5-8 | PSR 8 20 ADSS

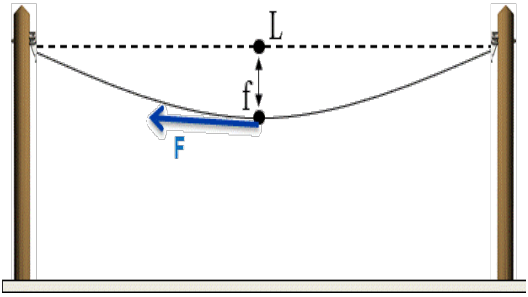
Aerial cables in FTTx applications

TELECOM AERIAL SEL-SUPPORTING CABLES

Important constraints

Cables may be subject to considerable forces.
If we consider a fiber cable 144 whose weight is 150 kg / km as presented above, one must bear in mind the following few notions considering a range of 50 m:

In G1/HEAVY conditions we see that the initial tensile force is multiplied by ~ 4. It is there-fore essential that the cable design, the complete solution and conditions for the imple-mentation of all these aspects fit well if we want to achieve sustaina-bility and life expectancy of 40 years sought.



F, L and f linked ; F ≤ MIT

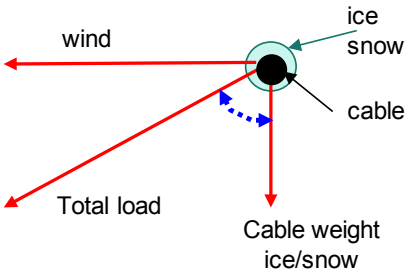
	Conditions	Force (daN)
Install	20° C without wind	68
A1	NFC11201-A1 BT A-ZVN ; 15 ° C ; wind 427,5 Pa	164
Light	NESC Light ; 30° F ; wind 9 lb/sq ft	177
A2	NFC11201-A1 BT A-ZVF : 15 ° C ; wind 480 Pa	176
Medium	NESC Medium ; 15° F ; wind 4 lb/sq ft ; ice ¼ in	194
G1	NFC11201-A1 BT G1 ; -5 ° C ; wind 360 Pa ; ice 1 kg/m	256
Heavy	NESC Heavy ; 0° F ; wind 4 lb/sq ft ; ice ½ in	281

Aerial cables in FTTx applications

THE CONSTRAINTS OF THE AERIAL DEPLOYMENT AND THEIR CONSEQUENCES

Climatic constraints

- Wind, snow and ice: Increase the load on the cable
- Temperature: The cable length varies with the temperature (contraction phenomenon and expansion of materials)
- Consequences: The cable length varies. Either by the load variation effect on the cable. Either by the phenomenon of expansion and contraction of materials. Sheath and cable core do not vary in the same length (pistoning phenomenon) Because the Young's moduli and the expansion coefficients from one material to another and from a set of material to another are different



→ **Cable design**

→ **Management lengths to connection points**

Aerial cables in FTTx applications

SPECIAL CARE IN CLOSURES

Pistonning phenomenon

- Relative movement of the cable core vs sheath

Coupling coils

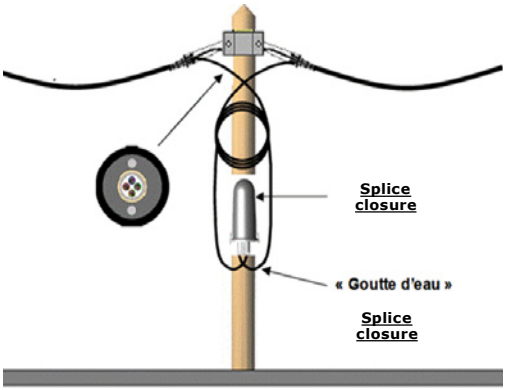
PREFERED

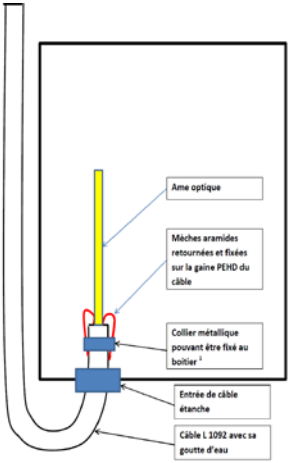
- Allows to fasten all cable elements
- 4 loops at static radius of cable as specified in the cable data sheet, for instance:
  12 FO : R ≈ 60 mm
  36 FO : R ≈ 80 mm
  72 FO : R ≈ 120 mm

Tightening aramid on the sheath

ALTERNATIVE

- When coupling coils not allowed
- Allows a certain limit to fasten all cable elements
- Not enough for long distances (> 200 m) and heavy climatic conditions





Aerial cables in FTTx applications

MAIN INSTALLATION GUIDANCE

Foreward

Although crucial stakeholders safety recommendations are not addressed here, the purpose of this document to ensure the sustainability of the facility. The safety of people and property, on the site but also those in the immediate vicinity of the site and may be affected should be considered as a first priority.

This is all the more important part of the work is done in height, potentially in close proximity to power lines and cable reels, the weight can be up to several hundred kilograms should be handled.

The various operations must be done by qualified persons for these operations under the conditions of the site.

At all times local Health & Safety statutory requirements MUST be adhered to. It is the responsibility of the installer to understand and comply with these regulations.

Aerial cables in FTTx applications

MAIN INSTALALTION GUIDANCE

Are you sure your poles are strong enough ?

- Although optical cables generally have a much lower weight to copper cables, it is necessary to ask the question of the resistance of the poles.
- Professional software can be used for computations (like Camelia which is a reference in France)
- In some cases and when authorized, possible to use fuse clamps, the cable lifting beyond a certain effort

Aerial cables in FTTx applications

MAIN INSTALLATION GUIDANCE

Basics

- An aerial cable is designed for use in specific limit conditions:
  - Topology: span, sag, electric fields
  - Climate: wind, ice load, air pollution
  - It can not be used out of these limits without risk to the performance and durability of the connection
  - It is also necessary to ensure that these conditions will not change over time

- **An aerial cable must be installed with anchoring devices suitable for its size and structure Tensile qualification (MAT) applies to the couple: cable and anchoring system.**

- During its installation it must not be subject to :
  - Bending radius less than specified by the cable manufacturer (pulleys diameter to take into consideration)
  - Tension higher than specified MAT (required use of a tension limiter or dynamometer with audible alert)

Refer to the CIG0110-ADSS Safety and Handling Recommendations

Linking the future

Følg os på Linked-in, Facebook, Twitter eller YouTube med nyheder og videos om virksomheden, nye produkter, aktiviteter og mere.

Prysmian Group
Roskildevej 22
DK-2620 Albertslund
Danmark
www.prysmiangroup.dk

Vi er her for dig

Du er altid velkommen til at kontakte os vedrørende spørgsmål og forespørgsler.

Salg:

Telefon: +45 60 39 27 38

Kundesupport:

Telefon: +45 60 39 27 16

E-mail:
dk-telecom-sales@prysmiangroup.com

Prysmian Group