

Microblown Cable Installation

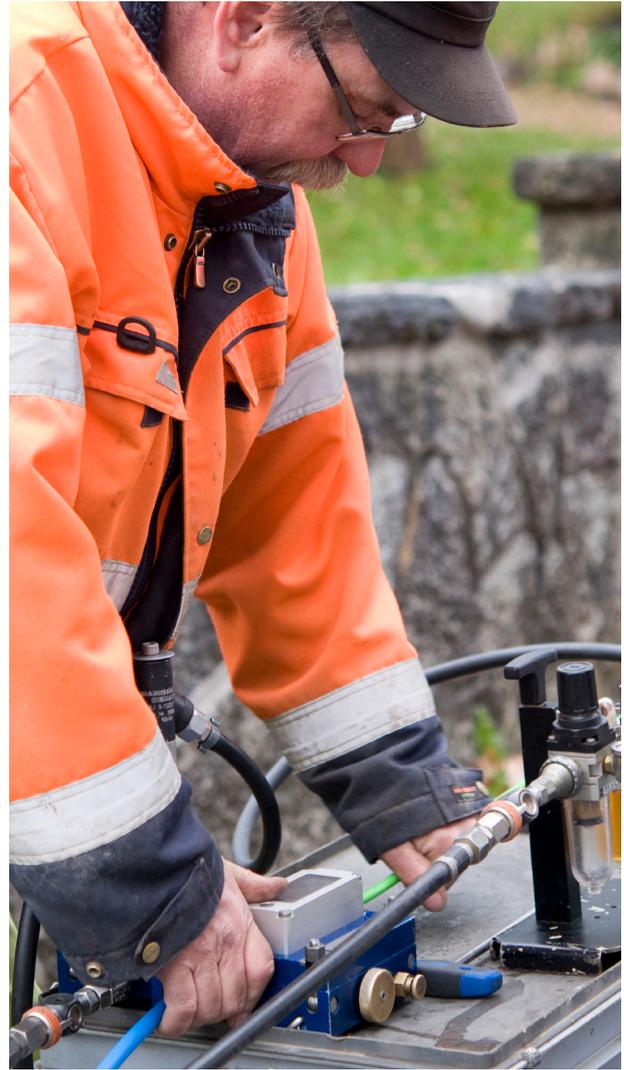
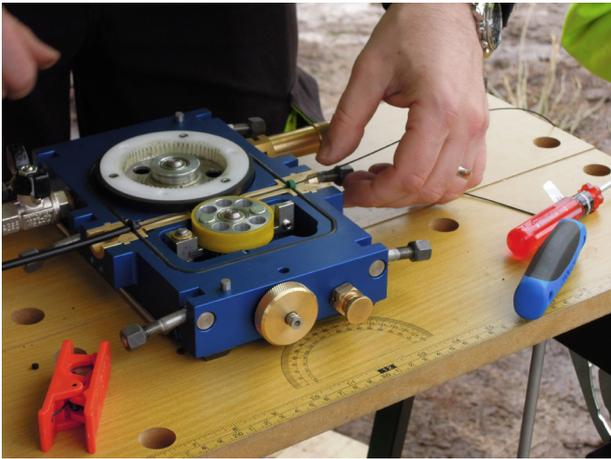
WHITE PAPER

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AIR JETTING TECHNOLOGY

Installation of cables into microducts with air jetting technology is fast and reliable. This technology is currently used in many countries, all around the world, and in several points of the network, be it backbone or access. It offers a lot of advantages and flexibility from the central office to the distribution nodes and eventually to the final subscriber.



HOW FAR CAN CABLE BE BLOWN?

The most common question we receive at Nexans regarding our micro-blown cables is: how far can it be blown? Difficult to answer this question as it depends so much on several different criteria – the percentage of occupation into duct, the materials (cable and microducts), how the microducts have been installed, the outside temperature during installation and, finally, the experience of the installer. Our fibre seminars have been attended by experienced installers who have reached up to 3000 meters blowing distances by using traditional optical fibre cable in traditional ducts. In the last miles of the access network, blowing distances around 500-600 meters are good enough but one thing is for sure, a good performance cannot be achieved without considering some factors.

INFLUENCING FACTORS

Microduct quality

The quality of microducts and related accessories is as important as the way they are installed. The ducts can cause issues if dimensions are not respected, in case of out-of-roundness or fluctuation in size along the route. Connectors must be able to withstand high pressure without break or air-leak and their design shall not slow down the cable progression.

Please also consider that connectors are not designed to plug microducts in a bend.

Microduct installation

Microducts installation is a key factor to secure a smooth and easy route without wavy effects and damage on tubes (crush). There is nothing wrong in digging a trench, laying the ducts and backfilling the trench without working the foundations. In this case, you should consider the fact that you have almost no control on the positioning of the ducts and the blowing distance will be affected. Indeed, a perfect installation is supposed to be made without any bend to achieve the maximal blowing distance. In practice, it is not so simple and all additional bends along the route will impact the blowing distance accordingly. We can also consider that the impact of small bends at multiple places is higher than a large bend in one place.

Lubrication

Lubrication is far from negligible. Using the right lubricant, recommended by the duct manufacturer, is requested. The quantity of lubricant must be adapted to the microduct size and of course to the blowing distance to be achieved. In some cases, when distance is short, it could be skipped. But keep in mind that even if lubrication is time consuming, it is also a warranty of good performance and eventually of efficiency.



Cable occupation in the microduct

The percentage of occupation of the cable in microduct should be below 65%:

$$(\text{cable OuterDiam})^2 / (\text{microduct InnerDiam})^2 < 65\%$$

It is possible to use larger cables, but the performance will be impacted. Nevertheless, a small cable can very often perform in a larger tube.

Adapted equipment

The equipment, be it a blowing machine, cable pay-off, cooling system, drier or compressor must be adapted to the cable and the microduct.

Basic rules

The respect of some basic rules, based on expertise from cable, microduct or blowing machine manufacturers is very important. It is known that for many reasons, it is not always fully applicable on site but training sessions or field assistance are provided by the Nexans team all over Europe to support our customers and installers in the installation phase.

PROCEDURE

SAFETY INSTRUCTIONS

- Before any cable installation, all the people involved must be trained in the preparation procedures and the cable blowing.
- Wearing eye protection, ear muffs, helmet and protective suit is subject to the local regulations and company safety rules but is strongly recommended on site.
- The communication between the different working stations must be tested and safety messages such as "STOP" or "RUN" must be perfectly understood.
- During the installation, all operators must be advised as soon as the microduct is put under pressure.
- Care should be taken to avoid passing or standing in front of the duct exit when under pressure
- Air pressure between the compressor and the blowing machine must be shut down prior to any operation on the connections.

MATERIAL CHECKING

- Always start by checking your equipment to make sure it meets the requirements.
Are the blowing machine, accessories and compressor suitable for the cable and microducts?
Is it possible to reach the right level of air flow and pressure? Access to a flow-meter is an advantage.
The best results are achieved when a dryer and an air cooler are installed between the compressor and the blowing machine.
- Do I have connections of the right type for this installation job?
- Do I have a suitable stand (pay-off) for the drum size?
- When you have made sure that the right equipment is in place, you can begin preparations for the blowing operation.

MICRODUCT CHECKING

- Check that the microducts have not been damaged during the installation using a gauge. This gauge should have a diameter slightly smaller than the internal diameter of the duct.
A ball chain is efficient for this operation (see the illustration above).
Prior to this control, make sure that the far end of the duct is secured with a trap to catch the gauge.



- It takes less than 15 minutes per km of microduct at 8 bars maximum to finalise this operation. If not, problems with the ducting may be suspected.
- If the duct has passed the gauge test, it must be cleaned to remove moisture and dirt. The best way to do so is to use sponges made for this purpose. If it is not possible to get a clean duct even by repeating this operation, the microduct is considered as inappropriate for blowing.

CABLE CHECKING

A cap must be mounted on the head of the cable (see the illustration). This cap is used to prevent air penetration into the cable at high pressure but also to ensure there will be no rough contact between the cable head and the tube or the connectors.



LUBRICATING OF THE MICRODUCT

Use the right lubricant, which means the one recommended by the cable or duct manufacturer. The amount of lubricant depends on the size and length of the microduct.

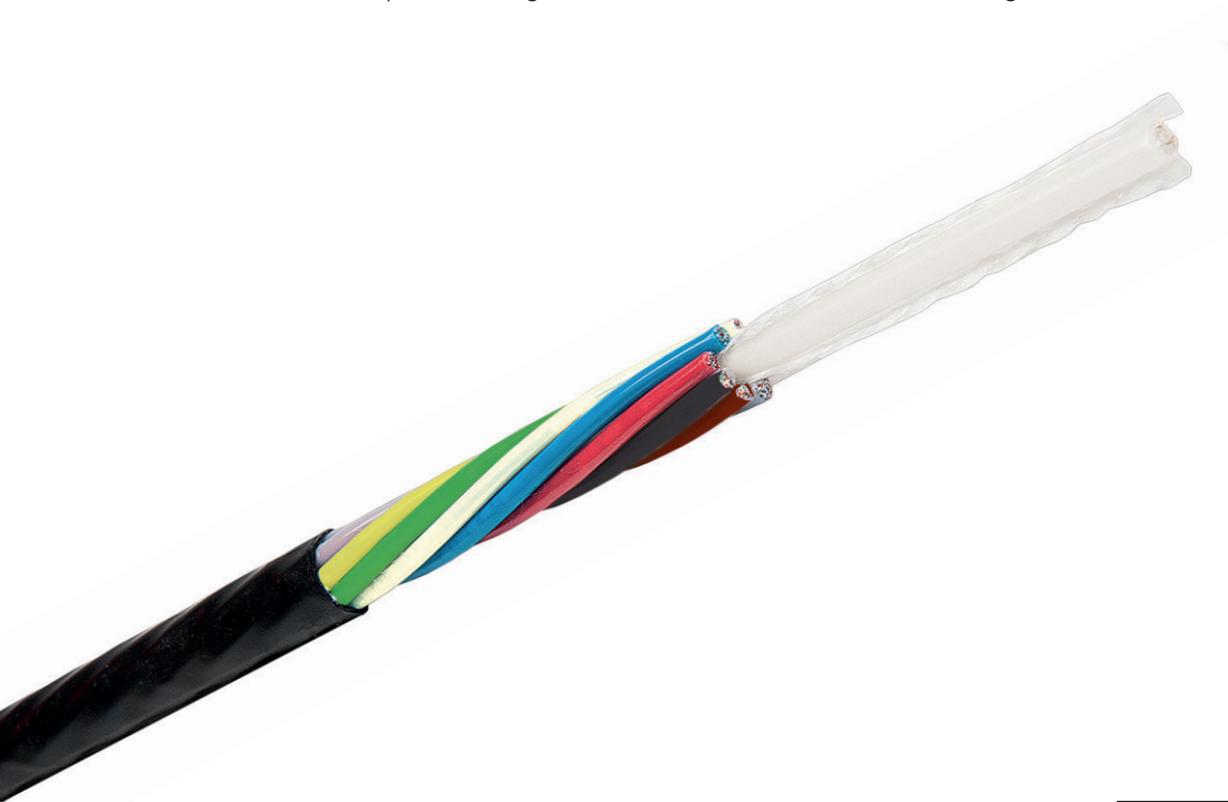
The lubricant must be stacked between two sponges into the tube (sponge/lubricant/sponge). Pressure for lubrication must be limited to 4 bars.

You can leave the air flow a few minutes after the sponges exit the microduct to dry the lubricant. It will improve its behaviour.

INSTALLATION OF THE REEL ON THE DRUM STAND

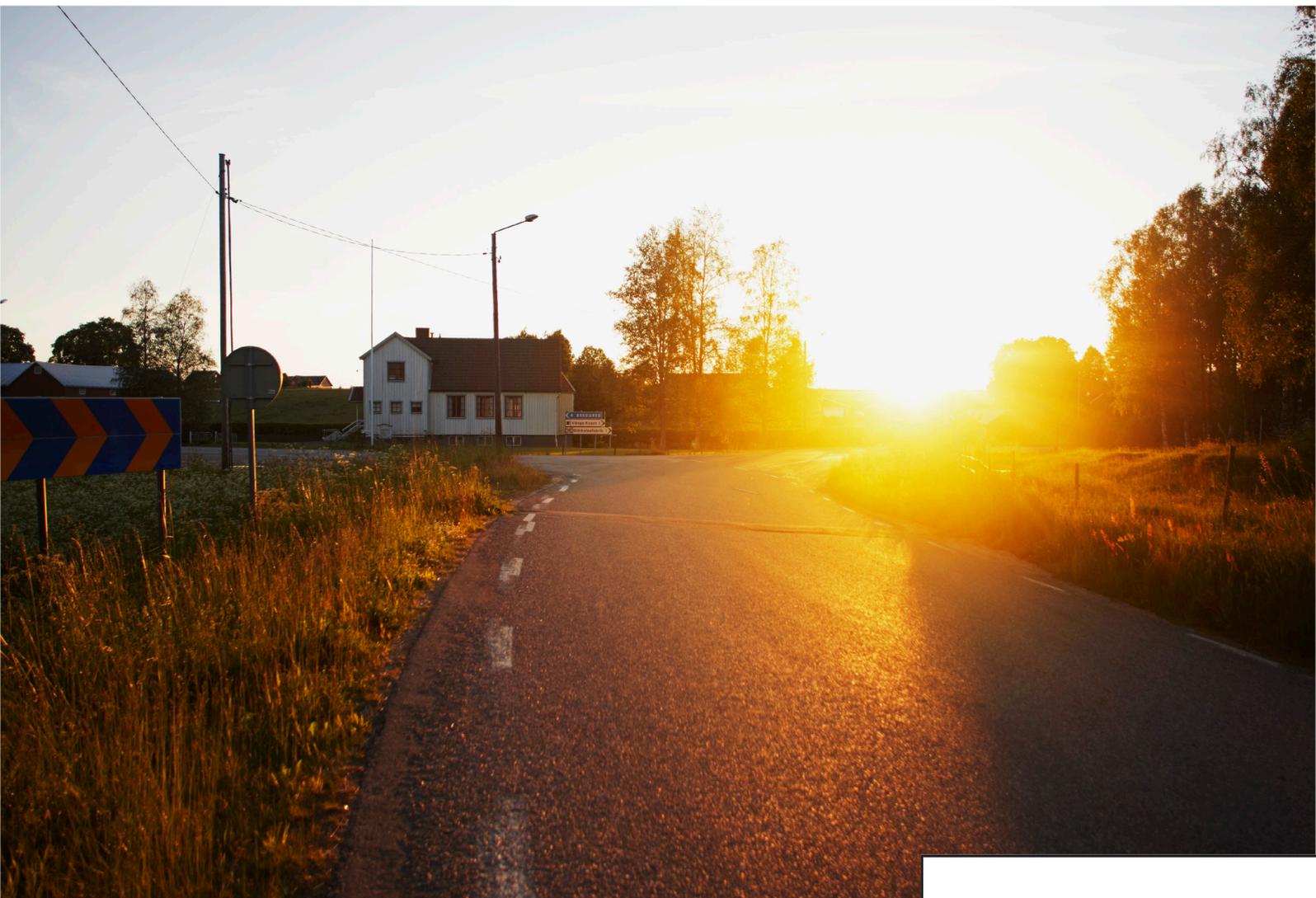
The cable drum must be placed on a pay-off using the right shaft dimension and appropriate fixings to avoid any risk of damage for material and workers.

The cable must be protected against water, sun and dust while blowing.



BLOWING OPERATION

- Start by pushing the cable at a speed between 40 and 60 m/min, without air pressure in the microduct.
- If the speed remains stable, leave all the parameters unchanged.
- As soon as the speed begins to decrease, open the air inlet valve of the blowing machine to reach a pressure between 1 and 2 bar in the microduct. Speed goes up to the previous value.
- The torque (the pushing force on the cable) must be adjusted during the blowing operation to regulate the rate of progression of the cable in the microduct.
- If the cable does not react and speed does not increase, it is necessary to increase the pressure by step of 1 bar.
- If you can not progress anymore and the target is almost achieved, you can stop the machine and release the air pressure in the tube. After 5 minutes, open the air flow until the maximum air pressure is reached. After a few minutes, restart the machine to push the last meters. Repeat if necessary.
- Remove the cable end sleeve from the end of the cable. The sleeve can be re-used.



ANNEX 1 - DUCT SIZE CALCULATION

The cable and microduct diameters must be compatible. Optimal couple between microducts and blowing cables are shown in the table below. The table does not indicate any blowing distance because it widely depends on how the duct was installed.

Cable/ Ducts - Inner diameter		Fiber count	Cable outer diam	2.8	3.5	5.5	8	10	11	12	14	16	19	26	
Micro cables Unitube	GAGL Ultimate™	2-4	1,7	Optimal	Optimal	Acceptable									
	SP 1604 (UT16 B-lite)	2-12	2,4		Optimal	Optimal	Optimal	Acceptable							
	SP1089 (UT30 B-lite)	2-12	3,9			Optimal	Optimal	Optimal	Acceptable	Acceptable					
Micro cables Bundles	Blite3 72	12-72	4,7				Optimal	Optimal	Acceptable	Acceptable					
	Blite ³ 96	96	5,7				Optimal	Optimal	Optimal	Optimal	Acceptable	Acceptable			
	Blite ³ 144	144	7.6					Optimal	Optimal	Optimal	Acceptable	Acceptable			
	Blite ³ 288	288	8,7						Optimal	Optimal	Optimal	Acceptable			
Micro cables Loose tube	SP0990	12-72	5,7				Optimal	Optimal	Optimal	Optimal	Acceptable	Acceptable			
	SP1436	96	6,5				Optimal	Optimal	Optimal	Optimal	Acceptable	Acceptable			
	SP1895 (200µm)	192	6.55				Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Acceptable		
	SP1870	288	11								Optimal	Optimal	Optimal	Acceptable	
	GRHL Ultimate™	12-72	6,2				Optimal	Optimal	Optimal	Optimal	Acceptable	Acceptable			
	GRHL Ultimate™	96	6,8				Acceptable	Optimal	Optimal	Optimal	Optimal	Acceptable	Acceptable		
	GRHL Ultimate™	144	6,7				Acceptable	Optimal	Optimal	Optimal	Optimal	Acceptable	Acceptable		
	GRHL (200µm)	288	7,9					Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Acceptable	
	GRHL Ultimate™	288	11,5									Optimal	Optimal	Optimal	Acceptable

- Optimal dimensional compatibility
- Acceptable dimensional compatibility

About Nexans

Nexans brings energy to life through an extensive range of advanced cabling systems, solutions and innovative services.

For over 120 years, Nexans has been providing customers with cutting-edge cabling infrastructure for power and data transmission. Today, beyond cables, the Group advises customers and designs solutions and services that maximize performance and efficiency of their projects in four main business areas: Building & Territories (including utilities, e-mobility), High Voltage & Projects (covering offshore wind farms, submarine interconnections, land high voltage), Telecom & Data (covering data transmission, telecom networks, hyperscale data centers, LAN), and Industry & Solutions (including renewables, transportation, Oil & Gas, automation, and others).

Corporate Social Responsibility is a guiding principle of Nexans' business activities and internal practices. In 2013 Nexans became the first cable provider to create a Foundation supporting sustainable initiatives bringing access to energy to disadvantaged communities worldwide. The Group's commitment to developing ethical, sustainable and high-quality cables also drives its active involvement within leading industry associations, including Europacable, the NEMA, ICF or CIGRE to mention a few.

Nexans employs nearly 27,000 people with industrial footprint in 34 countries and commercial activities worldwide. In 2018, the Group generated 6.5 billion euros in sales.

Nexans is listed on Euronext Paris, compartment A.

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