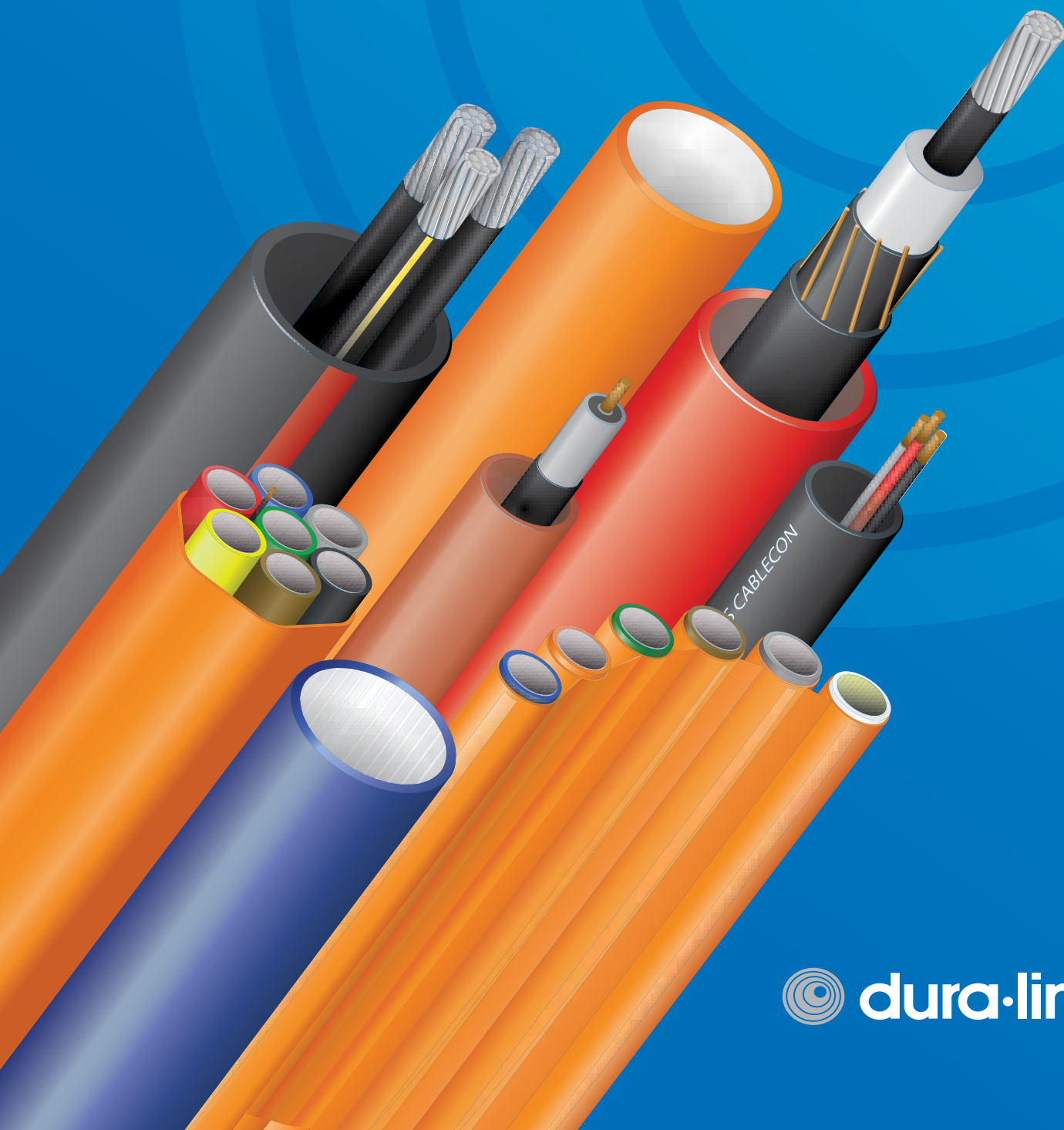


DURA-LINE FTTX SYSTEM CATALOGUE



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DURA-LINE EUROPE INTRODUCTION

COMPANY

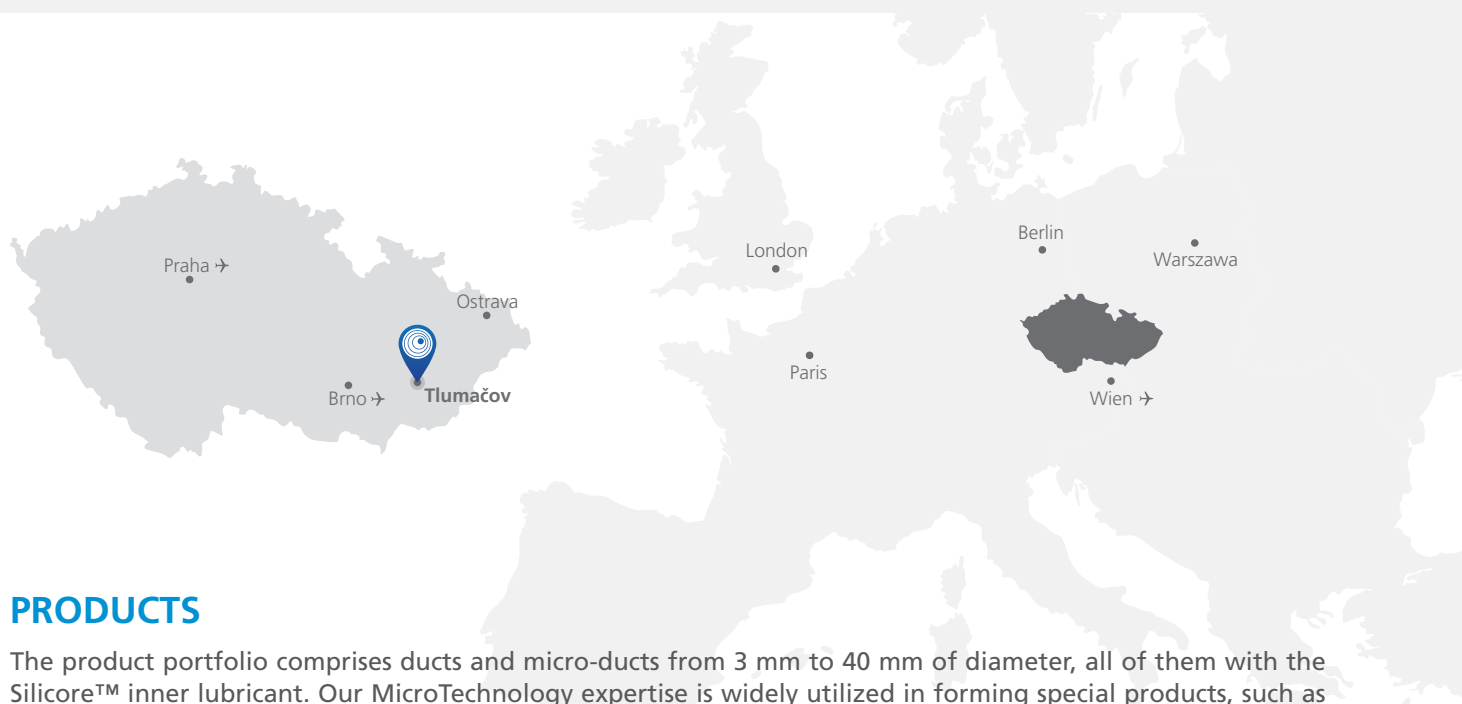
DURA-LINE CT, s. r. o. ("Dura-Line Europe) is part of the global group Dura-Line Corporation, established in 1971, headquartered in Knoxville, Tennessee, USA.

We are an international manufacturer and distributor of communication and energy infrastructure products and systems. A unified system of DURA-LINE's products provides protection and fast, safe installation of communication and power cables for a wide variety of industries.

Since the 1980's, we have focused on the development of special HDPE ducts and micro-ducts for the protection of fiber optics communication cables.

Our ducting, equipped with the unique Silicore™ permanently lubricated lining, are widely used by companies specializing in building telecom, CATV and enterprise data networks. Globally, Dura-Line operates 18 factories spread throughout 4 continents.

The European markets are served from the Czech Republic, where Dura-Line Europe produces a large variety of protective ducting solutions specifically designed for a variety of FTTx networks. Products from our European plant are used by hundreds of customers in more than 25 countries. Dura-Line's MicroTechnology products together with accessories manufactured by European renowned manufacturers, and presented in this catalogue, form an unified system appreciated by the largest telecom operators, system integrators, cable manufacturers or contractors and installers.



PRODUCTS

The product portfolio comprises ducts and micro-ducts from 3 mm to 40 mm of diameter, all of them with the Silicore™ inner lubricant. Our MicroTechnology expertise is widely utilized in forming special products, such as Dura-Multi™, DuraFlat™ or DuraPack™ protective HDPE bundles. In addition we can also ensure a simultaneous installation of telecommunication cable into the micro-ducts, offering to markets advanced, and yet economical, DuraFibre™ and DuraCable™ solutions.

In response to increasing customers requirements on quality and individual solutions for new products, profiles and materials for micro-ducts developed in our company, we have opened a testing center where the quality of installation of our products is evaluated. In this testing center we are able to simulate conditions of actual use in terrain and measure behavior of our products when being installed.



DuraDuct

- ✓ SILICORE™ permanent lubricant
- ✓ Complete range of dimensions
- ✓ Customized product – color, strips, labels
- ✓ High quality HDPE
- ✓ OD from 18 to 50 mm



DuraMicro

- ✓ No excavation required when installed into existing HDPE ducts
- ✓ Increase of the route capacity
- ✓ Revival of occupied ducts – override blowing
- ✓ High flexibility of the network
- ✓ Investment time distribution – fiber on request
- ✓ OD from 3 mm to 16 mm



DuraTrace

- ✓ Duct with tracing wire
- ✓ Quick & easy localization of buried utilities



DuraMulti

- ✓ Maximum space utilization
- ✓ High flexibility of the network – spare ducts for future use
- ✓ Avoid undulations and crossing of single micro-ducts – better blowing performance
- ✓ Minimization of installation costs, fast and easy installation of several micro-ducts in one operation step



DuraFlat

- ✓ HDPE material ensures high chemical and corrosion resistance
- ✓ High flexibility during installation, horizontal/vertical/folded shape installation
- ✓ Minimization of installation costs, fast and easy installation of several micro-ducts in one operation step
- ✓ Ideal last mile drop connection of single houses
- ✓ Minimum need for accessories - simple and easy branching



DuraPack

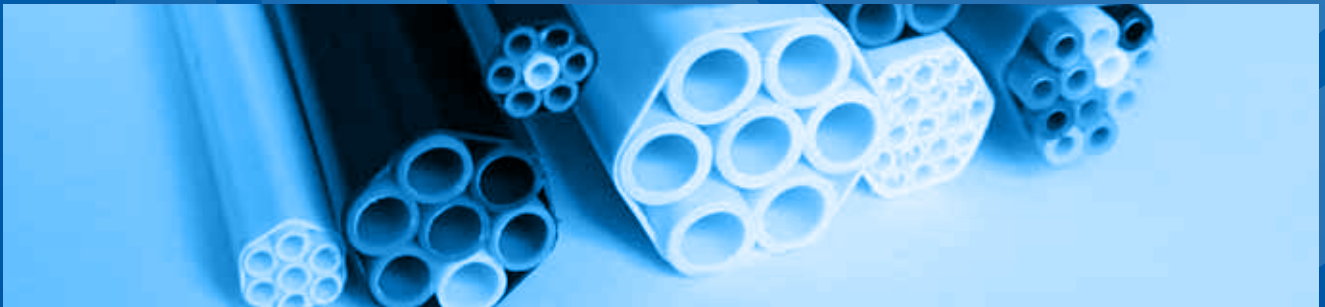
- ✓ Very high flexibility of your network configuration – combinations on request
- ✓ Minimizes deployment time and installation cost
- ✓ The best solution for micro-duct protection and blowing performance
- ✓ Effectively uses duct space – higher filling ratio compared with blowing
- ✓ Loose micro-ducts – very high impact resistance



DuraAir F8

- ✓ Lightweight future-proof solution
- ✓ Standard Figure 8 construction, metal free
- ✓ High UV resistance (at least 15 years guaranteed)
- ✓ Standard aerial accessories
- ✓ Tested & Certified – vibration test, tension test
- ✓ Compliance with EN 60794

ProDuct Guide





Introduction

As an ISO-9001 rated manufacturer, Dura-line takes pride in manufacturing state-of-the-art quality products. We have several technologies that set us apart from other manufacturers including SILICORE™ super slick permanent lining and specially designed interior ribs reducing the coefficient of friction. Dura-Line is leading the way in the development of MicroTechnology with innovative products and solutions.

MICROTECHNOLOGY

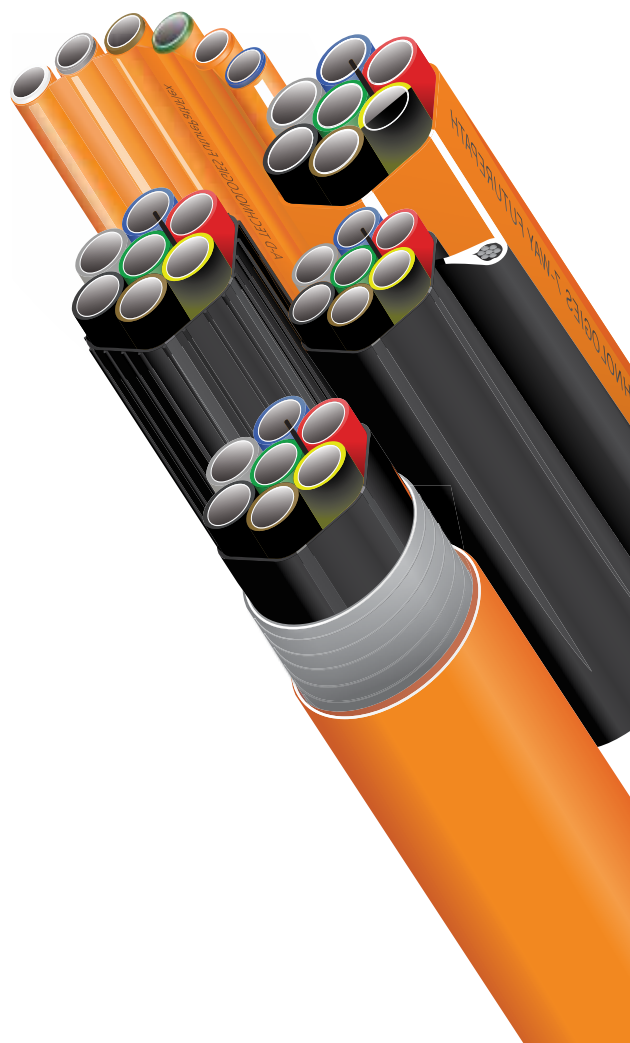
MicroTechnology is a forward-thinking, future-oriented technology that you can put in place today. As network demands continue to grow, it becomes more important than ever to better utilize the available space in your existing duct systems. Single micro-ducts or bundles like DuraMulti allow for controlled expansion of your network, meeting bandwidth requirements as needed. With the multiple pathways in bundle, as your network grows, you will have available pathways without additional construction costs.

VERSATILE COST-EFFECTIVE EXPANSION

With so many different styles, configurations and sizes of micro-ducts available, there is virtually no fiber optic project that could not benefit from the use of MicroTechnology in both reducing initial construction costs and future proofing the network. It can be used in every facet of the network build, and by utilizing the different versions it can easily be installed in any scenario.

Micro-duct bundles have proven to be a very cost effective solution when compared to traditional methods and designs. Both DuraMulti and DuraFlat provide maximum space utilization at minimum installation cost which is much lower compared to a traditional sub duct installation. Also the ability to expand your network easily in the future is already in place.

With its many configurations, micro-duct bundles can be utilized for expanding most networks, whether subdividing existing conduit structures or as an OverRide solution for occupied duct. Crowded easements, both aerial and buried, can benefit from MicroTechnology for network expansion while requiring minimal space. When it comes to expanding any network, it is important to be able to minimize expenditures, and MicroTechnology is an excellent way to accomplish that goal.



Material & feature variants

Dura-Line offers a full complement of products and accessories to facilitate placement of HDPE duct and communications cables. All our product lines can be customized to meet your needs. Material, color, diameter, inner layer, application or print, all give you a enormous variety of options and the freedom to choose the best solution for your network.

MATERIAL

All our ProDucts are made only from virgin HDPE, so we can always guarantee the top quality final product. Besides standard HDPE, we can offer modifications such like:

HDPE – High Density Polyethylene ducts, generally considered as an outside plant product. Recyclable.

LSHF – Low Smoke Halogen Free, fire-retardant material, which is recommended for indoor applications.

UV Stabilized – ducts with increased UV resistance necessary for any applications where ducts are exposed to sun UV rays.

AntiRodent – ducts saturated with AntiRodent additive, which repels rodents like mice, squirrels and protects against their attacks.

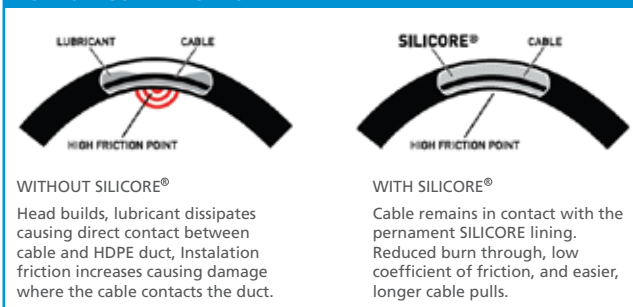
AntiStat – micro-ducts with anti-static treatment, reducing static charge buildup, improving thus blowing performance (blowing length and speed).

INNER LAYER

All our products are treated with a super-slick, permanently lubricated Silicore lining, in order to reduce coefficient of friction between the cable and duct itself.

The Silicore lining is manufactured during the extrusion process and lasts the lifetime of the duct.

HOW SILICORE® WORKS



PRODUCT VARIATION

All of these product lines can be customized to meet your needs. Material, color, diameter, inner layer, application and print stream, all give you a variety of products and the freedom to choose the best solution.

APPLICATION	MATERIAL	INNER LAYER	COLOR RANGE
Direct Install	HDPE	Smooth	Plain
Direct Burial	LSHF	Ribbed	Transparent
	UV Stabilized	always with Silicore™	Stripped
	AntiRodent		RAL color codes
	AntiStat		

RAL COLOR RANGE

Wide range of standard RAL colors are available. Combination with colored stripes, customer is getting huge choice of color combinations and options for unique micro-duct identification.

2009	2003	3020	6029	6018	6017	6027
5015	5021	1016	1018	1021	3015	4003
tran	4006	8015	8015	1015	7045	9003

PRINTING

Micro-ducts are printed along the entire length with text according to the customer's requirements. Printing colour is in contrast to the micro-duct colour. Printing scheme is repeated each 1 meter along the micro-duct, unless specified otherwise.

Example of the printing scheme:

DURA-LINE CT DuraMicro DB 14/10 mm SILICORE 09/2014 LOT No 12345678 0000 m >|<



Packaging

We are always looking for the best and most suitable way of packaging to meet customer requirements. Therefore we offer more than one option to pack and dispatch our products. Of course we always suggest the best option considering transport efficiency, handling and customer needs. Just contact our customer service and find the most suitable way for you. We distribute our product on wooden drums, in coils, on micro-drums (MTB) and we can also supply you with FAST-IN collapsible drums.

STANDARD DUCT PACKAGING

- a) Big Wooden Drums (DB) – Heavy-duty duct packaging. Reusable, refundable. Several sizes available to meet project requirements. These can be also offered as 2 section drum for simultaneous unwinding of 2 products.
- b) Coils – Cost effective for small scale projects. Short coils allow machinery free handling. Long coils can be unwinded with FAST-IN drum
- c) FAST-IN – Collapsible metal drum for easy manipulation with long coils. Universal – adjustable core dia 80-95 cm. No hassle with drums returns.



MICRO-DUCT PACKAGING

- a) MTB drums – Disposable drums made of plywood for standard handling & storage on site. Wide range of sizes.
- b) Plastic drums PTB – 100% wear resistance, only advised where severe weather conditions or manipulation is expected. Disposable.

All our products are packed, protected by stretched foil and labeled with unified stickers.

STORING

Wooden drums must be stored safely. Improper storage conditions can easily cause damage to drums and ducts themselves. Therefore please follow these basic instructions below.

- ✓ Keep the drum in an upright position
- ✓ Keep and handle the drum in an upright position otherwise you risk the problems with your duct. Duct layers can get entangled and damaged when drum is laid on its side.
- ✓ Always keep your duct protected with black foil against UV rays.
- ✓ Your duct ends must be sealed and protected against ingress of moisture and dirt and also fixed to the drum.
- ✓ If storing outside please follow your product datasheet instructions according to temperature range and storing conditions. Standard temperature range is from -20°C to +40°C
- ✓ Check drums before moving. Any nails or other damage of the drum can damage your duct itself.

TRANSPORT INSTRUCTIONS

Drums should only be transported with suitable vehicles and has to be secured firmly to prevent them from moving during transportation. Main danger comes from invisible damages leading to unusable product. Combination of wedges and support must be used and tied down. Drums should be fastened sideways from the highest point. Rolling of the drums can be avoided by using transport blocks. The front most drum should rest against the truck front board, considering the shaft weight.

PRODUCT	DuraDuct
OD / ID	40 / 33
CUSTOMER	2
ORDER	130145070P66
LENGTH	2000 m
LOT No	71024592
PRINT	ČD Telematika a.s.
COLOUR	ORANGE
SPECIAL	4 x 1 BROWN STRIP
PRESSURE TEST	OK
PRESSURE TEST CONTROL	OK
DURA LINE CT a.s. - Czech Republic Tel: +420 577 199 111	

Quality control

Our quality department carries out a wide range of tests to ensure supreme quality of our products. All our production records are stored and fully trackable, available for customers or quality inspections. The below mentioned mechanical tests are essential, but additional tests are also performed.

PRODUCTION

- ✓ BB test – steel ball with specific diameter is blown into the duct to confirm that inner diameter meets specification
- ✓ Operational pressure test – duct is pressurized up to 10 bar to confirm no air leakage

LABORATORY

- ✓ **Dimension check** – measurement of ducts' inner and outer diameter, wall thickness and ovality to confirm product meets dimensional specifications
- ✓ **Tensile strength** – duct sample is pulled to detect any change in material composition
- ✓ **Crushing** – duct is pressed to verify adequate duct outer pressure resistance
- ✓ **Inner friction** – confirmation of duct inner layer meeting friction specification
- ✓ **Long term pressure test** – duct is pressurized up to 18 bar for 170 hours in 80 degree of celsius bath. No leakage accepted. Confirms heat and pressure resistance.



DURA-LINE CT	
MICRODUCTS TEST REPORT No.: 48 / 2014	
LIST No.: 42923478	Dimensions: 14/10 mm
Product type: LHM 98 200/10/10	Type: standard
Substitution: 98/10/10	
Inner surface: 10/10	
Manufactured: 10.7.2014	
Customer: 0	
MECHANICAL	
Outside diameter (mm): 14.7	Inside diameter (mm): 10.1
Min wall thickness (mm): 1.02	
TENSILE STRENGTH	
Tensile force (N): 144	Tensile strength (MPa): 18
Max. deformation (%): 14.1	Pressure forward (N): 1402
Reversal deformation (%): 4.49	
COEFFICIENTS	
Modulus (GPa): 0.01	Coefficient of Poisson (ν): 0.002
STRESS-STRAIN	
Stress force (N): 34.8	Max deformation (mm): 14.1
Strain coefficient (mm): 0.002	
HEAT REVERSION	
Change (average) (mm): 0.11	Heat reversion (%): 0.49
NOTES	
1. Location: 0	
2. Location: 0	
3. Location: 0	
4. Location: 0	
5. Location: 0	
Date: 22.10.2014	
Tested by: [Signature]	

Dura-Line Europe has been successfully recertified according to international standards ISO 9001, ISO 14001 and ISO (OHSAS) 18001. This confirms full compliance and effectivity of our processes.



DuraDuct

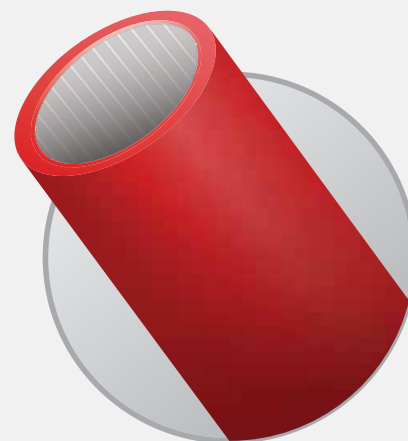
FEATURES & CHARACTERISTICS

Our DuraDuct are the top quality subducts, made only from virgin or regrind HDPE. They are available in many material & application variants. Exceptional inner surface treated with permanent Silicore™ layer for a low friction & better cable blowing performance.

DuraDucts can be either pulled inside the main 100 mm conduits within metropolitan network or direct buried in the trench.

Both applications are indicated with DI or DB in the product name.

- ✓ SILICORE™ permanent lubricant
- ✓ Wide range of dimensions & applications
- ✓ Customizable product – color, stripes, print, inner surface
- ✓ High quality HDPE only
- ✓ Any size from 18 mm to 50 mm OD



PRODUCT RANGE

Application	OD	ID	Weight [kg / km]	Standard Pack [length / weight]
DB	20	15	131	DB1 (6500 m / 1300 kg)
DB	20	16	107	DB1 (6500 m / 1200 kg)
DB	25	20	168	DB1 (4000 m / 1050 kg)
DB	32	25.5	280	DB1 (2700 m / 1150 kg)
DB	32	25	300	DB1 (2700 m / 1210 kg)
DB	32	26.2	255	DB1 (2700 m / 1100 kg)
DB	32	26	260	DB1 (2700 m / 1100 kg)
DB	40	32.6	430	DB1 (1750 m / 1150 kg)
DB	40	32	461	DB1 (1750 m / 1200 kg)
DB	40	33	384	DB1 (1750 m / 1070 kg)
DB	50	40.6	635	DB1 (1000 m / 1110 kg)
DB	50	40.8	623	DB1 (1000 m / 1070 kg)
DB	50	40	672	DB1 (1000 m / 1170 kg)
DB	50	41	611	DB1 (1000 m / 1010 kg)
DB	50	42	550	DB1 (1000 m / 950 kg)
DI	25	21	140	DB1 (4000 m / 950 kg)
DI	32	27	220	DB1 (2700 m / 1000 kg)
DI	32	28.2	167	DB1 (2700 m / 850 kg)
DI	32	28	177	DB1 (2700 m / 870 kg)
DI	40	34	330	DB1 (1750 m / 1000 kg)
DI	40	35.4	260	DB1 (1750 m / 850 kg)
DI	40	35	280	DB1 (1750 m / 890 kg)
DI	50	43	490	DB1 (1000 m / 900 kg)
DI	50	44	425	DB1 (1000 m / 900 kg)



DuraMicro

FEATURES & CHARACTERISTICS

DuraMicro micro-ducts are made of only virgin HDPE material and are available for both DI & DB applications.

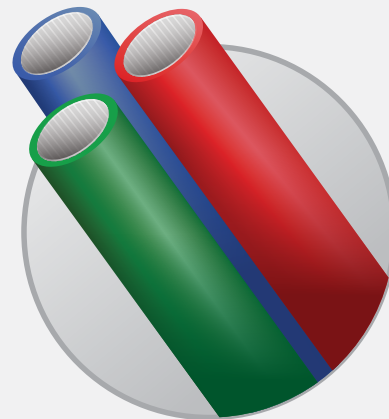
Direct Installed versions must be protected and therefore are pre-installed, pulled or blown into DuraDuct.

Direct Buried micro-ducts have a high impact & crush resistance so they can be direct buried into the ground with no other protection.

For the safety reasons we also offer low smoke halogen free micro-ducts, which are recommended for indoor installation.

Complete range and material variants covers completely the current FTTH network demand.

- ✓ SILICORE™ permanent lubricant
- ✓ Wide range of dimensions from 3 / 2.1 mm to 16 / 14 mm
- ✓ Customizable product – color, stripes, print, inner surface, material, application
- ✓ High quality HDPE only
- ✓ Investment time distribution – fiber on request





PRODUCT RANGE

Application	OD	ID	Weight [kg/km]	Standard Pack [length/weight]
DB	4	3	5	MTB DT small (4000 m / 33 kg), MTB DT (6000 m / 135 kg)
DB	6	3.5	18.1	MTB DT small (2000 m / 47 kg), MTB DT (6000 m / 194 kg)
DB	7	3.5	28	MTB DT small (1300 m / 47 kg), MTB DT (6000 m / 176 kg)
DB	7	4	25	MTB DT small (1300 m / 44 kg), MTB DT small (1000 m / 44 kg)
DB	8	4.4	33	MTB DT (5000 m / 190 kg), MTB DT small (1000 m / 47 kg)
DB	8	4	36	MTB DT (5000 m / 205 kg), MTB DT small (1000 m / 40 kg)
DB	8	5	29	MTB DT (5000 m / 170 kg), MTB DT (5000 m / 126 kg)
DB	8	6	20	MTB DT small (1000 m / 26 kg), MTB DT small (700 m / 47 kg)
DB	10	5.5	52	MTB DT (3500 m / 207 kg), MTB DT (3500 m / 192 kg)
DB	10	6	47.5	MTB DT small (700 m / 47 kg), MTB DT (3500 m / 158 kg)
DB	10	7	38	MTB DT small (700 m / 38 kg)
DB	12	8	59	MTB DT (2200 m / 155 kg)
DB	14	10	72	MTB DT (1800 m / 156 kg)
DB	15	9.6	100	MTB DT (1400 m / 165 kg)
DB	16	10	117	MTB DT (1200 m / 166 kg)
DB	16	12	84	MTB DT (1200 m / 126 kg)
DI	3	2.1	3.2	MTB DT small (3000 m / 21 kg), MTB DT (5000 m / 73 kg)
DI	5	3.5	9.5	MTB DT small (3000 m / 39 kg), MTB DT (6000 m / 116 kg)
DI	6	4	15	MTB DT small (1900 m / 40 kg), MTB DT small (1300 m / 29 kg)
DI	7	5.5	14	MTB DT (6000 m / 109 kg), MTB DT (3500 m / 120 kg)
DI	10	8	27	MTB DT small (700 m / 28 kg)
DI	12	10	34	MTB DT (2200 m / 101 kg)
DI	14	11	55	MTB DT (1800 m / 125 kg)
DI	14	12	40	MTB DT (1800 m / 98 kg)
DI	15	12	59	MTB DT (1400 m / 109 kg)
DI	16	13	62	MTB DT (1200 m / 100 kg)
DI	16	14	43	MTB DT (1200 m / 78 kg)
DI	18	14	96	MTB DT (1000 m / 122 kg)
DI	18	15	74	MTB DT (1000 m / 100 kg)
DI	18	16	51	MTB DT (1000 m / 77 kg)

DuraTrace

FEATURES & CHARACTERISTICS

DuraTrace products indicate the presence of tracing wire for quick & easy localization. For single micro-duct tracing wire is placed outside and over-sheathed together with duct. Within bundles, tracing wire is placed in the free space among the micro-ducts.

- ✓ duct with tracing wire
- ✓ quick & easy localization of buried utilities
- ✓ tracing wire: black, dia 2.1mm

PRODUCT RANGE

DuraTrace can be supplied in all variants of DuraMicro, DuraMulti, DuraFibre or DuraPack.



DuraMulti

FEATURES & CHARACTERISTICS

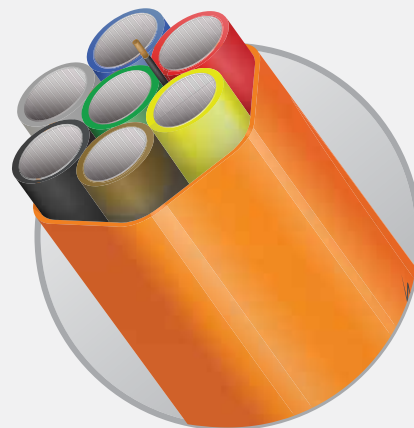
DuraMulti micro-duct bundles with tight thin jacket are designed for a quick, simple & cost effective installation of multi micro-ducts in one deploying step.

DuraMulti DB bundles contain thick walled micro-ducts, have very high crush resistance and therefore can be directly buried without any additional protection. Thin jacket allows easy access to individual micro-ducts which can be connected only with simple connectors with no need for protective enclosures and branch-off boxes. This reduces the cost of accessories compared with loose bundle solution.

DuraMulti DI bundles contain thin walled micro-ducts and therefore require extra protection. These are typically pulled in main conduits from manhole to manhole or inside the MDU's as a main riser duct route.

The construction of these bundles allows to combine different sizes of micro-ducts. Such like DuraMulti Hybrid bundles are highly customized products for effective FTTH network deployment.

- ✓ exceptional network flexibility, customized configuration
- ✓ no special tools – see installation scheme DuraMulti connection in the trench
- ✓ very high crush resistance
- ✓ no tendency of micro-bending, long distance cable blowing
- ✓ all installation methods & applications (pulling, blowing, DB, indoor)



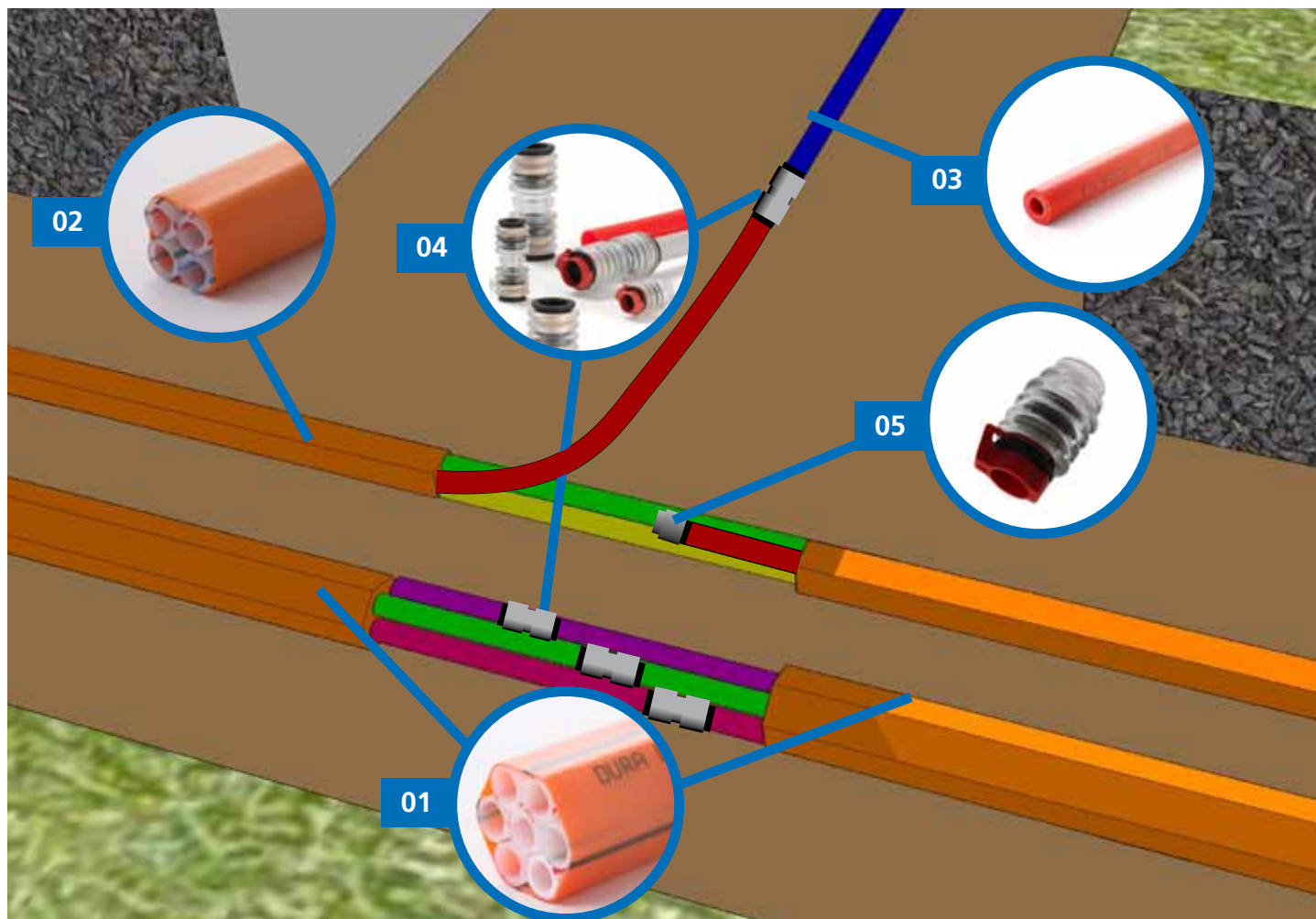
PRODUCT RANGE

Application	Size of MD	Number of MD								Standard packaging		Product name
	OD / DO	2	3	4	7	10	12	22	24	Weight [kg /km]	Packaging [length /weight]	
DB	4 / 2.5	X	X	X	X	X	X	X	X	178	DB 1 (3x 1500 m / 1250 kg)	DuraMulti DB 24x 4 / 2.5 mm
DB	5 / 2.1	X	X	X	X	X	X	X	X	424	DB 1 (3700 m / 2000 kg)	DuraMulti DB 24x 5 / 2.1 mm
DB	7 / 4	X	X	X	X	X	X	X	X	355	DB 1 (3500 m / 1640 kg)	DuraMulti DB 12x 7 / 4 mm
DB	8 / 5	X	X	X	X	X	X			263	DB 1 (4400 m / 1660 kg)	DuraMulti DB 7x 8 / 5 mm
DB	10 / 6	X	X	X	X	X	X			134	MTB DT (1400 m / 213 kg)	DuraMulti DB 2x 10 / 6 mm
DB	12 / 8	X	X	X	X	X	X			305	DB 1 (2x 2000 m / 1620 kg)	DuraMulti DB 4x 12 / 8 mm
DB	14 / 10	X	X	X	X	X				615	DB 1 (1300 m / 1200 kg)	DuraMulti DB 7x 14 / 10 mm
DB	16 / 12	X	X	X	X					235	DB 1 (4x 1000 m / 1500 kg)	DuraMulti DB 2x 16 / 12 mm
DI	3 / 2.1	X	X	X	X	X	X	X	X	39	MTB DT (3500 m / 163 kg)	DuraMulti DI 7x 3 / 2.1 mm
DI	5 / 3.5	X	X	X	X	X	X	X	X	160	MTB DT (800 m / 154 kg)	DuraMulti DI 12x 5 / 3.5 mm
DI	7 / 5.5	X	X	X	X	X	X	X	X	132	DB 1 (5800 m / 1160 kg)	DuraMulti DI 7x 7 / 5.5 mm
DI	10 / 8	X	X	X	X	X				160	DB 1 (2x 2600 m / 1230 kg)	DuraMulti DI 4x 10 / 8 mm
DI	12 / 10	X	X	X	X					320	DB 1 (2000 m / 1040 kg)	DuraMulti DI 7x 12 / 10 mm
DI	14 / 12	X	X	X	X					380	DB 1 (1350 m / 890 kg)	DuraMulti DI 7x 14 / 12 mm
DI	16 / 13	X	X	X						336	DB 1 (1000 m / 735 kg)	DuraMulti DI 4x 16 / 13 mm

Application	Bundle configuration	Standard packaging		Product name
		Weight [kg /km]	Packaging [length /weight]	
DB	12x 7 / 4 + 1x 14 / 10	445	DB6 1200 m / 1000 kg	DuraMulti Hybrid DB 12x 7 / 4 + 1x 14 / 10
		445	DB1 1900 m / 1300 kg	DuraMulti Hybrid DB 12x 7 / 4 + 1x 14 / 10
DB	24x 7 / 4 + 1x 14 / 10	765	DB1 1500 m / 1550 kg	DuraMulti Hybrid DB 24x 7 / 4 + 1x 14 / 10
DI	12x 5 / 3.5 + 1x 10 / 8	198	DB 1 4800 m / 1400 kg	DuraMulti Hybrid DI 12x 5 / 3.5 + 1x 10 / 8
DI	22x 5 / 3.5 + 1x 12 / 10	323	DB 1 2700 m / 1350 kg	DuraMulti Hybrid DI 22x 5 / 3.5 + 1x 12 / 10



SITE LAYOUT



PRODUCT OVERVIEW

DuraMulti Connection

Product Group		Catalogue page	Product Group Representative
DuraMulti DB	01	16	DuraMulti 7x14/10 mm
DuraMulti DB	02	16	DuraMulti 4x7/4 mm
DuraMicro DB	03	13	DurMicro DB 7/4 mm
Micro-duct Connector DI or DB	04	36, 37, 39, 43	Robust Reinforced Connector DB
Micro-duct End Cap	05	44, 45, 46	Robust Reinforced End Cap
Duct Shears		85	
Micro-duct Shears		64	

SITE APPLICATIONS



SITE LAYOUT



PRODUCT OVERVIEW

DuraMulti Connection

Product Group		Catalogue page	Product Group Representative
DuraMulti	01	16	
DuraMicro	02	13	
Duct sealing systems	03	56	MDIII Duct seal
Bundle sealings	04	55	DuraMulti termination Sealing
Gasblock terminators	05	48, 49, 51, 52	Divisible gasblock
Gasblock connectors	06	50	Gas-block Connector
EndCaps	07	44, 45, 46	Robust reinforced End Cap
Fibre optic cables	08		
DuraMicro LSHF	09		
Micro-duct Shears		64	
Duct Shears		85	

SITE APPLICATIONS





DuraFlat

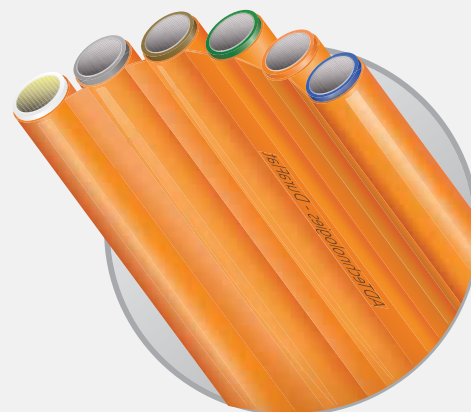
DuraFlat

FEATURES & CHARACTERISTICS

Flat shaped bundles of micro-ducts, DuraFlat production line is a perfect solution primarily designed for last mile customer connection. It is the most flexible type of micro-duct bundle which allows many different installation techniques – Direct Buried, Vertical long haul, MicroTrenching & also indoor on wall installation. This makes it the most versatile and easy to install system.

When installed in horizontal position it is more sensitive for micro-bending. On the other hand, it is completely free of spiraling effect when uncoiled from drum. Also branching and connection is super simple & quick.

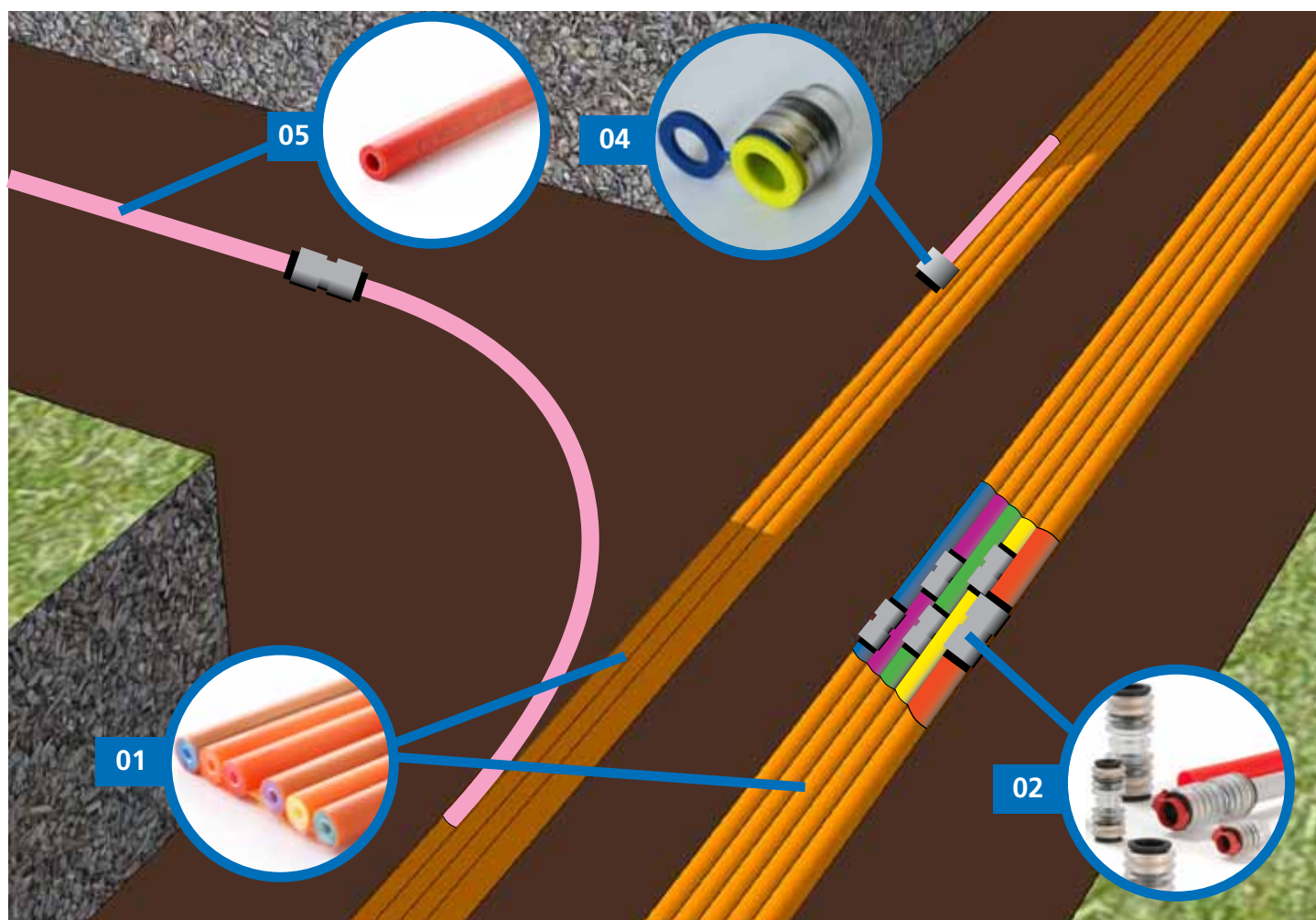
- ✓ Very high flexibility – horizontal/vertical/ folded shape installation
- ✓ up to 7 micro-ducts within one bundle
- ✓ minimum accessories – eliminates enclosures & duct gas seals, only simple DB connectors
- ✓ highly customizable product – micro-duct size, colors, jacket color, stripes & printing
- ✓ user-friendly deployment of many micro-ducts



Application	Size of MD	Number of MD					Standard packaging		Product name
	OD / DO	3	4	5	6	7	Weight [kg/km]	Packaging [length/weight]	
DB	7 / 4	X	X	X	X		300	DB1 (5000 m / 2000 kg)	DuraFlat DB 6x 7 / 4 mm
DB	8 / 5	X	X	X	X		274	DB1 (4500 m / 1750 kg)	DuraFlat DB 6x 8 / 5 mm
DB	10 / 6	X	X	X	X		440	DB1 (3000 m / 1720 kg)	DuraFlat DB 6x 10 / 6 mm
DB	12 / 8	X	X	X	X		495	DB1 (2000 m / 1390 kg)	DuraFlat DB 6x 12 / 8 mm
DB	14 / 10	X	X	X	X		580	DB 1 (1500 m / 1270 kg)	DuraFlat DB 6x 14 / 10 mm
DI	16 / 12	X	X	X	X		620	DB1 (1000 m / 1000 kg)	DuraFlat DB 5x 16 / 12 mm
DI	5 / 3.5	X	X	X	X	X	126	MTBDT (1150 m / 170 kg)	DuraFlat DI 7x 5 / 3.5 mm
DI	8 / 5.5	X	X	X	X		245	DB1 (4500 m / 1600 kg)	DuraFlat DI 6x 8 / 5.5 mm
DI	10 / 8	X	X	X	X		315	DB1 (3000 m / 1340 kg)	DuraFlat DI 6x 10 / 8 mm
DI	12 / 10	X	X	X	X		340	DB1 (2000 m / 1080 kg)	DuraFlat DI 6x 12 / 10 mm
DI	14 / 12	X	X	X	X		330	DB1 (1350 m / 950 kg)	DuraFlat DI 5x 14 / 12 mm
DI	16 / 13	X	X	X	X		270	DB1 (3x 1000 m / 1200 kg)	DuraFlat DI 3x 16 / 13 mm
DI	20 / 16	X	X	X	X		591	DB1 (1200 m / 1160 kg)	DuraFlat DI 4x 20 / 16 mm



SITE LAYOUT



PRODUCT OVERVIEW

DuraFlat Connection

Product Group		Catalogue page	Product Group Representative
DuraFlat DB	01	22	
Micro-duct Connector DB	02	36, 37, 39, 43	Robust Reinforced Connector DB
Micro-duct Reducing connector	03	41, 42	Reducing reinforced Connector DB
Micro-duct End Cap	04	44, 45, 46	Robust Reinforced End Cap
Micro-duct Shears		64	
DuraFlat Stripper		65	



DuraFlat

SITE APPLICATIONS



DuraPack

FEATURES & CHARACTERISTICS

Loose bundles of micro-ducts protected in main duct has been proved over the year to be excellent solution for FTTH networks. Individual micro-ducts can be pulled or blown into the sub-duct on site which gives a huge flexibility in CAPEX/OPEX management. On the other hand, DuraPack bundles are produced at a factory and such like saving installation cost & time of micro-duct blowing. The max. number of micro-ducts within the DuraPack bundles is also always higher then what can be achieved by blowing on site.

Since micro-ducts are loose and sub-duct provides excellent impact protection, DuraPack is the least sensitive product to micro-bending & trench quality. The Silicore inner lining remains in the duct for many years which makes future repairs or micro-duct replacement easier.

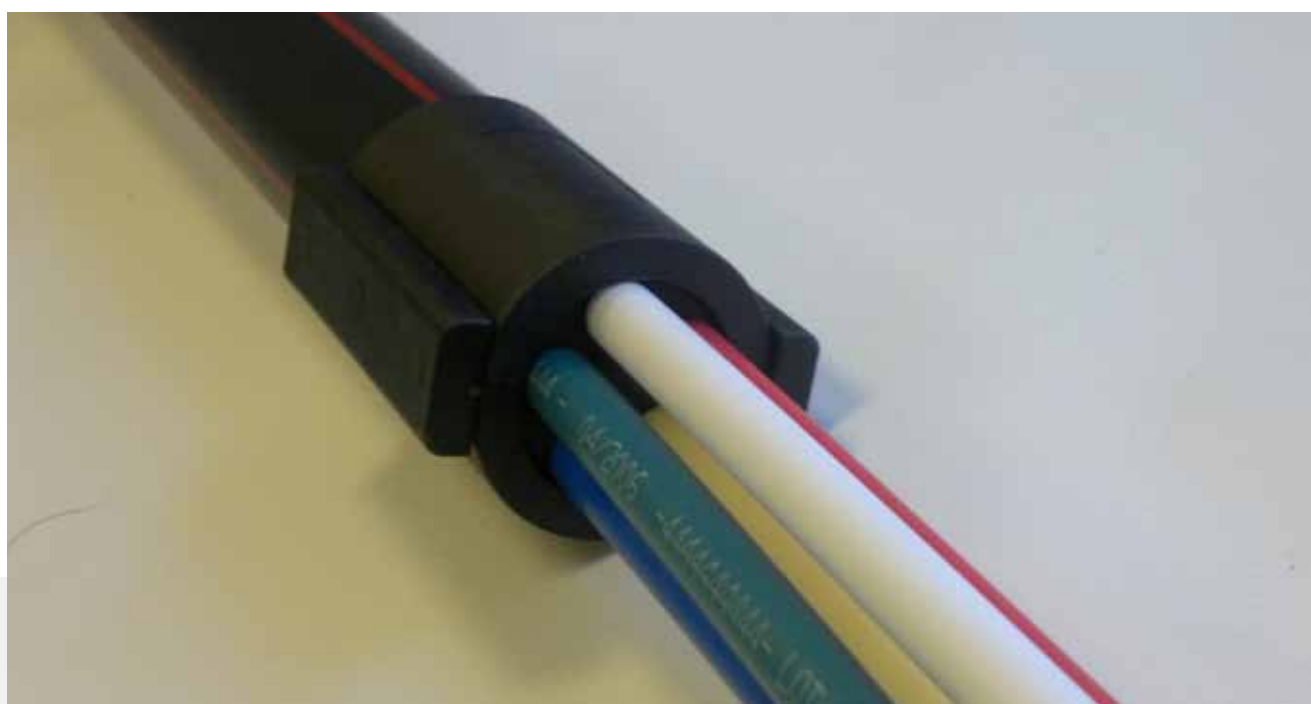
Connection and branching of DuraPacks is done within the special enclosures (see DuraPack installation scheme) which keeps the main duct route clean.

- ✓ Very high flexibility of your network configuration – combinations on request
- ✓ The best impact resistance for micro-duct protection
- ✓ The best cable blowing performance
- ✓ Effectively uses duct space – higher filling ratio compared to blowing on site
- ✓ Future-proof solution - main duct filling can be re-configured

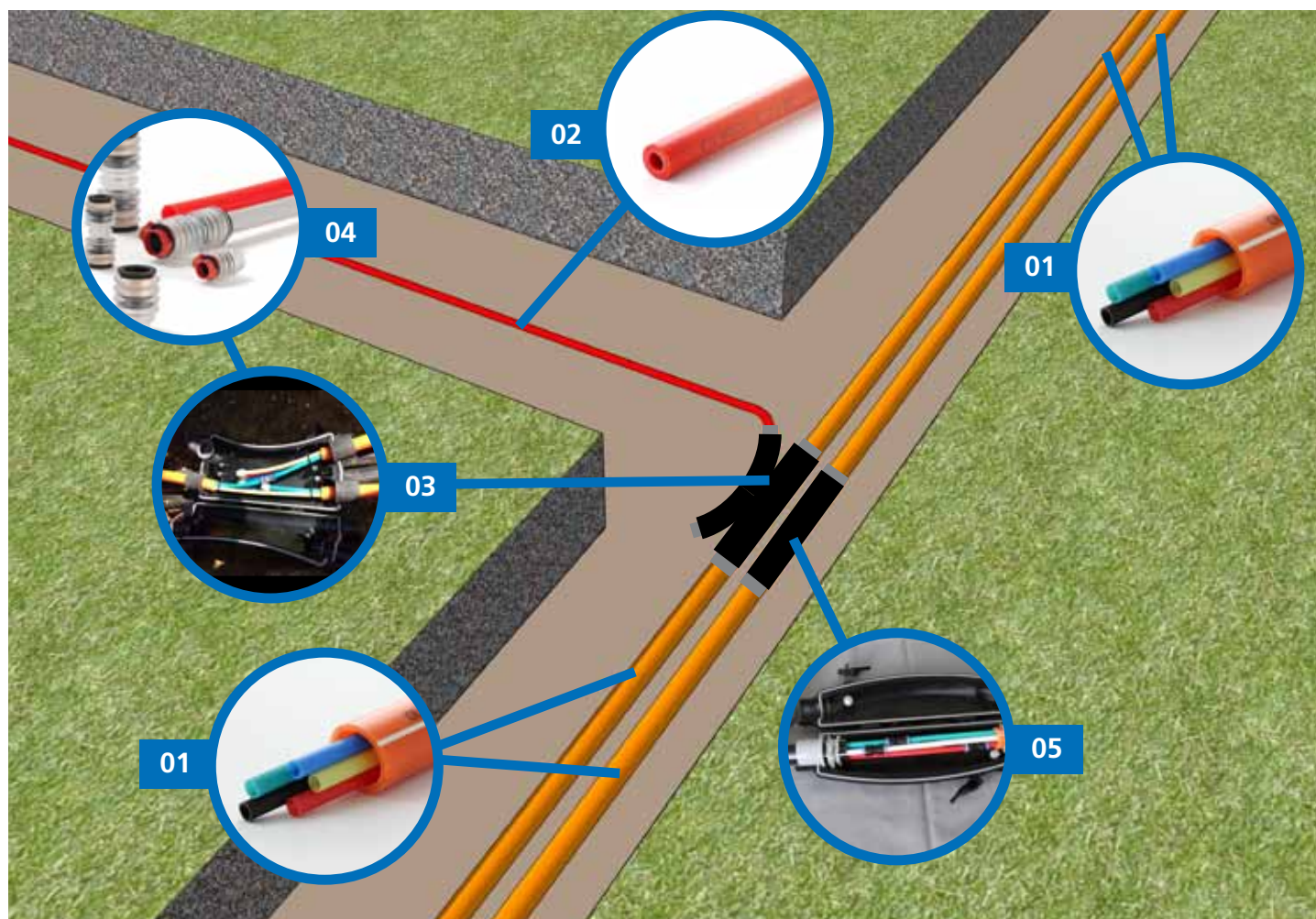


PRODUCT RANGE

Application	SubDuct	Size of micro-ducts: OD [mm]										Standard packaging		
		4	5	7	8	10	12	14	16	18	Weight [kg /km]	Packaging [length /weight]	Product name	
	Maximum number of micro-ducts in the duct													
DB	16 / 12	7	3	1	1						94	MTB DT 900 m / 110 kg	DuraPack DB 16 / 12 + 2x 4 / 3 mm	
DB	25 / 20	12	4	3							187	DB1 4000 m / 1100 kg	DuraPack DB 25 / 20 + 2x 5 / 3.5 mm	
DB	32 / 26	16	8	5	4						372	DB1 2500 m / 1380 kg	DuraPack DB 32 / 26 + 8x 7 / 5,5 mm	
DB	40 / 33	26	13	10	7	4	3				495	DB1 1750 m / 1200 kg	DuraPack DB 40 / 32.8 + 4x 10 / 8 mm	
DB	40 / 33	26	13	10	6	4	3				546	DB1 1750 m / 1500 kg	DuraPack DB 40 / 33 + 6x 10 / 8 mm	
DB	50 / 41	39	20	15	9	6	5	4			839	DB1 1000 m / 1340 kg	DuraPack DB 50 / 40, 6 + 6x 12 / 10 mm	
DB	50 / 41	51	20	15	10	7	5	4			865	DB1 1000 m / 1320 kg	DuraPack DB 50 / 41 + 6x 12 / 10 mm	
DI	25 / 21	13	5	4							178	DB1 4000 m / 1160 kg	DuraPack DI 25 / 21 + 4x 5 / 3.5 mm	
DI	32 / 27	17	9	5	4	3					301	DB1 2000 m / 1050 kg	DuraPack DI 32 / 27 + 3x 10 / 8 mm	
DI	32 / 28	19	9	6	4	3	1				285	DB1 2700 m / 1300 kg	DuraPack DI 32 / 28 + 4x 10 / 8 mm	
DI	40 / 34	27	14	11	7	4	3				520	DB1 1750 m / 1360 kg	DuraPack DI 40 / 34 + 4x 12 / 10 mm	
DI	40 / 35	29	15	11	7	5	3				433	DB1 1750 m / 1210 kg	DuraPack DI 40 / 35 + 6x 10 / 8 mm	
DI	50 / 42	42	21	16	10	7	5	4			754	DB1 1000 m / 1200 kg	DuraPack DI 50 / 42 + 6x 12 / 10 mm	
DI	50 / 43	44	22	17	11	7	5	4	3		592	DB1 1000 m / 1100 kg	DuraPack DI 50 / 43 + 3x 12 / 10 mm	
DI	50 / 44	46	23	18	11	8	5	4	3		597	DB1 1000 m / 1050 kg	DuraPack DI 50 / 44 + 4x 16 / 14 mm	
DI	63 / 55				18	12	9	7	5		1030	DB1 670 m / 1130 kg	DuraPack DI 63 / 55 + 12x 10 / 8 mm	



SITE LAYOUT



PRODUCT OVERVIEW

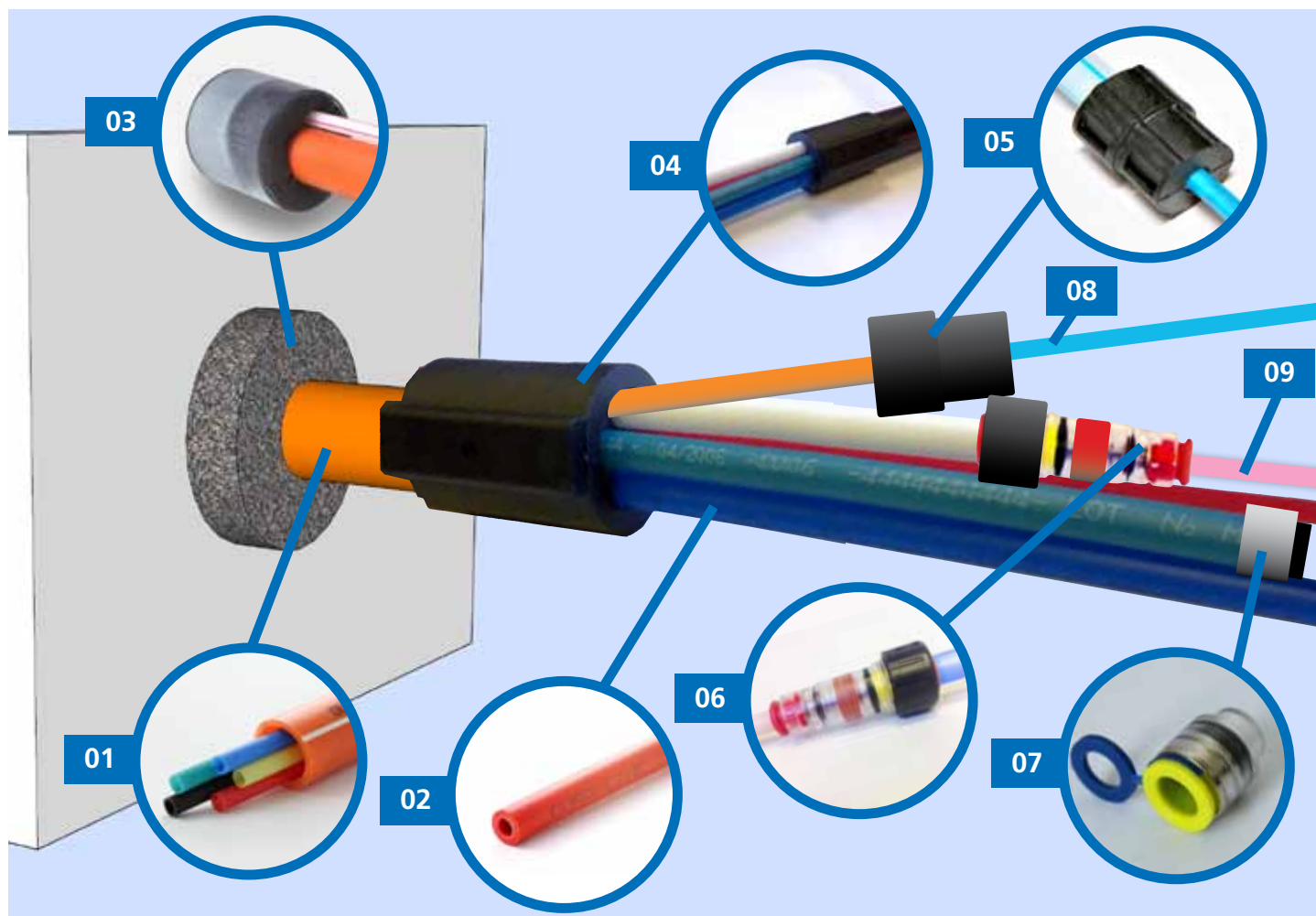
DuraPack Connection

Product Group		Catalogue page	Product Group Representative
DuraPack	01	25	
DuraMicro	02	13	
Bundles Connectivity Closure	03	57, 58, 59, 60	H-Hermetic Derivation Element
Micro-duct Connector DI or DB	04	36, 37, 39, 43	Robust Reinforced Connector DB
Micro-duct End Cap	04	44, 45, 46	Robust Reinforced End Cap
Bundles Connectivity Closure	05	57, 58, 59, 60	Inline Hermetic Element for HDPE (DuraPacks)
Duct Shears		85	
Micro-duct Shears		64	

SITE APPLICATIONS



SITE LAYOUT



PRODUCT OVERVIEW

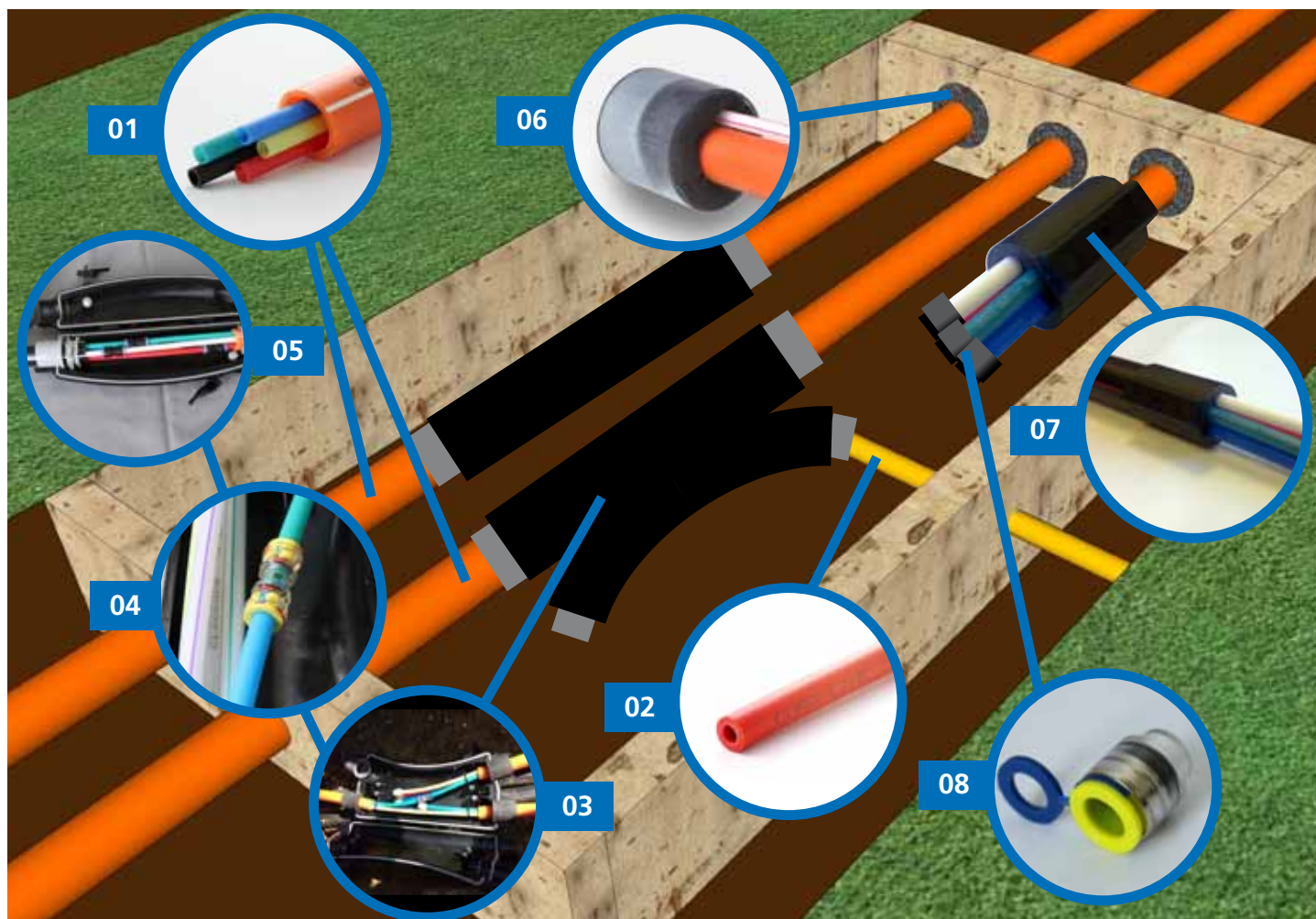
DuraPack Connection

Product Group		Catalogue page	Product Group Representative
DuraPack	01	25	
DuraMicro	02	13	
Duct sealing systems	03	56	MDIII Duct seal
Bundle sealings	04	53	Divisible SD Sealing
Gasblock terminators	05	48, 49, 51, 52	Divisible gasblock
Gasblock connectors	06	50	Gas-block Connector
End caps	07	44, 45, 46	Robust reinforced End Cap
Fibre optic cables	08		
DuraMicro DI LSHF	09		
Micro-duct Shears		64	
Duct Shears		85	

SITE APPLICATIONS



SITE LAYOUT



ACCESSORIES OVERVIEW

DuraPack Connection

Product Group		Catalogue page	Product Group Representative
DuraPack	01	25	
DuraMicro	02	13	
Bundles Connectivity Closure	03	57, 58, 59, 60	H-Hermetic Derivation Element
Micro-duct Connector DI or DB	04	36, 37, 38, 43	Robust Reinforced Connector DB
Micro-duct End Cap	04	44, 45, 46	Robust Reinforced End Cap
Bundles Connectivity Closure	05	57, 58, 59, 60	Inline Hermetic Element for HDPE (DuraPacks)
Duct sealing systems	06	56	MDIII Duct seal
Bundle sealings	07	55	Divisible SD Sealing
Duct Shears		85	
Micro-duct Shears		64	

SITE APPLICATIONS

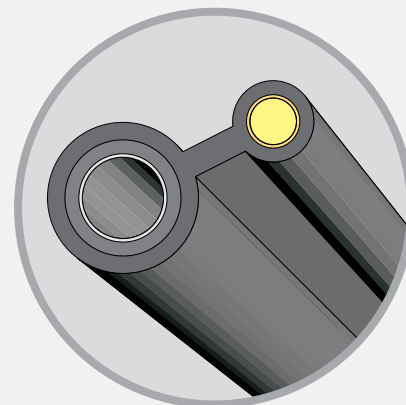


DuraAir

FEATURES & CHARACTERISTICS

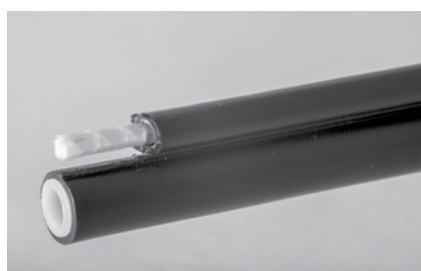
The standard figure 8 construction of our new aerial drop product is lightweight and with minimal visual pollution solution. It is easy to install, with only very low stringing tension required. DuraAir F8 withstands also some extreme overloads due to the severe weather conditions. Using Push-Fit connectors it will easily become part of your micro-duct based FTTH network with quick one-step cable blowing operation.

- ✓ Lightweight future-proof solution
- ✓ Standard Figure 8 construction, metal free
- ✓ High UV resistance (at least 15 years guaranteed)
- ✓ Standard aerial accessories
- ✓ Tested & Certified – vibration test, tension test
- ✓ Compliance with EN 60794



PRODUCT RANGE

Construction	Configuration	Weight [kg/km]	Packaging [length/weight]
Figure 8	1x MD 5 / 3.5		37 MTB DT 4000 m / 174 kg
Figure 8	1x MD 10 / 8		71 MTB DT 1650 m / 147 kg
Figure 9	1x MD 14 / 12		92 MTB DT 1000 m / 118 kg
Figure 8	1x SD 20 / 16		142DB1 6500 m / 1200 kg
Figure 8	2x MD 12 / 10		210DB1 5800 m / 1620 kg
Figure 8	3x MD 12 / 10		280DB1 4500 m / 1750 kg
Figure 8	4x MD 12 / 10		450DB1 2400 m / 1500 kg
Figure 8	12x MD 5 / 3.5 + 1x10 / 8		



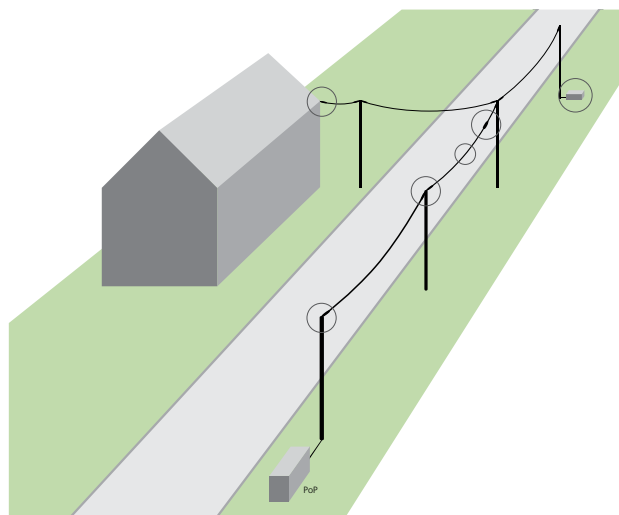
Typical application

- ✓ Span: max 50 m
- ✓ Sag: Usually the average sag is set up at 1 % of the average span at 15 or 20 °C.
For instance, given an average span of 50 meters, the sag would be 0.5 m
- ✓ Tension very small, for 50 m span & 0.5 m sag, TENSION = 30 daN



Tension Calculation

$$\text{Tension} = \frac{(\text{Weight}_D + \text{Weight}_C) \times (\text{Span})^2}{8 \times \text{Sag}}$$



DuraAir F8 5/3.5	Temperature at time of installation °C	Sag	Installation force [N] at a span length in meters of				
			30 m	40 m	50 m	60 m	70 m
	20	1 %	176 N	235 N	293 N	352 N	410 N

Sag according to span between poles, including cable of 3 kg/km weight.

Accessories



SC37C Suspension clamp



BQC12x50 Pigtail hook



AC35 260 Anchoring clamp



UPB Universal PoleBracket



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