

Enterprise

End to End Solutions



What's important in a communications network?

AS BANDWIDTH REQUIREMENTS are increasing at unpredictable rates, designing networks that can keep pace with the rapid changes are challenging. Enterprise Networks designed with jetted fiber solutions, including FuturePath and MicroDucts from Dura-Line, specially designed fiber cables, and air-jetting machines, take network design, architecture, and installation to a new level. Spread the investment of building the network over time, as the need grows. Moves, adds and changes are easily accommodated. Future expansions are possible with multiple pathways in place. Communication networks in facilities such as hospitals, corporate campuses, manufacturing facilities, data centers and broadcast studios are now using jetted fiber solutions and are experiencing the scalable, flexible, and financial advantages!

How does jetted fiber work?

Jetted fiber is a complete solution that utilizes multi-celled flexible conduit with a MicroCable designed for optimal performance in air-jetting situations. The solution allows for placing a pathway and installing only the fiber needed to meet current bandwidth requirements, while remaining scalable to easily accommodate larger fiber demands in the future.

- **Limit Capital Investment:** Only install fiber needed today. No need to "predict" future bandwidth or install, terminate and test dark or unused fibers.
- **Multi-Celled FuturePath:** increase the number of pathways for both today and future use. Eliminate right-of-way access issues and problems with limited duct space.
- **Jetted Fiber Solution Network Design:** allow jetting end-to-end limiting mid-span entries and prevent future disruptions (pathway is already in place, just add or remove fiber as needed).
- **Easy to Upgrade or Move, Add or Change:** With a pathway in place, it's easy to jet in additional fiber, remove or replace fiber. Take advantage of new fiber technology as it's introduced.



What makes Dura-Line MicroDucts different?

DURA-LINE HAS A PROPRIETARY SOLUTION to overcome friction. Cable installation difficulty is directly proportional to the route of the conduit. Straight paths are easiest, however, real-life installs rarely have straight paths. Bends and turns in the pathways cause friction spots along the route. Lubricants were developed to help overcome the friction challenges. Over time, lubricants dissipate, causing direct contact between the cable and the conduit. That contact not only makes the install difficult, but can damage the cable. In conduits with SILICORE™ or SuperSILICORE™, the cable remains in contact with the slippery lining, reducing the friction, avoiding burn through with easier and longer cable installs.

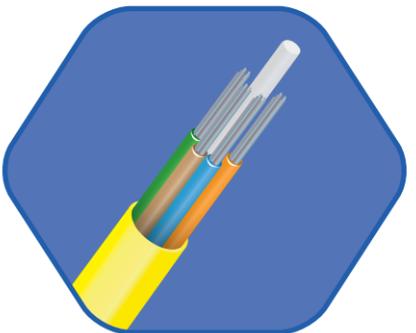
SILICORE or SuperSILICORE is co-extruded on the inside of Dura-Line MicroDucts. The reduced friction provides higher speed cable jetting and longer cable install distances. The permanent pathway remains for future repairs, replacements or upgrades.

What are jetted fiber solution components?



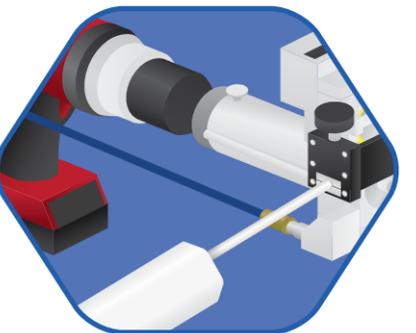
MicroDucts

- MicroDucts, either single or bundled as FuturePath (up to 24 MicroDucts)
- Riser, Plenum, LSZH or HDPE/OSP material
- Armored configuration available for protection from rodents or harsh environments
- SILICORE™ and SuperSILICORE™ for fast fiber installations



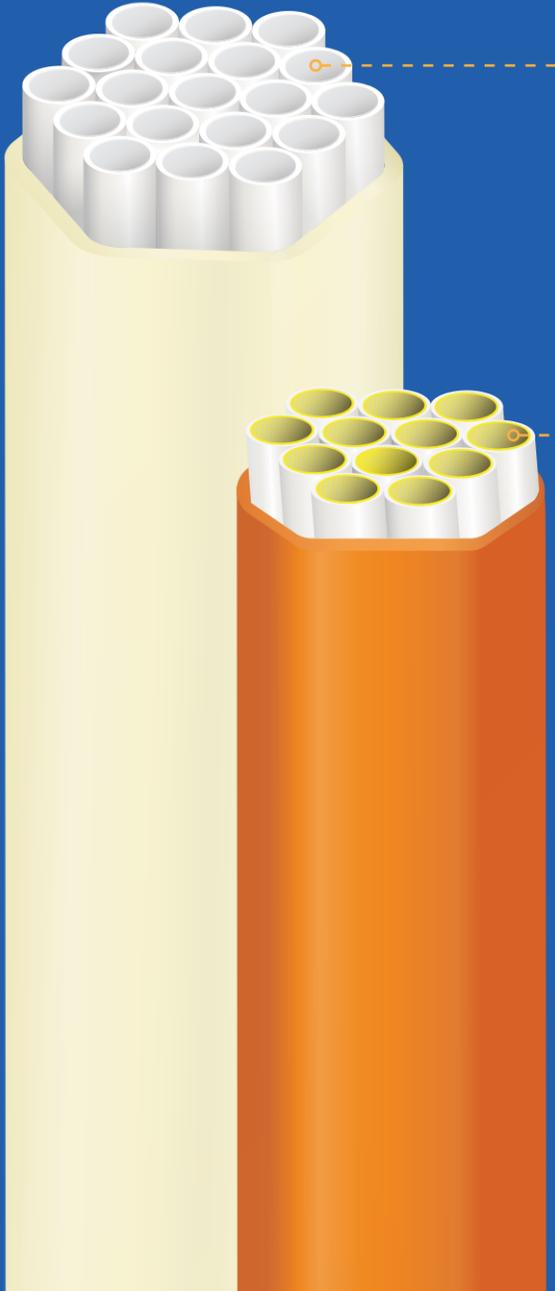
MicroCable

- Fiber counts range from 2-96 strands
- Jettable indoor/outdoor rated fiber
- Available in SMF and MMF (OM1, OM3, OM4)
- Fully GR-409 Compliant (TIA/EIA 568-C and ANSI/ICEA)
- NEC/NFPA Flame Rated (Riser and Plenum)
- Water-blocking feature inside cable
- Ribbon options available



Jetting Equipment

- Handheld units, powered by standard cordless or corded drills
- "Air-assisted" jetting distances of up to 3,000 feet are possible
- Installation speeds of 150-200 feet/min are typical
- Easily and quickly installed by small crews of 3 people or less

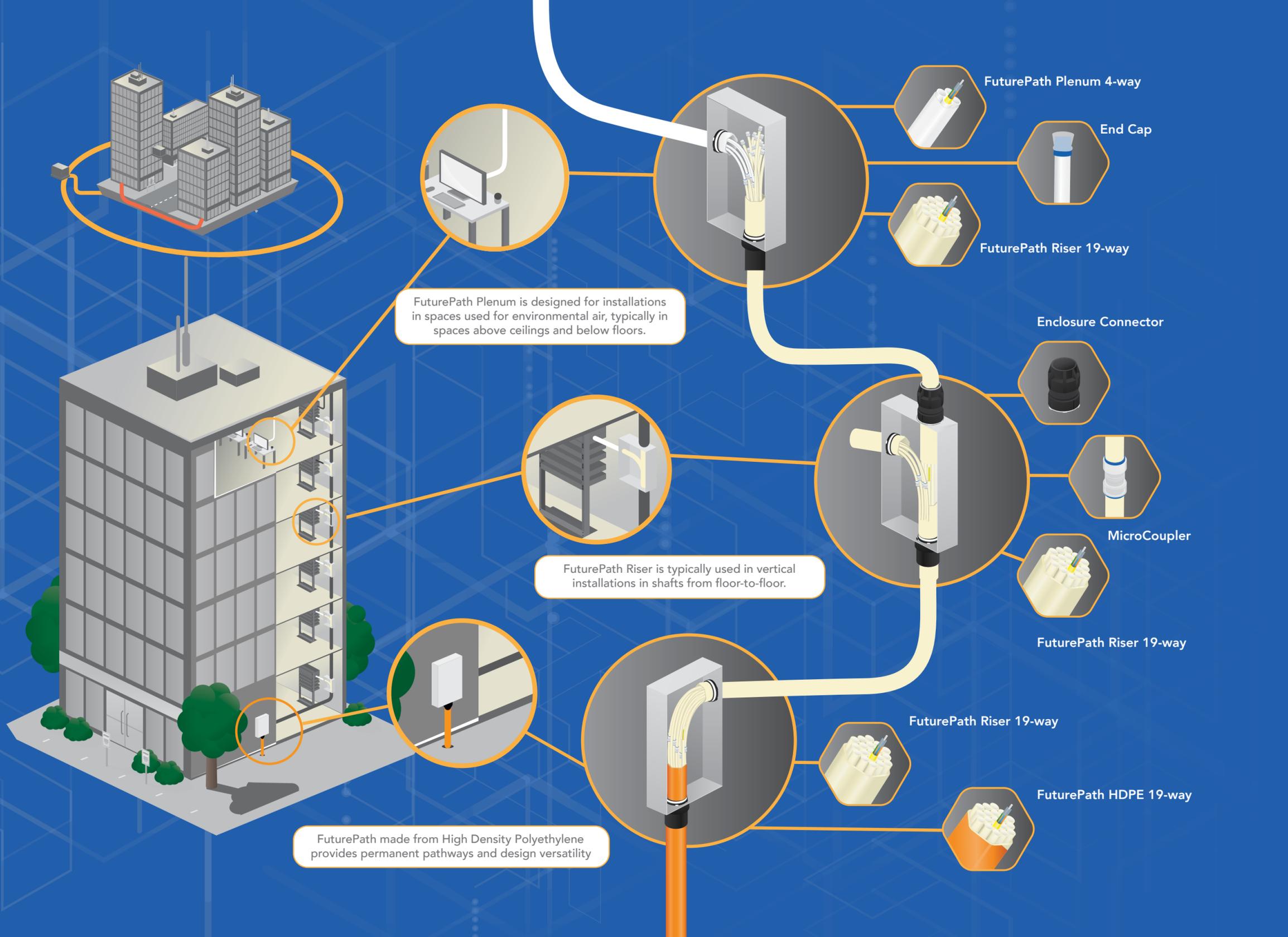


SILICORE™

- Standard on Riser and Plenum products
- Permanent - remains unchanged for life of MicroDuct
- Easier and faster cable installations
- Compatible with any cable jacket
- Identifiable by its bright white color

SuperSILICORE™

- Standard on all HDPE/OSP MicroDucts
- Super slippery interior lining
- Permanent - remains unchanged for life of MicroDuct
- Easiest, fastest, and farthest cable installs
- Lowest co-efficient of friction
- Compatible with any cable jacket
- Identifiable by its bright yellow color



Build a design that is Flexible, Scalable, Smart.

Complete Indoor/Outdoor Solution

Take your network from outside to inside the building. Transition from HDPE/OSP MicroDucts to Riser MicroDucts inside a MicroDuct Distribution Box. No need for splicing OSP fiber to indoor fiber. With a complete range of accessories, network construction is simple. Quick, easy-to-use push-on couplers join MicroDucts with an air and watertight seal. Once the pathway is in place, jet in the fiber you need in a matter of minutes. Flexible, Scalable, Smart.

Pathway Design

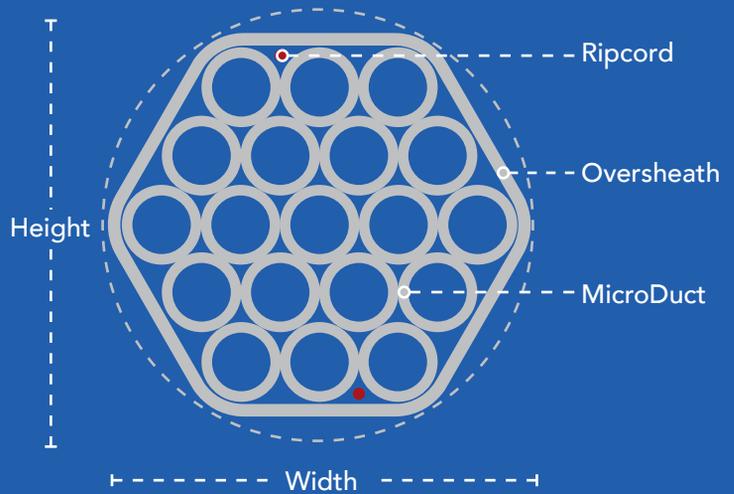
Enterprise Networks are private networks that may pass from building to building, as well as run throughout the inside of the building. To accommodate the different spaces, the pathway handles the transitions from HDPE to Riser to Plenum. The MicroCable fiber is an indoor/outdoor cable that can be utilized throughout all the transitions.

Components Used

- | | | | |
|---------------------------------------------------------------------------------------|----------------------------------|---------------------------------------------------------------------------------------|------------------------------|
|  | FuturePath HDPE 19-way
p. 11 |  | MicroCoupler
p. 17 |
|  | FuturePath Riser 19-way
p. 12 |  | End Cap
p. 17 |
|  | FuturePath Plenum 4-way
p. 13 |  | Enclosure Connector
p. 19 |

MicroDucts and FuturePath

FUTUREPATH IS AVAILABLE in a variety of sizes and configurations to suit your network installation needs. Available materials are HDPE, Riser, LSHF, Plenum and Armored. MicroDucts are 8.5mm in outer diameter and 6mm inner diameter. Configurations from single MicroDucts to 24 pathways will allow for rapid deployment of fiber today with permanent pathways in place for future growth.



Materials

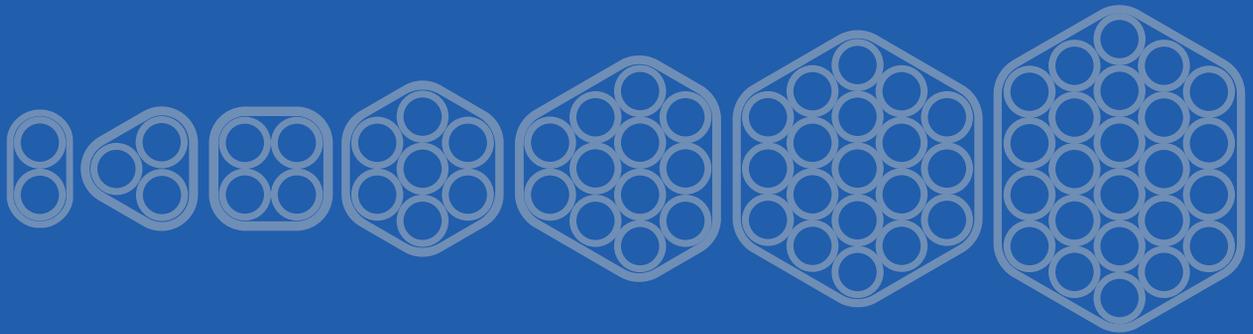
- HDPE
- Riser
- Plenum
- LSZH
- Armored

Packaging

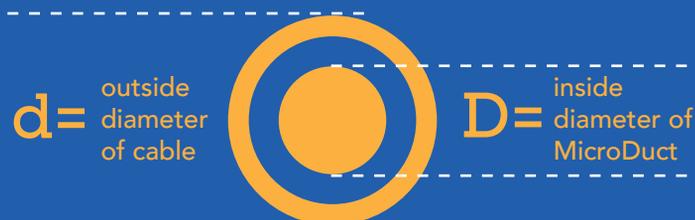
- Up to 6,000 feet per reel
- Custom lengths available
- MicroDucts consecutively numbered and printed every 2 inches

Fiber Capacity per MicroDuct

- Range from 2 to 96 strand MicroCable
- SM, MM
- Fibers up to 4.5mm OD



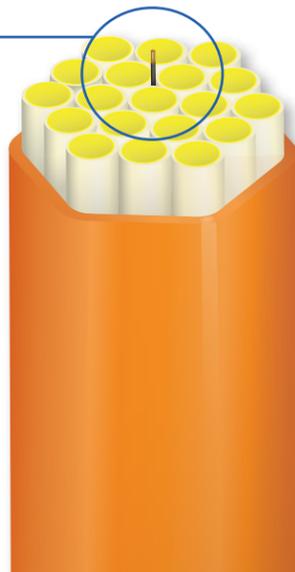
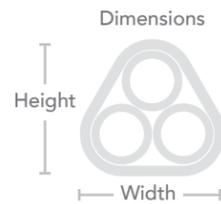
Calculate $(d/D) \times 100 = \% \text{ Cable Fill Ratio}$



To calculate the fill ratio, divide the cable diameter (d) by the interior dimension (D) of the MicroDuct. To achieve maximum jetting performances, Dura-Line recommends a fill ratio between 50% and 75%. Several factors impact jetting performance, including the condition of route, bends, and equipment.

FuturePath HDPE 8.5/6mm w/Tracer Specifications

- Orange oversheath with natural MicroDucts
- Includes 20 gauge locate wire
- All conduits produced to GR-3155-CORE
- HDPE Temperature Range: -40°F to +180°F (-40°C to +82°C)
- Ripcords: 1 per 2-way; 2 all others



MICRODUCT SPECIFICATIONS	
NOM OD (MM/IN)	8.5/0.33
MIN ID (MM/IN)	5.9/0.23
WEIGHT (LB/FT)	0.018
BEND RADIUS SUP (IN)	3
BEND RADIUS UNSUP (IN)	7
SWPS† (LBS)	96

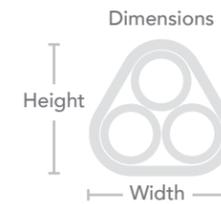
	2-WAY	3-WAY	4-WAY	7-WAY	12-WAY	19-WAY	24-WAY
DIMENSIONS H x W (IN)	0.44 x 0.77	0.75 x 0.79	0.79/0.93	1.04 x 1.13	1.33 x 1.46	1.62 x 1.80	1.62 x 2.13
NOM OD (IN)	0.77	0.85	0.93	1.13	1.48	1.80	2.13
OVERSHEATH THICKNESS (IN)	0.05	0.06	0.06	0.06	0.06	0.06	0.06
OSP LOCATE WIRE	20 ga	20 ga	20 ga	20 ga	20 ga	20 ga	20 ga
WEIGHT/FT (LBS)	0.075	0.110	0.136	0.207	0.322	0.472	0.579
BEND RADIUS SUP (IN)	5	8	8	11	14	16	16
BEND RADIUS UNSUP (IN)	10	16	16	22	28	32	32
SWPS† (LBS)	404	593	733	1,112	1,727	2,528	3,099

PART NUMBERS							
1,000'	10008038	10009422	10009423	10008044	10009425	10009428	10009429
2,500'	10009435	10009436	10009424	10009431	10009426	10009189	10009434
5,000' *6,000'	10009421	10009437	10009438	10009439	10009427	10009433 *10009432	10009430

*Unsupported Bend Radius guidelines should be followed during the installation process. The Supported Bend Radius are post-installation measurements.
†Safe Working Pull Strength (SWPS) is calculated at 80% of tensile or breaking strength.

FuturePath HDPE 8.5/6mm Specifications

- Orange oversheath with natural MicroDucts
- Non-locatable version
- All conduits produced to GR-3155-CORE
- HDPE Temperature Range: -40°F to +180°F (-40°C to +82°C)
- Ripcords: 1 per 2-way; 2 all others



MICRODUCT SPECIFICATIONS	
NOM OD (MM/IN)	8.5/0.33
MIN ID (MM/IN)	5.9/0.23
WEIGHT (LB/FT)	0.018
BEND RADIUS SUP (IN)	3
BEND RADIUS UNSUP (IN)	7
SWPS† (LBS)	96

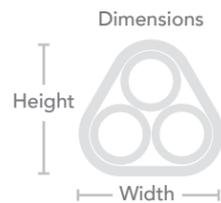
	2-WAY	3-WAY	4-WAY	7-WAY	12-WAY	19-WAY	24-WAY
DIMENSIONS H x W (IN)	0.44 x 0.77	0.75 x 0.79	0.79 x 0.93	1.04 x 1.13	1.33 x 1.46	1.62 x 1.80	1.62 x 2.13
NOM OD (IN)	0.77	0.85	0.93	1.13	1.48	1.80	2.13
OVERSHEATH THICKNESS (IN)	0.05	0.06	0.06	0.06	0.06	0.06	0.06
WEIGHT/FT (LBS)	0.075	0.110	0.136	0.207	0.322	0.472	0.579
BEND RADIUS SUP (IN)	5	8	8	11	14	16	16
BEND RADIUS UNSUP (IN)	10	16	16	22	28	32	32
SWPS† (LBS)	404	593	733	1,112	1,727	2,528	3,099

PART NUMBERS							
1,000'	10004625	10004654	10004655	10004659	10004662	10004665	10004668
2,500'	10008884	10008885	10004656	10004874	10004663	10008882	10008883
5,000' *6,000'	10004624	10008886	10008887	*10008888	*10004664	*10006770	*10004669

*Unsupported Bend Radius guidelines should be followed during the installation process. The Supported Bend Radius are post-installation measurements.
†Safe Working Pull Strength (SWPS) is calculated at 80% of tensile or breaking strength.

FuturePath Riser 8.5/6mm Specifications

- Dull yellow oversheath and MicroDucts
- All conduits produced to GR-3155-CORE
- ETL LISTED UL 2024 & CSA C22.2 No.262-04 and UL-94 V-2 & CSA FT4
- Riser Temperature Range: -40°F to +180°F (-40°C to +82°C)
- Ripcords: 1 per 2-way; 2 all others



MICRODUCT SPECIFICATIONS	
NOM OD (MM/IN)	8.5/0.34
MIN ID (MM/IN)	5.9/0.23
WEIGHT (LB/FT)	0.022
BEND RADIUS SUP (IN)	3
BEND RADIUS UNSUP (IN)	7
SWPS† (LBS)	89

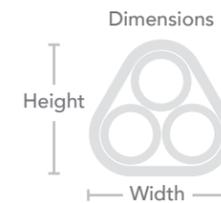
	2-WAY	3-WAY	4-WAY	7-WAY	12-WAY	19-WAY	24-WAY
DIMENSIONS H x W (IN)	0.44 x 0.77	0.75 x 0.79	0.79 x 0.93	1.04 x 1.13	1.33 x 1.46	1.62 x 1.80	1.62 x 2.13
NOM OD (IN)	0.77	0.85	0.93	1.13	1.48	1.80	2.13
OVERSHEATH THICKNESS (IN)	0.050	0.060	0.060	0.060	0.060	0.060	0.060
WEIGHT/FT (LBS)	0.091	0.134	0.165	0.251	0.392	0.576	0.706
MIN BEND RADIUS SUP (IN)	5	8	8	11	14	16	16
MIN BEND RADIUS UNSUP (IN)	10	16	16	22	28	32	32
SWPS† (LBS)	419	615	749	1,119	1,724	2,502	3,050

PART NUMBERS							
1,000'	10004866	10008987	10004591	10004592	10004596	10004599	10004601
2,500'	10004586	10008988	10004867	10008992	10008979	10008981	10008984
5,000' *6,000'	10008986	10008989	10008990	*10004594	*10008980	*10008982	*10008985

*Unsupported Bend Radius guidelines should be followed during the installation process. The Supported Bend Radius are post-installation measurements.
 †Safe Working Pull Strength (SWPS) is calculated at 80% of tensile or breaking strength.

FuturePath Plenum 8.5/6mm Specifications

- Opaque white oversheath and MicroDucts
- All conduits produced to GR-3155-CORE
- ETL LISTED UL 2024 & CSA C22.2 No.262-04 and UL-94 V-0 & CSA FT6
- Plenum Temperature Range: -30°F to +165°F (-34°C to +74°C)
- Ripcords: 1 per 2-way; 2 all others



MICRODUCT SPECIFICATIONS	
NOM OD (MM/IN)	8.5/0.34
MIN ID (MM/IN)	6.7/0.26
WEIGHT (LB/FT)	0.024
BEND RADIUS SUP (IN)	3
BEND RADIUS UNSUP (IN)	7
SWPS† (LBS)	89

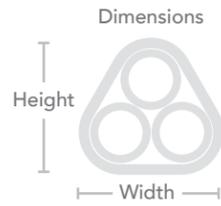
	2-WAY	3-WAY	4-WAY	7-WAY	12-WAY	19-WAY	24-WAY
DIMENSIONS H x W (IN)	0.38 x 0.71	0.67 x 0.71	0.71 x 0.85	0.97 x 1.06	1.26 x 1.39	1.56 x 1.74	1.56 x 2.07
NOM OD (IN)	0.71	0.77	0.85	1.06	1.41	1.74	2.07
OVERSHEATH THICKNESS (IN)	0.020	0.020	0.020	0.025	0.025	0.030	0.030
WEIGHT/FT (LBS)	0.076	0.106	0.134	0.229	0.369	0.577	0.713
MIN BEND RADIUS SUP (IN)	4	7	8	10	14	16	16
MIN BEND RADIUS UNSUP (IN)	8	14	16	20	28	32	32
SWPS† (LBS)	377	508	626	1,057	1,644	2,552	3,111

PART NUMBERS							
1,000'	10004851	10008950	10004853	10004856	10004857	10004858	10004859
2,500'	10010091	10010095	10010092	10010097	10010099	10010101	10010103
5,000' *6,000'	10010093	10010096	10010094	10010098	10010100	10010102	10010103

*Unsupported Bend Radius guidelines should be followed during the installation process. The Supported Bend Radius are post-installation measurements.
 †Safe Working Pull Strength (SWPS) is calculated at 80% of tensile or breaking strength.

FuturePath LSZH 8.5/6mm Specifications

- Chalky white oversheath and MicroDucts
- ETL verified to UL1685-4, IEC 60754-1, IEEE-1202, NFPA-130
- Ripcords: 1 per 2-way; 2 all others



MICRODUCT SPECIFICATIONS	
NOM OD (MM/IN)	8.5/0.34
MIN ID (MM/IN)	5.9/0.23
WEIGHT (LB/FT)	0.022
BEND RADIUS SUP (IN)	3
BEND RADIUS UNSUP (IN)	7
SWPS† (LBS)	89

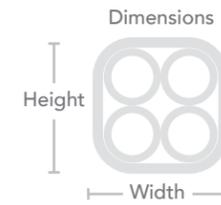
	2-WAY	3-WAY	4-WAY	7-WAY	12-WAY	19-WAY	24-WAY
DIMENSIONS H x W (IN)	0.44 x 0.77	0.75 x 0.79	0.79 x 0.79	1.04 x 1.13	1.33 x 1.46	1.62 x 1.80	1.62 x 2.13
NOM OD (IN)	0.77	0.85	0.93	1.13	1.48	1.8	2.13
OVERSHEATH THICKNESS (IN)	0.05	0.06	0.06	0.06	0.06	0.06	0.06
WEIGHT/FT (LBS)	0.088	0.129	0.159	0.242	0.376	0.553	0.647
MIN BEND RADIUS SUP (IN)	5	8	8	11	14	16	16
MIN BEND RADIUS UNSUP (IN)	10	16	16	22	28	32	32
SWPS† (LBS)	354	518	634	951	1,461	2,127	2,567

PART NUMBERS							
1,000'	10008934	10008937	10008940	10008943	10008925	10008928	10008931
2,500'	10008935	10008938	10008941	10008944	10008926	10008929	10008932
5,000' *6,000'	10008936	10008939	10008942	*10008945	*10008927	*10008930	*10008933

*Unsupported Bend Radius guidelines should be followed during the installation process. The Supported Bend Radius are post-installation measurements.
†Safe Working Pull Strength (SWPS) is calculated at 80% of tensile or breaking strength.

FuturePath Armored 8.5/6mm Specifications

- Encased in Zetabon™ steel armor for protection from rodents or harsh environments
- Superior mechanical protection against rodents, ballistics, crush, chemicals, moisture penetration and ground or soil heave
- Ripcords for easy opening of inner sheath



MICRODUCT SPECIFICATIONS	
NOM OD (MM/IN)	8.5/0.33
MIN ID (MM/IN)	5.9/0.23
WEIGHT (LB/FT)	0.018
BEND RADIUS SUP (IN)	3
BEND RADIUS UNSUP (IN)	7
SWPS† (LBS)	96

	4-WAY	7-WAY	19-WAY
NOM OD (IN)	1.11	1.31	1.98
OVERSHEATH THICKNESS (IN)	0.06	0.06	0.06
WEIGHT/FT (LBS)	0.23	0.319	0.645
MIN BEND RADIUS SUP (IN)	11	13	20
MIN BEND RADIUS UNSUP (IN)	22	26	40
SWPS† (LBS)	1,246	1,724	3,473

PART NUMBERS			
4,000'	10004888	10004889	10004890

*Unsupported Bend Radius guidelines should be followed during the installation process. The Supported Bend Radius are post-installation measurements.
†Safe Working Pull Strength (SWPS) is calculated at 80% of tensile or breaking strength.

Jetting Equipment

JETTING EQUIPMENT IS THE DRIVING FORCE in the jetted fiber solution. From simple handheld units powered by variable speed drills to pneumatic and hydraulic powered machines, there are a variety of choices to fit your installation needs. The choice of jetting equipment is determined by the size of the cable to be placed and the outer diameter of the pathway. All machines have ranges of optimal performance as well as components to adapt to specific cable and conduit diameters.

The following is a list of industry-recognized manufacturers you can contact regarding the sale/rental/leasing of their jetting equipment offerings compatible for air jetting cables into the Dura-Line MicroDuct products. Be sure to provide the following information:

- Cable OD & Fiber count
- Dura-Line FuturePath MicroDuct size (e.g., 8.5/6mm, 12.7/10mm, etc.)
- Any other MicroDuct sizes being used (e.g., 8/6mm, 10/8mm, etc.)




Plumettaz America Corporation
 Soddy Daisy, TN 37379
 1-855-PLUMETT (758-6388)
 ussales@plumettaz.com




GMP (General Machine Products (KT), LLC)
 Trevese, PA 19053
 (215) 630-2366
 www.gmptools.com




Condux International
 Mankato, MN 56001
 (800) 533-2077
 www.condux.com




Jameson
 (800) 346-1956
 www.spartacogroup.com/resources/fiber-blowing-machines-product-brochures/

Popular Accessories

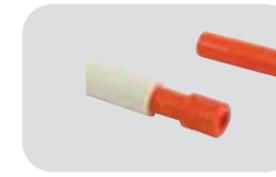
DURA-LINE OFFERS A COMPLETE LINE of Accessories designed to make your jetted cable installation successful. Highlighted below are a few of our most popular products. Please visit our website or contact your sales representative for more details.



Coupler



End Cap



End Plug



Gas Block Connector

MicroCouplers and End Caps

- MicroCouplers are used to join two segments of MicroDucts; Straight and Transition Couplers are available
- End Caps and End Plugs keep MicroDucts clean and free of debris
- Gas Block Connectors provide a simple and effective gas seal between the MicroDuct and the fiber cable

DESCRIPTION	PART #
8.5mm Straight Coupler	20001834
8.5mm x 8mm Transition Coupler	20001884
8.5mm x 5mm Transition Coupler	20001883
10mm x 8.5mm Transition Coupler	20001881
8.5mm End Cap	20001819
8.5 End Plug (for Riser only)	20001523
8.5/6mm Gas Block Connector for Cable 3.3-4.0mm	20002104

Popular Accessories



Round MicroDuct Cutter



Straight MicroDuct Cutter



Ratchet Cutter

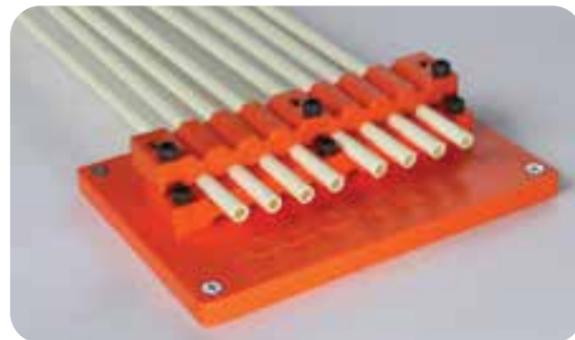


Longitudinal Sheath Slitter

MicroDuct Cutters

Using the correct tool for the job makes all the difference. Choose from a variety of cutters designed with a special purpose in mind – making the job go safely, smoothly, and quickly.

DESCRIPTION	PART #
MicroDuct Round Cutter	20001745
MicroDuct Straight Cutter	20001856
Ratchet Cutter for 3/4" to 1-1/2" Conduit	20001923
Ratchet Cutter for 2" Conduit	20001803
Longitudinal Sheath Slitter	20003768



MicroDuct Mounting Bracket

- Expandable modular system designed to organize multiple MicroDucts at termination
- Small and compact, requiring a minimum amount of mounting space
- Additional brackets can be added as needed; when ordering the Wall Mounting Plate Kit, please note you will also need to order a Top Mounting Bracket to complete the first row

DESCRIPTION	PKG	COLOR	PART #
8.5mm MicroDuct Wall Mounting Plate Kit (Secures a row of 8 MicroDucts. Includes wall plate, base bracket, and 3 screws, top mounting bracket not included)	each	orange	20002120
8.5mm MicroDuct Top Mounting Bracket (each bracket secures a row of 8 MicroDucts, with 3 screws)	each	orange	20001719



MicroDuct Distribution Box

The MicroDuct Distribution Box or MDB is a convenient indoor junction box where multiple MicroDucts can be joined together. For example, this would be used to drop a tube to an adjacent floor, while allowing other MicroDucts to pass through to the next MDB. The NEMA 12 box is a continuous hinge wall mount type box available in two sizes listed below. The box is used in conjunction with the FuturePath enclosure connectors.

DESCRIPTION	CONFIGURATION	PART #
Box 16x14x8 NEMA 12 JIC 1 Door Continuous Hinge Wall Mount - MDB	16 x 14 x 8 NEMA 12	20002884
Box 20x20x7 NEMA 12 JIC 1 Door Continuous Hinge Wall Mount - MDB	20 x 20 x 7 NEMA 12	20003021



FuturePath Enclosure Connectors

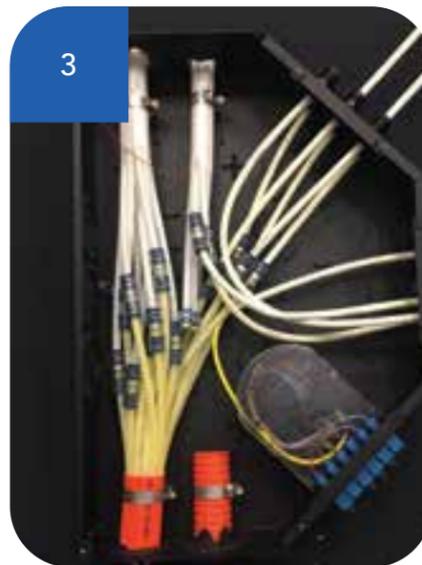
CONFIGURATION	PART #
Enclosure Connector 8.5mm single	20003048
Enclosure Connector 8.5mm 2-way	20001915
Enclosure Connector 8.5mm 3-way	20003049
Enclosure Connector 8.5mm 4-way	20001916
Enclosure Connector 8.5mm 7-way	20001917
Enclosure Connector 8.5mm 12-way	20001918
Enclosure Connector 8.5mm 19-way	20001919
Enclosure Connector 8.5mm 24-way	20001920



1



2



3



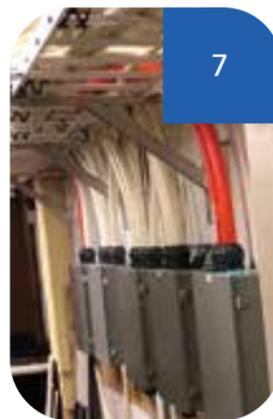
4



5



6



7



8

1. Air jetting MicroCable into MicroDuct.
2. Well-organized pathways secured by MicroDuct Mounting Brackets.
3. MicroDuct Distribution System (MDS) Enclosure with combined MicroDuct routing and fiber termination.
4. FuturePath Riser passing through wall penetration and fire stop.
5. MicroDucts connecting in Distribution Box.
6. FuturePath routing inside building in cable trays.
7. FuturePath utilizing FuturePath Enclosure Connector into MicroDuct Distribution Box.
8. Pressure testing MicroDuct pathway prior to jetting fiber.



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