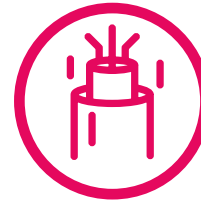


# SHORT INFORMATION DOCUMENT

## Micro-ducts

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Everything you need to know about micro-ducts and how to work with them



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## What is a micro-duct?

Micro-ducts were developed to save space when installing lighter and lower cost micro-cables. We consider it a micro-duct when it has a bore diameter between 8 and 18mm.

Single ducts or pipes with smaller bore diameters (usually 3-5mm) are normally designed for individual fibres or bundles of up to 24 fibres. Those with a larger outer-diameter of 25mm are generally considered a sub-duct.

## The different types

There are different designs of micro-ducts, but most have sliding grooves to reduce contact area and friction with the cable, which look like sharp peaks or troughs in the inner surface. They run parallel to the ducts and don't, as some believe, have a rifling effect.

Typically, micro-ducts are made with polyethylene and some have a low-friction lining made with a material like silicone. Despite the proportionately higher manufacturing costs and added difficulties in recycling low-friction lined (LFL) micro-ducts, performance tests have produced varying results with some showing little improvement in cable installation

## Common sizes

Micro-ducts come in a range of sizes and these sizes can be identified differently by manufacturers. The most common way refers to a micro-duct by outer diameter/inner diameter but some use outer diameter/wall thickness. This means a 14/10 micro-duct is sometimes called a 14/2 micro-duct.

The sizes of micro-duct most commonly used by installers are 14/10 and 16/12 but 12/8 and 18/14 are also frequently used, but other wall thicknesses are also available, eg. micro-ducts with a 1mm wall thickness can be used for bundles in another duct.

## Couplings

Couplings should match the duct's inner and outer diameters to prevent a step which could snag the cable. Some manufacturers recommend using a reaming tool to prevent this.

## Compatibility

Costs and available space are always considerations when selecting the right duct for an installation, but the diameter of the micro-cable you want to install is key.

The rule of thumb is the cross section of the cable should be around 65% of the micro-duct bore cross-section. Manufacturers might quote between 60% and 70% cable area fill ratios according to the product and the installation requirements, but bear in mind:

- 01 A fill ratio that's too low could lead to the cable snaking within the duct, particularly if it's 25% or less.

DUCT BORE DIAMETER (MM)	THE MAXIMUM CABLE DIAMETER FOR CROSS-SECTION FILL RATIO (MM)		
	60%	65%	70%
8	6.2	6.4	6.7
10	7.7	8.0	8.4
12	9.3	9.7	10.0
14	10.8	11.3	11.7
16	12.4	12.9	13.4

## Tolerances

Keep in mind that although most diameters are stated as nominal, upper and lower tolerances are sometimes stated and should be calculated.

- 02 A 70% fill ratio might be OK for a straight installation of a few hundred metres with no joins.
- 03 For longer, more complex projects, sticking to a maximum of 60% is a safe bet.

## Lubrication

Cable installation results in friction and the micro-duct becoming hot, so using lubrication is recommended. This is generally applied to the inside of the micro-duct by blowing a sponge carrier through.

Exact levels of lubrication vary according to manufacturers recommendations, but this second chart is a rough guide.

DUCT BORE DIAMETER	ML/100M	BORE FILL LENGTH/100M	ML/KM	BORE FILL LENGTH/100M
8	16	32cm	165	3.2
10	25	30cm	230	3.0
12	30	26cm	300	2.6
14	35	23cm	350	2.3
16	40	20cm	400	2.0

## Don't forget!

To carry out a pre-lube! Pass a water soaked sponge through the duct to clear debris.

## Some final points...

The quality of the micro-duct and the method of installing the cable significantly increases the chance of avoiding problems.

The main reason for ensuring your maximum fill ratio is smaller than the bore diameter is to allow for variations in uniformity of the duct, which would cause real issues if the ratio was very high.

Similarly, if the bore is off centre, this will impact the wall thickness and cause the duct to weaken. Blowing cable involves pressurising the pipe which can mean any small variations of the duct can be important to its integrity.



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