



Micro-blown cable installation

Fast and reliable installation of cables into microducts using air jetting technology

Air jetting technology

Deploying cables into microducts using air jetting technology is both swift and reliable. This method is employed globally across numerous countries, serving various network points, be it the backbone or access. Its widespread usage stems from the multitude of benefits and flexibility it provides, connecting the Central Office to distribution nodes and, ultimately, to the end-user.

How far can micro-blown cables be blown?

One of the most frequently asked questions we receive at Aginode is with regards to the maximum blowing distance of our micro-blown cables: How far can they be blown exactly? Providing a precise answer to this is challenging, given the numerous factors influencing the outcome. The extent to which the duct is occupied, the materials used (both for the cable and microducts), the installation method of the microducts, the ambient temperature during installation, and the expertise of the installer all play important roles.



During our fibre seminars, experienced installers have shared achievements of reaching blowing distances up to 3000 meters using traditional fibre optic cables in conventional ducts. In the concluding stretches of the access network, blowing

distances of approximately 500-600 meters are considered satisfactory. However, it is essential to emphasize that achieving optimal performance requires careful consideration of various factors.



Influencing factors

- The quality of microducts and related accessories are as important as the manner in which they are installed. Problems can arise if the dimensions of the ducts are not adhered to, leading to issues such as ovalization or fluctuations in size along the route. Joints in the microducts also play a crucial role. These must withstand high pressure without experiencing breaks or air leaks, and their design should not impede the installation of the cable. For this reason any joints in the microduct should be located in straight sections of the route and not in bends where there is a greater risk of misalignment and blockage.
- Ensuring a smooth and damage-free route for tubes during microduct installation is very important. There is nothing wrong in digging a trench, laying the ducts, and backfilling it without disturbing the foundations. However, this method offers limited control over duct positioning, affecting blowing distances. Ideally, installations should be bend-free to achieve maximum blowing distance, but achieving this in practice is challenging. Each additional bend along the route decreases the blowing distance, with the cumulative impact of small bends surpassing that of a single large bend.
- Lubrication is a crucial factor that should not be overlooked. It is essential to use the appropriate lubricant as recommended by the duct manufacturer. The amount of lubricant applied should be tailored to the size of the microduct and, of course, to the blowing distance that needs to be covered. While in certain instances, especially when the distance is short, lubrication may be skipped, it is important to note that, despite being time-consuming, lubrication serves as a guarantee for optimal performance and, ultimately, efficiency.
- Ensure that the cable occupation percentage in the microduct remains below 65%:

$$\text{Duct Occupation \%} = \frac{\text{Cable Outer Diameter}^2}{\text{Duct Inner Diameter}^2}$$

While using larger cables is feasible, it may compromise performance. Conversely, a smaller cable often performs well within a larger tube. The equipment, whether it is a blowing machine, cable pay-off, cooling system, drier or compressor must be adapted to the cable and to the microducts.

- The respect of some basic rules, based on expertise from cable, microduct or blowing machine manufacturers is very important. While acknowledging that on-site implementation may face challenges for various reasons, the Aginode team offers training sessions and on-field assistance throughout Europe. These initiatives aim to assist our customers and installers during the installation phase.

Procedure

Safety instructions

- Before commencing cable installation, all involved personnel must undergo training in both preparation procedures and cable blowing techniques.
- Adherence to local regulations and company safety rules mandates the use of eye protection, ear muffs, a helmet, safety shoes and protective overalls; these are strongly recommended on site.
- Ensure effective communication between different working stations and confirm the clear understanding of safety messages such as "STOP" or "RUN."
- During the installation process, all operators must be advised as soon as the microduct pressurized.
- Exercise caution to avoid passing or standing in front of the duct outlet under pressure.
- Prior to any operations on connections, shut down the air pressure between the compressor and the blowing machine.

Material checking

- Always start by checking your equipment to ensure that it meets the requirements. Verify if the blowing machine, accessories and compressor are suitable for the cable and microducts. Is it possible to reach the right level of air flow and pressure? If possible, use a flowmeter for added precision. The best results are obtained by incorporating a dryer and an air cooler between the compressor and the blowing machine.

- Do I have connections of the right type for this installation job?
- Do I have a stand (pay-off) for the drum size?
- Once you've confirmed that the appropriate equipment is in place, commence preparations for the blowing operation.

Microduct checking



- Ensure the microducts remain undamaged during the installation using a gauge. This gauge should have a slightly smaller diameter than the internal duct diameter. Before checking, make sure that the far end of the duct is secured with a trap to catch the gauge.
- It takes no more than 15 minutes per kilometer of microduct to complete this verification process, at maximum pressure of 8 bars. If not, problems with the ducting may be suspected.

If the duct has passed the gauge test, proceed to clean it to eliminate any accumulated moisture and dirt. The best way to do this is to use purpose-built sponges. If repeated cleaning attempts fail to yield a pristine duct, consider the microduct unsuitable for blowing applications.

Cable checking

A protective cap should be fitted onto the cable's end, as shown in the illustration. This cap serves the dual purpose of preventing air infiltration at high pressure and ensuring there is no abrasive contact between the cable head, the tube, and the connectors.



Lubricating of microducts

When lubricating microducts, make sure to use the appropriate lubricant, as recommended by the cable or duct manufacturer. The quantity of lubricant required is determined by the size and length of the microduct. The lubricant should be applied between two sponges within the tube, following the sequence: sponge/lubricant/sponge. It's crucial to limit the lubrication pressure to 4 bars.

After the sponges emerge from the microducts, allow air to flow for a few minutes to facilitate the drying of the lubricant. This step enhances the lubricant's performance.

Installing the reel on the drum stand

- Place the cable on the drum in a manner that uses the correct shaft dimension and fixings. This precaution is essential to prevent any potential risks of damage to both the material and workers.
- Protect the cable from water, sun exposure, and dust during the blowing process.

Blowing operation

- 1 Start by pushing the cable at a speed ranging from 40 to 60 meters per minute, ensuring there is no air pressure in the microduct.
- 2 If the speed remains stable, leave all the parameters unchanged.
- 3 If you observe a decline in speed, take the following steps: open the air inlet valve of the blowing machine to introduce a pressure between 1 and 2 bar into the microduct. This action should restore the speed to its previous value.
- 4 Adjust the torque, the force applied to the cable, to control its speed as it progresses into the microduct during the blowing operation.
- 5 If the cable doesn't respond, and the speed doesn't increase, increment the pressure in 1-bar steps.
- 6 If further progress is halted, and the target is nearly reached, pause the machine, release air pressure into the



duct. After 5 minutes, gradually open the air flow until maximum pressure is reached. After a few minutes, restart the machine to push the remaining meters. Repeat if necessary.

- 7 Remove the cable end sleeve from the cable end; the head cap is reusable.



Annex 1

Duct size calculation

Ensure compatibility between cable and microduct diameters.

Refer to the table below for optimal pairings of microducts and blowing cables.

Note: Blowing distance is not specified in the table as it varies depending on the microduct installation phase.

B-LITE	Technology	Max fibre count	Cable outer diameter (mm)	Ducts - Inner diameter (mm)								
				3.5	5.5	8	10	11	12	13	16	
B-LITE LT 250µm	Unitube	12	2,5	Optimal	Optimal	Acceptable						
B-LITE LT 200µm	Unitube	24	2,5	Optimal	Optimal	Acceptable						
B-LITE³ 250µm	Micro-module	72	4,7			Optimal	Optimal	Acceptable	Acceptable			
		96	5,7			Optimal	Optimal	Optimal	Optimal	Acceptable	Acceptable	
		144	7,6				Optimal	Optimal	Optimal	Optimal	Optimal	Acceptable
		288	8,7					Optimal	Optimal	Optimal	Optimal	Optimal
B-LITE LT 200µm	Loose-tube	144	6,6			Acceptable	Optimal	Optimal	Optimal	Optimal	Optimal	Acceptable
		192	6,6			Acceptable	Optimal	Optimal	Optimal	Optimal	Optimal	Acceptable
		288	7,9				Optimal	Optimal	Optimal	Optimal	Optimal	Optimal
B-LITE LT 250µm	Loose-tube	72	5,3			Optimal	Optimal	Optimal	Acceptable	Acceptable	Acceptable	
		96	6,2			Optimal	Optimal	Optimal	Optimal	Optimal	Optimal	Acceptable
		144	7,6				Optimal	Optimal	Optimal	Optimal	Optimal	Optimal
		288	9,3						Optimal	Optimal	Optimal	Optimal

	Optimal dimensional compatibility
	Acceptable dimensional compatibility

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