Passive Solutions for UK FTTx Networks

BUILD VALUABLE NETWORKS,
FROM BACKHAUL TO SUBSCRIBERS

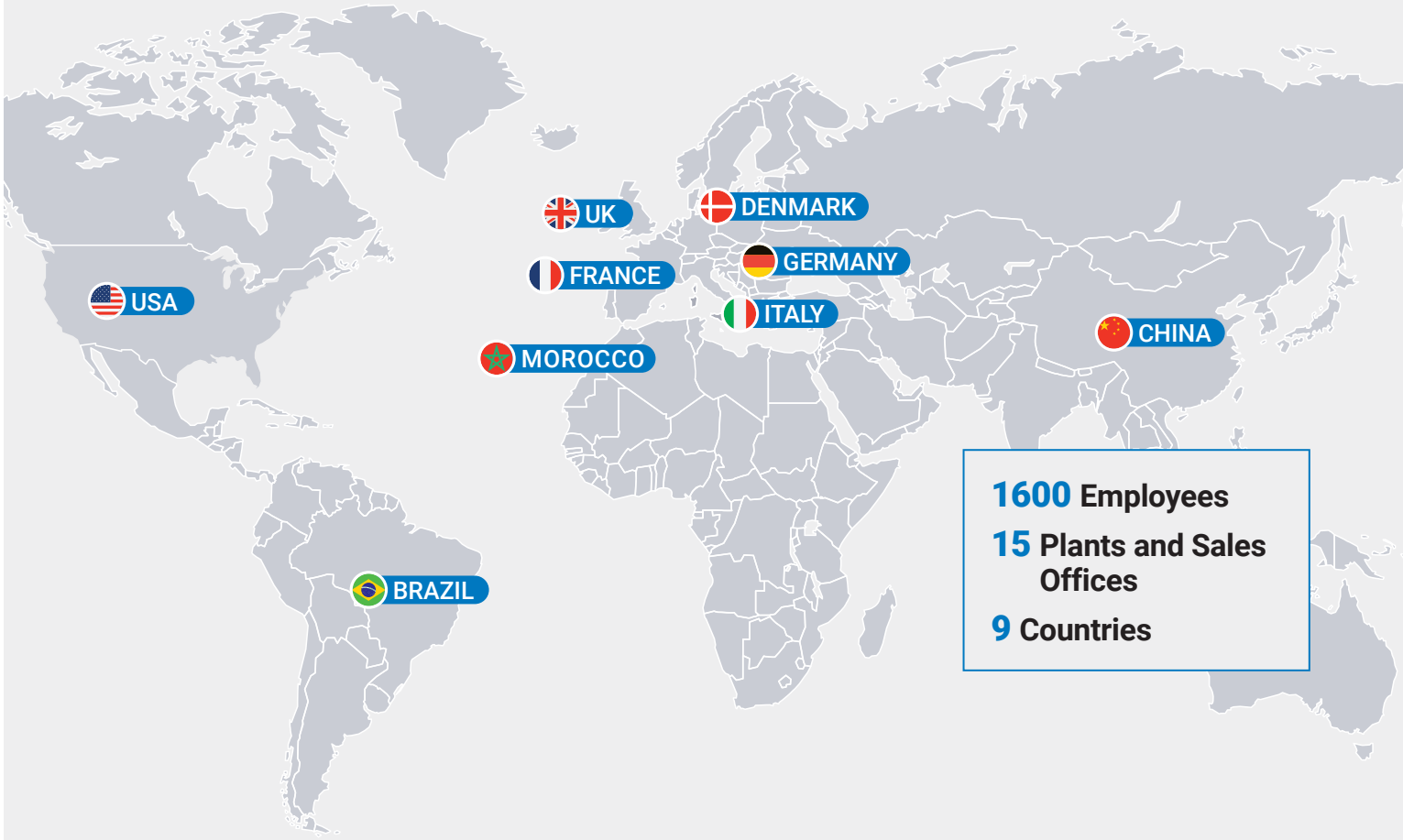
Savings Corner included

ACOME GROUP

ACOME Group

Founded in **1932, ACOME** is a leading industrial cooperative group, headquartered in Paris (France), specialising in the design, manufacture, and marketing of high-tech cables, microducts and connectivity equipment for automotive, data networks, and telecom networks. With a strong presence across five continents, as **the referenced supplier**, ACOME delivers innovative solutions that meet the evolving needs of its customers worldwide.

A global presence on 5 continents



1600 Employees

15 Plants and Sales Offices

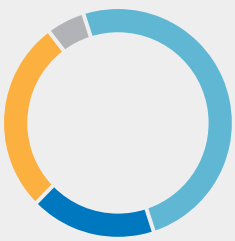
9 Countries

€535m

turnover, of which **69%** exports

on 31 December 2024

Breakdown of consolidated turnover by activity



Automotive **55%**

Telecom & rail network **27%**

Communication network in buildings **14%**

Other **4%**

A comprehensive product portfolio

The acquisition of LYNDDAHL Telecom in January 2024 marked a significant milestone for the ACOME Group, completing our product portfolio. Through the complementary strengths of ACOME, LYNDDAHL Telecom and Idea Optical, we now offer a **comprehensive suite of cables, ducts, and connectivity solutions** for high-speed fibre networks across Europe.

ACOME GROUP

3 essential brands for building the passive layer of your telecom networks

MICRODUCTS SOLUTIONS

LYNDDAHL Telecom provide microduct solutions ACOME GROUP

CABLES SOLUTIONS

ACOPTIC®

CONNECTIVITY SOLUTIONS

ideaoptical ACOME GROUP

A recognised CSR policy

Corporate Social Responsibility (CSR) is deeply ingrained within ACOME's cooperative DNA, serving as a cornerstone of our strategy and daily operations. This commitment is shared across the entire Group, from the parent company to its subsidiaries.

ACOME regularly measures and analyses the carbon footprint of its operations encompassing all direct and indirect emissions (scopes 1, 2 and 3*) in France and for the Group. Our carbon footprint reduction trajectory aims to reduce our carbon emissions in line with the 1.5°C target for scopes 1 and 2 set by the Paris Agreement and below 2°C for scope 3. It is validated by Science Based Target (SBTi) since May 2024.

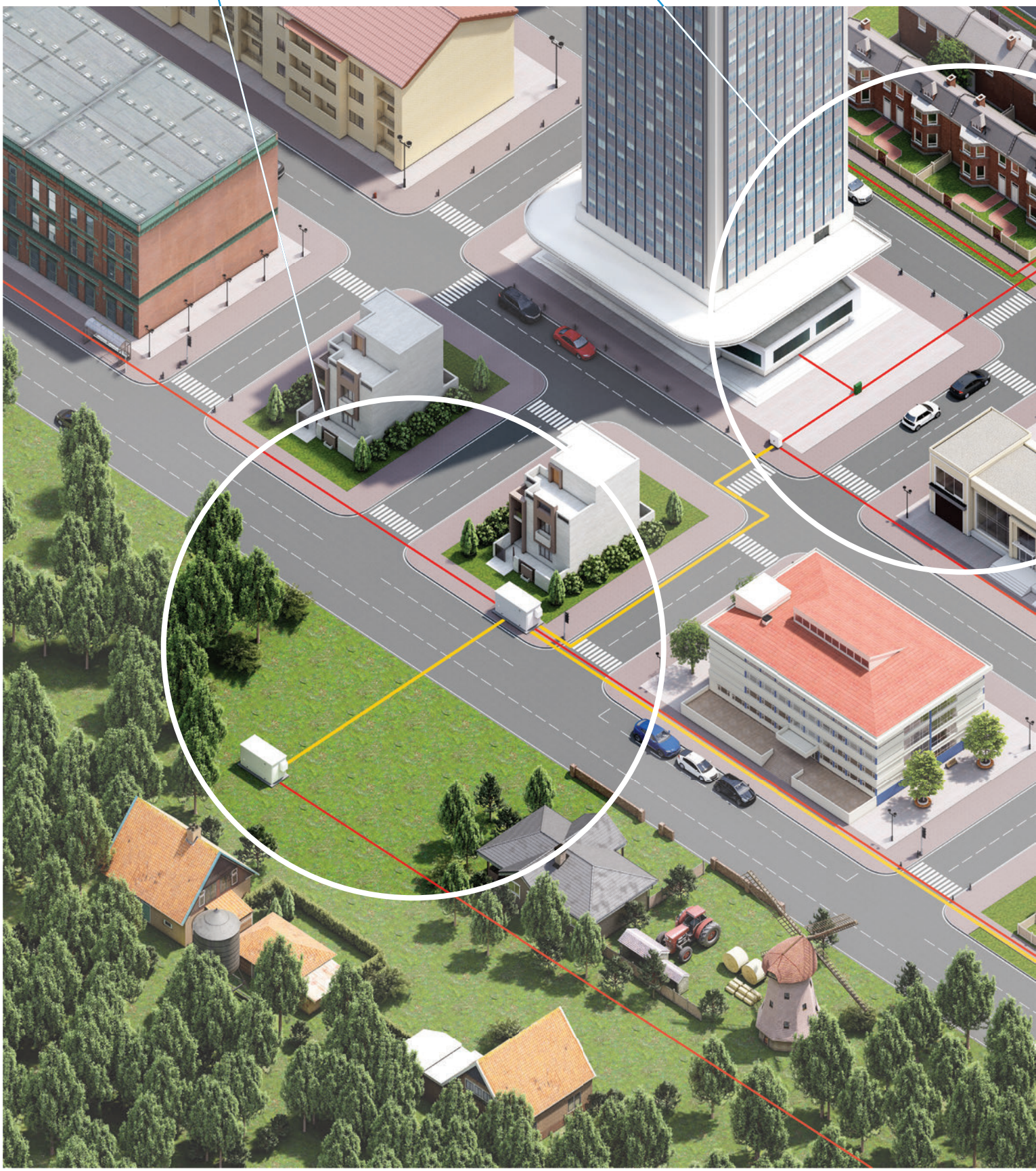
Carbon footprint of Mortain industrial site in 2024 out of use of sold produts emission.

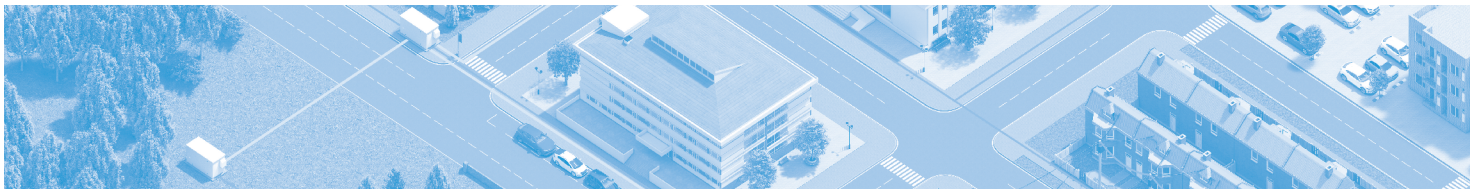
146 kt

SCIENCE BASED TARGETS
DRIVING AMBITIOUS CORPORATE CLIMATE ACTION

BUSINESS AMBITION FOR 1.5°C

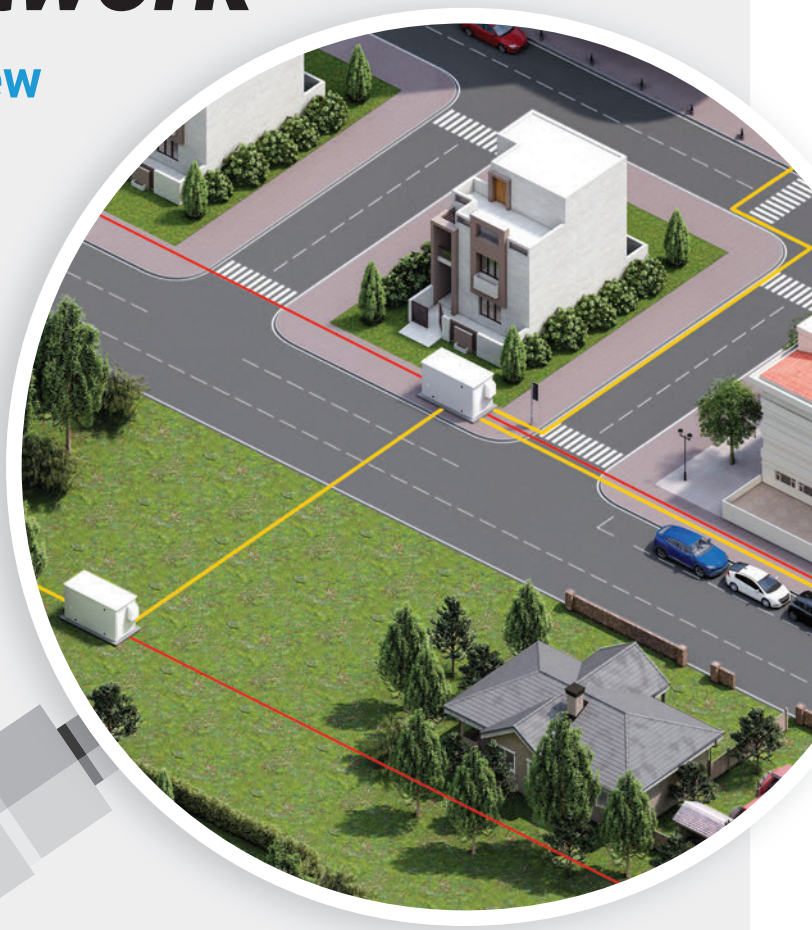
* Excluding disposal phase





Backhaul network

+ Product general overview (cables and components)



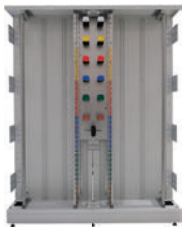
Central offices, POPs, Data centres (…) constituting the nodes of the backhaul network of telco operators, are linked together over long distances.

ACOME Group brings a comprehensive range of passive components to build, upgrade and repair backhaul networks.

> Products

OUTDOOR CABLES

RACKS

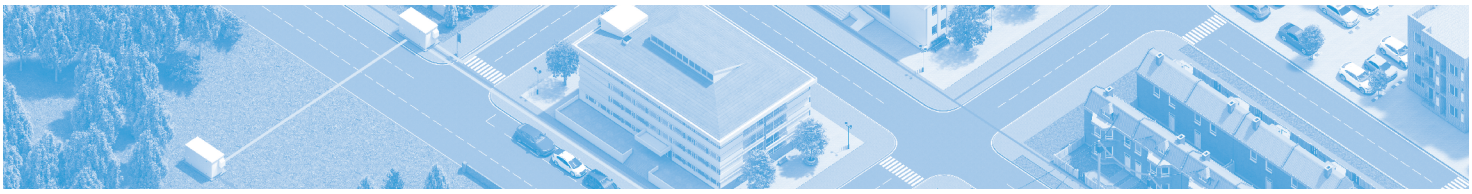


OPTICAL PATCH PANELS

INDOOR CABLING

PATCH CORDS

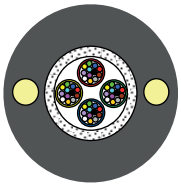
ACTIVE CABINETS

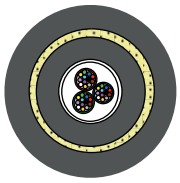


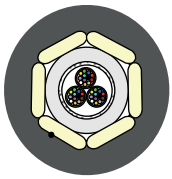
Outdoor cables for the backhaul networks

Laid over long distances and in challenging environments.

ACOPTIC backhaul cable ranges have been developed for installation into ducts, sewers, surface mounted and direct burial.







	UNC1566	CCC1575	CCC1577
FIBRE COUNT	12 to 144f	12 to 288f	12 to 144f
TENSILE STRENGTH	2750-3380 N	2200-3500 N	4000-6000 N
CRUSH RESISTANCE	300 N/cm	300 N/cm	450-500 N/cm
DIAMETER	9-13 mm	10.5-13.2-15.5 mm	12-14.5 mm
WEIGHT	64 to 129 kg/km	98-152-198 kg/km	125 to 189 kg/km

Scan the QR codes to download the data sheets

FEATURES & BENEFITS

EASY FIBRE ACCESS
Uses compact tube technology = tool-free, low grease and kink proof

INSTALLATION
Pulling, blowing or floating installation

STEEL ARMOURED CABLES
A backhaul network can also use sewers and...
> see page 18

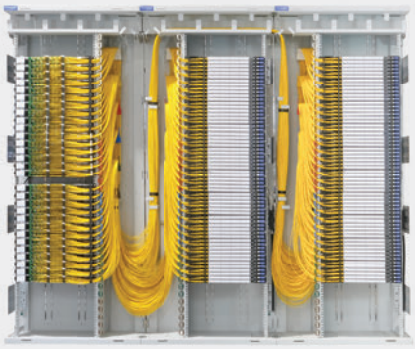
BLOWN CABLES FOR MICRODUCTS
A backhaul infrastructure can also rely on microducts. In this case...
> See page16

Optical racks for central offices

TAILORED SOLUTIONS

The range of racks and Optical Distribution Frames intended for Central offices in existing buildings extends from stand-alone cabinets to open Optical Distribution Frames allowing, among other things, to assemble them and make them communicate with each other. Compact modular solutions and in the form of beam mounted solutions complete this range.

1 x 47U cabinet
iBER-903-RES



Communicating Optical Distribution Frames
iBER-803-RES-COM

Beam mounted solutions
iTOP-144

POP IN SHELTERS

A complete solution consisting of lightweight racks, splicing racks and high-density patch panels has also been developed to allow installation in shelters.

Lightweight racks
iRMO-606 / iRMO-606 BF

Scan the QR code to download our POP solution's catalogue

FEATURES & BENEFITS

- Wide range of racks and Optical Distribution Frames suitable for all types of premises or shelters housing equipment for Central Offices.
- Development capacity allowing us to offer tailor-made products that meet specific request.
- Guaranteed compatibility with all optical subracks in the Idea Optical range as well as ACOPTIC cables.

Optical patch panels

VERSATILE INTEGRATION

The range of optical patch panels can be divided into 2 different groups, sliding and pivoting.
All patch panels are compatible with Optical racks or cabinets of the market respecting the usual standards (ETSI or 19'' formats).

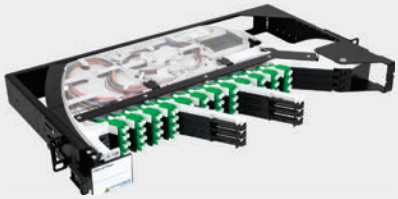
Sliding version
iLIA-V2-24

Pivoting version
iTOM-V3-144

Pivoting patch panels are particularly recommended for Telecom applications and particularly for FTTP.

A standard format offers a density of 48 connections on 1U in SC/APC or LC/APC but our range also has been extended by high density subracks offering up to 96 LC/APC connections per U.

HD Sliding patch panel with splitters
iLIA-V2-1U PLC 1V32



High Density pivoting patch panel
iTOM-HD-96 1U

Scan the QR code to download the data sheet

Technical optimizations allow the subraks to be stacked in clever ways and the possibility of pre-wiring them with a cable tail and saving time and ease of installation.

Pre-terminated pivoting subrack
iTOM-V3-144

Stacked pivoting subrack
iTOM-HD-288-3U

FEATURES & BENEFITS

- Extensive range of subracks with variable densities that can extend from 12 to 96 connections per U.
- Ability to supply factory pre-terminated patch panels with an ACOME cable tail.
- Range accepting the accommodation of all combinations of optical splitters.

Indoor cabling / Pre-terminated cables

$B2_{CA}$
C_{CA} C_{ca}-s1a, d1, a1
D_{CA}
E_{CA}

The **ACOPTIC CSX1811** cable, with a CPR Cca rating, is a 5mm diameter flexible cable for datacentres, central offices and other indoor environments.

Pre-terminated cable

The **ACOPTIC CSX1811** cable is available unterminated or factory terminated, with a choice of connectors.

ADVANTAGES

- Custom-made
- Traceability
- Factory tested and assembled
- Fast implementation
- Meets regulatory standards

Patch cords solutions

All types of patch cords used in fibre optic networks
- Connectors SC, FC, ST, LC, MU, E2000, etc.
- Simplex, duplex or uniboot cables LSZH
- PC, UPC and APC polishings
- RoHS compliant

Outdoor armoured optical patch cords
- Discreet
- Light
- Rodent proof

ALSO

- Optical Splitters PLC
- Outdoor armoured breakout
- Shielded Patch Cords
- Pigtails
- Etc.

Active cabinets

EXCHANGE CLOSURES FOR LOW DENSITY AREAS

We have developed a large range of active street cabinets based on customer specifications. Secure and weatherproof, these outdoor cabinets can contain active and passive equipments.

Active cabinet with independent side compartment allowing the integration of electrical Equipment

iBER-1750 OUTDOOR BAT 38SU + 21U

Their structure composed of aluminium double-walled panels and forced ventilation or air conditioner integrated, offer them very good heat regulation performances.

Cabinet with air conditioned Blocks

iBER-1675 OUTDOOR G1 2X21U

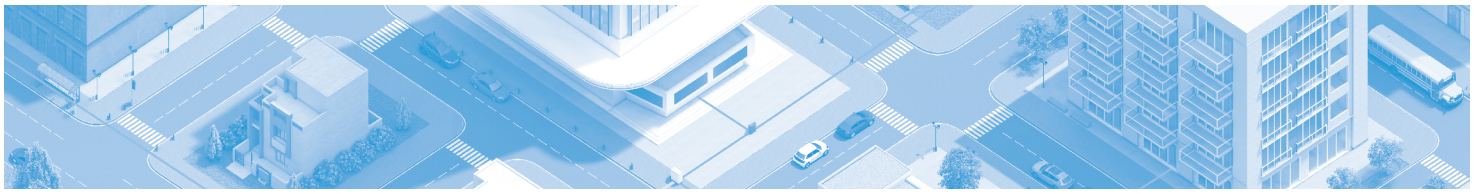
Cabinet with Batteries

iBER-1650 OUTDOOR BAT

Scan the QR code to download our catalogue Active street cabinets

FEATURES & BENEFITS

- Extensive range of cabinets of different capacities and possibility of custom designs
- Ability to develop complex active cabinets integrating all possible options (climate management, security and specificities of the energy part, etc.)
- Design of all our cabinets with guaranteed optimization in terms of ergonomics (no annoying uprights, intelligent cord routing, etc.)



Passive components for

Underground access network

FTTx access networks go from Central Offices (or Point Of Presence) to the customers branching points. Generally underground for its spine segment with high fibre count cables.

Underground deployments covers several methods of installation: blowing (in microducts), pulling in ducts, direct buried or laid in sewers.

> Products

MICRODUCTS & BUNDLES

FITTINGS

CHAMBERS

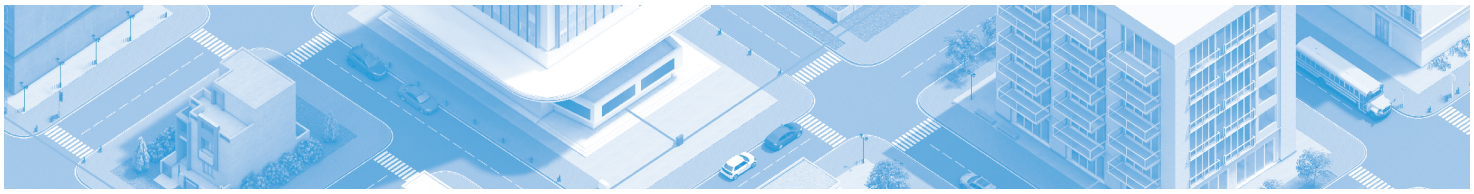
MICRODUCT CABLES

HIGH-DENSITY MINI-CABLE

PASSIVE CABINETS

DIRECT BURIED & SEWER CABLES

PULLED CABLES



Microducts & bundles

FEATURES

- High Quality HDPE
- Outdoor/buried/Sub-Duct and Indoor LSZH microducts
- Smooth or Ribbed inner surfaces
- Low friction inner liner
- UV protection
- Transparent or solid colours
- Up to 4 coloured stripes
- Colours customised

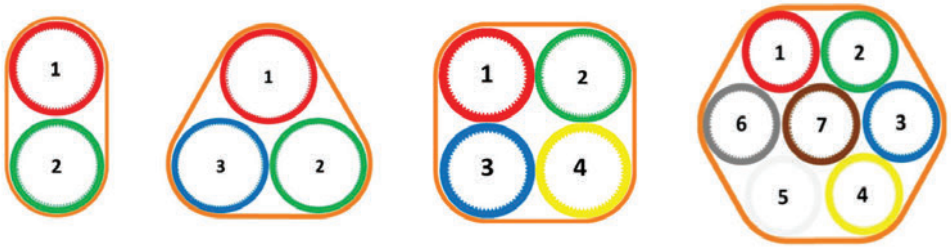
THICK WALL	THIN WALL
7 / 3.5mm	5 / 3.5mm
8 / 4mm	7 / 4mm
10 / 6mm	
12 / 8mm	10 / 8mm
14 / 10mm	12 / 10mm
16 / 12mm	14 / 12mm
20 / 16mm	

Additional sizes and dimensions are also available

Bundles of microducts

WAYS
2
3
4
7
8
10
12
19
48

80mm max bundle diameter



FEATURES

- Combinations of diameter available
- Tailor-made combinations possible

Fittings for microducts & bundles

To connect microducts with each other

Connectors
from 3mm to 25mm

Reducers
for 5 to 20mm microducts

To seal microducts and keep the installation clean and safe

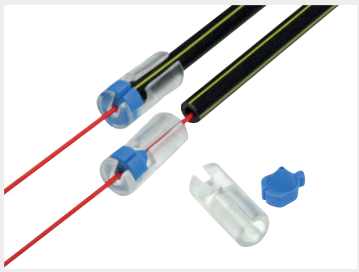
End Stop fittings
from 3 to 25mm

Gas End fittings
from 5 to 16mm

Black End Caps
from 5 to 32mm

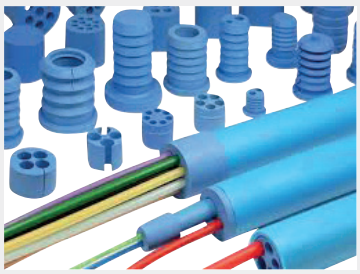
Yellow DBI End Caps
from 5 to 50mm

To seal ducts and microducts



Splitable Gas Seal for fibre
from 7 to 10mm

Splitable Gas Seal for microducts
from 10 to 18mm



Seal for telecable ducts
from 20 to 50mm

Seal with different ways
from 25 to 50mm

Chambers & closures for microducts

FEATURES

Chamber base-body:

- 1 height: 700mm
- 3 different sizes:
  - > 445x915mm
  - > 570x1150mm
  - > 750x1150mm

Additional raising frames:

- 2 heights for each size:
  - > 100mm
  - > 200mm

Closures for bundles of microducts

Bundle jointing closures
- 1 in - 1 out
- 2 in - 2 out

Y-type distribution closures
- Droping a bundle
- Droping a microduct

Subscriber microduct junction closure
- Up to 7 ports

Closures made of ABS and/or polypropylene, to be installed in manholes or direct buried.

Bend radius guides

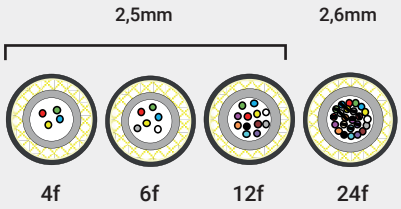
- Enable 90° bend with a 175mm radius.
- Avoid accidental kinking

Nano cables and microduct cables

Nano cables - ACOPTIC range

MCB1610

MCB1610 single bore cables for installation into microducts under 8mm inside diameter.
Uses 250µm fibre up to 12f and 200µm for 24f.

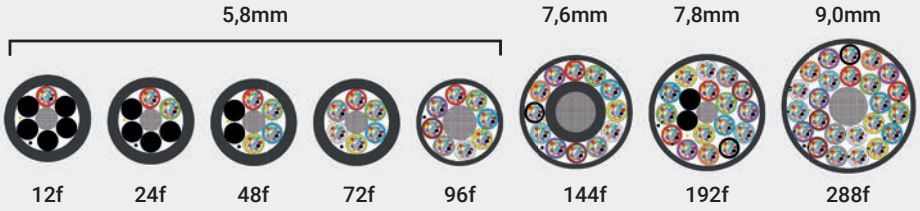


Scan the QR code to download the data sheet

Microduct cables - ACOPTIC range

MCD1520

MCD1520 multi-loose tube cables for installation into microducts from 8mm inside diameter. Based on 250µm fibres and 12 fibres µLoose tubes, MCD1520 is available from 12 to 288f with G652D or G657A1 fibres.



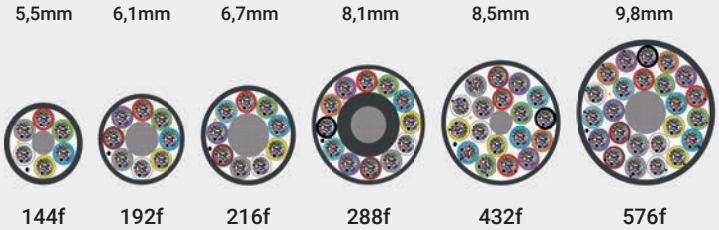
Scan the QR code to download the data sheet

High density microduct cables

24x200µm fibres / tube - ACOPTIC range

MCD1521HD

High-density, loose tube cables designed to maximise microduct's fibres capacity.



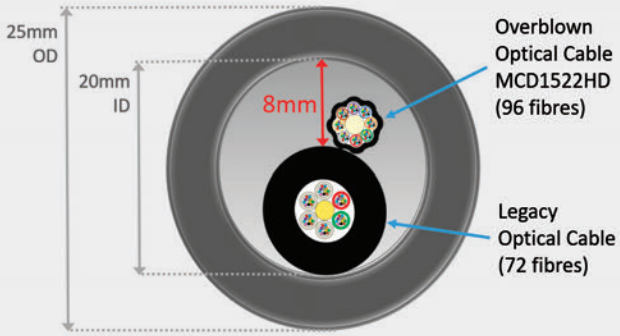
Scan the QR code to download the data sheet

12x200µm fibres / tube - ACOPTIC range

MCD1522HD

Overblowing is a technique that enables civil avoidance by making use of the existing legacy populated ducts.

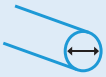
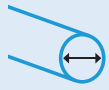
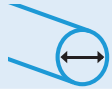
MCD1522HD is our overblow cables range.



Cable selection according to microduct

ACOPTIC for microducts gathers **4 ranges of cables offering high versatility** to adapt your fibres deployment as per your needs and the existing microduct infrastructure.

The below chart enables you to select the correct range and cable.

Minimum Inner Microduct Ø	ACOME Range	Fibre Count	Bundle Construction	Nominaler cable Ø	Fibre Type
4 mm 	MCB1610	4	1x4	2,5 mm	250 µm
	MCB1610	6	1x6	2,5 mm	250 µm
	MCB1610	12	1x12	2,5 mm	250 µm
	MCB1610	24	1x24	2,6 mm	200 µm
6 mm 	MCD1522-HD	48	4x12	4,4 mm	200 µm
	MCD1522-HD	72	6x12	4,4 mm	200 µm
8 mm 	MCD1520	12	1x12	5,8 mm	250 µm
	MCD1520	24	2x12	5,8 mm	250 µm
	MCD1520	36	3x12	5,8 mm	250 µm
	MCD1520	48	4x12	5,8 mm	250 µm
	MCD1520	60	5x12	5,8 mm	250 µm
	MCD1520	72	6x12	5,8 mm	250 µm
	MCD1520	96	8x12	5,8 mm	250 µm
	MCD1522-HD	96	8x12	5.1 mm	200 µm
	MCD1521-HD	144	6x24	5,5 mm	200 µm
	MCD1521-HD	192	8x24	6,1 mm	200 µm
10 mm 	MCD1520	144	12x12	7,6 mm	250 µm
	MCD1522-HD	144	12x12	6.7 mm	200 µm
	MCD1520	192	16x12	7.8 mm	250 µm
	MCD1521-HD	216	9x24	6.7 mm	200 µm
	MCD1522-HD	288	24x12	7.5 mm	200 µm
	MCD1521-HD	288	12x24	8,1 mm	200 µm
	MCD1521-HD	432	18x24	8,5 mm	200 µm
12 mm 	MCD1520	288	24x12	9,0 mm	250 µm
	MCD1521-HD	576	24x24	9,8 mm	200 µm

ACOPTIC speciality cables for underground deployments

Duct Cables

Scan the QR codes to download the data sheets

ACOPTIC range UND1533
from 4 to 288f and 6.1 to 13.2mm

With range UND1558
from 432 to 864f and 16.5 to 19.5mm

Dielectric cables combining **compactness, lightness** and **robustness**.
Widely deployed and approved for **pulling, floating** and **blowing** in ducts.

Cables for direct burial or sewer

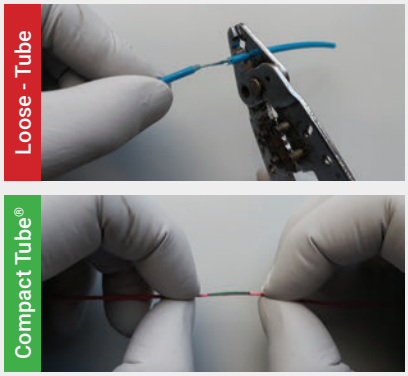
Scan the QR code to download the data sheet

Steel armoured cables to combat **aggressive environments**, including **rodents**, **high impacts** and **crush**.

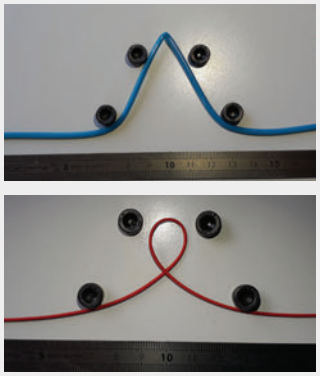
With range CCC1378
from 6 to 288f and 12.5 to 17.5mm

ACOPTIC Compact-tube® technology inside

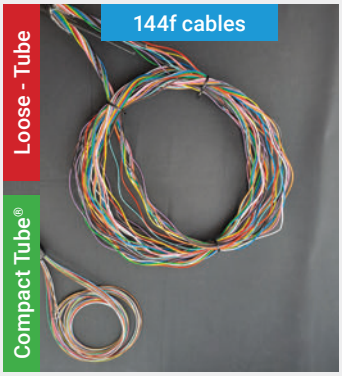
The three speciality cable ranges are designed with the ACOPTIC compact tube technology inside. Compact tubes are micromodules that provide ease of installation and maximising storage space.



Tool-Free fibre access **Low-Gel Elements**



Kink-Free Elements

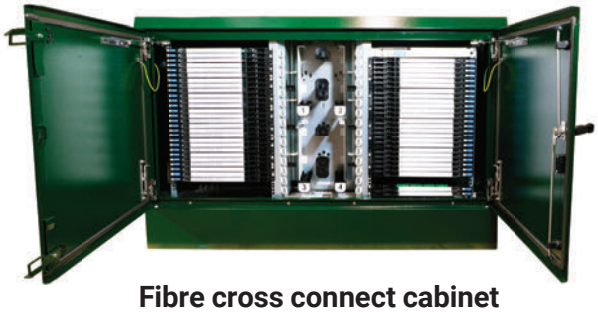


No Shape Memory **Small & Easy Coilling**

Passive street cabinets

MEET ALL CONFIGURATIONS

A wide range of passive cabinets has been developed and qualified to meet the different requirements of operators in Europe.
The cabinets in our range are a combination of our know-how and customer specifications.
For "Fibre cross connect" version, the range is from 1x15U to 2x40U.



Fibre cross connect cabinet
iBER-1635 G2 2x15U

Fibre distribution terminal cabinet
iBER-835 G2 1x15U

Whether they integrate optical patch panels or systems based on splice tray organisers, the design of our cabinets allows the replacement of a mechanical element (door, roof side, etc.) without network interruption.

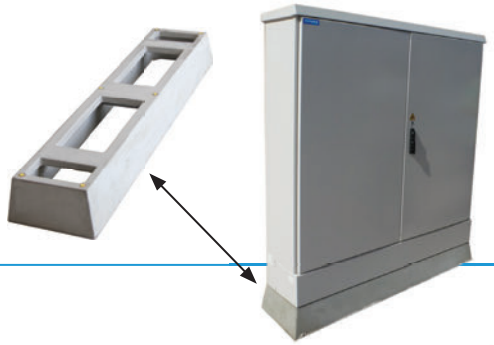
Scan the QR code to download the data sheet

Primary or secondary node cabinet
iBER-603 OUTDOOR G2

Cabinet casing exploded view

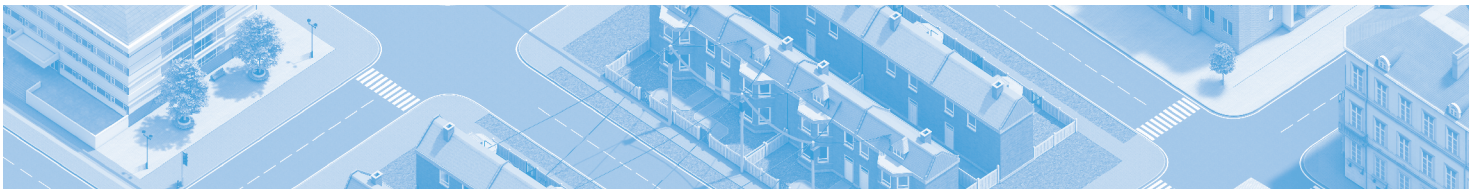
Removable structure

To ensure a perfect installation for street cabinets we recommend GRFC prefabricated bases made of Glass Fibre Reinforced Concrete.



FEATURES & BENEFITS

- Full cabinet disassembly without service downtime.
- Removable and customisable back panel.
- Design with natural air circulation preventing all risks of damp.
- Double bottom preventing all undesirable intrusions and mechanical leak tightness around each microduct.

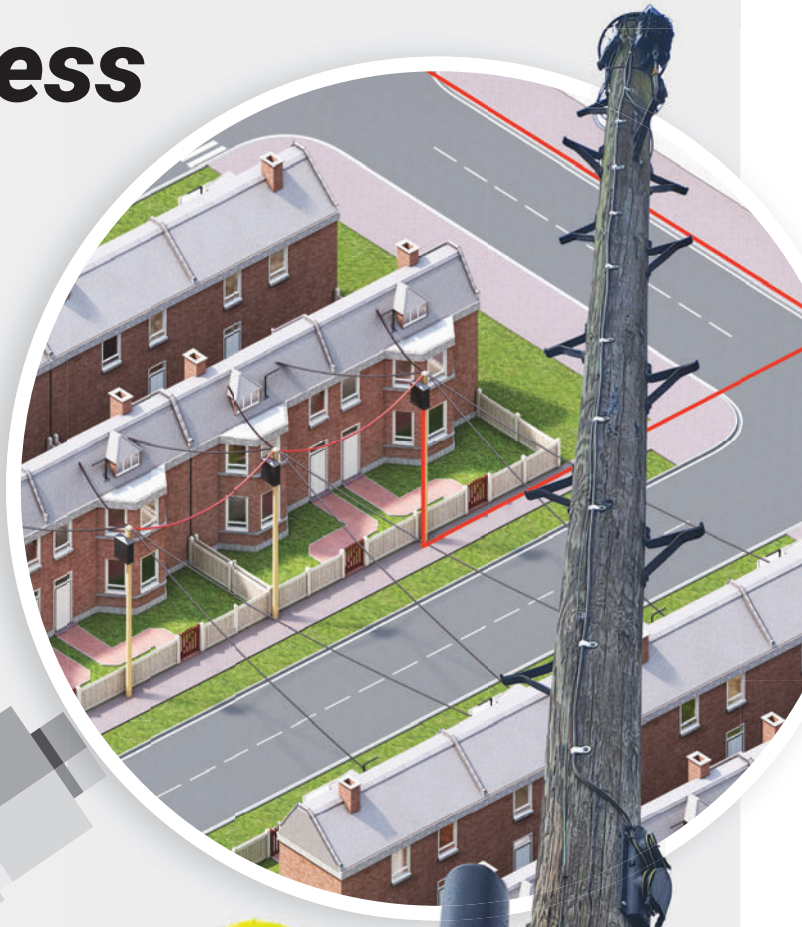


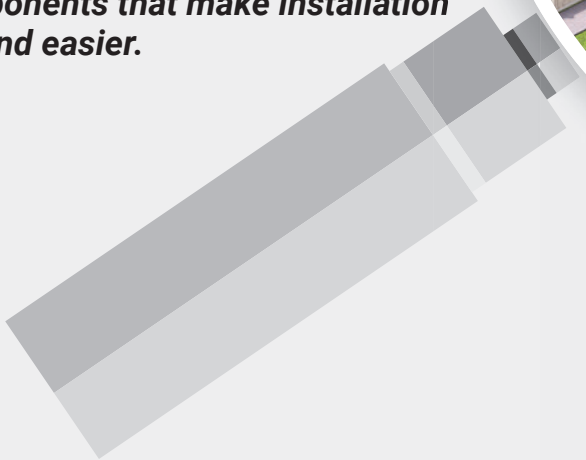
Passive components for

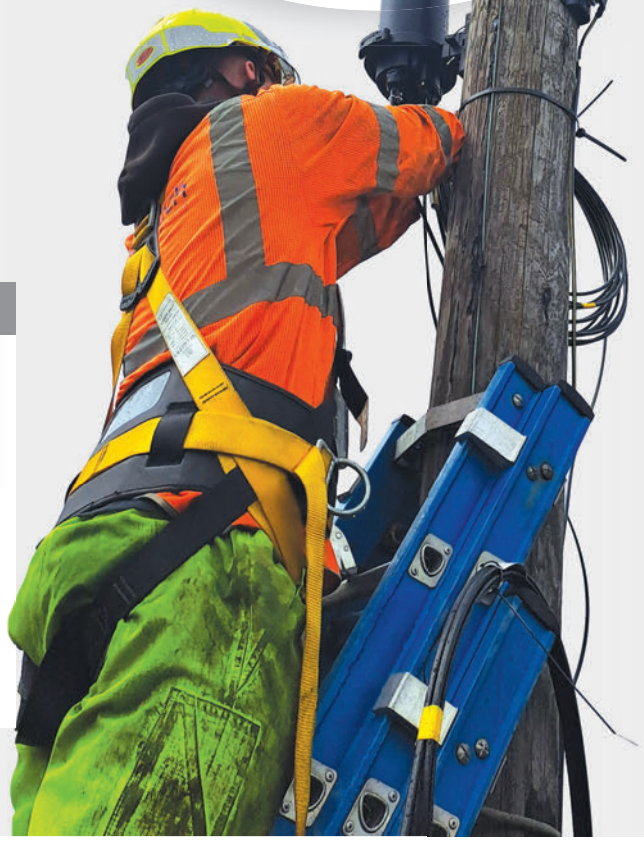
Overhead access network

Since aerial solutions are more exposed to weather conditions, they must be designed to endure these challenges throughout their lifespan. Achieving the necessary level of resilience requires not only advanced expertise but also extensive experience in aerial deployments.

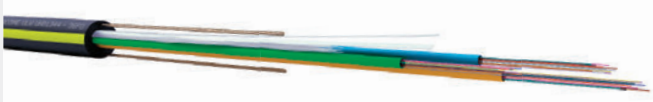
Find out how ACOME Group contributes its expertise with denser, lighter cables and components that make installation quicker and easier.

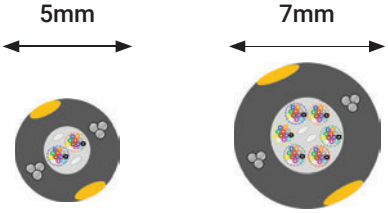


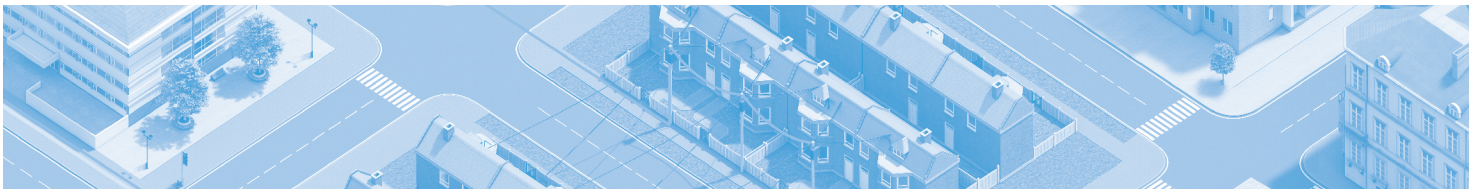




ULW CABLES







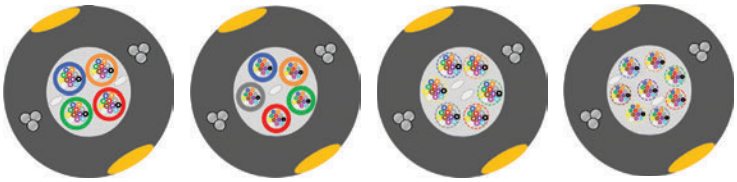
Overhead ULW cables

7mm Ultra Light Weight cables ACOPTIC Range UND1344

- **12 Fibres per element up to 96f**
- **100% PIA approved** - from 4 to 96f
- **The most comprehensive** 7mm ULW range in the market from 4 to 96f
- **Include** 60 and a 72f version
- **Compact-tube®** from 4 to 60f **& Nanomodule®** from 36 to 96f

The most comprehensive range of ULW cables in the UK

4 to 48f | 60f | 72f | 96f



Scan the QR code to download the data sheet

Helical dead-end for 7mm ULW cables

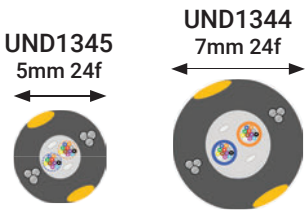
- **Cable diameter range:** 6.8/7.2mm
- **Made of galvanised steel wire**
- **Identification code:** IC6016

Easy, quick and safe assembly and disassembly, without any tool.

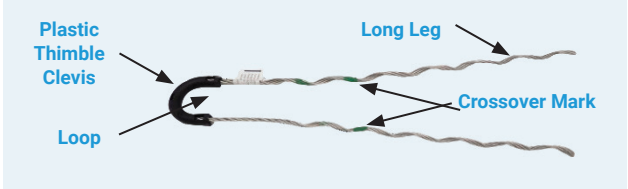
5mm Ultra-Light-Weight – Range UND1345

Enhanced resilience to bad weather conditions: Wind, Snow, Ice.

- **PIA Approved**
- **Nanomodule inside**
- **Standard 250µm** fibre
- **From 12 to 24** fibres
- **Elements of** 12 fibres



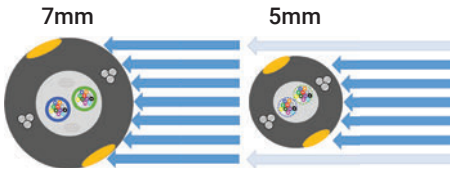
Helical Dead-end for 5mm ULW cables



- **Cable diameter range:** 4.8/6.2mm
- **Made of galvanised steel wire**
- **Identification code:** IC5704

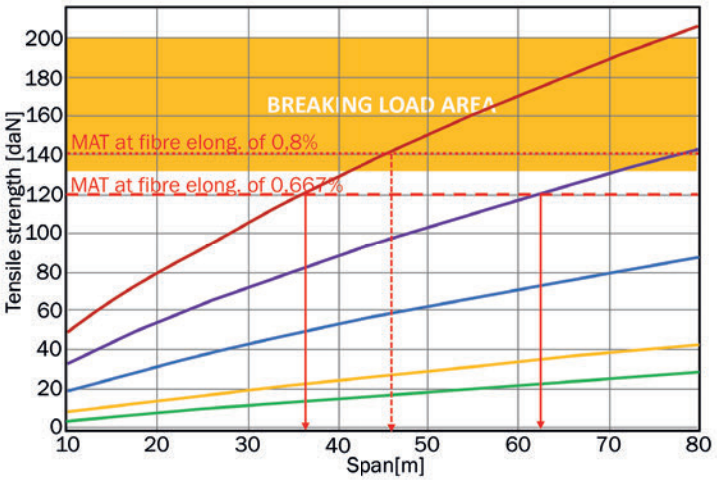
Direct assembly on cross-arms, anchoring brackets and others.

Like a cable in the wind

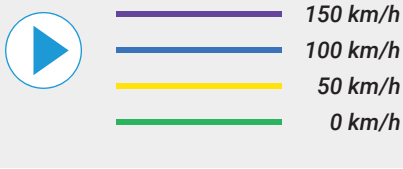


The UK has been hit by 84 storms since 2015, almost half of which have gusted over 150km/h (93mph). 1 in 10 storms even exceeded 200km/h (125mph). In this climate context, which is set to intensify, it is wise and urgent to adapt to the future so that we do not have to rebuild tomorrow what we are doing today. Aerial deployment has a number of advantages: it is faster, requires less energy and is therefore less costly. The disadvantage, compared with underground networks, is that they are subject to the vagaries of the weather. Solutions exist to build a resilient aerial network.

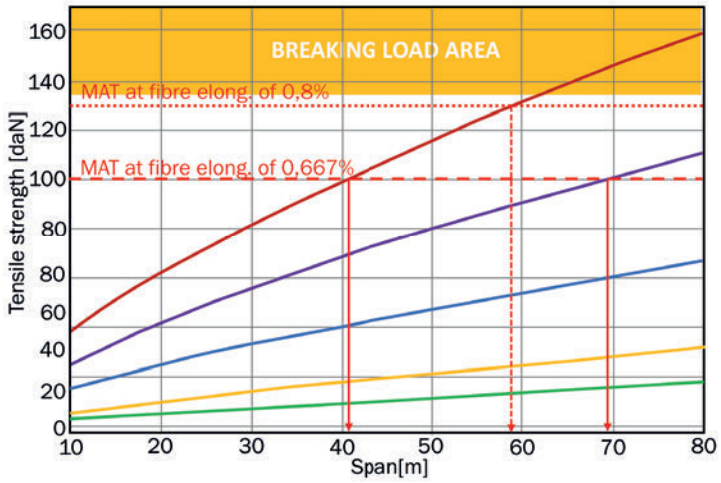
Response of a 7mm ULW cable (UND1344 - 24fo) to wind speed



Traditionally, Ultra Light Weight (ULW) aerial cables have a diameter of 7mm from 4 to 96 fibres and must meet the breaking load requirement of between 1350 and 2000N. In addition, the fibre strain (MAT) must be 0.667% at 1200N, with the possibility of a derogation of up to 0.8%. And all this for a maximum span of 68m.



Response of a 5mm ULW cable (UND1345 - 24fo) to wind speed



A ULW cable with a diameter reduced to 5 mm is less subject to wind load. It also has a lower MAT, since fibre elongation is reached at a tension of 1000N. However, we can see that it still fully meets the fibre strain requirements of 0.667%, far from the elongation of 0.8%, in winds of at least 150 km/h, unlike a 7 mm version.

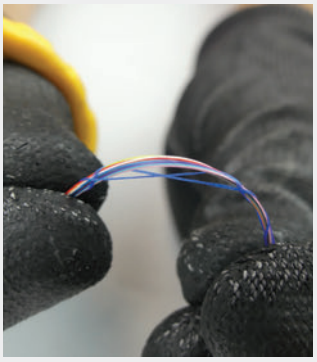
Protecting the fibre from excessive elongation is a guarantee of longevity for the infrastructure, as shown in the table below. That's why, when possible, it is to use lightweight cables with reduced diameters for aerial installations.

LIFE EXPECTANCY* OF AN OPTICAL FIBRE AFTER 25 YEARS BASED ON ITS ELONGATION

Fibre Elongation (FE)	≤ 0.1 %	0.1% < FE ≤0.3%	0.3% < FE ≤0.5%	0.5% < FE ≤0.6%
Failure rate at permanent elongation	25 years <0	25 years <1/100 fibre broken	25 years 1/15 fibre broken	25 years 1/2 fibre broken

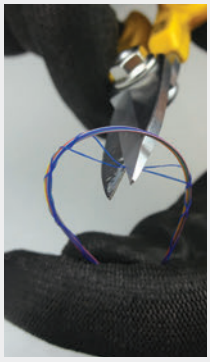
** Study conducted by ACOME on 10km of 144f optical cable in compliance with IEC TR 62048*

Nanomodule® technology embedded



Nanomodule is a breakthrough technology coming with features enhancing productivity, confort, health and safety to fibre splicers in the field.

- **Grease-free** bundle
- **Fast and easy** fibre access
- **30% smaller** than a µloose tube
- **Ability to drop fibres** without cutting the whole bundle.
- **Enable 72 and 96** fibres ULW cables in bundles of 12 fibres.



Up to 73% more productivity for your splicing teams.

Maximum number of midspan work a team of 2 fibre-splicers can produce daily (Eg.: deported joint case).

Fibres to be dropped	With a classic 36f ULW	With a classic 96f ULW	With a Nanomodule® ULW
12f	4/day	3/day	4.4/day
8f	4/day	3/day	5/day
4f	4/day	3/day	5.2/day

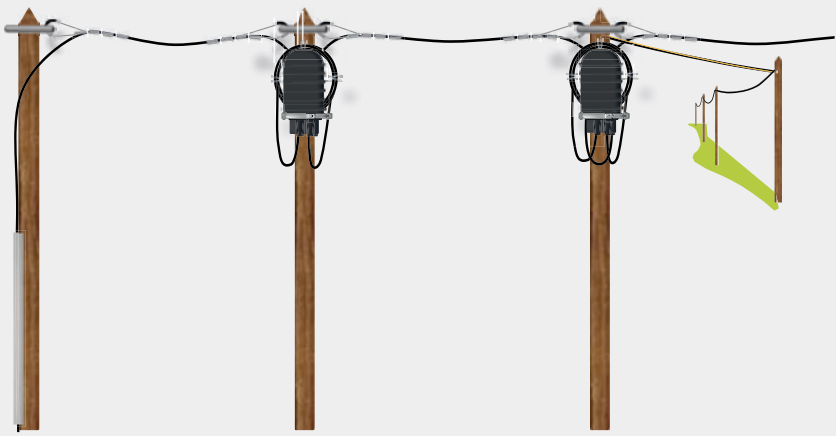
Towards zero passthrough splices whatever the network architecture.

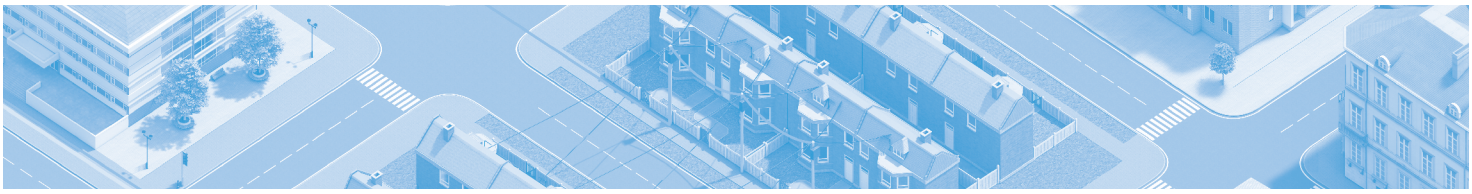
Passthrough splices are connections that are done to repair cut links for fibres that are not dropped in the joint closure where the work is done. They are considered inescapable when less than 12 fibres are to be dropped at each joint closure.

Nanomodule® makes it easy, safe and fast to midspan only the fibres you need to drop.

> See how many and how much you can save page 28

Customer branching points | **Typical closures where midspan is practiced daily** | **Junction point closure**





Passive components for

Connecting every subscriber

Connecting subscribers to its FTTP network is the central purpose of all telecoms operators. Per subscriber, the connection is the most expensive and riskiest part of the network. Getting it right first time is the key to prosperity for investors.

Meet all your needs for a complete, tried and tested range of solutions from ACOME Group : SDU or MDU, Brownfield or Greenfield, the following pages come with solutions that get customers connected faster, ease wayleaves, reduce complexity, take cost out and delivery best value.

> Products

OUTDOOR DROP

INDOOR CABLING

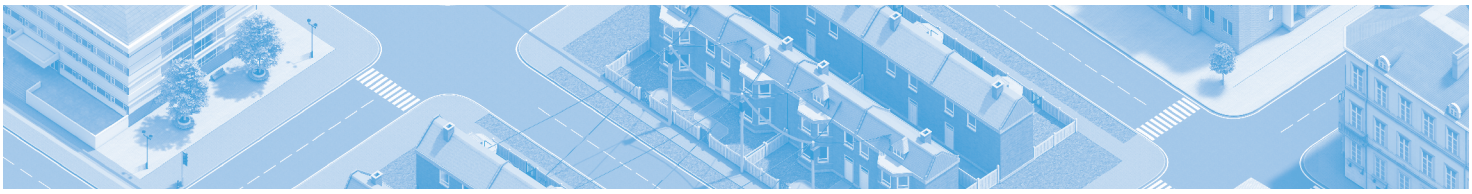
TRANSITION BOXES

INDOOR DUCTING

OTO KITS

BASEMENT BOXES

OTHER FITTINGS



SDU

Overhead connections

The fastest way for connecting single dwelling units. Regular pruning of nearby trees is required to prevent breakage caused by falling branches during storms.

Underground connections

Legacy ducts can mean long, tedious connections and even failures. These connections are nevertheless preferred for aesthetic reasons.

> See page 26

Brownfield MDU

Corridor cable based distribution

Obtaining wayleaves to connect subscribers to fibre in MDUs can be a lengthy process. Offering the most discreet and secure solution on the market will make it easier to overcome the objections of the freeholders and managing agents on whom the roll-out of the fibre distribution network in the building depends.

> See page 28

Housing cabling

Subscriber connection kits and discreet optical extension kits

Whether they own or rent their home, subscribers will find it all the easier to agree to fibre if they know that a particular operator is installing attractive, discreet connection kits, from the point of entry into the home to the location of the operator's ONT (the internet box).

> See page 27

Greenfield MDU

Indoor blown FTTP-Ready installations

Building regulations require architects and MDU developers to design and deliver to freeholders and future managing agents an FTTP-Ready building that will accommodate new ISPs over time without the need to overbuild networks within the building, while allowing residents to change ISPs.

> See page 29

Branching Single Dwelling Units (SDU)

OVERHEAD SUBSCRIBER CONNECTION

3mm Aerial drop cable

- 1fo 900µm Tight buffer
- 100% PIA Approved
- **Clean break** TPU Sheath (no chewing gum effect)

Scan the QR code to download the data sheet

Mini@ Clamp

- For ø 3-4 mm Cable
- UV resistant thermoplastic
- For span up to 70m
- Max. Tension Load: 1200N
- **IDENTIFICATION CODE**: IC6118

3mm Aerial drop cable

- Available **PRE-TERMINATED**
- LC connectors
- SC connectors
- Hardened connectors
- Pigtail or Patchord

- **Bulk cable dispenser boxes support one man team installs, reduce cable wastage and ensure the right parts are always on hand.**

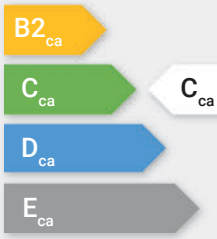
Transition box BTO

Scan the QR code to watch the video

- SDU **entry point**
- **IP54 / IK07**
- **4 colours** available (Black, Brown, Grey, White)
- Up to 4 splices

UNDERGROUND SUBSCRIBER CONNECTION

5.6 mm outdoor / 2.3 mm Indoor cable UNB1656

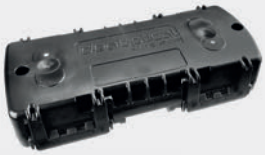


- 1f 600µm tight buffer
- valid for field mounted connectors
- Cca 2.3mm sub-unit
- 2 FRP strength members

LAY OUT METHOD

- **Pulled**
- **Blown**
- **Pushed**

Tiny multi-purpose splice point MBEO



TYPICAL APPLICATIONS

- Aerial optical repair box
- Underground optical demarcation point

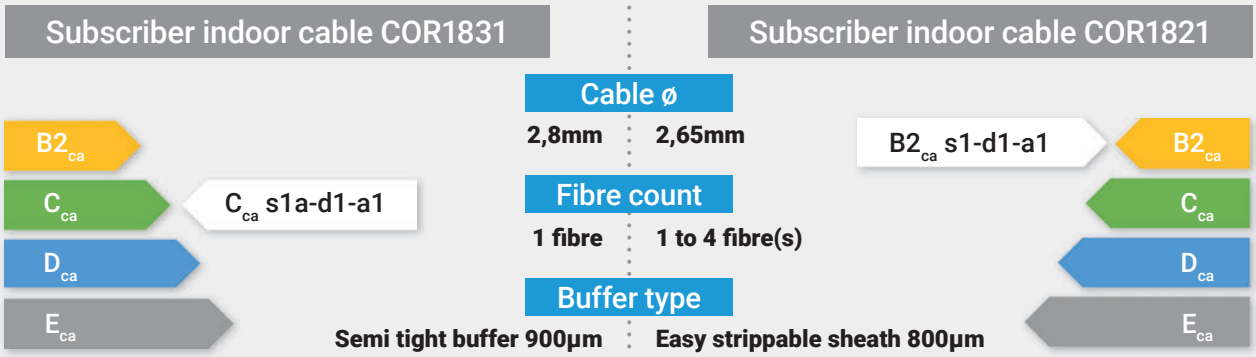
MAIN FEATURES

- **IP68**
- **IK09**
- **Up to 4 splices**
- **142 x 66 x 26** (L x W x H)
- **Eco-designed**

Scan the QR code to watch the video

Housing cabling

SUBSCRIBER'S INDOOR CONNECTION



Internal drop cable available in bulk or factory pre-terminated to LC or SC connector with or without OTO (Optical Terminal outlet).

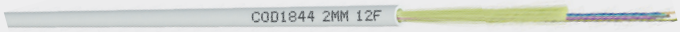
DISCRETE OPTICAL EXTENSION KIT

Indoor discreet cabling solution kit's content

- 1 optical feeder outlet with 30 m of 900 µm SC or LC pre-terminated cable at the 2 ends;
- 4 wall entry/exit grommet (drilling Ø of 6 to 12 mm);
- 6 closed corner protectors with adhesive for fixing;
- 6 open corner protectors with adhesive for fixing;
- 1 syringe containing 35 ml of adhesive;
- 1 tool to drill through partitions (SC plug or 900 µm cable);
- 50 cm of adhesive cable guide tape.

Brownfield Multi Dwelling Units (MDU)

CORRIDOR DISTRIBUTION



Distribution cable COD1844

$B2_{ca}$ — $B2_{ca}$ s1b-d1-a2

C_{ca} — **ø 2mm from 4 to 12f**

D_{ca} — **ø 3mm from 16 to 24f**

E_{ca}

Pre-terminated or 'Bulk' cable option (dispenser box) versions

Point of entry (POE)

Available in a «ready to connect» or «ready to splice» version.

Standard POE

POE-Compact

Indoor Subscriber connection > See p27

Floor distribution box

Pre-terminated floor box
- Up to 12 SC/APC
- Compliant with a pass-through cable with bottom entry and top way-out

BUILDING ENTRY

Outdoor indoor cable UND1636

Linking the outdoor joint node of the Telco Network to the basement box.

$B2_{ca}$ — **≤ 48 Fibres**

C_{ca} — C_{ca} s1-d2-a1

D_{ca}

E_{ca}

Basement boxes

Starting point of the building fibre network.

Several sizes are available.

≤ 8 Dwellings: BRIO-S-W
≤ 12 Dwellings: BRIO-M
≤ 24 Dwellings: BRIO-L-W

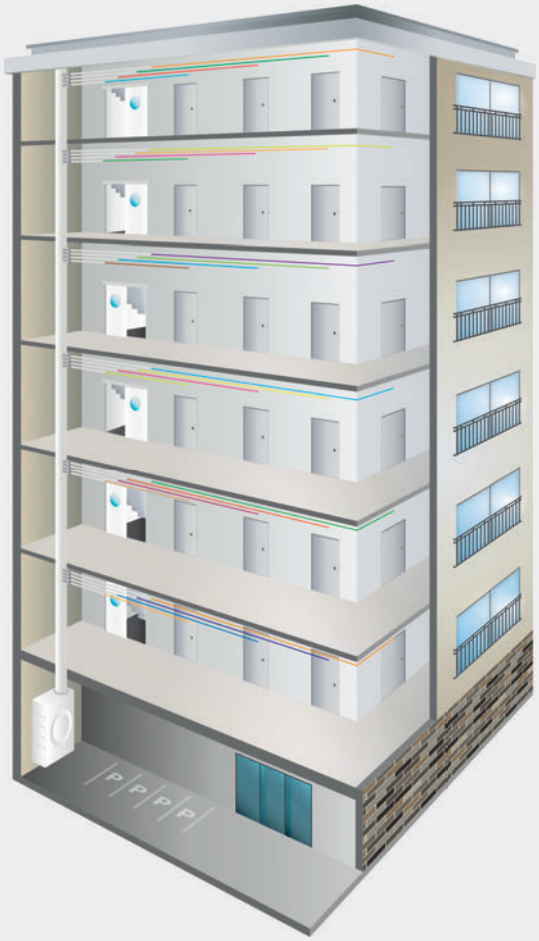
BRIO-L-W

Greenfield Multi-Dwelling Units

DAY 1 INSTALLATION DURING CONSTRUCTION PHASE

Rising spine

Floor distribution



Indoor microduct bundle

Flame-retardant, VDE Certified (40059293) pathway made of n x 5/3.5mm or 7/4mm microducts' bundles (one per dwelling)

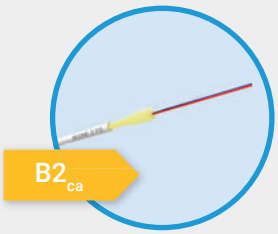
Connectors & End stops

Basement entry box BRIO

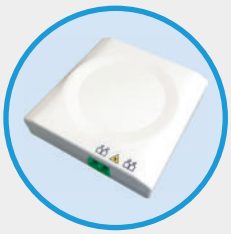
Microducts to the homes

To avoid overbuilt, use your basement box as a mutualization point.

DAY 2 CABLE BLOWING



Subscriber drop Cable COR1821



OTO (PTO T1 or T2)

Indoor subscriber connection –> See p27

Going further with

Radio Frequency Solutions

Scan the QR code to download the data sheet

$aving$ Corner

When technology contributes to your economic performance

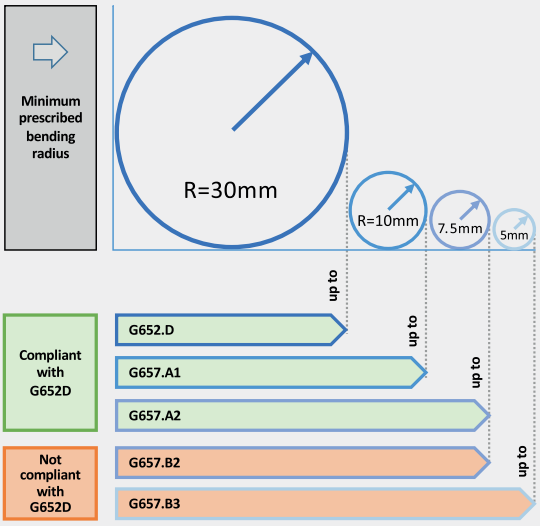
- Save massive infrastructure costs with PON architectures.
- The longer the maximum distance of an FTTH network, the better the ROI.
- Midspan access: Put an end to passthrough splices.
- Workforce shortage: doing more with less.
- Keep control of your fibre and save your optical signal.
- Ease field operations with grease-free cables.

SAVINGS CORNER

Save massive infrastructure costs with PON architectures

At the heart of FTTx Networks stands the Optical Fibre. Different types of single-mode fibres can co-exist in an FTTx network. ***The choice of a fibre must above all be made on the capacity of the network to remain functional despite the sum of the attenuations generated by the choices of the architecture. A PON architecture enables the number of fibres and installations to be reduced considerably.***

Fibre: the heart of your FTTx network



When cables are laid-out and fibres installed they are expected to operate for several decades. Unlike the active layer, the bussiness model of Telco companies could not stand with a passive layer renewed every 10 years.

≤4%

When building your FTTP network would cost you an average of £600/home-passed, the cost of the optical fibre cables will represent less than 4% of this investment in a PON architecture.

As per the IEC 60794 1-1 standard, the linear attenuation of the cabled fibre cannot exceed 0.3 dB/km.
Being aware of the bend radius of the fibres you buy is a key point to avoid extra loss at installation that may consume your link loss margin.

xPON architectures generates savings & attenuation

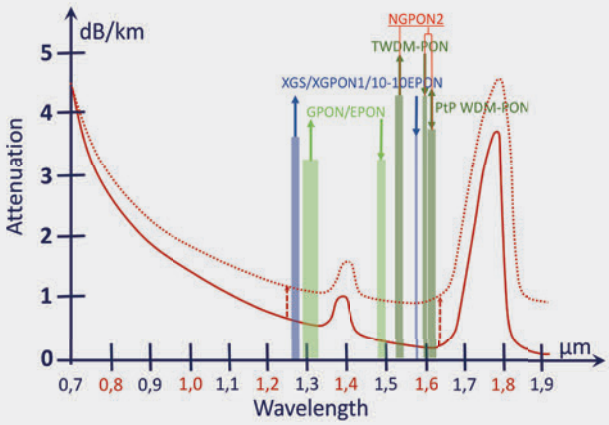
Split ratio	Loss range (a-b)
1:2	3.5 - 3.7 dB
1:4	6.7 - 7.3 dB
1:8	9.9 - 10.9 dB
1:16	13.5 - 14.5 dB
1:32	16.2 - 18.1 dB
1:64	21 - xx dB

a= Common engineering frame of reference
b= Max. at 1310nm as per IEC 61753-031-3
Source : ARCEP Fibre expert comittee.

A Passive Optical Network (PON), unlike a Point to Point architecture, consists in splitting one fibre between several subscribers.

1 fibre from a POP can serve up to 64 subscribers, so that it can reduce drastically the quantity of optical fibres in the upstream access network with subsequent savings.

But the more you split a signal the higher is the attenuation.

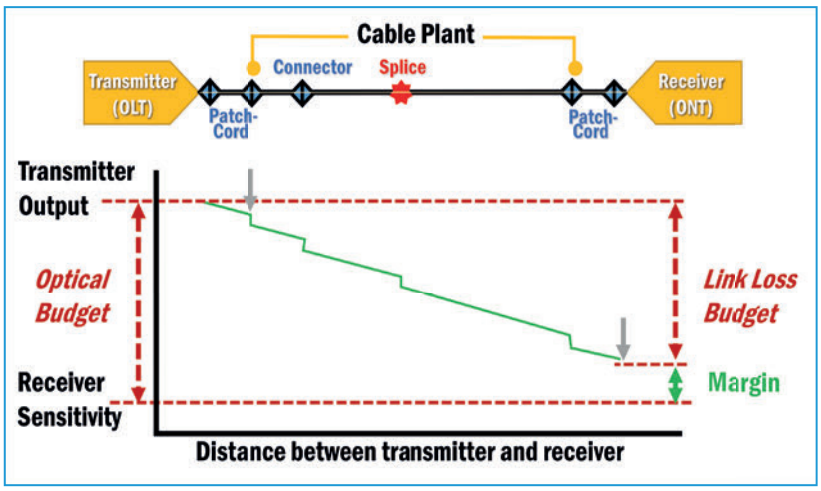


New PON technologies (XGS/XGPON1...) will solicit the fibres at more extreme wavelengths, both on the low and the high wavelengths ranges than any existing telecommunication system.

The longer the maximum distance of an FTTH network, the better the ROI

Although rarely mentioned, the length of the network will certainly determine the number of addressable homes, which will have a direct impact on the return on investment. The length of the network depends on the optical budget and the various optical losses induced by choices and practices.

Reducing OPEX: The critical importance of the optical budget



The optical budget is the maximum allowable loss of optical power between the optical OLT ports (located in the PoP) and the ONT input (at the subscriber's premise).

This budget is defined by the active equipment's optical budget class (OLT and ONT) used by your ISP. The most common GPON class is B+ which offers a 28dB loss margin to build your access network.

Optical budget classes	Minimum loss	Maximum loss
A	5dB	20dB
B	10dB	25dB
B+	13dB	28dB
C	15dB	30dB

Contributions to link loss budget

Loss event	Maximum loss	Standard
Optical fibre	0.3dB/km at 1550mm 0.4dB/km at 1310mm	IEC 60794-1-1
Splitters	See left hand page	IEC 61753-031-3
Pre-terminated connector	0.3dB/pce	IEC 61300-3-35
Field mounted connector	0.6dB/pce	IEC 61300-3-35
Splice	0.1 to 0.25dB/pce	IEC 61753-131-3
Mechanical splice	0.2 to 0.5dB/pce	IEC 61753-131-3
Ageing	0.1 to 0.25dB/km	IEC 60794-1-22 F9

Splices are done to drop fibres at a joint point or to repair a passthrough link cut during midspans.

Ageing: The IEC60794 1-22 F9 considers cables passing when the ageing test gives an average loss increase of 0.1 dB/km with no fibre beyond 0.25dB/km.

ACOME Group homologates most of its cables with no fibre beyond 0.1 dB/km of extra loss after ageing.

Be aware of the impact of the number of splices.
> See page 28

Beware of the impact of the macro/micro bending.
> See page 30

SAVINGS CORNER

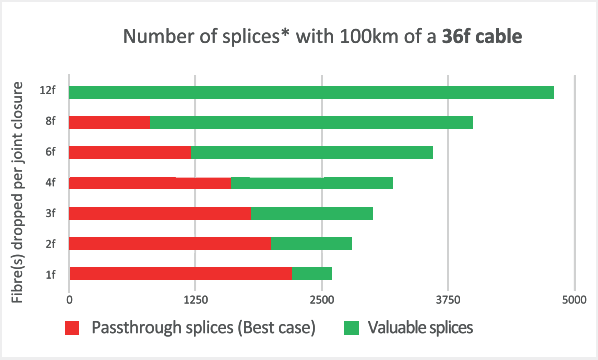
Midspan access: Put an end to passthrough splices

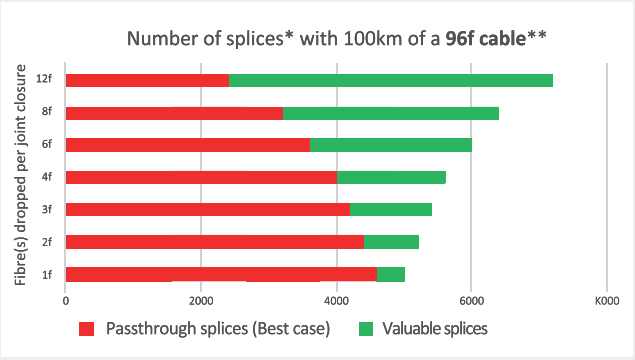
The reduction of costly pass-through splices is the driving force behind midspan access, allowing network drops at any point where fewer fibres than the total cable count are needed.

Passthrough splices involve splicing fibres to restore link continuity for those not dropped at the joint where they were cut. A typical Midspan practice involves cutting the entire fibre bundle; the more fibres in the bundle, the more pass-through splices are required.

Classic Midspan: inevitable costly passthrough splices

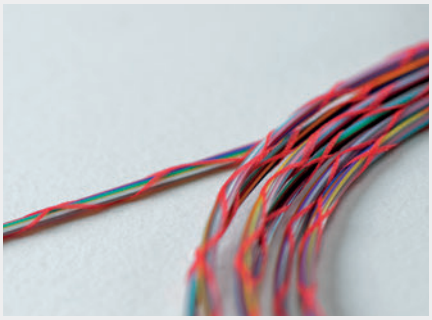
Unless you need to drop all the fibres from the cut bundle, you will inevitably have to make passthrough splices. But did you know that you can eliminate the pass-through splices, shown in red, by introducing the fibre mid-spanning? This is the best case scenario pictured below.





**Assuming an average of 4 classic midspans per km - ** 96f cable made of 4 elements of 24 fibres each*

Innovative practice: Midspan the fibre to eliminate 100% of the passthrough splices



The Nanomodule is a technology of fibre grouping that ingeniously provides an individual access to any fibre. Only drop fibres are cut and the passthrough fibres are left intact. Eliminating so many splices also decreases the optical losses and enable to extend the network length.

> see previous page

Nanomodule®
ACOME's breakthrough technology makes it easy, fast and safe to midspan the fibre.
> See page 23

Workforce shortage: doing more with less

The shortage of skilled-workers regularly makes headlines in the specialist press, questioning the ability to achieve deployment targets. Fibre splicers are among the skills in shortage.

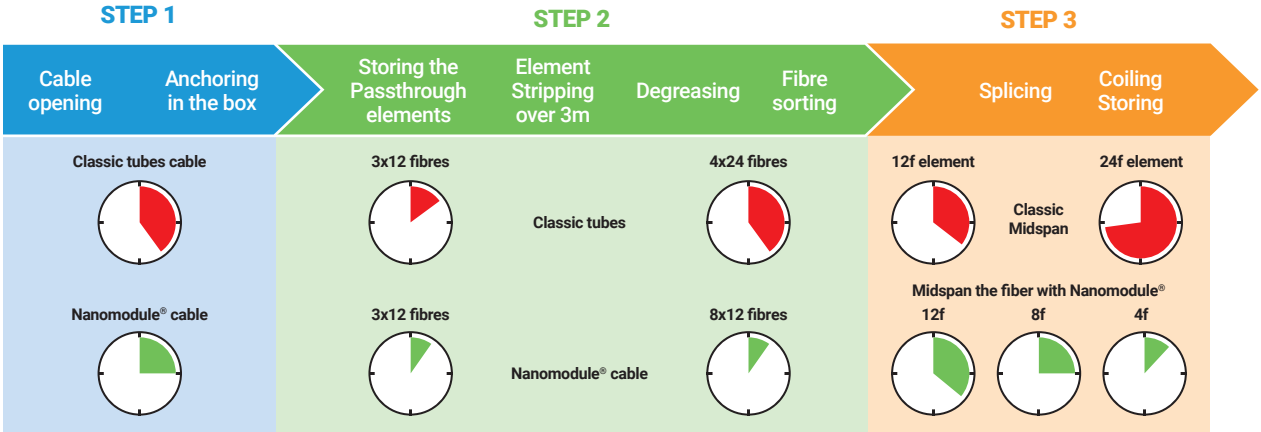
Hiring , training, and retaining the tension skills represent a high budget. Contractors are facing anyway a high turnover. Cables with Nanomodules® aims at increasing significantly productivity of the workforce.

Nanomodule®: A collection of features that translate into productivity gains

Flexibility never before achieved	**Expedited cable anchoring to the box, quickened coiling and storage**
Enable 12 fibres modularities where others come with 24 fibres	**Easier fibre selection ; less splice in classic midspan case of 12f drop cases**
Enable similar cable density with 250µm instead of 200µ	**Easier and faster fibres manipulation**
Fibre access without cutting the element	**Eliminates the need to repair the passthrough links**
Gel-free elements	**Eliminates the degreasing phase**

Nanomodule: Time savings from the field

The following comparisons were made by operators and their installation teams of 2 experienced fibre splicers.



Productivity boost from 10 to 100%

Team's Daily Production	Midspan including CBT cable prep.			Pre-terminated splitter box		
Fibres to drop	12f	8f	4f	12f	8f	4f
With Nanomodule® cable	4,4	5	5,2	6	6,5	7
With classic nx12f cable	4	4	4	5	5	5
With classic nx24f cable	3	3	3	3,5	3,5	3,5

Number of closures cabled per day as per the number of fibre to be dropped each time.

Scan the QR code & discover more about the nanomodule

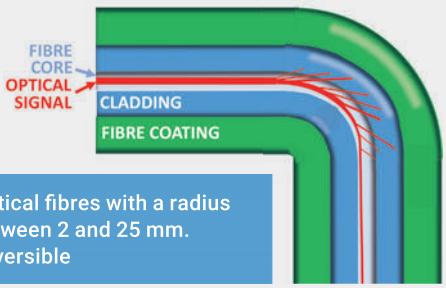
Keep control of your fibre and save your optical signal

Although the passive layer of FTTH networks (fibre, cables and connectivity) is expected to last for 5 decades, it needs to be able to evolve and undergo constant intervention.

Optical fibre is a highly efficient waveguide, with a loss of only 0.2 dB per km. However, if it is not properly fitted, unexpected losses will occur, jeopardising connections or reducing the possible length of the network.

Macro-bends

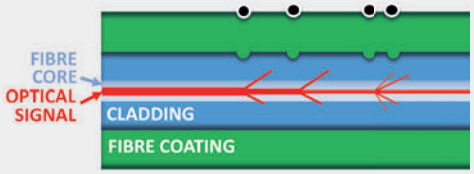
DIAGRAM OF A MACRO-BEND ON OPTICAL FIBRE



Bends of optical fibres with a radius typically between 2 and 25 mm.
> Usually reversible

Micro-bends

DIAGRAM OF A MICRO-BEND ON OPTICAL FIBRE



Stress points and radial stresses with a geometric dimension of less than 1 mm
> Usually non reversible

Improper installation practices such as:

- Incorrect routing of fibres in trays;
- Incorrect winding of the fibre bundles in the storage areas of the boxes;
- Jumper or cord routing fault in patch areas
- Coiling diameter not compliant with cable, element and / or fibre prescriptions.

CAUSES

- **Crushing** of a cable segment (faulty clamps , vehicle or heavy object weighing down on a cable section);
- **Pinching** a portion of fibre in the trays or box cable glands;
- **Compression** of part of a fibre bundle
- **Faulty fastening** in the overhead boxes
- **Improper manufacture** of the cable ;
- **Defect in the optical fibre** (coatings not sufficiently protecting the fibre core, etc.);
- **Excessive traction** on the cable during installation.

MACRO-BEND BETWEEN A G652.D AND G657.A2 FIBRE (*SYCABEL)

	G652.D		G657.A2	
Radius	1550nm	1625nm	1550nm	1625nm
7.5mm	≤ 1.5 dB/loop	≤ 5 dB/loop	≤ 0.003 dB/loop	≤ 0.01 dB/loop
20mm	≤ 0.15 dB/loop	≤ 0.7 dB/loop	Non mesurable	≤ 0.001 dB/loop
30mm	Non mesurable	≤ 0.001 dB/loop	Non mesurable	Non mesurable

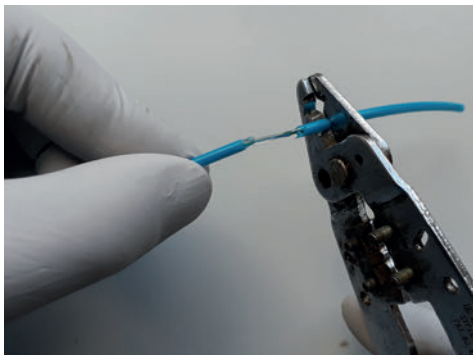
MICRO-BENDING LOSS FOR A COMPRESSION TEST BETWEEN A G657.A2 AND G652.D FIBRE (LAB ACOME)* SYCABEL

	1550nm	1625nm	1650nm
G657.A2	0.1 dB	0.1 dB	0.1 dB
G652.D	+ 0.3 à 1 dB	+ 0.45 à 2 dB	+ 0.6 à 2.5 dB

Save also materials and space thanks to bend insensitive fibres which allow smaller splice boxes

Ease field operations with grease-free cables

Complexity is a hidden cost driver. If you want to make your contractors want to work for you, promise them you'll only supply them with cables easing field operations.



The degreasing stage of an optical cable is very important. Patching the optical fibres in the trays requires perfect degreasing. The time required for this operation depends on the quantity of gel, but an average of 10 minutes per fibre module is recommended. This step is not risk-free.

Risks associated with poor degreasing, a source of extra wasted time

- **Splices complications :** Dust and other contaminants can cause excessive attenuation during splicing, requiring the operation to be repeated several times ;
- **Trays contamination:** Fouling of fibre trays will considerably complicate subsequent operations (maintenance, network upgrades, etc.).

Use of solvent: risks for the fibre, for health, for the environment

- **In excess,** it can contaminate the fibre.
- **If the solvent is too aggressive**, it will alter fibres' coating, making them more sensitive to micro-bending.
- **All solvents that can be used** or are used are flammable and toxic (in particular, they give off noxious vapours that can be inhaled).

In general, spectroscopic grade isopropyl alcohol is recommended, with the use of lint-free wipes.

In practice, white spirit is widely used in the field to remove most of the jelly. White spirit is an aggressive, toxic and irritating solvent.

Its use requires the use of rubber gloves, protective goggles and ventilation of the workstation.

Nanomodule®: makes work clean, fast and safe

- Reduces the quantity of consumables
- Reduces the amount of waste on worksites
- Eliminates exposure to toxic vapours
- Eliminates the degreasing stage
- Makes bare-handed work safer
- Contributes to productivity gains

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