Prysmian Group

Sirocco XS

Flexible, future-proof blown fibre solutions

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Linking the future

As the worldwide leader in the cable industry, Prysmian Group believes in the effective, efficient and sustainable supply of energy and information as a primary driver in the development of communities.

With this in mind, we provide major global organisations in many industries with best-in-class cable solutions, based on state-of-the-art technology. Through two renowned commercial brands – Prysmian and Draka – based in almost 100 countries, we're constantly close to our customers, enabling them to further develop the world's energy and telecoms infrastructures, and achieve sustainable, profitable growth.

In our energy business, we design, produce, distribute and install cables and systems for the transmission and distribution of power at low, medium, high and extra-high voltage.

In telecoms, the Group is a leading manufacturer of all types of copper and fibre cables, systems and accessories – covering voice, video and data transmission.

Drawing on over 130 years' experience and continuously investing in R&D, we apply excellence, understanding and integrity to everything we do, meeting and exceeding the precise needs of our customers across all continents, at the same time shaping the evolution of our industry.

Introducing *XSNET*

From aerial and underground installations, through to both simple and more complex residential networks, Prysmian's *XSNET* family of products and solutions represents a new standard in Fibre To The Home (FTTH). Answering the critical need for ease of deployment, flexibility, reliability and cost-efficiency – and being backed by a full suite of valuable support services – *XSNET* is the ideal range of cabling for today's changing world.

xsNet

Value Innovation for your Broadband Network

| *xsNet* INDOOR SOLUTIONS | *xsNet* POP SOLUTIONS |
| *xsNet* OSP SOLUTIONS | *xsNet* ENGINEERING SOLUTIONS |

QUICKDRAW*xs*   SIROCCO*xs*   OASYS   JETNET*xs*

RETRACTANET*xs*   VERTICASA*xs*   VERTV*xs*   EASENET*xs*

BENDBRIGHT*xs*   Supported throughout by BENDBRIGHT*xs* fibre technology

SIROCCO^{XS}

If you're looking for a comprehensive yet simple, integrated solution for managing ever-evolving network demands, then SIROCCO^{XS} from Prysmian is the ideal answer.

The SIROCCO^{XS} blown fibre system uses compressed air to blow optical fibre into pre-installed tubes. It enables on-demand deployment of optical fibres from one internal or external network point to another, allowing for rapid upgrades to the latest fibre technologies.

Existing tube routes can also be easily interrupted at any location, so re-routing to new users can be achieved as and when required.

Moreover, SIROCCO^{XS} substantially lowers network build costs, and provides more flexible design and better damage recovery performance than conventional systems – avoiding high initial capital expenditure or extensive network planning.

SIROCCO^{XS} is well suited to the needs of last mile, campus or in-building networks.

Where is fibre going?

The increasing number of services available via optical fibre (Broadband Internet, VoIP, Video on Demand, High Definition IPTV) and the need to provide higher bandwidth capability – both upstream and downstream – is leading network operators to replace copper wire networks with optical fibre deeper into the last mile and closer to the customer.

Consequently it is important to keep down installation and operational costs in structures like high-rise buildings and Multi Dwelling Units (MDUs) and minimize the impact of the work on the final customer.

SIROCCO^{XS}

Introduction

The *Sirocco^{XS}* Blown Fibre System provides a simple, well established solution to the needs of operators for a flexible system that manages evolving network demands without the necessity for high initial capital expenditure or extensive network planning.

Sirocco^{XS} enables optical networks to adapt to changing business requirements.

Sirocco^{XS} allows optical fibres to be deployed on demand from one point in the network to another (internal or external) using compressed air to blow the optical fibres into pre-installed tubes.

Features & Benefits

The *Sirocco^{XS}* Blown Fibre System uses well established technology that is constantly being upgraded and improved to provide customers with a series of significant benefits for the planning and operation of their last mile, campus or in-building network.

Increase network design flexibility

– Network on Demand – provide additional service on a just-in-time basis.

– Reroute existing fibre links to new users easily.

– Adopt the latest fibre technologies, simply replace the fibre units.

– Superior damage recovery speed and performance.

Manage capital and operating expenditure

– Capital expenditure can be deferred.

– Minimise splice and breakout expenses.

– Deploy fibre as and when required to meet needs.

– Eliminate unlit fibres.

Speed of customer connections

– Add customers more quickly.

– Upgrade customers more quickly.

– Interrupt tube routes at any location for network extension.

– Minimise disruption.

Application Guide

For almost all applications in the access network and premise distribution, the *Sirocco^{XS}* Blown Fibre System offers a cost effective alternative to traditional cabling. Pre-install a multi-tube link and blow in a package of fibres (2 to 12) for day 1 operation. Subsequently, when and if additional capacity is required, more fibres can be blown into adjacent tubes. Simplify planning right across the network with a flexible solution that makes change much easier to face. The *Sirocco^{XS}* Blown Fibre System offers solutions for:

Access Networks & Fibre To The Home
Telecom operators need to make assumptions about how much capacity they should provide to each building: How many megabits or gigabits of capacity will each customer require now and in the future, whether each customer is a business or one of many customers in a residential apartment block who may or may not want service today, next month, next year? This will influence the fibre cable capacity installed. With *Sirocco^{XS}* blown fibre, provide capacity for today and spare tubes for tomorrow's upgrades.

In suburbs and other residential areas, some customers will want fibre service as soon as it can be provided, others will wait until they perceive costs are less or potential applications have increased. In green field sites, a network of empty tubes can be installed as the 'fourth utility'; being fibre-ready these estates are able to accommodate future needs on an incremental basis.

Private Networks
In business, the only thing to be confident about the future is that it will be different and not what was expected. Fluctuations in demand will not only be in the amount of bandwidth needed but also in the delivery locations which will require infrastructures to be adaptable and robust enough to meet today's requirement as well as being future proofed. With *Sirocco^{XS}* blown fibre, provide capacity for today and spare tubes for tomorrow's upgrades.

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Product List

Fibre and Cable
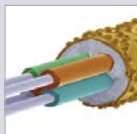
Sɪʀᴏᴄᴄᴏ^{xs} Blown Fibre Unit (EPFU)
Optical fibre unit containing 2, 4, 6, 8 or 12 fibres cushioned and protected by resin layers with an outer low friction layer for easy blowing. Available in all fibre types.

Sɪʀᴏᴄᴄᴏ^{xs} Internal Blown Tubes
A range of LSOH tube cables from single tube to 24 tubes suitable for indoor application – riser and horizontal distribution. Low friction tubes help maximise blowing distance.

Sɪʀᴏᴄᴄᴏ^{xs} External Blown Tubes
A range of HDPE tube cables from single tube to 24 tubes suitable for external application including duct and direct burial. Low friction tubes help to maximise blowing distance.

Connectivity

Sɪʀᴏᴄᴄᴏ^{xs} Rack Solutions
A range of solutions including racks and rack mounted products that can accommodate blown fibre. These include specific patching shelves for Sɪʀᴏᴄᴄᴏ^{xs} tube and EPFU.

Sɪʀᴏᴄᴄᴏ^{xs} External Plant Solutions
Solutions for outdoor use that can accommodate blown fibre. These include streetside cabinets with shelves/sub racks including splitter shelves and/or tube management.

Sɪʀᴏᴄᴄᴏ^{xs} External Plant Solutions
Solutions for outdoor use that can accommodate blown fibre. These include flexible tube distribution solutions as well as fibre management through external nodes/joints.

Sɪʀᴏᴄᴄᴏ^{xs} External Plant Solutions
Solutions for outdoor use that can accommodate blown fibre. These include simple branching units and resin filled joints for breakout, drops or extending Sɪʀᴏᴄᴄᴏ^{xs} networks.

Sɪʀᴏᴄᴄᴏ^{xs} Customer End Solutions
Solutions to manage the entry of fibre into a building or distribution around buildings. These provide Sɪʀᴏᴄᴄᴏ^{xs} tube as well as fibre management to the customer.

Installation

Sɪʀᴏᴄᴄᴏ^{xs} Tools and Accessories
There is a wide range of push-fit tube connectors for external or internal use to facilitate easy network build and deployment. A range of suitable tools are also available.
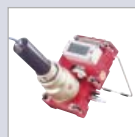
Sɪʀᴏᴄᴄᴏ^{xs} Installation Kit – Blowing Head
A range of equipment has been developed to achieve simple installation of Sɪʀᴏᴄᴄᴏ^{xs} blown fibre. Key to this is the Sɪʀᴏᴄᴄᴏ^{xs} Blowing Head and its clutch control system.

Sɪʀᴏᴄᴄᴏ^{xs} Installation Kit – Compressors
Included in the range of equipment for installation of Sɪʀᴏᴄᴄᴏ^{xs} blown fibre are petrol (external) and electric (internal) clean, dry air generating compressors.

Sɪʀᴏᴄᴄᴏ^{xs} Installation Kit – Others
Additional items of equipment for installation of Sɪʀᴏᴄᴄᴏ^{xs} are available separately or as part of a kit solution. Training is also a key element in their successful use.

The *Sirocco*^{XS} Solution

Branching Unit

Ultra Compact Termination Box

Streetside Cabinet SC3000

External Compact Termination Box

Blown Fibre Tube Cables & EPFU

Tube Distribution Closure
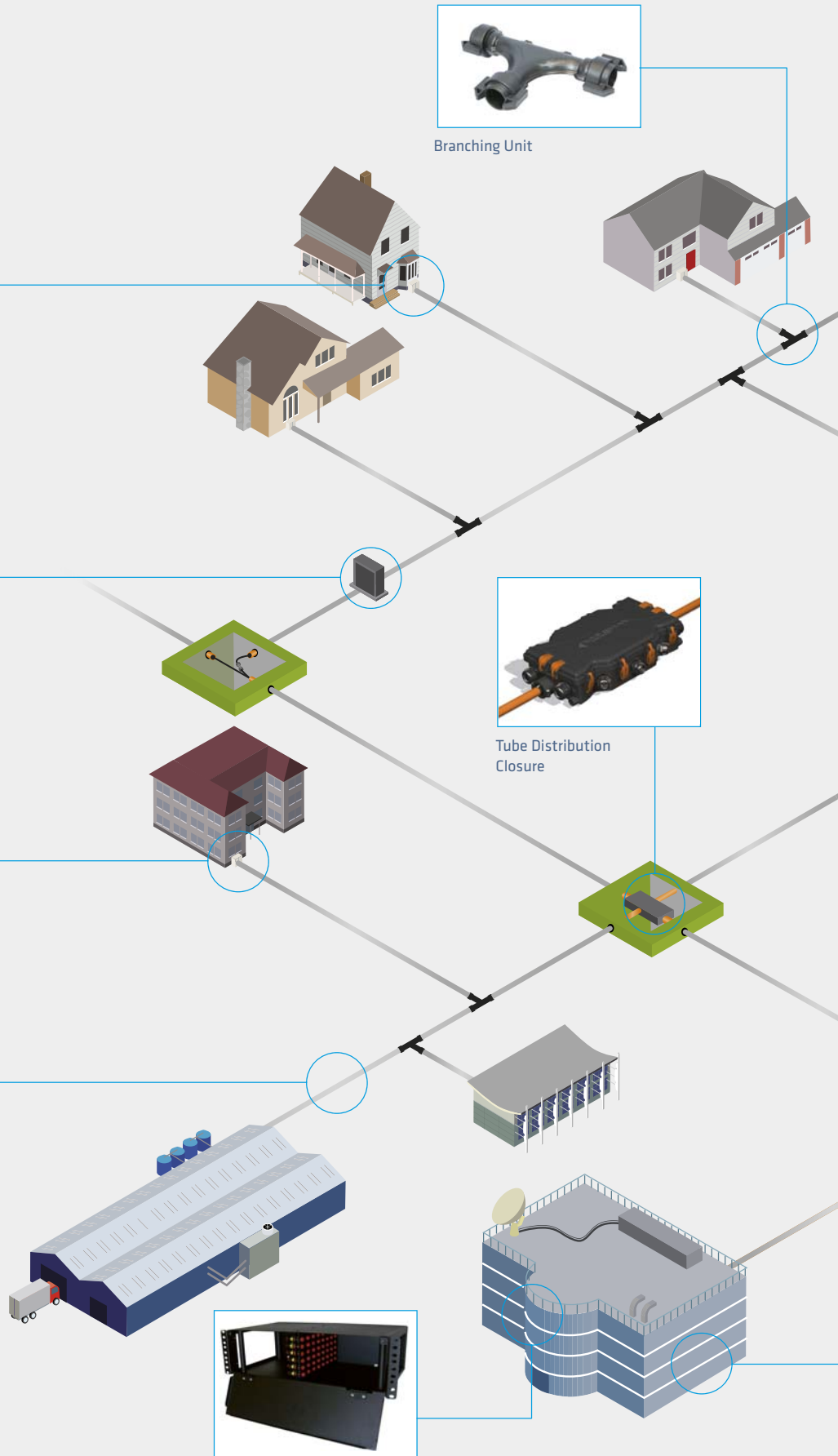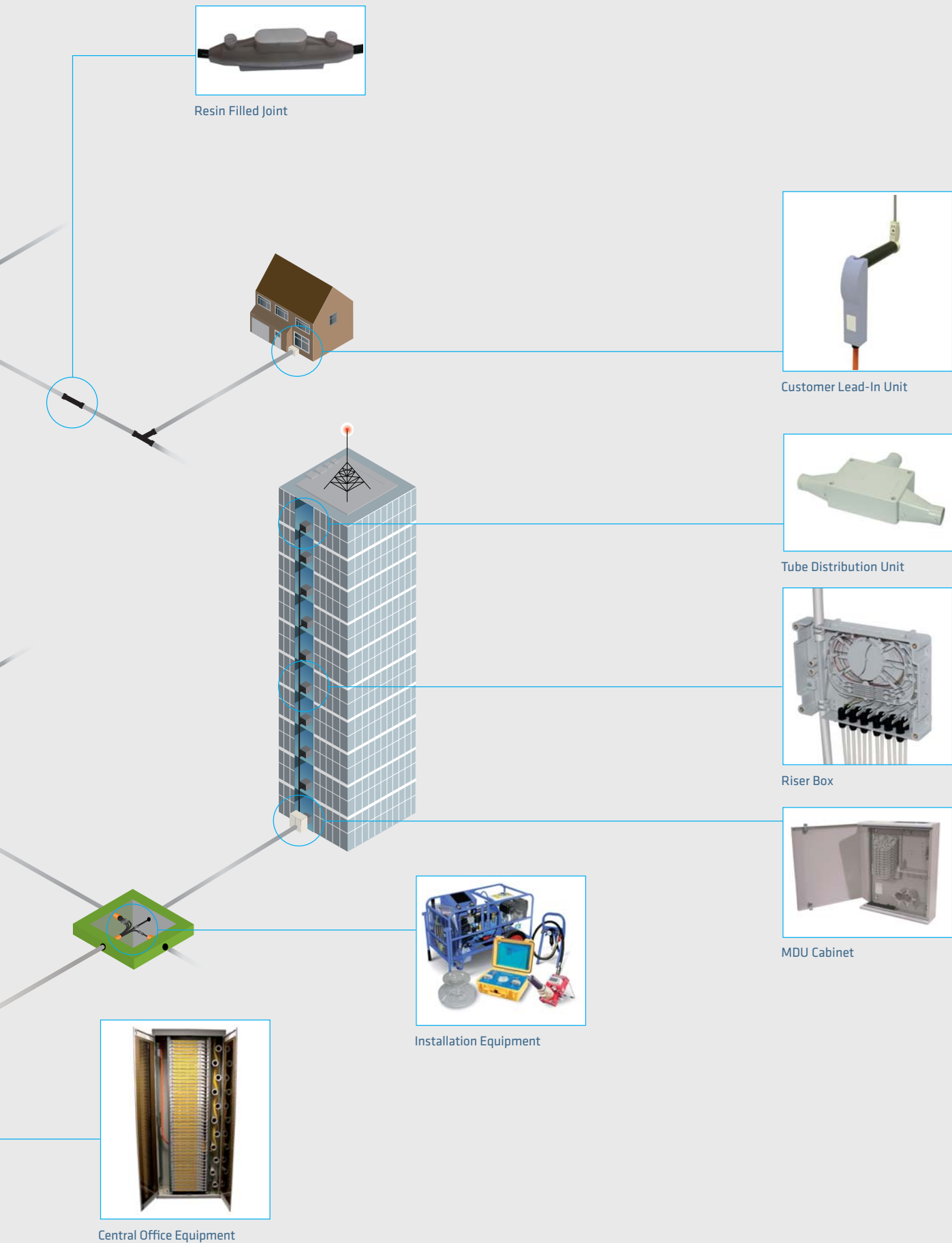
Tube Patching Shelf

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Resin Filled Joint

Customer Lead-In Unit

Tube Distribution Unit

Riser Box

MDU Cabinet

Installation Equipment

Central Office Equipment

Case Studies

Scandinavia - Low Temperature Networking

Near the Arctic Circle, a man is driving through the snow. He's installing a broadband network for the residents of the small Swedish city of Piteå. On the coast of the Gulf of Bothnia, Piteå's isolation means it is ideal for what is probably its biggest industry; the testing of new models for the world's car industry. "Bentleys, BMWs, and Audis, we've even seen Lamborghinis go by".

It's a challenging environment, because its cold for much of the year – and that challenge applies to the telecommunications industry too. If you're digging the streets to lay new cables, you have a window of only a few months mid year when the ground is soft enough.

The local authority wants to provide fibre to the home for its citizens, with the assistance of EU funding designed to bring services to isolated communities. It hasn't issued a contract to one operator, but is building a carrier-neutral network of fibres that all operators can use to

offer services (triple-play including telephone, high-speed data and television). The provider is building the network using the $Sirocco^{xs}$ blown fibre system.

One tube goes to each house and apartment in the city. If a resident doesn't want service straight away the tube is installed to a connecting box on the wall. "We build 100% of the tube infrastructure, but we don't blow fibre until the customer wants service". If they don't, the tube is sealed against moisture and dirt. When they do, it takes about 30 minutes to blow in a two fibre link.

The network starts from the centre of the city using conventional fibre cable to a local distribution point. A tube is then installed, typically up to 500m, to each house. "We started from scratch at the start of the year and installed 18kms of tube cable. Around 600

households signed up to start, about 50% of those connected to the tube cable network. We expect 1500 – 2000 connections".

"We can install fibre at any time during the winter months because the tube network is in place".

"With the onset of winter and frozen ground we stop installing cable. It's dangerous to dig when the ground is hard – you can damage other services below the footpath".

The company also manages networks for other operators, including advanced IP-based security services with TV cameras and alarms. Perfect with all those expensive cars around!

Middle East - High Temperature Networking

At the other extreme, demand for the $Sirocco^{xs}$ Blown Fibre System from countries around the equator such as in Singapore or the Middle East, has led to the development of appropriate installation practices that can cope with extremes of temperature and relative humidity.

When the installation is to be carried out inside buildings then the likelihood is that temperature and humidity will be controlled, but outside, the full extent of the variation will be experienced and needs to be overcome.

The range of Prysmian compressors, petrol and electric, clean and dry the air to be pumped into the tube for blowing

fibre and cool the air to within 2°C of ambient. However, when installing a network of 8 fibre multimode 62.5/125 into 24 tube Direct Install blown cable around an oil tank storage farm in the Middle East, ambient temperatures can easily remain at more than 30°C throughout the day.

The project was to install a new security system as well as upgrading the control system for the oil storage facility, installing 24 tube cable into existing PVC ducts as a backbone. Then 4 tube was used for cable drops to connect to the communication box for the CCTV cameras, sensors to monitor the oil levels and fire pumps facility control. In many cases, the route lengths necessitated long length blows.

"By utilising an air chiller unit, after the electric compressor, that reduced the temperature of the air, it was possible to achieve the blow lengths that we needed around the site".

"The total project took less than four weeks and was a major success, leading to repeated installations across other facilities."

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England - Making Fibre Accessible

Despite popular opinion in some quarters that blown fibre solutions were first introduced for in-building networks, because they are too fragile for the rigours of application in external environments, blown fibre was originally developed as a solution for Access Networks and has been most extensively used for last mile customer connections around the world.

None more so than in the UK, where, for around 20 years, blown fibre has been the solution for building access networks for business customers in towns and cities. While the standard approach has been to install one or a number of 2 or 4 singlemode fibre units into the available tubes, the flexibility of the blown fibre solution means that in recent years higher fibre count units (8 or 12 fibre) can address larger customers' needs or provide a growth path to add capacity at a later stage. As the bundles can be blown out and re-utilised elsewhere, if required, more capacity can be offered by replacing a 2 fibre unit with a 4, 6, 8 or 12 fibre unit should there be no available tubes to take extra fibre.

In the access network, the length of the typical final business customer drop will be a few hundred metres. All of the *Sirocco*^{XS} blown fibre bundles (2 to 12 fibre, irrespective of fibre type) will blow about 1km into a *Sirocco*^{XS} tube infrastructure in a single Point-to-Point (P2P) connection, making planning simple.

"In the access network, with the tube cable in place, blowing fibre typically takes less than 15 minutes".

With the growth in FTTH, residential homes are now able to obtain top quality triple play service, getting the benefit of high capacity optical fibre to single homes and into apartment blocks. In green field sites the operator is able to build its backbone network and simply lay empty tubes to each house for later fibre connection if the customer wants the service (reducing initial investment). In apartment buildings, the riser can be cabled on day 1, possibly with just the first few customers linked in (innovators and early adopters) and investment in breakout boxes, tube connections, fibre links and termination units delayed until required.

Wales - Achieving Managed Flexibility

A UK-based oil refinery has been using blown fibre since 1994/5, gradually expanding the network to provide a communications backbone from the main data centre around the refinery, with a leg to the shipping berths.

*"The key benefit for us in using *Sirocco*^{XS}, I like to call managed flexibility."*

"What has really made a major difference to us" explains the plant's Infrastructure Engineer "is that we now have complete control of the activity so we can react quickly to urgent needs.

We purchased sets of installation equipment from Prysmian and following their training programme we can install the fibres ourselves. Downtime here costs upwards of $0.5m a day so we can now get a link in place quicker than it used to take the contractors to get here."

They also appreciate the flexibility of the technology. Initial links were 4 fibre 62.5/125. As demand increased they were replaced with 12 fibre units of 50/125 because of better fibre performance and cheaper electronics. With maximum fibre route lengths increasing from 880m to 6km, singlemode fibre became more attractive for a duplicate server farm 'outside the blast zone' – safety and security being a necessity.

One of the most challenging tasks for the infrastructure team is to provide additional facilities during shutdown every four years (180 telephones and 290 PCs located around the site).

Traditionally, robust tight buffered cables would be laid around the floor and cut out after use. With a ducted blown fibre tube network in place, *Sirocco*^{XS} blown fibre can be blown in ready for the contractors and blown out again when they've gone.

Many of the tubes may be in place months or years before they are used. The *Sirocco*^{XS} Tube Integrity and Length Tester (STILT) is invaluable in checking the route before blowing fibre.

"*Sirocco*^{XS} has made a big difference to the way we can manage our network and respond to normal requirements and urgent changes."

SIROCCO^{XS} 11

Blown Fibre Units (EPFU)

Prysmian produces optical fibre units specifically engineered for blown fibre applications. The fibres are contained in a soft inner acrylate layer which cushions the fibres, an outer harder layer which protects the fibre from damage and a low friction layer that assists in improving blowing distance, which is typically in excess of 1000 metres in a single direction. The $SIROCCO^{XS}$ units are available in lengths up to 6000 metres supplied in portable plastic pans for ease of use. The $SIROCCO^{XS}$ units can be supplied in whatever type of fibre is required, including hybrid solutions with a mixture of fibre types. Colour coding indicates the type of fibre (singlemode yellow, 50/125 turquoise/blue and 62.5/125 magenta/red) except for 12 fibre which, with its alternative low friction coating, is coloured grey.
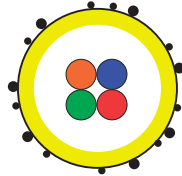
2 Fibre Unit (with ripcord)*

Diameter	1.0mm
Weight	0.85 g/m
Breakout	2 minutes (typical)
Fibre colours	blue, orange
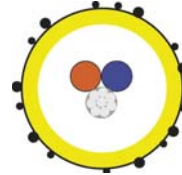
4 Fibre Unit

Diameter	1.0mm
Weight	0.85 g/m
Breakout	3 minutes (typical)
Fibre colours	blue, orange, green, red

6 Fibre Unit

Diameter	1.1mm
Weight	0.95 g/m
Breakout	4 minutes (typical)
Fibre colours	blue, orange, green, red, grey, yellow
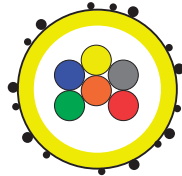
8 Fibre Unit

Diameter	1.4mm
Weight	1.60 g/m
Breakout	5 minutes (typical)
Fibre colours	blue, orange, green, red, grey, yellow, violet, brown
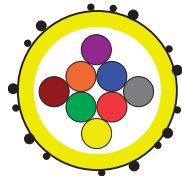
12 Fibre Unit

Diameter	1.3mm
Weight	1.65 g/m
Breakout	8 minutes (typical)
Fibre colours	blue, orange, green, red, grey, yellow, violet, brown, black, white, pink, turquoise
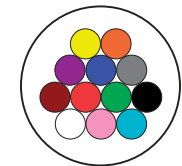
Pan Dimensions/Weights

	2f		4f		6f		8f		12f	
Length	Pan	kg	Pan	kg	Pan	kg	Pan	kg	Pan	kg
500m	S	3.0	S	3.1	S	3.2	S	3.3	S	3.4
1000m	S	3.3	S	3.3	S	3.5	S	4.0	S	4.1
2000m	S	4.1	S	4.1	S	4.5	S	5.5	S	7.0
4000m	D	6.9	D	6.9	D	7.1	D	9.7	D	9.8
6000m	D	8.5	D	8.5	N/A	N/A	N/A	N/A	DD	15.8

Pan Code	Dimensions (mm)
Shallow (S)	(l)615 x (w)530 x (h)155
Deep (D)	(l)615 x (w)530 x (h)251
Double Deep (DD)	(l)600 x (w)600 x (h)392

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Blown Fibre Units – Detailed Specification

Properties

Mechanical	International Standard	Test Conditions	Performance
Tensile strength	IEC 60794-1-2-E1	1W N (9.81 x mass of 1km)	Pass. Maximum fibre strain = 0.4% Residual fibre strain = 0.05%. Note 1, note 2
Crush	IEC 60794-1-2-E3	100N for 60 seconds	Pass. Note 1, note 2
Bend	IEC 60794-1-2-E11	40mm (2, 4 & 6f), 60mm (8 & 12f)	Pass. Note 1, note 2
Aged bend	BT CW1500 pt 4	40mm (2, 4 & 6f), 60mm (8 & 12f) at 60°C for 1000 hrs	Pass. Note 1

Environmental

	International Standard	Test Conditions	Performance
Temperature performance	IEC 60794-1-2-F1	-10°C to + 60°C for 3 cycles (multimode)-30°C to + 60°C for 3 cycles (singlemode)	Pass. Note 2, note 3 and note 4
Cold test	BS EN 60068-2-1	-20°C for 96 hrs	Pass. Note 2, note 3 and note 4
Condensation test	IEC 60068-2-38	-10°C to + 65°C at 93%RH for 24 hrs x 10	Pass. Note 2, note 3 and note 4
Water immersion	BT CW1500 pt 4	20°C ± 5°C for 2000 hrs	Pass. Note 2, note 3 and note 4
Fibre breakout from unit	BT CW1500 pt 4	0°C, 20°C, 40°C, length 2m	See opposite
Note 1	No significant damage		
Note 2	No change in attenuation after test		
Note 3	Pass for singlemode = ± 0.07dB/km at 1310nm and 1550nm		
Note 4	Pass for multimode = ± 0.25dB/km at 850nm and 1300nm		

Transmission Performance

Maximum Attenuation (dB/km)

Wavelength	Singlemode (G652b)	Low Waterpeak (MagniLight G652d)	MM 62.5/125	MM 50/125	OM3	OM4
850nm	-	-	3.5	2.6 (2f–3.2*)	2.6 (2f–3.2*)	2.6 (2f–3.2*)
1300/1310nm	0.38	0.38	1.0	0.8 (2f–1.2*)	0.8 (2f–1.2*)	0.8 (2f–1.2*)
1383nm	-	0.35	-	-	-	-
1550nm	0.26	0.26	-	-	-	-

*and for hybrid designs

Bandwidth (MHz.km)

Wavelength	Singlemode (G652b)	Low Waterpeak (MagniLight G652d)	MM 62.5/125	MM 50/125	OM3	OM4
850nm Minimum Modal	-	-	200	500	1500	3500
850nm Effective Modal	0.38	0.38	-	-	2000	4700
1300/1310nm	-	0.35	600	800	500	500

Data Sheets

EPFU Range and Technical Parameters	**Data Sheet SE001**	EPFU Multimode 50/125 (OM3)	**Data Sheet SE006**
EPFU Singlemode G652b	**Data Sheet SE002**	EPFU Multimode 50/125 (OM4)	**Data Sheet SE007**
EPFU Low Waterpeak (MagniLight) G652d	**Data Sheet SE003**	EPFU Bend Insensitive G657.A1	**Data Sheet SE008**
EPFU Multimode 62.5/125 (OM1)	**Data Sheet SE004**	EPFU Bend Insensitive G657.A2/B2	**Data Sheet SE009**
EPFU Multimode 50/125 (OM2)	**Data Sheet SE005**	EPFU Hybrid Range Details & Technical Parameters	**Data Sheet SE010**

SIROCCO^{XS}

Blown Fibre Tube Cables

Sirocco^{XS} blown fibre bundles (EPFU) are blown into pre-installed tubes to form a communications network. There are two types of tube: internal LSOH tubes and external polyethylene tubes.

Both are designed to support the installation of *Sirocco^{XS}* blown fibre bundles by having a low friction coating on the inside of the tubes. The tubes are then packaged to suit the application i.e.

A number of LSOH tubes inside an LSOH sheath for internal applications, as below.

A number of polyethylene tubes inside an HDPE sheath for installation in ducts with, where necessary, additional layers of protection for more onerous environments, see opposite.

Tests to Primary Tube & Cable Assembly

As part of the approval process for *Sirocco^{XS}* blown tube cables, there are a wide range of test parameters that the cables must meet or pass. These tests involve the primary tube and the finished cables.

Tensile: tested in accordance with IEC 60794-1-2 Method E1, requiring no permanent deformation after the applied load.

Kink: tested in accordance with IEC 60794-1-2 Method E10, at ≤20 x OD, no reduction of diameter greater than 15%.

Impact: tested in accordance with IEC 60794-1-2 Method E4, 1 joule, no residual deformation greater than 15%.

Crush: tested in accordance with IEC 60794-1-2 Method E3, no permanent deformation after the applied load*.

Bend: tested in accordance with IEC 60794-1-2 Method E11, at ≤12 x OD, 5 turns, no residual deformation greater than 15%.

Friction (tube only): A 5kg weight pulled at 1m/min across 100mm. Over 2 pulls the coefficient of friction must be less than 0.1.

Pressure Performance (tube only): tested in accordance with IEC 86A/1205/CD Annex C, proof and burst tests across 0 to +40°C.

*load 400N (LSOH), 700N (poly tubes), 1000N (DI) and 2000N (DB)

Internal Cable (LSOH)

These designs were developed for suitability for use in buildings where reduced halogen content, low smoke and acid gas emission and improved resistance to burning make them attractive where people and high performance equipment may be at risk.

Data Sheet ST003

The Internal LSOH cable must also pass a range of additional tests, for:

Flammability: IEC 60332 parts 1 & 3

Low Acid Gas Emission: IEC 60754-1

Smoke: IEC 61034-2

Flammability Temperature: BS EN ISO 4589-3 (not less than 270°C)

Product details

Assembly Type	Nominal OD (mm)	Minimum Bend Radius (mm)	Maximum Tensile (N)	Nominal Weight (g/m)
1 Way	5.0	60	75	15
2 Way	7.2 x 12.2	90 x 150	375	75
4 Way	12.2 x 14.3	150 x 175	610	122
7 Way	15.7 x 17.0	190 x 205	925	185
12 Way	20.0 x 22.3	240 x 270	1450	290
19 Way	24.3 x 27.0	295 x 325	2100	420
24 Way	31.8 x 32.0	380 x 385	2900	580

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Blown Fibre Tube Cables

While other options are available, the standard range of blown tube cables in the *Sirocco*^{xs} Blown Fibre System are:

Direct Install Cable (Duct)

The Direct Install (DI) cables are intended for installation in ducts and sub-ducts.

Data Sheet ST004

They are made up of High Density PolyEthylene (HDPE) tubes of 5mm diameter, each tube having a low friction inner. Each tube can accommodate one *Sirocco*^{xs} fibre unit, up to 12 fibres.

The tubes are laid up together to form a cable, shielded with an aluminium tape layer as a moisture barrier and then sheathed in high density polyethylene to provide proven mechanical protection. There are up to 24 tubes in a cable.

Can be customised to customer requirements e.g. sheath colour.

Direct Bury Cable

The Direct Bury (DB) cables are for installation directly in the ground. The heavier construction lies flatter in trenches, has increased crush rating and more resistance to localised bending.

Data Sheet ST005

They are made up of High Density PolyEthylene (HDPE) tubes of 5mm diameter, each tube having a low friction inner. Each tube can accommodate one *Sirocco*^{xs} fibre unit, up to 12 fibres.

The tubes are laid up together to form a cable, shielded with an aluminium tape layer as a moisture barrier and then double sheathed in high density polyethylene to provide proven mechanical protection. There are up to 24 tubes in a cable.

Can be customised to customer requirements e.g. sheath colour.

Direct Bury Non-Metallic Cable

These Direct Bury (DB) cables are for installation directly in the ground, especially where lightning incidence establishes preference for a non-metallic cable.

Data Sheet ST009

They are made up of High Density PolyEthylene (HDPE) tubes of 5mm diameter, each tube having a low friction inner. Each tube can accommodate one *Sirocco*^{xs} fibre unit, up to 12 fibres.

The tubes are laid up together to form a cable, uses a water-swellable tape layer as a moisture barrier and then double sheathed in high density polyethylene to provide proven mechanical protection. There are up to 24 tubes in a cable.

Can be customised to customer requirements e.g. sheath colour.

Product details

Assembly Type	Nominal OD (mm)	Minimum Bend Radius (mm)	Maximum Tensile (N)	Nominal Weight (g/m)
1 Way	8.6	100	500	50
2 Way	14.0 x 8.6	165 x 105	800	80
4 Way	15.3	185	1200	120
7 Way	18.3	220	1650	165
12 Way	23.5	285	2450	245
19 Way	28.3	340	3400	340
24 Way	33.3	400	4400	440

Product details

Assembly Type	Nominal OD (mm)	Minimum Bend Radius (mm)	Maximum Tensile (N)	Nominal Weight (g/m)
1 Way	11.5	140	1050	105
2 Way	16.5 x 11.5	200 x 140	1500	150
4 Way	18.6	225	2100	210
7 Way	22.0	265	2800	280
12 Way	29.5	355	4800	480
19 Way	34.2	410	6500	650
24 Way	39.3	475	7700	770

Product details

Assembly Type	Nominal OD (mm)	Minimum Bend Radius (mm)	Maximum Tensile (N)	Nominal Weight (g/m)
1 Way	10.0	120	650	65
2 Way	17.5 x 12.5	210 x 150	1300	130
4 Way	20.4	245	2400	240
7 Way	23.3	280	3000	300
12 Way	29.0	350	4200	420
19 Way	34.0	410	6000	600
24 Way	38.5	465	6800	680

Connect

The *Sirocco*^{XS} Blown Fibre System can be used throughout the network, necessitating the availability of connectivity products that can manage the transition of tubing or fibre through central exchange, outside plant, campus and in-building environments.

In the following section are specific products designed for the *Sirocco*^{XS} Blown Fibre System for each area of the network. In addition, there are numerous products that can be used with blown fibre but have a host of other uses e.g. customer termination boxes. These are to be found in the OAsys Connectivity catalogue and on the Prysmian Group website.

Rack Products

Product Name	Data Sheet Reference	Patching Layout		Rack Type		See OAsys brochure
		Tray Patching	Front Patching	19"	ETSI	
RS3000 Rack	RA007		■	■		■
Modular Main Rack	RA005	■		■	■	■

Rack Mounted Products

Product Name	Data Sheet Reference	Patching Layout		Rack Type		See OAsys brochure
		Tray Patching	Front Patching	19"	ETSI	
SRS3000 Splice & Patch Shelf	RM014		■	■	■	■
SRS3000 Splice Only Shelf	RM018			■	■	■
SRS3000 Distribution Sub-Rack	RM015		■	■	■	■
PSP Splice & Patch Shelf	RM012		■	■	■	■
19" Tube Patching Panel	RM007			■	■	
19" Tube Patching Shelf	RM017			■		
Sirocco^{XS} Splicing Shelf	RM006			■	■	

Outside Plant

Product Name	Data Sheet Reference	Cable Seal		Application			See OAsys brochure
		Heat shrink	Mechanical	Aerial	Direct Burial	Underground	
Compact Node	OP005	■		■		■	■
Blown Fibre Generic Joint	OP003	■				■	
Modular Jointing System (MJS)	OP010	■	■	■		■	■
FDN – FTTH Distribution Node	HT001	■	■	■		■	■
FRBU – Mid Size Fibre Joint	HT003	■	■	■		■	■
FML – Large Fibre Joint	HT004	■	■	■		■	■
UFC – Universal Fibre Joint	HT005	■	■	■		■	■
Tube Distribution Closure (TDC)	OP017		■		■	■	
SC3000 Streetside Cabinet	OP023						■
FTTH Streetside Cabinet	OP016						
Branching Units	SA002				■	■	
Resin Filled Joints	OP026		■		■	■	

Customer End

Product Name	Data Sheet Reference	Splicing	Patching	Application		See OAsys brochure
				Indoor	Outdoor	
Ultra Compact Termination Box Mk1	WM022	■	■	■		■
Ultra Compact Termination Box Mk2	WM030	■	■	■		■
Compact Termination Box Mk1	WM001	■	■	■		■
Compact Termination Box Mk2	WM044	■	■	■		■
External Compact Termination Box (ECT)	WM017	■	■	■	■	■
Internal Customer Splice Box	WM015	■	■	■		■
External Customer Splice Box	WM014	■	■		■	■
Internal/External Splice Wall Box	WM029	■		■	■	■
MDU Wall Box	WM008	■	■	■		■
Internal Splitter Node	WM050	■		■		■
Riser Box	WM013	■		■		■
Multi-Tray Riser Box	WM045	■		■		■
Customer Lead-In Unit (FTTH)	WM002			■	■	■
Customer Lead-In Unit (Business)	WM007			■	■	■
Blown Fibre Gas Seal Unit	WM003			■		
1 Tube Gas Block Housing	WM016			■		
Internal Tube Distribution Unit	WM011			■		

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Rack Mounted Products

Sirocco^xs Splicing Shelf

The *Sirocco^xs* splicing shelf is compatible with 19" rack practice (direct mounting) and is horizontally mounted within the rack framework. It is also compatible with ETSI rack practice (2SU) using front mounting adapter plates (not supplied).

The unit provides the splicing capacity for up to 8 connectorised pigtails. It is supplied with one pair of connectorised pigtails. Three additional pairs may be added for system upgrade. Two blown fibre tube entries are provided at the front of the shelf enabling 2 or 4 fibre blown units to be installed. Manufactured from mild steel and high impact FR polystyrene (grey).

**The required space envelope is (w)481mm x (d)230mm x (h)44mm.**

Data Sheet RM006

19" Tube Patching Panel

The *Sirocco^xs* blown fibre tube patching panel is compatible with 19" and ETSI rack practice and is horizontally mounted within the rack framework. It provides the patching capacity for up to 24 x 5mm diameter blown fibre tubes and allows for quick and easy reconfiguration of tube routing. It is front facing, allowing easy access to all bulkhead connectors.

It is supplied with 24 x 5mm diameter bulkhead connectors and all accessories required to install the patching panel into the rack. Manufactured in mild steel (finish: zinc passivate clear).

The required space envelope is (w)481mm x (d)140mm x (h)44mm.
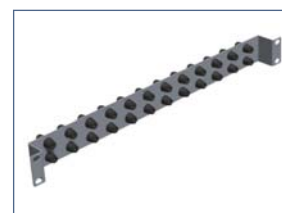
Data Sheet RM007

19" Tube Patching Shelf

The 19" blown tube patch shelf provides a solution for connecting up to 48 blown fibre tubes of 5mm in diameter. The shelf is 3U in height and can be mounted into a 19" rack or streetside cabinet.

The connectors inside the shelf are gas block connectors which means the shelf is ideal for connecting external tubes to internal tubes. The unit is supplied with 48 gas block connectors mounted into the steelwork and the fixings required to install it into a rack or streetside cabinet. Manufactured in mild steel (painted black).

The required space envelope is (w)490mm x (d)260mm x (h)135mm.

Data Sheet RM017

Outside Plant

Blown Fibre Generic Joint

The *Sirocco^xs* blown fibre generic joint is used where blown fibre cables are to be installed and spliced. The joint is fitted with a pressure relief valve to prevent accidental pressurisation of a sealed closure during blown fibre installation. It has capacity for 30 splice trays. The closure base has 6 circular entry ports and one oval entry port for mid-span breakout applications. Cables up to 30mm in diameter can be installed in each port. The closure sealing is tested to IP68 – BT specification LN450B.

It is supplied without splice trays and accessories, and is configured using joint upgrade kits, general accessories and blown fibre accessories. A number of mounting bracket options are available.

The required space envelope is (Ø)270mm x (h)490mm.

Data Sheet OP003

Connect

Data Sheet OP017

Tube Distribution Closure

The *Sirocco*^{XS} Tube Distribution Closure (TDC) is a direct bury in-line sealed closure (IP68 rated) designed for intercepting a blown fibre tube cable assembly to allow multiple spur-offs to smaller blown fibre tube cables. It can be installed at the time of tube cable installation (day 1) or fitted over an already installed cable as a retro-fit allowing ultimate flexibility for a blown fibre network.

The closure protects the accessed tubes and connectors and contains an integral pressure relief valve to prevent accidental over-pressurisation. It is fitted with toggle clips for easy access. Rubber seals to seal the in-line cables are sold separately to suit the required diameter of the cable. Cable glands to distribute the drop cables are supplied separately as required. For details on the range of drop tube options see the datasheet.

Dimensions are (l)550mm x (w)290mm x (d)108mm.

Data Sheet OP016

FTTH Streetside Cabinet

The FTTH streetside cabinet is a distribution/drop off access point within a blown fibre network. It allows a blown fibre cable of up to 24 tubes to be connected and distributed to up to 24 single blown tube cables. The cabinet is lockable to prevent unwanted access, although the fully removable front allows easy access to the working area.

All tubes are positively managed to a 50mm diameter to allow continuous blowing. The cabinet is supplied with 24 x 5mm bulkhead connectors and is manufactured from 1.5mm galvanised steel.

The required space envelope depends upon the choice of mounting i.e. pole mounted is (h)720mm x (w)650mm x (d)535mm, while pedestal mounted is (h)970mm x (w)650mm x (d)535mm.

Data Sheet SA002

Branching Units

There are a number of branching units available for the *Sirocco*^{XS} Blown Fibre System which are easily installed at initial cable installation stage or if later breakout is required. They can be installed in pits or directly buried, resisting the ingress of mud, sand, debris and silt. These are:

– **Swept Tee Branching Unit** allowing 1 or 2 way cable drops (fibre can be installed from one direction only).

– **90° Tee Branching Unit** which also allows 1 or 2 way cable drops (fibre can be installed from either direction).

– **4 Port Extended In-Line Enclosure** suitable for connecting 12, 19 & 24 way cables (plus 7 way Direct Buried cable) in any combination.

– **Extended In-Line Enclosure** suitable for connecting 12, 19 & 24 way cables (plus 7 way Direct Buried cable) in any combination and dropping 1 way to 12 way cable from connecting side ports.

Data Sheet OP026

Resin Filled Joints

The *Sirocco*^{XS} resin filled joints provide a cost-effective jointing system for connecting 1 way up to 4 way cables in blown fibre networks. The range of joints are designed for in-line jointing or multiple spur-offs to smaller tube count cables. The joints are designed for day 1 installation or retro-installation resulting in maximum flexibility to a blown fibre network.

The resin is supplied in a 2 part bag which ensures that the resin/filler mixing is undertaken in a safe manner. The typical cure time for the resin is 30 minutes. Once the resin has cured the joint can be re-entered to re-configure the tube arrangement if necessary.

Rated at IP68, these units can be installed in ducted networks or for direct buried applications.

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DB1 Connection Kit

The DB1 connection kit is used to connect two single tube direct buried blown tube cables together. Its application is likely to be in last mile customer drops for simple length enhancement prior to blowing. It is a highly cost efficient jointing system.

The cables are connected using a standard 5–5mm tube connector. A length of protective conduit is then used to protect the joint and the conduit is sealed to the cable sheath using two pieces of low temperature heatshrink.

The connection is sealed to IP68 using the low temperature heatshrink and then protected using a 20mm diameter conduit.

Data Sheet OP018

Customer End

Blown Fibre Gas Seal Unit

The blown fibre gas seal unit is typically used in business premises or entry to apartment blocks. It is a wall mounted unit that is positioned internally at the cable entry point. Incoming external blown tube cables are connected to internal blown tube cables for distribution. The unit provides a point for housing gas seal connectors. These connectors are used to seal both populated (with blown fibre bundle) and unpopulated blown tubing to prevent the ingress of gas and moisture.

It is used for internally fed cable (a quick set resin is supplied) or with a Customer Lead-In Unit (supplied) for cables entering through the fabric of the wall. It will accommodate up to one 12 tube external *Sirocco*^{xs} cable and internal *Sirocco*^{xs} cables in any combination up to 12 tubes.

The required space envelope is (w)96mm x (d)63mm x (h)253mm.

Data Sheet WM003

1 Tube Gas Block Housing

The single tube gas block housing is a wall mounted unit that is positioned internally at the cable entry point. An incoming external blown tube cable is connected to an internal blown tube cable using a gas seal connector. The connector is used to seal both populated (with blown fibre bundle) and unpopulated blown tubing to prevent the ingress of gas into the building.

It can be used with internally fed cable or with a Customer Lead-In Unit (datasheet WM002) for a cable entering through the fabric of the wall. It can also feed directly into the 4 fibre Compact Termination Box (datasheet WM001).

The required space envelope is (w)25mm x (d)25mm x (h)90mm.

Data Sheet WM016

Internal Tube Distribution Unit

The internal tube distribution unit (TDU) is used as a 3 or 4 way distribution point for tube management for vertical/horizontal connections of blown fibre tube cables. The TDUs allow the interception of a blown fibre cable and connection to spur-off cables for distribution within the internal environment. Ports can accept up to a 19 way low fire hazard tube cable but can also manage individual tube breakout and tube re-routing.

It enables the interception of existing part populated tube and can provide a location for external/internal interface interstitial gas blocking. All parts are made from flame retardant materials.

**The required space envelope is (w)240mm x (d)68mm x (l)390mm (3 way)
and (w)280mm x (d)70mm x (l)520mm (4 way).**

Data Sheet WM011

Accessories

The *Sirocco*^{XS} Blown Fibre System is configured using a range of connectors that join lengths of tube together and caps that protect the tubes from the ingress of moisture and dirt when they are empty.

There are a wide range of different connectors that can be used. The standard range covers those intended for use with the *Sirocco*^{XS} Blown Fibre System which has a 5mm tube as its building block. In certain circumstances, there may be a legacy network of 3mm, 7mm or 8mm tubing and it may be necessary to connect different tube sizes together – this can be accomplished but care must be taken in blowing through a link comprising different tube sizes.

The information below relates to the main products but much more information is available on the Prysmian website – datasheet reference SA001.

Tube Connector

Used for simple push fit connection of 5mm to 5mm *Sirocco*^{XS} tubing. Can be used in external plant and with internal *Sirocco*^{XS} tubing of customer premises plant where gas sealing is not required.

Tube End Cap

Used for terminating unused *Sirocco*^{XS} tubing within external plant.

Water Blocking Connector

Used for water blocking *Sirocco*^{XS} tubing entering underground external plant. A simple push fit device provides a water tight seal for tubes (unpopulated) and tubes with installed *Sirocco*^{XS} units (populated). For populated tubing this device is fitted after *Sirocco*^{XS} units have been installed.

Gas Seal Connector

Used for gas sealing *Sirocco*^{XS} tubing entering customers' premises. The connector is used with customer premises plant and provides the interface between external and internal *Sirocco*^{XS} tubing. The connector simply push fits over the tube providing a gas tight seal for tubes (unpopulated) and tubes with installed *Sirocco*^{XS} units (populated). The device allows fibre to be 'blown through' into the customer premises. A sealing device is activated externally to seal the tube/unit.

Tube Sealing Cap

Used for sealing unused *Sirocco*^{XS} tubing entering internal plant. This cap provides a gas tight seal to unpopulated tubes.

Close-Down Assembly

These assemblies, comprising a piece of tube with a connector at either end, are used to protect the area between two lengths of tube following a centre blow.

Reducer Connector

Used for simple push fit connection of different sized *Sirocco*^{XS} tubes, e.g. 5mm to 8mm.

Bulkhead Connectors

Used for attachment of a *Sirocco*^{XS} tube onto a patch panel or other terminal unit so that the tube is held firmly in place and EPFU can be blown through onto a tray without risk of any subsequent movements dislodging connection. Available in 'snapfit' or 'screw thread' attachment options.

Data Sheet SA004

Cable/Tube Cutters

The cable and tube cutters are the best tools available for entering and cutting *Sirocco*^{XS} blown fibre tube cables and the individual tubes. The range includes longitudinal cable cutters, circumferential cable cutters and *Sirocco*^{XS} tube cutters.

Data Sheet AC011

Blown Fibre Manifold

The blown fibre manifold can be used on a variety of Prysmian rack mounted products including the SRS3000 sub-rack system and the PSP splice & patch shelf. It provides the ability to enter onto a shelf with up to six blown fibre tubes. The manifold clips into place on the back of the shelves and is supplied with a cover to protect the fibres.

Installation Equipment

As part of the *Sirocco*^{XS} Blown Fibre System, Prysmian offers a range of installation equipment that has been designed and developed by the Prysmian Installation Engineers working with the equipment manufacturers to ensure excellent performance and innovation in design.

The main items of equipment are the *Sirocco*^{XS} blowing head, which manages and controls the installation process, together with a range of electric and petrol compressors which generate clean, dry, oil-free air for the blowing process.

Sirocco^{XS} Blowing Head

The *Sirocco*^{XS} blowing head has been designed to manage the rapid installation of the *Sirocco*^{XS} Enhanced Performance Fibre Units (EPFU) in *Sirocco*^{XS} tubes and to achieve optimal blowing performance with these products.

The installation speed is a maximum 50 metres/minute and is controlled by the adjustable magnetic clutch system. The maximum installation length is determined by the tube path geometry and tube length.

It is a safe and simple process and is achieved with a high level of reliability. The equipment is light and easy to use.

The required space envelope is (w)150mm x (d)190mm x (h)240mm.

Data Sheet SI001
Spares Data Sheet SI010

Petrol Compressor

A portable, petrol engine driven rotary vane compressor unit (using a Honda GX240QX OHV petrol engine) producing 120 litres/minute of pulse free treated compressed air at a working pressure of 10 bar. It provides the ideal source of compressed air for field installation of *Sirocco*^{XS} blown fibre units.

It has an air cooled aftercooler that reduces air temperature to within 2°C of ambient and a 3 stage filtration system that provides technically oil-free air. A 24v DC socket supplies the blowing head.

Output: 120 l/min. Noise Level: 62dB (A) at 1 metre. Weight: 85kg.
The required space envelope is (w)500mm x (d)900mm x (h)750mm.

Data Sheet SI002

Electric Compressors

A portable, electrically driven rotary vane compressor unit producing 110 litres/minute of pulse free treated compressed air at a working pressure of 10 bar. All models (120v for USA and Canada installations and 240v & 110v for others) are quiet running, providing the ideal source of compressed air for in-building installation of *Sirocco*^{XS} blown fibre units.

It has an air cooled aftercooler that reduces air temperature to within 2°C of ambient and a 3 stage filtration system that provides technically oil-free air. A 24v DC socket supplies the blowing head.

Output: 110 l/min. Noise Level: 60dB (A) at 1 metre. Weight: 63kg.
The required space envelope is (w)450mm x (d)900mm x (h)700mm.

Data Sheet SI003

FTTH Electric Compressor

It is a quiet, portable, electric motor (220/240v DC) driving a reciprocating compressor unit producing 60 litres/minute of treated compressed air at a working pressure of 8 bar, providing the ideal source of compressed air for FTTH installation of *Sirocco*^{XS} blown fibre units.

It has a cooling coil and large capacity air receiver that reduces air temperature to within 2°C of ambient and a 3 stage filtration system that provides technically oil-free air. A 24v DC socket supplies the blowing head.

Output: 60 l/min. Noise Level: 59dB (A) at 4 metres. Weight: 35kg.
The required space envelope is (w)400mm x (d)400mm x (h)800mm.

Data Sheet SI011

Installation Equipment

Other items help to manage the installation process or make it easier. Equipment is available as a complete kit for operators or their installation companies, supported by a training programme to ensure ability to use efficiently. For most of the products below refer to Data Sheet SI007.

Air Pressure Indicator/Valve

Used for controlling the flow of compressed air to the blowing head to enable safe installation of the fibre into the blown fibre tube.

Pan Guide

Located on top of the EPFU pan during installation, it is used to guide the fibre from the pan to the blowing head.

Air Flow Meter Kit

Contains a number of connectors that monitor and control the flow of compressed air through a tube link.

Pan Inversion Ring

Used to transport fibre from one pan to another. It enables a full pan of fibre and an empty pan to be joined together. Once the pans are joined together, they are rotated 180° so that the fibre safely falls into the empty pan.

Blowing Beads

A blowing bead is fixed to the end of the blown fibre unit before blowing commences. The bead helps the guidance of the blown fibre unit through the blown fibre tube particularly at bends. The beads also minimise the risk of snagging at connector locations.

STILT

Data Sheet SI006

The STILT (*Sirocco*XS Tube Integrity & Length Tester) is used to ensure that there are no air leaks in a blow length before installation (tube and connector). The full section length can then be measured to ensure an adequate length of fibre unit is available to blow.

Air Chiller

Data Sheet SI012

The *Sirocco*XS air chiller is designed to deliver chilled clean dry air for installing optical fibre using the blown fibre technique. It is designed to be used in conjunction with any of the *Sirocco*XS compressors when the ambient air temperature is above 30°C. The air chiller is suitable for outdoor use however it is recommended that the power supply is via a 30mA RCD. Compressed air is reliably cooled to temperatures as low as +5°C without the use of CO_2 or N_2. The required space envelope is (w)370mm x (d)459mm x (h)445mm. Weight is 28kg.

Installation Kits

Data Sheet SI009

To support the introduction of *Sirocco*XS, the range of installation equipment necessary to achieve product application is available in a series of starter kits. Any of the starter kits will allow the installation of P2P connections including centre blows for longer distances. An Installation Kit will contain a compressor (petrol or electric), blowing head, air pressure indicator/valve, pan guide, airflow meter kit, pan inversion ring, STILT, close-down assemblies and blowing beads.

Training

To ensure that the full benefits of SiroccoXS are realised by our customers, Prysmian offers a range of training services on the *Sirocco*XS installation equipment and techniques. The standard one-day training course offered by Prysmian ensures that safe and correct installation techniques are used by the trained installers at all times.

The course not only familiarises the trainees with the installation equipment and techniques but also with blown fibre tube cable, accessories and internal/external connectivity equipment used with *Sirocco*XS.

Prysmian also offers a wider range of other training courses for *Sirocco*XS.

Please contact Prysmian to discuss your requirement.

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One-stop-shopping with Prysmian's comprehensive integrated *xsNet* portfolio

Deploying a future-proof FTTx network is all about achieving the highest network reliability and customer satisfaction, whilst making the most of available resources and keeping costs low. Prysmian's fully integrated range of connectivity products provides all you need to build or adapt each segment of a low-maintenance FTTx network quickly and cost-effectively.

Our integrated *xsNet* range offers high grade optical fibre cables, carefully matched and easy-to-handle connectivity components and a choice of ducting solutions for indoor networks, outside plant networks and POP. And there's more: flexible design software and engineering advice based on three decades of broadband network design. With minimal effort, any network design, regardless of complexity or size, can be put together from scratch, updated or reconfigured.

## Prysmian Group's fibre optic and connectivity products

– Combined portfolio brings down the cost of FTTx
– Reach every community with an extensive portfolio of cable, connectivity and deployment technologies

xsNet

Value Innovation for your Broadband Network

Integrated *xsNet* concept

– Each standardised *xsNet* solution integrates seamlessly with the rest of the portfolio

– Each *xsNet* solution contains everything required to build a specific part of the network

– Operators can make service choices now, but also accommodate future upgrades and expansion

– Reduces the need for skilled labour

– Excellent logistical support

– Proprietary design software maps, configures, optimises and calculates costs of network concepts in seconds

– Changes and variations are easy to implement whilst designing and even after installation

– Expert engineering and consultancy services, plus professional support for building a winning business case
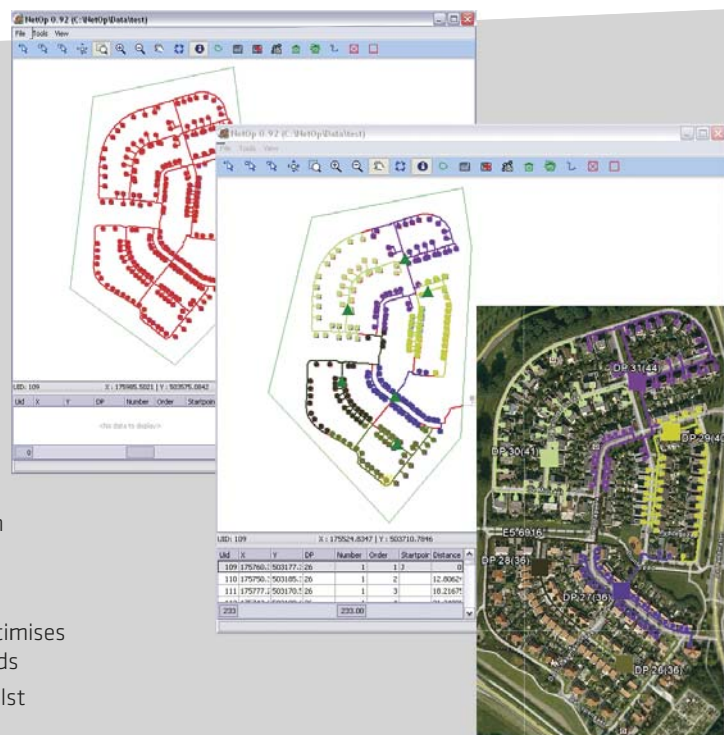
Linking communications
to communities

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