SiROCCO-xs
Flexible, future-proof blown fibre solutions
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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.

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.
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.

Moreover, SIROCCO\textsuperscript{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\textsuperscript{xs} is well suited to the needs of last mile, campus or in-building networks.

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

The SIROCCO\textsuperscript{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.

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Introduction

The Sirocco® 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® enables optical networks to adapt to changing business requirements.

Sirocco® 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® 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® 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® 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® 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® blown fibre, provide capacity for today and spare tubes for tomorrow’s upgrades.
Fibre and Cable

**SiroccoXS 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.

**SiroccoXS 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.

**SiroccoXS 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

**SiroccoXS Rack Solutions**
A range of solutions including racks and rack mounted products that can accommodate blown fibre. These include specific patching shelves for SiroccoXS tube and EPFU.

**SiroccoXS 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.

**SiroccoXS 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.

**SiroccoXS 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 SiroccoXS networks.

**SiroccoXS Customer End Solutions**
Solutions to manage the entry of fibre into a building or distribution around buildings. These provide SiroccoXS tube as well as fibre management to the customer.

Installation

**SiroccoXS 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.

**SiroccoXS Installation Kit – Blowing Head**
A range of equipment has been developed to achieve simple installation of SiroccoXS blown fibre. Key to this is the SiroccoXS Blowing Head and its clutch control system.

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

**SiroccoXS Installation Kit – Others**
Additional items of equipment for installation of SiroccoXS are available separately or as part of a kit solution. Training is also a key element in their successful use.
The Sirocco® Solution

- Resin Filled Joint
- Installation Equipment
- Central Office Equipment
- MDU Cabinet
- Riser Box
- Tube Distribution Unit
- Customer Lead-In Unit
- Central Office Equipment
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® 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”.

Middle East - High Temperature Networking

At the other extreme, demand for the Sirocco® 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.”

Case Studies
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 SiroccoXS blown fibre bundles (2 to 12 fibre, irrespective of fibre type) will blow about 1km into a SiroccoXS 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 SiroccoXS, I like to call managed flexibility.”

“We have complete control of the activity so we can react quickly to urgent needs. 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, SiroccoXS 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 SiroccoXS Tube Integrity and Length Tester (STILT) is invaluable in checking the route before blowing fibre. “SiroccoXS has made a big difference to the way we can manage our network and respond to normal requirements and urgent changes.”

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 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.

Case Studies
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® units are available in lengths up to 6000 metres supplied in portable plastic pans for ease of use. The Sirocco® 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 | 1.65 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

<table>
<thead>
<tr>
<th>Length</th>
<th>2f</th>
<th>4f</th>
<th>6f</th>
<th>8f</th>
<th>12f</th>
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<td>S</td>
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<tr>
<td>1000m</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
<td>S</td>
</tr>
<tr>
<td></td>
<td>3.3</td>
<td>3.3</td>
<td>3.5</td>
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</tr>
<tr>
<td>2000m</td>
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<tr>
<td></td>
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<td></td>
<td>8.5</td>
<td>8.5</td>
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</tr>
</tbody>
</table>

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
**Properties**

**Mechanical**
- **Transmission Performance**
  - **Mechanical International Standard Test Conditions**
    - **Tensile strength**
      - IEC 60794-1-2-E1
      - 1W (9.81x 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 CW500 pt 4
      - 40mm (2, 4 & 6f), 60mm (8 & 12f) at 60ºC for 1000 hrs
      - Pass. Note 1

**Environmental**
- **Temperature performance**
  - IEC 60794-1-2-F1
  - -10ºC to + 60ºC for 3 cycles (multimode)-30ºC to + 60ºC for 3 cycles (singlemode)
  - Pass. Note 2, note 3 and note 4
- **Cold test**
  - BS EN 60068-2-1
  - -20ºC for 96 hrs
  - Pass. Note 2, note 3 and note 4
- **Condensation test**
  - IEC 60068-2-38
  - -10ºC to + 65ºC at 93%RH for 24 hrs x 10
  - Pass. Note 2, note 3 and note 4
- **Water immersion**
  - BT CW500 pt 4
  - 20ºC ± 5ºC for 2000 hrs
  - Pass. Note 2, note 3 and note 4
- **Fibre breakout from unit**
  - BT CW500 pt 4
  - 0ºC, 20ºC, 40ºC, 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)**

<table>
<thead>
<tr>
<th>Wavelength</th>
<th>Singlemode (G652b)</th>
<th>Low Waterpeak (MagniLight G652d)</th>
<th>MM 62.5/125</th>
<th>MM 50/125</th>
<th>OM3</th>
<th>OM4</th>
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</thead>
<tbody>
<tr>
<td>850nm</td>
<td>-</td>
<td>-</td>
<td>3.5</td>
<td>2.6 (2f–3.2*)</td>
<td>2.6 (2f–3.2*)</td>
<td>2.6 (2f–3.2*)</td>
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<tr>
<td>1300/1310nm</td>
<td>0.38</td>
<td>0.38</td>
<td>1.0</td>
<td>0.8 (2f–1.2*)</td>
<td>0.8 (2f–1.2*)</td>
<td>0.8 (2f–1.2*)</td>
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<tr>
<td>1380nm</td>
<td>-</td>
<td>0.35</td>
<td>-</td>
<td>-</td>
<td>-</td>
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</tr>
<tr>
<td>1550nm</td>
<td>0.26</td>
<td>0.26</td>
<td>-</td>
<td>-</td>
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* and for hybrid designs

**Bandwidth (MHz.km)**

<table>
<thead>
<tr>
<th>Wavelength</th>
<th>Singlemode (G652b)</th>
<th>Low Waterpeak (MagniLight G652d)</th>
<th>MM 62.5/125</th>
<th>MM 50/125</th>
<th>OM3</th>
<th>OM4</th>
</tr>
</thead>
<tbody>
<tr>
<td>850nm Minimum Modal</td>
<td>-</td>
<td>-</td>
<td>200</td>
<td>500</td>
<td>1500</td>
<td>3500</td>
</tr>
<tr>
<td>850nm Effective Modal</td>
<td>0.38</td>
<td>0.38</td>
<td>-</td>
<td>-</td>
<td>2000</td>
<td>4700</td>
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<tr>
<td>1300/1310nm</td>
<td>0.38</td>
<td>0.35</td>
<td>600</td>
<td>800</td>
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**Data Sheets**
- EPFU Range and Technical Parameters
  - Data Sheet SE001
  - Data Sheet SE002
  - Data Sheet SE003
  - Data Sheet SE004
  - Data Sheet SE005
  - Data Sheet SE006
  - Data Sheet SE007
  - Data Sheet SE008
  - Data Sheet SE009
  - Data Sheet SE010
Blown Fibre Tube Cables

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

Both are designed to support the installation of **Sirocco** 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.

<table>
<thead>
<tr>
<th>Assembly Type</th>
<th>Nominal OD (mm)</th>
<th>Minimum Bend Radius (mm)</th>
<th>Maximum Tensile (N)</th>
<th>Nominal Weight (g/m)</th>
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</thead>
<tbody>
<tr>
<td>1 Way</td>
<td>5.0</td>
<td>60</td>
<td>75</td>
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<tr>
<td>2 Way</td>
<td>7.2 x 12.2</td>
<td>90 x 150</td>
<td>375</td>
<td>75</td>
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<tr>
<td>4 Way</td>
<td>12.2 x 14.3</td>
<td>150 x 175</td>
<td>610</td>
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<tr>
<td>7 Way</td>
<td>15.7 x 17.0</td>
<td>190 x 205</td>
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<td>20.0 x 22.3</td>
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<tr>
<td>24 Way</td>
<td>31.8 x 32.0</td>
<td>380 x 385</td>
<td>2900</td>
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</table>

A number of LSZH tubes inside an LSZH 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** 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 (LSZH), 700N (poly tubes), 1000N (DI) and 2000N (DB)

**Internal Cable (LSZH)**

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.

The Internal LSZH 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)
Blown Fibre Tube Cables

While other options are available, the standard range of blown tube cables in the SiroccoXS Blown Fibre System are:

**Direct Install Cable (Duct)**

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

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 SiroccoXS 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.

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 SiroccoXS 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

**Direct Install Cable (Duct) Product details**

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<th>Assembly Type</th>
<th>Nominal OD (mm)</th>
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<th>Maximum Tensile (N)</th>
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**Direct Bury Cable Product details**

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The SiroccoXS 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 SiroccoXS 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

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Data Sheet Reference</th>
<th>Patching Layout</th>
<th>Rack Type</th>
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Rack Mounted Products

**SiroccoXS Splicing Shelf**
The SiroccoXS 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.**

**19” Tube Patching Panel**
The SiroccoXS 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.**

**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.**

**Outside Plant**

**Blown Fibre Generic Joint**
The SiroccoXS 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.**
Tube Distribution Closure

The SIROCCO® 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.

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.

Branching Units

There are a number of branching units available for the SIROCCO® 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.

Resin Filled Joints

The SIROCCO® 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.
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.

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 SiroccoXS cable and internal SiroccoXS cables in any combination up to 12 tubes.

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

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.

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).
Accessories

The Sirocco® 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® 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® tubing. Can be used in external plant and with internal Sirocco® tubing of customer premises plant where gas sealing is not required.

**Tube End Cap**
Used for terminating unused Sirocco® tubing within external plant.

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

**Gas Seal Connector**
Used for gas sealing Sirocco® tubing entering customers' premises. The connector is used with customer premises plant and provides the interface between external and internal Sirocco® tubing. The connector simply push fits over the tube providing a gas tight seal for tubes (unpopulated) and tubes with installed Sirocco® 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® 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® tubes, e.g. 5mm to 8mm.

**Bulkhead Connectors**
Used for attachment of a Sirocco® 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.

**Cable/Tube Cutters**
The cable and tube cutters are the best tools available for entering and cutting Sirocco® blown fibre tube cables and the individual tubes. The range includes longitudinal cable cutters, circumferential cable cutters and Sirocco® tube cutters.

**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 SiroccoXS 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 SiroccoXS 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.

**SiroccoXS Blowing Head**

The SiroccoXS blowing head has been designed to manage the rapid installation of the SiroccoXS Enhanced Performance Fibre Units (EPFU) in SiroccoXS 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.

**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 SiroccoXS 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.

**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 SiroccoXS 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.

**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 SiroccoXS 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.
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**
The STILT (SiroccoXS 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**
The SiroccoXS 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 SiroccoXS 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 CO₂ or N₂. The required space envelope is (w)370mm x (d)459mm x (h)445mm. Weight is 28kg.

**Installation Kits**
To support the introduction of SiroccoXS, 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 SiroccoXS 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 SiroccoXS.

Prysmian also offers a wider range of other training courses for SiroccoXS.

Please contact Prysmian to discuss your requirement.
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