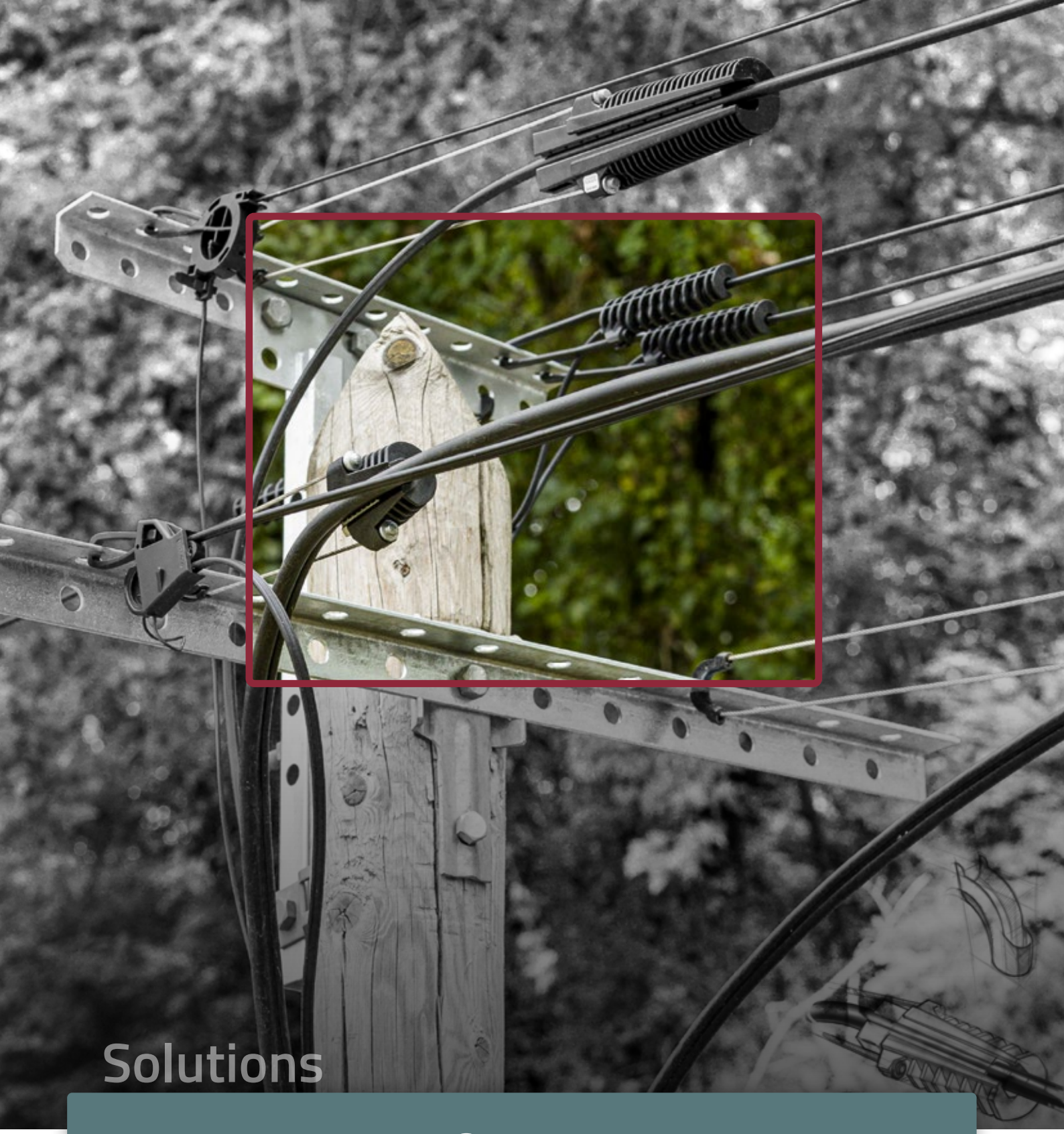


Solutions

ANCHORING & SUSPENSION

Telenco

Édito

Teleworking, online games, online medical consultations, online education - all these services are enabled by fast fibre optic broadband networks. In urban areas, characterised by a high population density, the access to ultrafast broadband is possible thanks to a varied technological ISP offer (fibre, 3G / 4G, VDSL, DOCSIS,…). On the metropolitan and municipal territories, networks benefit of a dense infrastructure, mainly deployed in the underground and on facades. In rural areas with low population density however, the digital divide is partly avoided thanks to the fibre deployment which, for economic and deployment speed reasons, is mainly performed on overhead lines or by re-exploiting the existing telecom and energy infrastructures.
The variety of geographical territories and the global warming induce strong constraints on overhead lines. Cable's thermomechanical features are thus important for ensuring the resistance to daily or seasonal temperature variations, as well as to overloads caused by bad weather conditions (wind, snow and ice). However, the thermomechanical characteristics associated with anchoring and suspension devices for overhead lines are just as important. Most importantly, the compatibility between anchor clamps and the cables that they support must be systematically considered.

The anchoring and suspension of telecommunications cables is written in the genes of the Telenco Group. For more than 20 years, Telenco has developed anchoring and suspension solutions for cables deployed all across the world. The Group constantly adapts its offer to meet the structure evolution of telecommunications cables and to ensure perfect behavioural compatibility so to support its customers in the deployment of sustainable and high-end telecommunications networks.

Let's build tomorrow's networks, today!

Network installers and design offices will find in this brochure technical information about overhead cable deployment, as well as guidelines for selecting the most suitable anchoring and suspension devices for the chosen cables based on:

- Anchor or suspension devices deployment conditions (RADAR method)
- Different anchoring and suspension technologies, their benefits and inconveniences

Next, you will find guidance on how to choose the right suspension or anchoring solution, among all Telenco® offer, for each type of cable (round, figure-8, flat) and which selection criteria to consider.

Ultimately, we focus our technical prescriptions on anchoring solutions for drop cables.

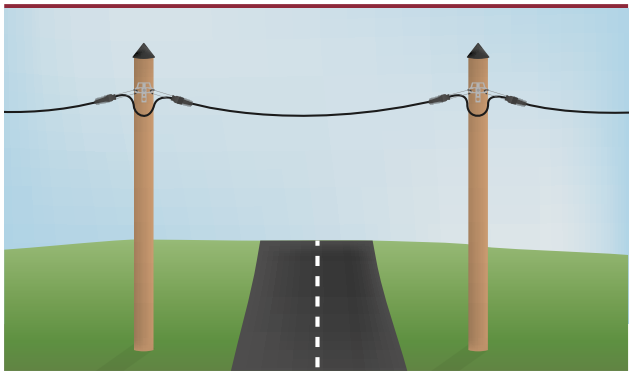
Technical documentation is at your disposal on
www.telenco-networks.com

Making the right equipment choice: THE RADAR METHOD

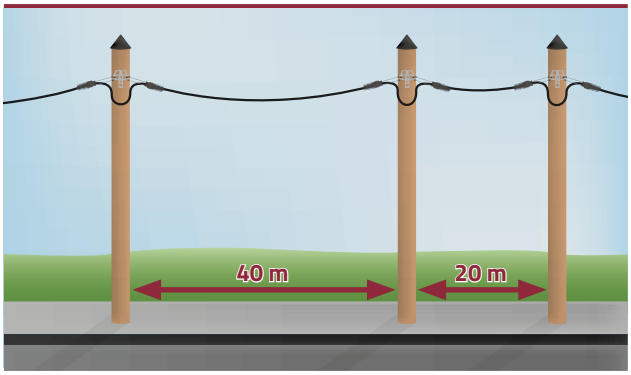
We suggest you to use the following RADAR method. This consists into considering 5 essential criteria : the overhead line layout and typology, the span length, the topography and the alignment segmentation. As a general rule, anchoring clamps or helical dead-ends can be used on all type of poles for securing a cable at the required horizontal tensioning and height. Suspension devices however have to be installed on intermediate poles : they maintain a cable at the correct height (vertical resistance).

	Anchoring	Suspension
ROAD CROSSING	Yes	No
ASYMETRIC SPAN	Yes	No
DEVIATION	Angle >25°	Angle <25°
ALIGNMENT SEGMENTATION	Every 5 poles	Up to 4 poles
RUGGED TERRAIN	Yes	No

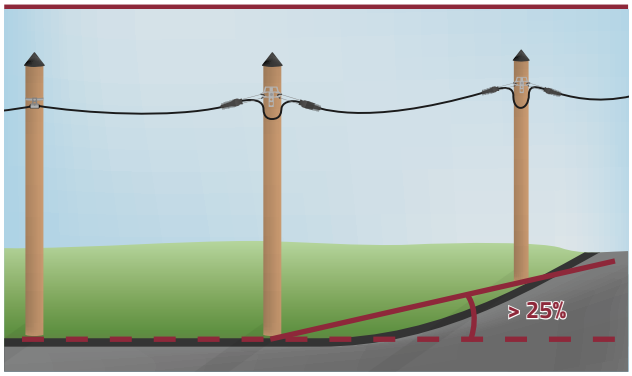
ROAD CROSSING



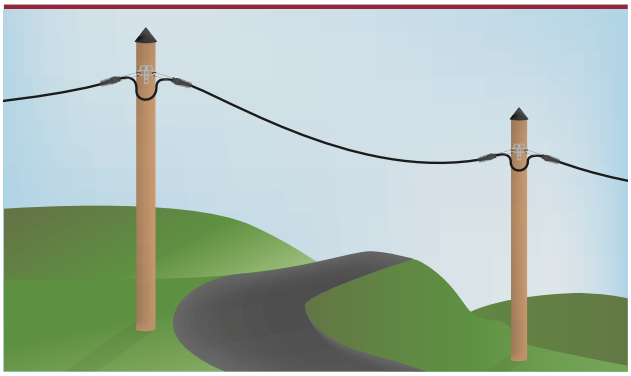
ASYMETRIC SPAN



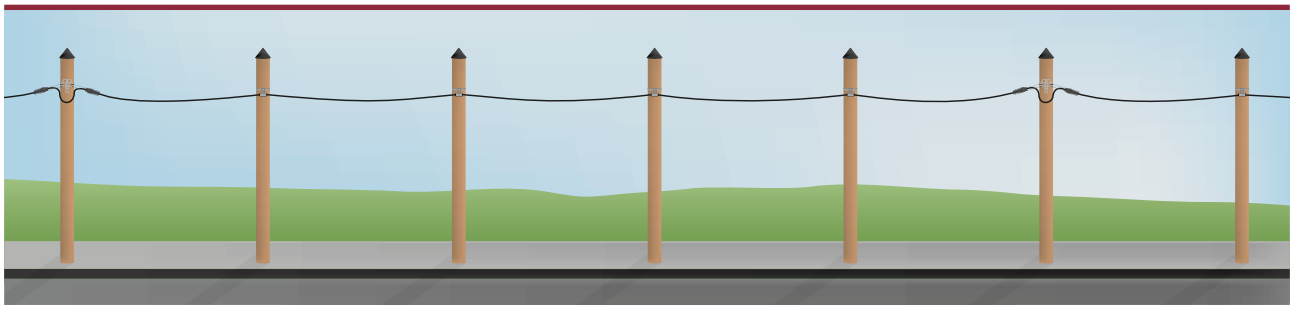
DEVIATION



RUGGED TERRAIN



ALIGNMENT SEGMENTATION



HIGH-END TECHNOLOGIES FOR SECURING OVERHEAD LINES

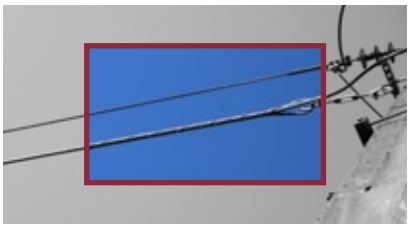
ANCHORING APPLICATIONS

CONICAL CLAMPING. The principle of this technology is simple: the more we pull on the cable, the more the cable tightens into the clamp. Provides for quick, toolless installation and an easy cable sag adjustement. Enables to absorb vibrations and create offsets from the support. Compatibility: round cables with FRP rods or figure-8 cables with steel or dielectric messengers (spans up to 180m).

MANDREL DEVICES. This technology consists into self-tightening the cable around the mandrel. This preserves cables of piston effects for all type of spans. Enables quick, easy and toolless installation, as well as simple sag adjustement. Especially recommended for small diameter cables built without FRP rods and/or a non-dense outer sheath.

WEDGE CLAMPS. Solution based on a wedge design ensuring an enhanced adapatation to the cable as well as an efficient cable grip. Compatibility: round, flat fibre optic and copper cables. For round optical cables with rigid insulation, an improved derived technology materialised in clamps with envelopping wedges is more suitable. Indeed, it preserves all the functional characteristics of the cable in case of overload.

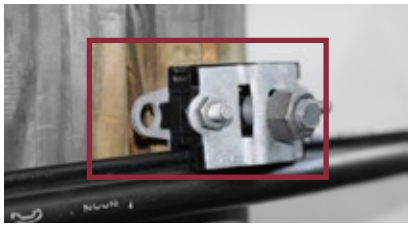
HELICAL DEAD-ENDS. Thanks to a wide contact surface with the cable, this technology is suitable for maintaining round cables rolled out on long spans (up to 250m) and in difficult installation conditions. Discreet, they require however additional accessories and a greater installation time than conical clamping devices.



SUSPENSION APPLICATIONS

J HOOK SUSPENSION CLAMPS. This technology enables the deployment of a cable on several consecutive poles without using intermediate pulleys. Installation on cross-arms (fixed suspensions) or poles (fixed and mobile suspension applications).

SHELL BODY SUSPENSIONS. Compatible with round or flat cables, suspension clamps offering a hinged body shell design can be installed on all type of poles.



SUSPENSION GROOVED PADS. This technology is used for figure-8 cables with steel or dielectric messenger. Designed with two grooves to adapt to different messenger diameters. Available for fixed or mobile suspension applications.

SOLUTIONS FOR ROUND CABLES

The Telenco® anchor, drop clamps and helical dead-ends are engineered to meet all termination needs within the FTTH feeder and distribution networks.

Discover the most appropriate solution for your network deployment in the table below. It summarises the correspondance between a Telenco® product and the allowable round cable diameter range and span length.

DESIGNATION	MODEL	SPAN	CABLE DIMENSIONS (mm) 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
ANCHORING APPLICATIONS			
AC Anchor clamps with enveloping wedges 1	AC56R	< 70m	
	AC68R		
ACADSS Compact anchor clamps 2	ACADSS6C	< 90m	
	ACADSS8C		
	ACADSS10C		
ACADSS Anchor clamps 3	ACADSS10	< 90m	
	ACADSS12		
	ACADSS14		
	ACADSS16		
	ACADSS18		
GSDE Galvanised steel helical dead-ends 4	GSDE1000	< 90m	
	GSDE1150		
	GSDE1300		
	GSDE1450		
	GSDE1600		
	GSDE1750		
	GSDE1950		
GSDE AR Helical dead-ends with armor rods 5	GSDE AR 1050	< 180m	
	GSDE AR 1150		
	GSDE AR 1250		
	GSDE AR 1290		
	GSDE AR 1350		
	GSDE AR 1420		
	GSDE AR 1530		
	GSDE AR 1730		

ACADSS Compact anchor clamps 2

These compact anchor clamps enable dead-ending applications of round ADSS optical cables on distribution networks with spans up to 90 meters. Telenco® ACADSS compact anchor clamps present an open conical body forming a jaw with two plastic wedges designed to perfectly fit onto the cable so to offer an excellent grip. A flexible bail equipped with a thimble eases the clamp installation on all type of pole hardware.

- Cable grip on 165mm section length
- Fast and toolless installation with zero bend radius constraint

AC Anchor clamps with enveloping wedges 1

Telenco® AC range of anchor clamps with enveloping wedges are used for the dead-ending of FTTH cables on poles or facades. Engineered with tighter fit wedges, AC anchor clamps preserve all the functional characteristics of the cable in case of overload. Designed with open conical body, a jaw with two plastic wedges and an insulated flexible stainless steel bail.

- Especially designed for round ADSS distribution cables
- Preserves the functional characteristics of the cable in case of overload

ACADSS Anchor clamps 3

These clamps are recommended for the dead-ending of fibre optic ADSS cables with HDPE insulation deployed on distribution networks with span configurations up to 90 meters. Thanks to their design based on conical wedges, Telenco® ACADSS anchor clamps perform an efficient cable grip on 230mm length.

- Simple, fast and toolless installation
- Suits to all field configurations

GSDE Galvanised steel helical dead-ends 4

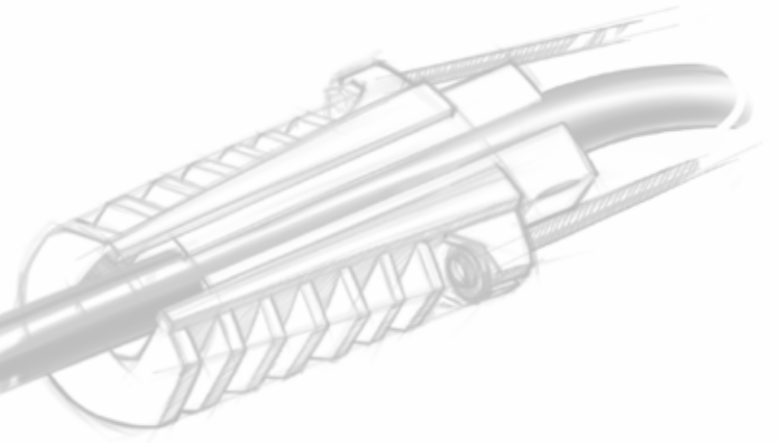
Made of hot-dip galvanised steel, Telenco® GSDE helical dead-ends are used for fixing ADSS round cables on telecommunications distribution networks characterised by short spans up to 90m. Available in a variety of models to meet a broad range of round cable diameters.

- Effective cable grip on a large contact surface
- Cable installation with zero bend radius constraint

GSDE AR Helical dead-ends with armor rods 5

Helical dead-ends from Telenco® GSDE AR range are used to terminate round ADSS cables on distribution networks with spans up to 180 meters. These spirals consist of two distinctive parts: four protective armor rods that are to be installed on the cable first and the helical dead-end to attach afterwards onto the armor rod.

- Equipped with armor rods for protecting cable against bending, compression and abrasion



SOLUTIONS FOR FIGURE-8 CABLES

Telenco offers a broad range of solutions for the roll-out of figure-8 cables in overhead configurations.

The table below includes Telenco® flagship ranges engineered to enable simple, fast and reliable dead-ending or suspension applications of figure-8 cables with steel or dielectric messenger (FRP). All these product solution ranges have been developed to meet the precise needs of feeder and distribution telecommunications networks.

DESIGNATION	MODEL	SPAN	CABLE DIMENSIONS (mm) 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
ANCHORING DIELECTRIC MESSENGER			
AC Anchor clamps ❶	AC35 140	< 90m	
	AC68 140		
AC L Anchor clamps ❷	AC35L 140 / 260 / 300	< 90m	
	AC68L 140 / 260 / 300		
ACFO Anchor clamps ❸	ACFO 810	< 90m	
	ACFO 1012		
	ACFO 1214		
ACAL Anchor clamps ❹	ACAL10	< 180m	
	ACAL 12		
	ACAL 14		
	ACAL 16		
Bolt anchor clamp ❺	AC3B912		
ANCHORING STEEL MESSENGER			
AC Anchor clamps ❻	AC6	< 90m	
	AC7		
	AC10		
Parallel groove clamps ❼	30/02	< 50m	
	31/01		
SUSPENSION APPLICATIONS			
SC Suspension clamps ❽	SC39B	< 70m	
	SC37C		
	SC711C		

AC Anchor clamps with compact body ❶

The Telenco® AC range includes anchor clamps engineered with compact body and wedges. Thanks to their open conical body forming a jaw with two plastic wedges and a flexible bail, these clamps are designed to enable effective dead-ending applications of figure-8 cables with steel or dielectric messenger on poles or facades.

- Compact design offering 200daN tensile strength
- Cable clamping on 60mm length

AC L Anchor clamps with long body ❷

This range includes product solutions offering an improved tensile strength. Telenco® AC L anchor clamps are designed with long body and wedges. They are recommended for the dead-ending of figure-8 cables with dielectric or steel messengers on distribution networks with spans up to 90m.

- Long body design offering a tensile strength of 300daN
- Cable clamping on 120mm length

ACFO Anchor clamps with reinforced body 3

The ACFO anchor clamp range is engineered for the dead-ending of aerial figure-8 cables or aerial figure-8 duct structures with FRP messenger. Designed with a fibreglass reinforced thermoplastic conical body, a pair of wedges and a 500mm long stainless steel flexible bail including an insulated thimble.

- Reinforced conical body
- Tensile strength: 750daN

ACAL Anchor clamps with aluminum body 4

The Telenco® ACAL range of anchor clamps is used for dead-ending applications of figure-8 cables with dielectric messenger on both feeder and distribution networks characterised by spans up to 180m. Engineered with an aluminum open conical body, two plastic wedges and a flexible bail of 500mm.

- Aluminum body construction
- Tensile strength: 1200daN

AC3B912 3 Bolt anchor clamp 5

The Telenco® AC3B912 clamp is used for the dead-ending of aerial figure-8 cables or aerial figure-8 duct structures with FRP messenger rolled out on distribution networks or medium voltage networks where spans do not exceed 70m.

- Compatible with messenger Ø from 9 to 12mm
- Designed with flexible bail with 11kV insulator
- Controlled clamping (35Nm² minimum)

AC Anchor clamps 6

Telenco® AC anchor clamps are used for the dead-ending of FTTH aerial figure-8 cables or aerial figure-8 duct structures with steel messenger deployed on distribution networks with spans up to 90m. Engineered with an open conical body, a flexible bail and a pair of metallic jaws that perforate the messenger sheaths so to anchor on its steel part when tightening.

- Effective cable clamping thanks to its specific wedge design
- Available in different bail lengths for adapting to every cable's bend radius constraint

Parallel groove clamps 7

The Telenco® parallel groove clamps with 3 bolts enable the dead-ending of figure-8 copper cables. Hot-dip galvanised steel pole hardware made of two metal plates including 2 grooves and, depending on the chosen model, 2 or 3 bolts. Its installation also requires the use of a turnbuckle 30/04 and a thimble.

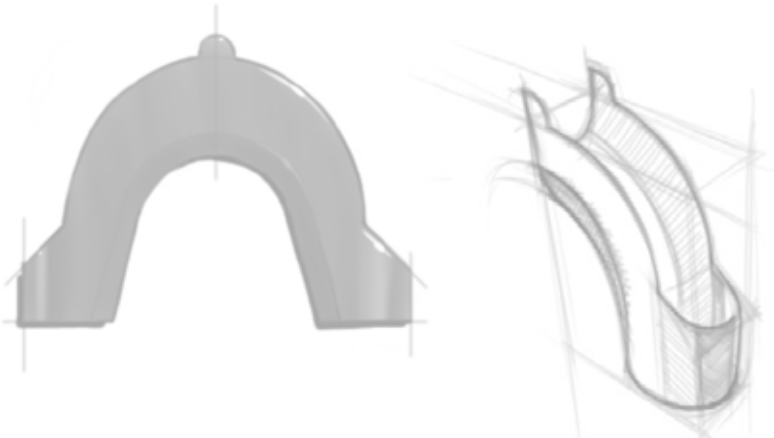
- Cost-effective design
- Available with 2 or 3 bolts, depending on the diameter of the messenger and the required tensile strength

SC Suspension clamps 8

Telenco® SC range includes clamps with an unique patented design used for the suspension of figure-8 cables with steel or dielectric insulated messenger on all type of poles (wooden, steel, concrete,...). With straight grooves and a reversible system, SC clamps are engineered with UV thermoplastic jaws reinforced with two galvanised steel plates and secured by two galvanised steel bolts.

- Unique patented design for a system integration directly on poles or on suspension brackets
- Full range of articulated* and fixed** suspension solutions

**Articulated versions : SC37C and SC711C*
*** Fixed version : SC39B*



SOLUTIONS FOR FLAT CABLES

For reliable dead-ending or suspension applications of flat optical cables on distribution networks, Telenco brings alternative technological solutions.

The table hereafter correlates each Telenco® product solution range with the constraints imposed by the deployed cables and the span lengths specific to every network configuration.

DESIGNATION	MODEL	SPAN	MAXIMUM DIMENSIONS (W X H)
ANCHORING APPLICATIONS			
Hypoclamp Drop clamp ❶	HYPOCLAMP F	< 70m	9 x 4mm
ODWAC XL Drop clamp ❷	ODWAC XL	< 90m	15 x 6mm
5/35 FTTH F Drop wedge clamp for flat drops ❸	5/35 FTTH F	< 70m	7 x 3mm

Hypoclamp F Drop clamp ❶

This Telenco® drop clamp is designed with a stainless steel body, a stainless steel shim and plastic wedges with opening and lockable bail at its extremity. The Hypoclamp F is used for the dead-ending on poles or facades of optical flat cables deployed on distribution networks with spans up to 70m.

- Simple, fast and toolless installation
- Cable clamping with zero bend radius constraint

ODWAC XL Drop clamp ❷

This drop clamp is used for the dead-ending of flat fibre optic cables on distribution networks with spans of maximum 90m. All stainless steel, the Telenco® ODWAC XL clamp presents an elongated body including a spacer and a rugged lockable bail. This product solution offers 150daN tensile strength and a 125mm bail length.

- Direct cable installation
- Compatible with most commonly met optical flat cables

5/35 FTTH F Drop wedge clamp for flat drops ❸

The Telenco® 5/35 FTTH F drop wedge clamp enables simple or double anchoring applications on optical flat cables rolled-out on distribution networks. The 5/35 FTTH F is a single-piece thermoplastic clamp designed with a conical closed body, a flat-grooved wedge connected to the body through a link that ensures its imperdability and an openable bail.

- Single-piece, cost-effective design
- Manual cable sag adjustement by locking the wedge on its remote position

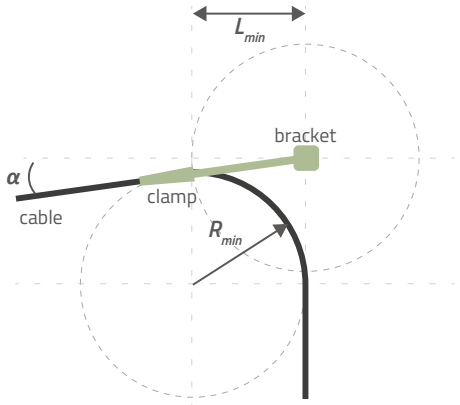
TECHNICAL FOCUS

How to determine the appropriate bail length for your clamp ?

A clamp's bail length is directly related to the cable bending performances. The lower the cable bending performance, the shorter the bail length may be. Two configurations have to be distinguished:

SIMPLE ANCHORING

$$L_{min} = \frac{R_{min}}{\cos(\propto)}$$



∝ is related to the sag, and in case of sag of 1% to 3%, cos (∝) ≈ 1

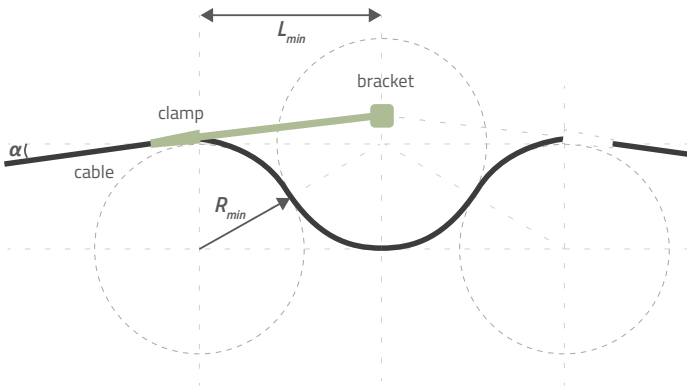
Example :

If cable diameter is 5mm and the minimum bending radius is 100mm (20xØ), thus, in this case, it results that the minimum bail length is 100mm.

DOUBLE ANCHORING

Assuming that the angle **α** due to the ratio cable sag over cable span is minor and cos (∝) ≈ 1, the bail length is directly related to the minimum bending radius of the cable and it can be determined by using the following formula:

$$L_{min} = \frac{\frac{\pi}{2} \times R_{min}}{\cos(\propto)} \approx 1.57 \times R_{min}$$



Example :

If the cable diameter is 8mm and the minimum bending radius is 160mm (20xØ), it results thus that the minimum bail length is:

1.57 x 160 = 251mm.

DEAD-ENDING SOLUTIONS FOR DROP CABLES

To meet the exact constraints of FTTH roll-outs and particularly those of the last mile access, Telenco develops innovative ranges of solutions for dead-ending applications.

The table here below reunites all the available solutions for carrying out a reliable and future-proof deployment project. Each solution is developed to best adapt to a specific cable diameter range and span configuration.

DESIGNATION	MODEL	SPAN	CABLE DIMENSIONS (mm) 2 3 4 5 6 7 8 9 10 11 12 13 14 15
ANCHORING APPLICATIONS			
Drop clamp with enveloping wedges 1	AC560	< 70m	
Drop mandrel clamps 2	@	< 90m	
	Mini @		
Drop wedge clamps 3	5/35 FTTH R	< 90m	
	5/35 XB 5/35 SB 5/35 SSB		
GSDE Helical dead-ends 4	GSDE0600 /0700	< 90m	

Drop clamp with enveloping wedges 1

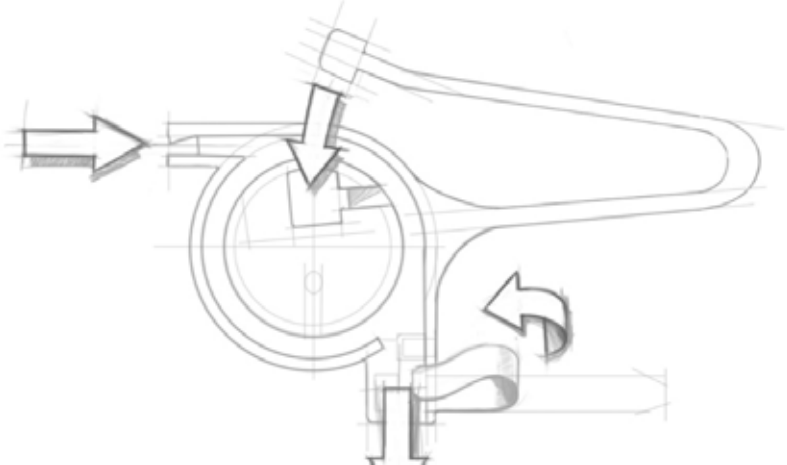
The Telenco® AC560 drop clamp is used for the dead-ending of FTTH drop cables on poles or facades with span configurations of up to 70m. Particularly recommended for round drops with rigid insulation. AC560 drop clamp is engineered with more enveloping wedges for protecting the cable and its functional characteristics in case of overload.

- Effective solution for network densification thanks to a compact body design
- Preserves all the functional characteristics of the cable in case of overload

Drop wedge clamps for FTTH drops 5/35 3

The Telenco® 5/35 range includes drop wedge clamps enabling simple or double anchoring on poles and facades. These one piece thermoplastic clamps are designed with a conical closed body, a grooved wedge and a link that ensures the wedge's captivity to the body. Range enriched with alternative models to meet different mechanical and environmental constraints. The 5/35 XB model comes with a plastic bail, while the 5/35 SB and 5/35 SSB offers a stainless steel bail.

- Effective cable grip due to the wedging system
- 4 available versions with different bail materials, lengths and shapes



Drop mandrel clamps @ and Mini @ 2

The AROBASE range has been developed to meet the deployment constraints of FTTH round and flexible drop cables on poles or facades with short spans. @ and Mini @ drop clamps included within this product range are designed with a mandrel body shape in which cable coils and self-tightens. The Mini @ drop clamp is a more compact model including a re-usable cable tie.

- Unique fastening solution for round outdoor drops with insulated and flexible sheath
- Cost-effective, single-piece with compact design

GSDE0600/0700 Galvanised steel helical dead-ends 4

The Telenco® GSDE0600/0700 helical dead-ends present no armor rod and are engineered for enabling the dead-ending of FTTH drops. These galvanised steel spirals are mainly used for the roll-out of drop cables on LV and telecoms infrastructures supporting access networks with spans up to 90m.

- Excellent cable grip
- Cable installation with zero bend radius constraint

TECHNICAL FOCUS

Cable-clamp compatibility for a future-proof network

Considering the sustainability and reliability of the network, it is essential that pole hardware and anchors to be adapted and qualified for the network on which they will be installed. The mechanical connection between the anchor and the cable constitutes therefore an important issue for overhead networks. The compatibility between anchors and cables is checked by carrying out the following qualification tests:

- Tensile tests at the short-term tensile load of the cable (Maximum Allowable Tension) according to EN 60794-1-2 standard - modified Method E1 involving a couple of anchoring devices on a cable length greater than 1 meter. There should be no slippage of the cable inside the anchoring clamps, no deterioration of the cable, nor deterioration of the signal (attenuation less than 0.1dB).
- Galloping test for anchor clamps according to EN 60794-1-2 standard - Method E1. This consists into applying 10 undulations to cables with a smaller or equal diameter to 6mm (drops), 3 undulations to cables with a greater diameter than 6mm (distribution and feeder cables) and a measurement of optical losses for 300 hours. A test is considered conclusive when registered optical losses are less than 0.1 dB throughout the test.

SUSPENSION SOLUTIONS FOR ROUND CABLES

DESIGNATION	MODEL	SPAN	CABLE DIMENSIONS (mm) 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20
SUSPENSION APPLICATIONS			
JTP J hook cable clamps 1	JTP5	< 70m	
	JTP8		
	JTP12		
	JTP15		
JHC J hook cable clamps 2	JHC10-15	< 70m	
	JHC15-20		
DS Mobile suspension clamps 3	DS2	< 70m	
	DS4		
	DS6		
	DS5		
	DS8		
	DS12		
	DS15		
DSAL Mobile suspension clamps 4	DSAL 0850	< 180m	
	DSAL 1000		
	DSAL 1150		
	DSAL 1300		
	DSAL 1450		
	DSAL 1600		
	DSAL 1750		
	DSAL 1950		

DS Mobile suspension clamps 3

The Telenco® DS standard clamps are used for the suspension of aerial round cables Ø 5-17mm on intermediate poles used for the roll-out of distribution networks with spans up to 70m. Designed with a hinged plastic shell equipped with an elastomer protective insert and an opening bail, these clamps secure the suspended cable thanks to an integrated bolt tightening system.

DS compact clamps are used for the suspension of lightweight cables Ø 2 to 8mm rolled out on spans up to 70m. The three models composing this range are easily differentiated by the colour of their neoprene already injected into their body. The DS compact clamps secure with 2 built-in clips and a cable tie (included).

- Product solution covering a wide range of round cable diameters
- Increased cable protection against aeolian vibrations

JTP J hook cable clamps 1

Universal solution for pole and cross-arm installation, Telenco® JTP clamp range enables the suspension of aerial round cables on distribution or last mile access networks. Designed with a deported galvanised steel body including an elastomer protective sleeve, JTP clamps can be used as a fixed or mobile solution and secured with a bolt tightening system.

- Locking system securing cable into the clamp
- One clamp for enabling fixed or mobile suspension and cable unrolling by removing the elastomer sleeve insert

JHC J hook cable clamps 2

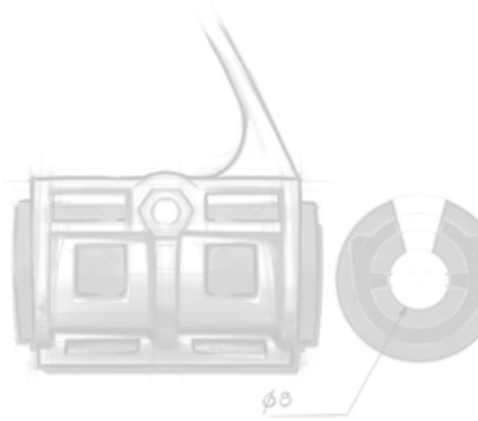
Telenco® JHC range is used for the suspension of fibre optic round cables with ADSS structure, Ø 10 to 20mm, deployed on distribution and access networks with spans up to 70m. Depending on the pole hardware used for their installation, JHC clamps enable fixed or mobile suspension applications. These clamps consist of a galvanised steel J-shaped body including an elastomer protective sleeve and a bolt tightening system.

- J-shape design enables cable unrolling directly into the clamp after removing the elastomer sleeve
- One clamp for fixed or mobile suspension applications

DSAL Mobile suspension clamps 4

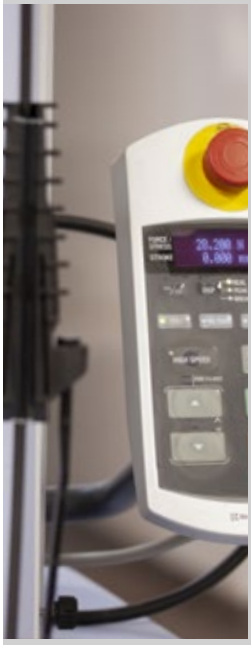
The Telenco® DSAL range of suspension clamps have been engineered to meet all suspension needs of ADSS cables deployed on MV infrastructures, used for distribution networks roll-outs with spans up to 180m. DSAL clamps present a hinged aluminum body equipped with an elastomer protective insert and secured by an integrated bolt tightening system.

- Lightweight, yet rugged and compact design
- Broad range of suspension solutions covering cable diameters from 8.5 to 19mm



TECHNICAL FOCUS

Ensuring the utmost quality for all of our products



For the past 20 years, at Telenco, the product quality is strictly related to the performance of functional tests. Conducted during the product development phase and the production quality control process, these technical evaluations are spread into 2 groups:

MECHANICAL TESTS:

- **Multidirectional tensile tests** at room temperature, up to the device breakage. They are performed according to CEI EN 60794-1-2 standard involving dead-ends, suspension devices and a reference cable.
- **Tensile strength tests under permanent load** with temperature are also carried out. They are generally performed on at least 200 hours, to check material shrinkage and grip performances at low or high temperature.
- **Long duration Vibration test**. Conditions are specified in the EN 60794-1-2 standard - Method E19, on two spans of 40 meters with a reference cable and an optical measurement during at least 300 hours.

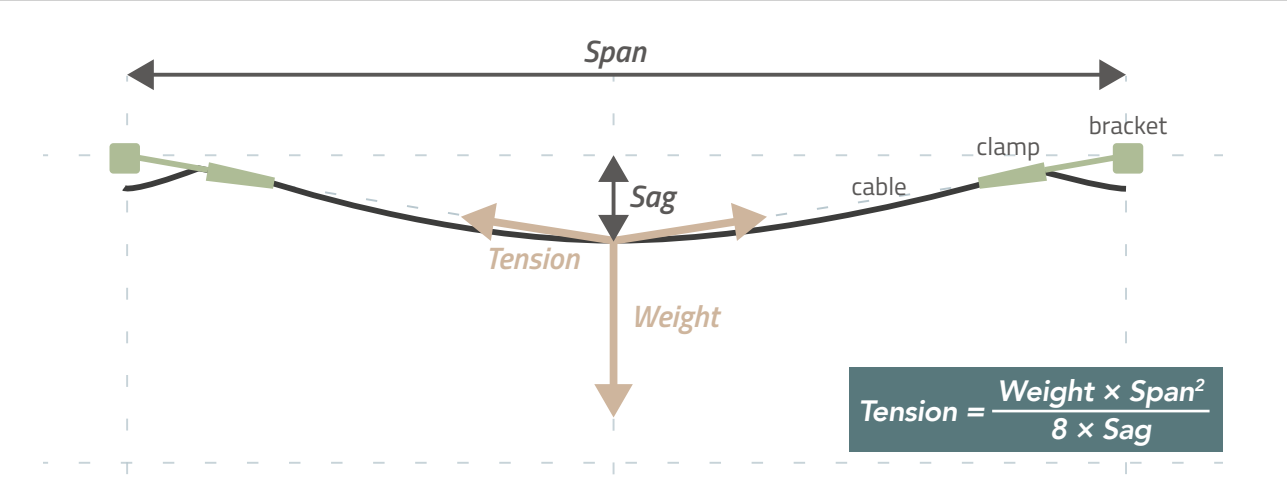
ENVIRONMENTAL TESTS:

According to CEI EN 50289-4-17, after an exposure of 1000 hours, **the UV resistance** is evaluated by the variation of the material's characteristics and after a Charpy shock test EN ISO 179-2 on test samples. For hot-dip galvanised products, **corrosion resistance** is directly related to Zinc thickness, according to EN ISO 1461. Measuring the thicknesses enables to guarantee the corrosion resistance. Stainless steel products are put under a salt spray according to CEI EN 60068-2-11 standard. Mechanical performances and aspects are thus evaluated.

Dielectric withstand tests are also carried out to check the insulation level between the cable and the pole hardware.

Cable tension calculations

Calculation formula for cable tension load



Where,

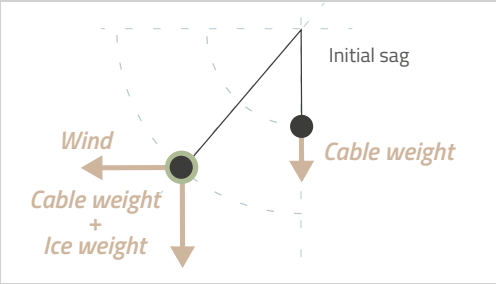
Weight (in kg/m): Apparent weight of one cable meter
Tension (in daN): Calculated tension load applied to the cable and clamp
Span (in m): Distance between two poles
Sag (in m) : Vertical distance at the center of the span, usually equal to 1% of the span

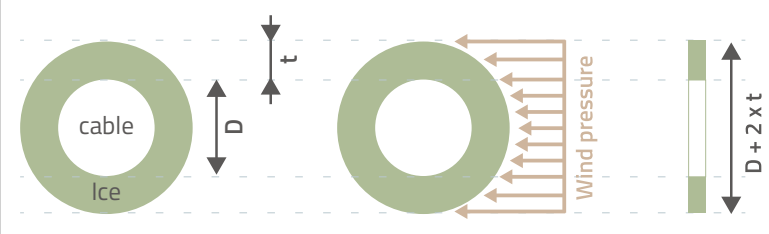
For example, for a 96 fibre count distribution cable, whose weight is 0.1kg/m, deployed on a 50 meters span with a sag of 1% (0.5 meter), the calculated tension is:

$$\text{Tension} = \frac{0.1 \times 50^2}{8 \times 0.5} = 62.5\text{daN}$$

Taking into account additional loads caused by bad weather

Bad weather conditions induce additional load on overhead infrastructures. The ice load increases the cable weight as well as the total surface subject to the wind.





The above formula takes into consideration weather conditions and their impact. Thus, wind and ice loads are integrated in the apparent cable weight calculation:

$$\text{apparent weight} = \sqrt{(\text{ice weight} + \text{cable weight})^2 + (\text{applied wind force})^2}$$

Cable data is provided by the cable manufacturers, while climatic data can be usually found in national standards for building/ infrastructure. As for example, in the USA, the National Electric Safety Code (NESC) Rule 250B defines 3 regions with typical values for ice thickness, temperature, and wind pressure:

		Temperature	Ice thickness	Wind Pressure
NESC RULE 250B	HEAVY	-18°C	12.7mm	192Pa
	MEDIUM	-10°C	6.35mm	192Pa
	LIGHT	-1°C	0mm	431Pa

A good knowledge of the topographic parameters (span, gradient of the ground) and of the climatic conditions allows to anticipate the loads and the overloads impacting the overhead infrastructure. This is also the best starting point for choosing the right material, cables and clamps, adapted to the considered area for a qualitative and future-proof network.

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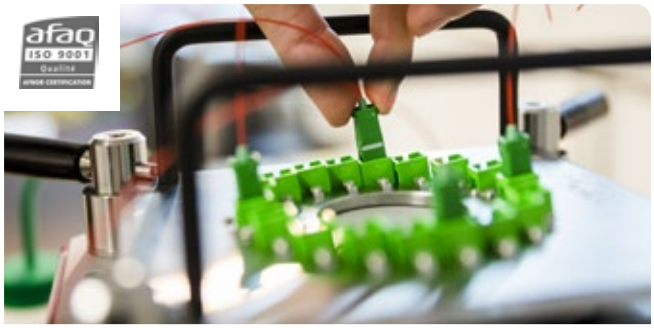

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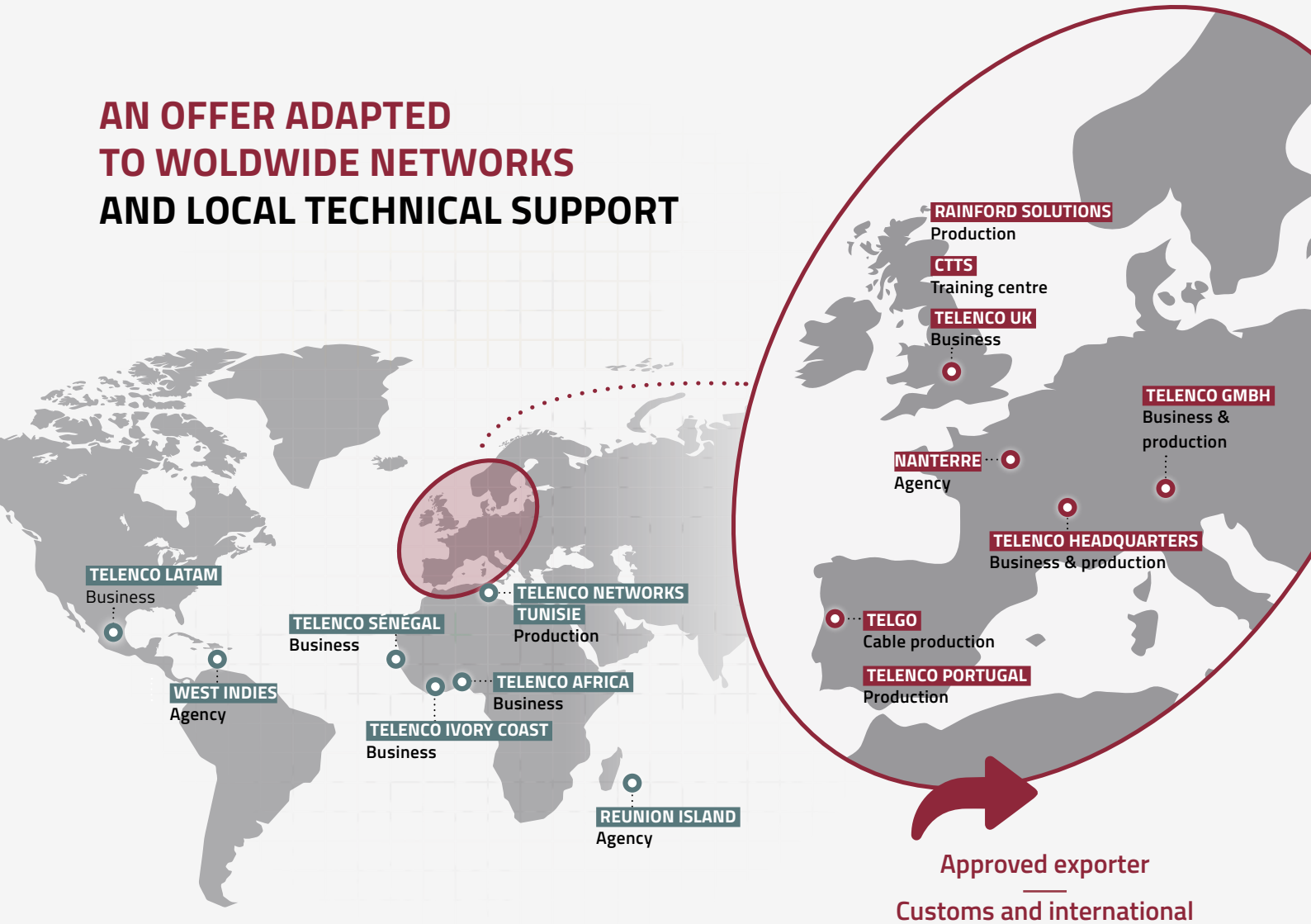

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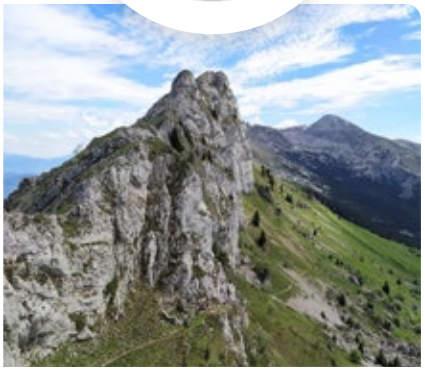

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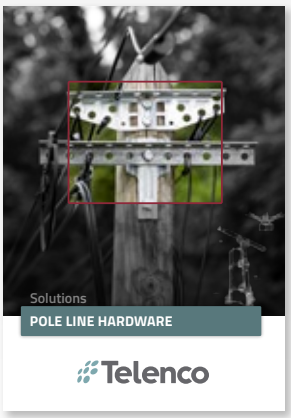

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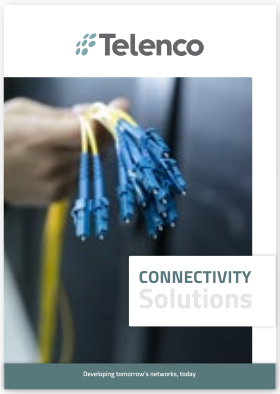

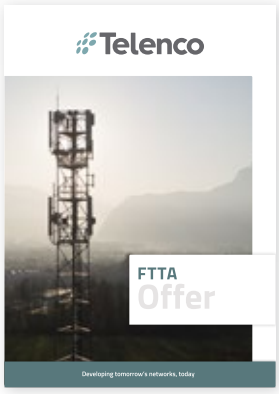

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