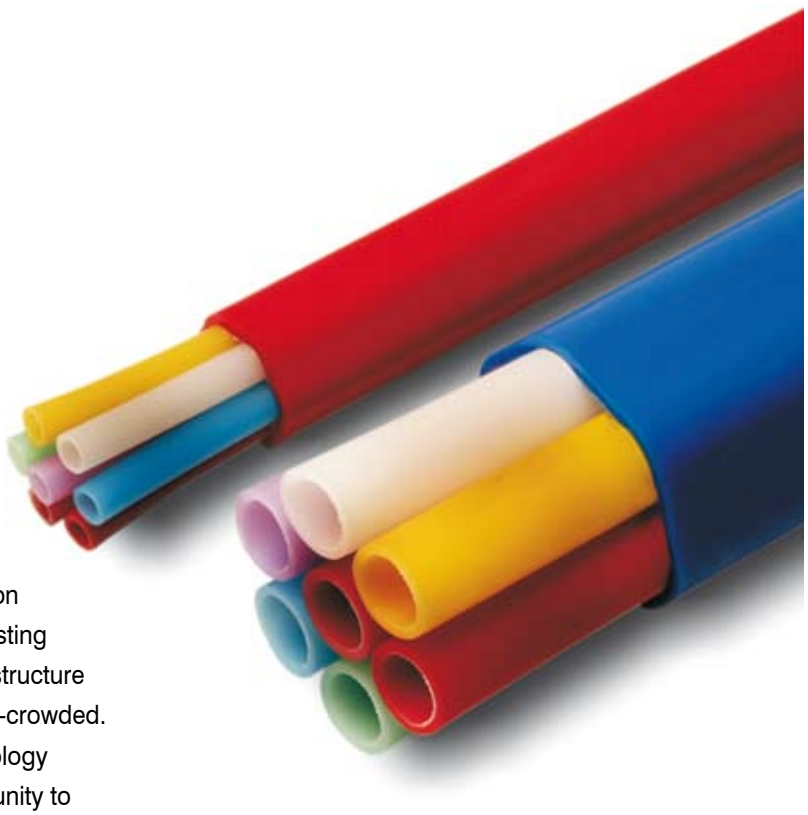
SABS
ISO 9001

Microdux™

HDPE micro duct with exceptional blowing qualities



With the ever-increasing demand for bandwidth in telecommunication networks, the existing buried duct infrastructure is becoming over-crowded. Microduct technology offers the opportunity to increase the fibre capacity of an existing duct network without incurring any civil engineering costs.

Microducts can be blown into occupied or vacant sub-ducts, and into each microduct a micro cable with a fibre count as high as 144 can be installed.

In new installations protected microduct assemblies can be utilised which consist of a bundle of individual microducts oversheathed with a robust HDPE jacket, which are suitable for direct burial.

Microdux - experience the joy of easy blowing

Background

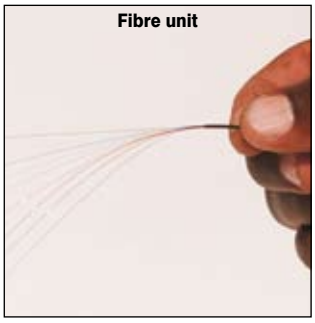
In the late 1990's there was an explosion in demand for bandwidth, and hence fibre optic capacity, in data and telecoms networks. The existing buried duct infrastructure became overcrowded, and the cost and disruption of digging up pavements to install more ducts were just too great. In addition new cost effective techniques were required to get fibre into homes and businesses. This led to the development of microduct technology.

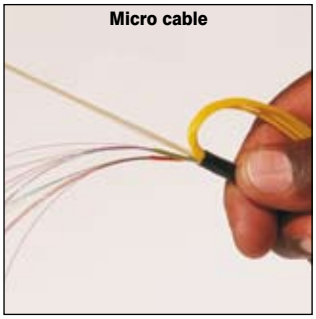
A microduct is a small flexible duct usually made from HDPE with an outer diameter typically less than 16mm. Microducts can be installed into existing larger sub ducts often 32 and 40mm diameter, and are used to increase the carrying capacity of the duct network.

Micro ducts with outside diameters of less than 8mm are generally used with ***fibre units*** which are assemblies of up to 12 optic fibres without a strength member and additional protection. They are delicate and have to be handled carefully. Micro fibre optic cables, complete with reinforcing members and protective sheath, are normally used with microducts over 8mm outside diameter, and fibre counts of up to 144 per cable are possible.

Both the fibre units and micro cables are installed in the microducts by means of blowing or jetting techniques. These techniques are also used to install empty microducts into sub-ducts.

Groups of individual microducts can be bundled and oversheathed to create a protected microduct.





Configurations of 1, 2, 4 and 7 way are common, but counts up to 24 are possible. With the correct design these ***protected microducts*** can be used for direct burial applications.

Advantages of Microdux

- Flexibility in network design
- Easy quick upgrades in future
- Simple to branch
- Maximises space utilisation in a duct network
- Low initial costs, populate with fibre as demand grows
- Easy to install in existing buried duct networks
- Long blowing distances
- Range of configurations to suit every application
- Excellent crushing strength
- Sequential metre marking
- Variety of colours available for easy identification
- Factory tested for obstructions and blockages.

Quality

Nextube, the manufacturer of **Microdux,** adheres to the highest quality standards. Nextube has been awarded SABS ISO 9001 certification.

Specifications

The standard IEC60794-5 First Edition "Microduct cabling for installation by blowing" is in its first edition and unfortunately many of the test methods have not been finalised.

Blow-ability

The most important attribute of a microduct is its ability to accept a blown micro cable, or blown fibre units. The formulation and surface finish of the low friction inner layers of the microduct are of vital importance when blowing. Many poor quality microducts, that look perfectly acceptable, simply do not work and blowing distances can be as low as a few hundred metres. All sorts of boundary effects come into play in the micro world and the composition of the inner layer has to take these into account. Unfortunately as yet there is no international standardised blowing performance test. It is still under consideration as part of the standard IEC60794-5. Blowing distances over 2000m have been achieved with **Microdux**.

Factors which permit greater blow distances:

- More air pressure (12bar instead of 10bar)
- Straighter route
- Downwards direction (down a building or hill rather than up)
- Larger microduct
- Smaller fibre product (lower weight)

Colours
Microdux have translucent colouring to enable the user to determine quickly if a particular microduct is occupied. A wide range of colours is available to suit customer requirements.

UV stability
Both microducts and protected microducts are UV stabilised and can be stored outdoors for 1 year. They are not designed for permanent outdoor exposure.

Standard sizes of Microdux
We manufacture (OD/ID) 14/10, 12/10, 12/9, 10/8, 7/5.5, and 5/3.5mm microducts. However any size or wall thickness can be produced if there are sufficient quantities. We can manufacture both smooth and ribbed inner bores as per the customer's preference.

Configurations of protected Microdux
Our standard configurations of protected **Microdux** are 7, 4, 2 and 1 way. However any configuration can be considered if there are sufficient quantities.

Proofing
After manufacture and coiling in the factory each individual **Microdux** is tested by blowing a ball with a diameter of 85% of the inner diameter of the microduct through it. Once assembled in a protected **Microdux** a ball with a diameter of 70% of ID is used.

It is recommended that this proofing test is repeated after installation of the microduct before blowing of cable to ensure the integrity of the system. Be careful to use a ball catcher at the open end of the microduct. The ball can reach very high velocities and can be ejected like a bullet. A pressure gauge and regulator should be used to control the air pressure and it should not exceed 2 bar.

Installation
The installation of microducts into existing sub ducts, and micro cables into microducts, must be performed by a competent, experienced contractor using the correct blowing equipment. The air used for blowing must be conditioned to reduce both temperature and humidity. Microduct technology requires far more finesse than traditional cable technologies.

Direct burial protected microducts should be laid in accordance with SANS1200LB with care being taken to lay the duct as straight as possible.

The maximum numbers of micro ducts it is possible to install into an empty sub duct are shown in the table opposite.

Temperature resistance
Microdux can be stored, installed, and operated at temperatures ranging from -20°C to +40°C. Temperatures above this may be tolerated for short

Maximum numbers of microducts in sub duct

	Microduct OD		
Sub duct size (OD/ID)	12 mm	10mm	7mm
32/26mm	2	3	5
40/33mm	4	5	10

Jointing

Translucent push fit couplings are used to join and branch microducts. These fittings are rated to 15 bar. End caps are available to close the end of unoccupied microducts.

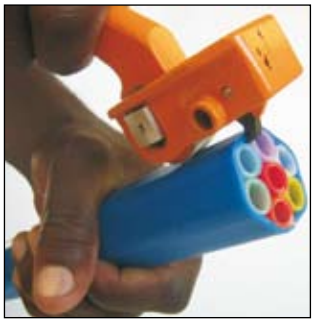
Marking

Microdux is marked with contrasting lettering at metre intervals showing date of manufacture, dimensions, sequential metre marking and any other information required by the customer.

Raw material properties	Value	Unit	Test method
Density	>0.94	g/m³	ISO1183
Tensile yield	>23	MPa	ISO527
Ultimate tensile	>36	MPa	ISO527
Ultimate elongation	>600	%	ISO527
Viscat softening point	80	°C	ISO306
Flexural stress	>19	MPa	ISO178

Tools

Special cutting and stripping tools are available to cleanly and neatly cut microducts, or protected microducts, and to strip the sheath off protected microducts.



Packaging

Individual microducts are supplied on wooden spools in lengths of up to 4000m. Protected microducts are supplied on steel reels in lengths of 1000m.

Bending performance

The minimum bending radius is 20 x outside diameter. For example a 12mm **Microdux** has a minimum bend radius of 240mm, and a 7 way 12/9 protected **Microdux** with an OD of 40mm will have a minimum bend radius of 800mm.

Technical Data	Nominal size (other sizes available on request)					
Parameter	**14/10mm**	**12/9mm**	**12/10mm**	**10/8mm**	**7/5.5mm**	**5/3.5mm**
Outside diameter	$14.0^{+0.15}_{-0.05}$ mm	12.0±0.1mm	12.0±0.1mm	10.0±0.1mm	7.0±0.1mm	5.0±0.1mm
Wall thickness	$2.0^{+0.0}_{-0.1}$mm	$1.5^{+0.0}_{-0.1}$mm	$1.0^{+0.0}_{-0.1}$mm	$1.0^{+0.0}_{-0.1}$mm	$0.75^{+0.0}_{-0.1}$mm	$0.75^{+0.0}_{-0.1}$mm
Ovality	<5%	<5%	<5%	<5%	<5%	<5%
Air pressure test (5 min)	12 bar	12 bar	10 bar	12 bar	10 bar	10 bar
Ball testing	8.5mm	7.6mm	8.5mm	6.8mm	4.7mm	3.0mm
Coefficient of friction	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Min. tensile force at yield	1130N	740N	520N	425N	220N	150N

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