PRODUCT **SOLUTIONS**

dura-line

Dura-Line is TRANSFORMING the Structure of Communication

TECHNOLOGY, DATA, AND CONSTANT COMMUNICATION are more intertwined with our daily lives than ever before in human history. As technology advances in the next decade, the Internet of Things (IoT) and the 4th Industrial Revolution will bring 50 billion devices online and provide access to the internet to the rest of the world's population.

Dura-Line provides the essential infrastructure to make this possible. Our products are designed to provide protection and fast, safe installation of communication networks and power cables for a wide variety of markets, including telecommunications, enterprise networking, energy, and transportation. Through our innovative product solutions and unparalleled customer insight, Dura-Line creates what connects us.

We started out in the U.S. as a small extrusion company in Middlesboro, Kentucky, but have grown to 18 locations worldwide, including Canada, India, Oman, and Europe. Our staff of highly trained and specialized engineers have been hands-on problem-solving with the telecommunications industry since the dawn of cell phones. Dura-Line is at the forefront of the industry creating strategic solutions that solve the issue of the unpredictable needs of tomorrow's fiber cable requirements.

a brief history of **DURA-LINE**

1971
Founded in Middlesboro, KY, manufacturing water and gas products

1981
First to develop and offer conduit to the telecom industry

1981
First manufacturer of fiber optic subduct and duct with pre-installed Bull-Line® pull tape

1985
First manufacturer to offer all major types of ducts including: Smoothwall, ribbed, corrugated, pre-installed fiber cable, pre-lubricated conduit, and fire-retardant conduit

1986
Introduced SILICORE® super slick permanent lining

1991
First ISO 9001 Certification

1998
Introduced PinPoint® locatable duct and MicroDucts

1999
Introduced FuturePath® (bundled MicroDucts)

2003
Introduced fire-retardant MicroDucts

2005
Introduced FuturePath® Flex, fire-retardant FuturePath®, CIC, MicroDucts

2012
Total of 18 manufacturing facilities worldwide. Introduced new formulation SuperSILICORE®. TL 9000 Certification

2018
Introduced FuturePath® Figure-8 Self-Support Aerial and LSZH conduit and MicroDucts

2022 and beyond
At our R&D Center in Clinton, TN, we are constantly innovating new products and solutions like our recently launched SILICORE® ULF

Manufacturing Responsibly

EACH OF OUR PRECIOUS resources are finite. We aren't perfect, but every day we try to get better, more efficient, and to be part of a company that is best for the world. Working in an environmentally-friendly and ecologically-responsible manner, which helps protect the environment and sustain it for current and future generations, is intrinsic in our culture and a message we gladly share with the rest of the world. All of our efforts together are making a difference. Here are a few of the ways we practice environmental sustainability at Dura-Line:

Dura-Line's Closed-Loop Water System

- Without the Closed-Loop Water System, Dura-Line would require 15.8 million gallons of water per month.
- Our manufacturing equipment processes 360 gallons of water per minute, continuously reusing water over and over again as part of our Closed-Loop Water System.
- The same water is recirculated in our Closed-Loop Water System so that it doesn't become waste water.

Dura-Line's Manufacturing Energy Efficiency

- Each year, all plants are evaluated and upgraded to more energy efficient machinery.
- Where possible, plants have partnered with local power companies on programs to be more energy efficient, which helps reduce the need to build more transmission lines.
- Several Dura-Line plants have already converted to LED lighting configurations.

Dura-Line's Reel Return Program

- In 2020 alone, Dura-Line recycled nearly 105,000 steel reels through our steel reel return program, more than double the amount recycled 5 years ago.
- For every pound recycled, enough energy is saved to light a 60-watt bulb for more than a day.

Dura-Line's Regrind Program

- The Regrind Program saves resources that otherwise would have been considered waste for the landfill (post-industrial and post-consumer waste recycling).

Dura-Line's Goal of Zero-Waste-To-Landfill

- All plants are working toward a zero-waste-to-landfill goal.
- In 2018, our Utah manufacturing plant was able to divert 73 percent of waste that otherwise would have gone to the landfill.

Dura-Line's FuturePath Product Line

- Supports "Dig Once" initiatives.
- Saves space in overcrowded right-of-ways.
- Requires fewer and smaller handholes.
- Reduces manpower and machine power for installation.
  - Reduces fuel consumption, gas emissions, and lower material handling requirements.
    - Lessens soil displacement.

Environmental Benefits of HDPE

- Non-leaching.
- Flexible, non-rusting materials minimizes leaks common in corroded steel pathways.
- Resin and pipe have a superior resistance to failure, corrosion, tuberculation, deposits, and rapid crack propagation (RCP).
- High performance in extreme temperatures, which greatly reduces compromised pathways.
- Reduced transportation costs, handling costs, and installations costs compared to steel counterparts.
- Modern manufacturing methods allow for thousands of feet of continuous extrusion requiring fewer joints.
- Joints typically use a mechanical coupler, rather than a glue-based solvent which gives off noxious fumes.
- Fewer and smaller handholes required.
- Low life-cycle costs.
- Useful life of HDPE is estimated at 50+ years.
- Studies have shown that HDPE can withstand. scratching and gouging up to 10-20 percent with no detrimental effects to the long-term performance of the pipe.
- Versatility of design allows for multiple applications in several industries.

Mission-Critical Products

Dura-Line's products are designed to provide fast, safe installation of communication networks and power cables for a wide variety of markets. Dura-Line products can frequently be found within the telecommunications, enterprise, networking, energy, and transportation markets.

MicroTechnology

Using MicroDucts are a better way to utilize that empty space, both today and tomorrow. It allows you to easily expand your fiber network and increase bandwidth as needed.

HDPE Conduit

As a global industrial leader, Dura-Line designs and manufactures a wide variety of superior quality products while offering innovations for more efficient and easier installations.

Specialty Conduit

Dura-Line's family of products includes a variety of specialty conduits needed for unique applications and environments including Figure-8 Self-Support Aerial, Low Smoke Zero Halogen (LSZH), and locatable PinPoint.

SILICORE ULF

QUICKER SLICKER FASTER BETTER Our newest innovation, SILICORE® ULF, is an ultra-low friction lining that allows cable to be installed safer, faster, and farther than ever before. For more than 50 years, Dura-Line has been the worldwide leader in industry firsts. We were the first to bring conduit to the telecom industry; the first to manufacture ducts with pre-installed pull lines; and the first to offer longitudinally ribbed ducts, to name a few.

Now we're proud to announce our latest breakthrough – SILICORE ULF – ultra-low friction lining.

The super slick, yet non-greasy lining provides 40% lower[1] coefficient of friction than before. What does this mean for you? This means you can jet fiber optic cable up to 25% farther[2] in conduit lined with SILICORE ULF, saving you a lot of time and money.

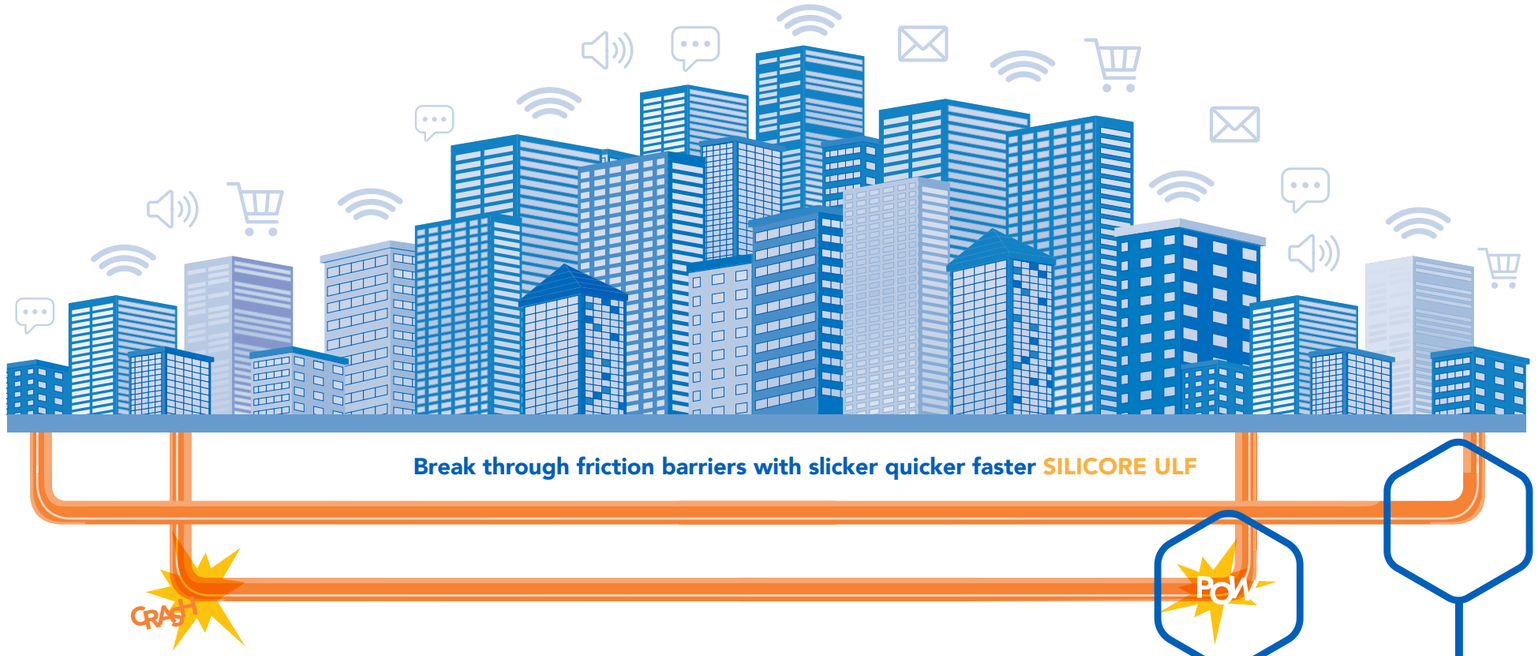
Because no one has time for friction.

Features

- No lubricant required
- Permanent: remains unchanged for life of conduit
- Lowest co-efficient of friction
- No lubricant clean-up
- No performance loss in all temperature conditions
- No special lubes required for cold weather
- Identifiable by its contrasting white color

[1]Compared to Dura-Line's SuperSilicore-lined conduit. Internal lab testing performed on 1.25" SDR Smoothwall conduits.

[2]Compared to Dura-Line's SuperSilicore-lined conduit. Internal lab testing with jetting of fiber optic cable in 16/12 mm MicroDucts. Your results may vary, as many factors influence jetting distances (e.g., bends in pathway, gravity, weather, etc.).

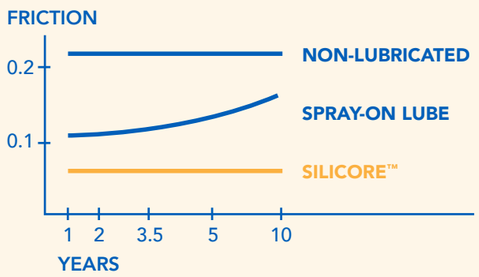


Break through friction barriers with slicker quicker faster SILICORE ULF

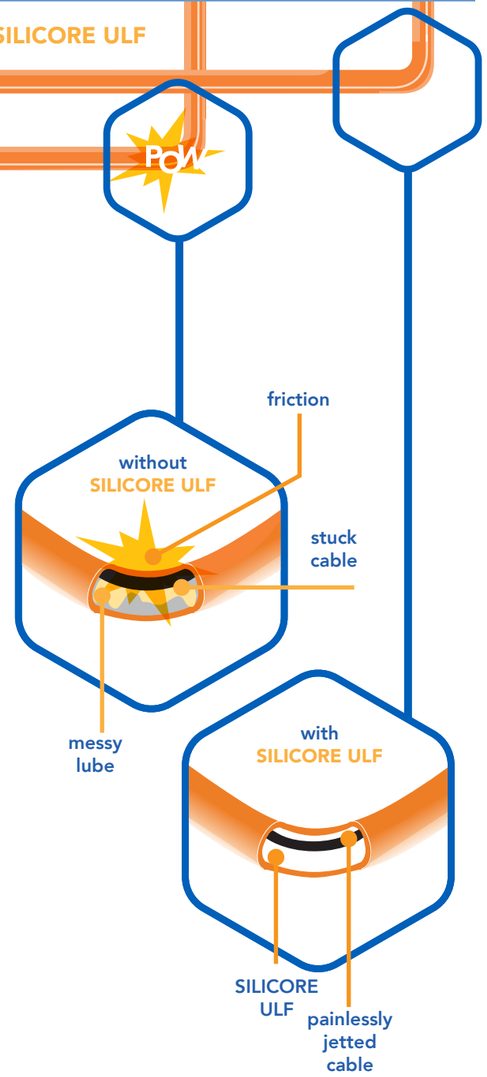
Independent Lab Testing:
Cable Jetting

40% LOWER COF

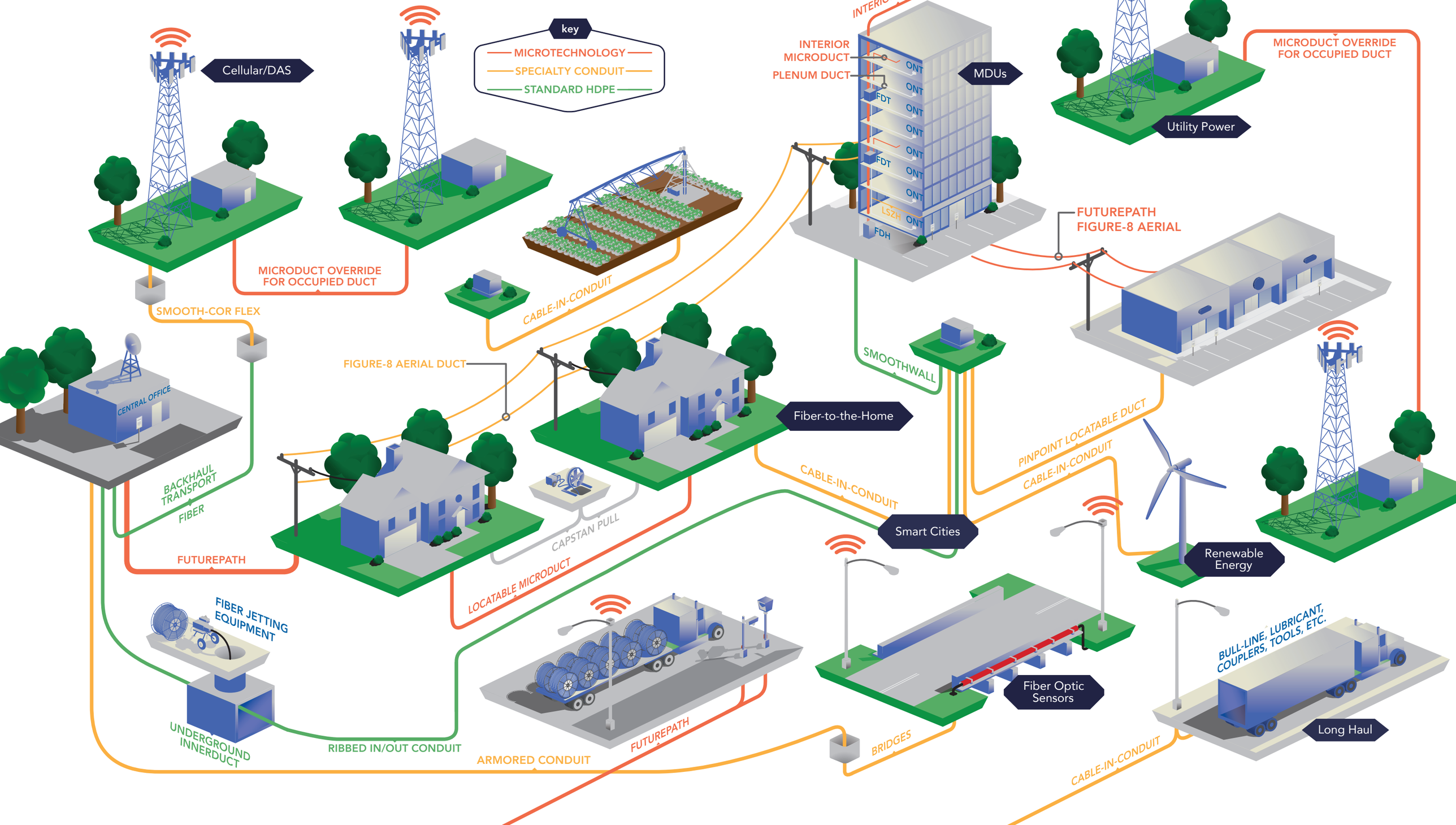
than Traditional HDPE Conduit with Wet Lubricant

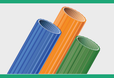


Watch a short animation and learn more about the benefits of SILICORE ULF



DURA-LINE IS AN ISO-9001 AND TL 9000 REGISTERED MANUFACTURER of conduits serving a variety of markets including: telecommunications, electrical, energy, and transportation. Our "Dura-Line Village" is designed to help you see the solutions our products provide in different applications. Dura-Line conduit delivers essential services throughout the world.



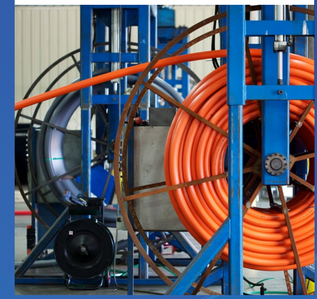
	MicroTechnology								Specialty Conduit						Standard HDPE			
																		
	FuturePath	FuturePath Hybrid/Jumbo	FuturePath Flex	FuturePath Armored	FuturePath Aerial	FuturePath Figure-8	MicroDucts	Fire Retardant MicroTechnology	Figure-8 Aerial	PinPoint	Armor-Guard®	Smooth-Cor Flex	Corrugated Riser, Plenum	Low Smoke Zero Halogen	Smoothwall	Smooth Out/ Ribbed In	Ribbed In/Out	Corrugated
Installation/ Application	Direct Buried, Overrides, Plow, Trench, etc	Direct Buried, Plow, Trench	Direct Buried, MicroTrench	Direct Buried, Plow, Trench	Aerial	Aerial	Overrides, Plow, Subdivided, Trench	Riser, Plenum, Low Smoke Zero Halogen (LSZH)	Aerial	Direct Buried, Plow, Trench	Direct Buried, Rodent/Impact Resistant	Trench	Indoor Use, Premise	Tunnels, Confined Spaces	Existing Conduit, Plow, Direct Buried, Aerial	Existing Conduit, Plow, Direct Buried, Aerial	Existing Conduit, Aerial	Existing Conduit, Indoors, Short Runs
Sizes	5mm– 27mm OD MicroDucts	Two or more duct sizes under one sheath	12.7/10mm 18/14mm	8.5/6mm 12.7/10mm	10mm–22mm	8.5/6mm, 12.7/10mm, 16/13mm, 18/14mm	5mm–27mm	5mm–27mm	1 1/4", 1 1/2", 2" (1/4" or 3/8" Strand)	1/2" - 2"	1 1/4"	2", 3", 4"	1", 1 1/4", 1 1/2"	1/2" – 1 1/4"	1/2" – 12"	1"– 6"	1" – 1 1/2"	1", 1 1/4", 1 1/2", 2"
Configuration or Wall	2-way–24-way	2-way–15-way	2-way, 4-way, 6-way, 8-way	4-way 7-way 19-way	2-way, 3-way, 4-way, 7-way	Single, 2-way, 4-way, 7-way	Multiple Options	Single, 2-way–24-way	SIDR 9 TSDR 13.5	SDR11/13.5 SCH40	SDR	Standard	Standard	SDR11/13.5, SCH40/80	Various SDR, SIDR, TC-7, SCH40/80, and UL Listings	Various SDR, SIDR, SCH40/80, and UL Listings	True SIDR	Standard or Split
Footage Markings	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes
Packaging	Reels	Reels	Reels	Reels	Reels	Reels	Reels	Reels	Reels	Reels	Reels	250' Coils	Coils, Reels	Coils, Reels	Reels, Coils, Multiple Ducts/ Reel, Sticks	Reels, Coils, Multiple Ducts/Reel	Reels, Coils, Multiple Ducts/Reel	Reels, Coils, Lengths
Color/Stripe	Full Color Range Oversheath Color Options	Full Color Range Oversheath Color Options	Full Color Range Oversheath Color Options	Full Color Range Oversheath Color Options	Full Color Range, Black Oversheath with UV and Thermal Protection	Full Color Range, Black Oversheath with UV and Thermal Protection	Full Color Range	Dull Yellow Opaque White Chalky White	Black with UV & Thermal Protection	Full Color Range	Full Color Range, Orange Oversheath	Red or Gray	Orange White	Chalky White	Full Color Range Stripe Options	Full Color Range Stripe Options	Full Color Range Stripe Options	Full Color Range Limited on 2"
SILICORE ULF	SILICORE ULF Standard	SILICORE ULF Standard for MicroDucts	SILICORE ULF Standard	SILICORE ULF Standard	SILICORE ULF Standard	SILICORE ULF Standard	SILICORE ULF Standard	SILICORE Standard, except LSZH	SILICORE ULF available	SILICORE ULF Available	SILICORE ULF available	No	SILICORE available	No	SILICORE ULF available up to 6"	SILICORE ULF available up to 3"	SILICORE ULF available	No
Ribs	Internal Ribs	Internal Ribs for MicroDucts	Internal Ribs	Internal Ribs	Internal and External Ribs	Internal Ribs	Internal Ribs	Internal Ribs except LSZH	Smooth Only	Internal Ribs Available	Smooth Only	Smooth Interior, Corrugated Exterior	Corrugated	Smooth Only	No	Internal Ribs	Internal and External Ribs	Corrugated
Pre-Installed Rope/Tape	No	No	No	No	No	No	Pull String Available	Pull String Available	Yes	Yes	Yes	No	Yes	No	Yes, 0.5"– 6"	Yes	Yes	Yes
PinPoint/ Locate Wire	Optional Locate Wire Under Sheath	Optional Locate Wire Under Sheath	No	No	No	No	Locate Wire on Locatable MicroDucts	No	No	Yes	No	No	No	No	No	No	No	No
Pre-Installed Cable	No	No	No	No	No	No	Pre-installed Cable Available	Single MicroDuct only	No	No	No	No	No	No	Yes, up to 3"	Yes, up to 3"	Yes	No

HDPE Conduit Standards

Dura-Line extrudes HDPE conduit in accordance with the requirements of the commonly used industry standards for the material, dimensional and final product testing. Below is a list of commonly used standards, one of which can be chosen to best meet your specific cable installation requirements.

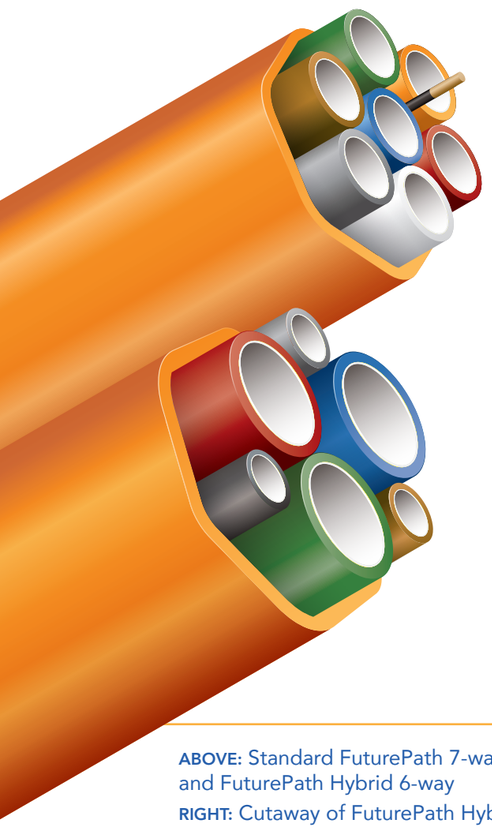
Standards include:

ASTM F2160
NEMA TC-7
UL 651A
UL 1990
ASTM D3485
CSA 22.2



MicroTechnology & FuturePath

AS THE DEMAND for bandwidth continues to skyrocket, network builders need solutions that install fiber faster, lower or eliminate construction costs, and provide for future expansion, all with limited space available. MicroTechnology is a forward-thinking, future-oriented technology that solves these concerns with MicroDucts and FuturePath. Both single MicroDucts or MicroDucts bundled together as FuturePath allow for controlled expansion of your network so bandwidth requirements can be scaled as needed. With FuturePath's multiple pathways, adding additional fiber is quick and easy without additional construction costs.



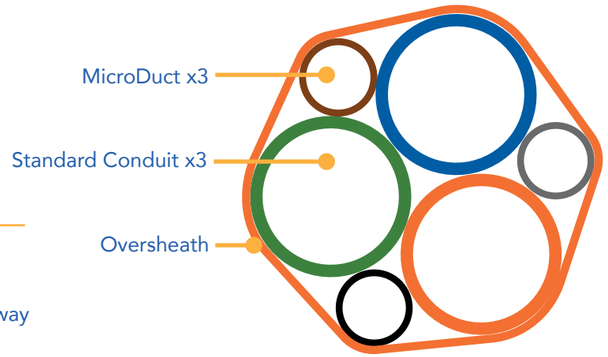
ABOVE: Standard FuturePath 7-way (top) and FuturePath Hybrid 6-way
RIGHT: Cutaway of FuturePath Hybrid 6-way

Versatile

- Create space with an override in existing conduits
- Direct Buried, Directional Bore, Trench or Plow
- Aerial configurations
- MicroTrenching
- Indoor or OSP
- Long-Haul, Back-Haul, Metro, FTTx, MDU compatible
- Place MicroCables and larger standard fiber cables at the same time with hybrid configurations

Cost-effective

- Multiple pathways for the price of one
- Build to scale
- More efficient and faster fiber placement
- Smaller, fewer reels reduce handling, staging, shipping
- Easily repaired



OD/ID (mm)	2-way	3-way	4-way	7-way	12-way	19-way	24-way
27/20	●	●	●●	●			
22/16	●●	●	●●	●			
18/14	●●	●	●●	●●			
16/13	●●	●●	●●	●●			
16/12	●	●	●	●			
14/10	●	●	●	●			
12.7/10	●●●●	●●●●	●●●●	●●●●	●●	●●	
10/8	●	●	●	●	●	●	
8.5/6	●●●●	●●●●	●●●	●●●●	●●●●	●●●●	●●●●
5/3.5	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●	●●●●

HDPE● Riser● Plenum● LSZH●

MicroDuct Size (OD/ID mm)	Estimated Fiber Count (# fibers in cable)	Fiber Cable (OD range mm)
27/20	up to 432	10.0 - 15.0
22/16	up to 432	8.0 - 12.0
18/14	up to 432	7.0 - 10.5
16/13	up to 288	6.5 - 9.8
16/12	up to 192	6.0 - 9.0
14/10	up to 144	5.0 - 7.5
12.7/10	up to 144	5.0 - 7.5
10/8	up to 96	4.0 - 6.0
8.5/6	up to 96	3.0 - 4.5
7/5.5	up to 48	2.8 - 4.1
5/3.5	up to 12	1.8 - 2.6

Calculate (d/D) * 100 = % Cable Fill Ratio

(OD CABLE / ID MICRODUCT) * 100 = % 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.

Popular Accessories

DURA-LINE OFFERS A COMPLETE LINE of Bull-Line Pull Tape, Lubricants, Couplers, Tools, and Accessories designed to make your cable installation highly successful. Highlighted below are a few of our most popular products. Please visit our website or contact your sales representative for more details.

BULL-LINE® PULL TAPE

- Choose from Woven Polyester, Locatable or Aramid Bull-Line Pull Tape
- Available in pull strengths from 500lb – 6,000lb tensile strengths
- Can be pre-installed into conduit
- Lowest burn-through resistance
- Easily jetted into conduit
- Accurate sequential foot or meter markings
- Locatable tracer wire option
- Test results prove that Bull-Line is superior when compared to competitor brands

LUBRICANTS & CHEMICALS

Hydra-Seal Sealants

Developed with high-performance properties, yet safe and user friendly. Packaged in multiple forms for convenience and available with a variety of complimentary accessories.

Lubricants

Formulated to meet specific requirements, our lubricants are available in a wide range of polymer and silicone-modified formulations in gel, creamy gel, or pourable forms. We offer a lubricant to match the type and weight of cable to be placed. Our lubricants are UL listed and available in summer and winter grades.

STANDARD COUPLERS

Shur-Lock™ II

- Designed for coupling HDPE and PVC conduit and dissimilar conduits such as HDPE to PVC, threaded or non-threaded metal conduit, or fiberglass (FRP) conduit.
- Stainless steel band clamps, locking ring, and pre-lubricated O-ring forms an air-tight seal to withstand 125 psi.
- Specialized for use by electrical installers requiring ETL/UL listing.

Push-Lock

- Compact profile is well suited for use in pull boxes, vaults, or other limited-access areas such as narrow trenches.
- Non-metallic construction provides excellent corrosion resistance in buried or encased applications.
- Installation is fast and easy; no heat or tools are needed, simply push the duct ends into the coupler.

Clear-Lock

- Simple, one person "push-on assembly."
- Clear midsection gives added visibility during installation.
- Provides visual confirmation of the pipe within the coupler, ensuring the pipe has been properly seated at the center stop.
- Ideal for pull boxes, vaults, or other limited access areas.

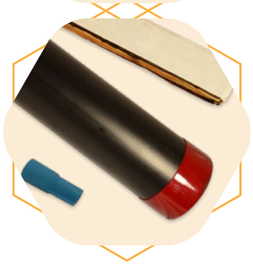
MICRO COUPLERS AND END CAPS

- Micro Couplers are used to join two segments of MicroDucts. Straight and Transition couplers are available. Multiple sizes available from 5mm to 27mm.
- End caps and end plugs keep MicroDucts clean and free of debris. Sizes available from 5mm to 27mm.
- Gas Block Connectors provide a simple and effective gas seal between the MicroDuct and the fiber cable.

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.

- The MicroDuct Straight cutter will make a 90° cut of the MicroDuct also cutting whatever is inside.
- The MicroDuct Round Cutter will only cut the MicroDuct, not what is inside.
- Longitudinal Slitters are used to slit the FuturePath oversheath.

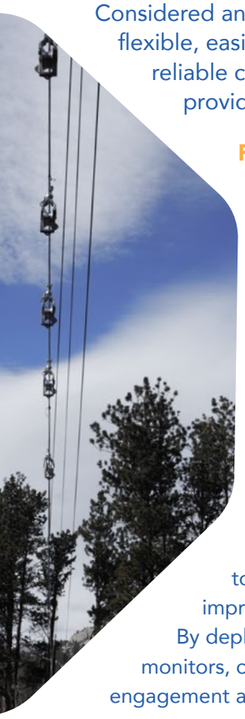


SPLICE KITS

FuturePath Splice Kits provide all the necessary components to join segments of FuturePath. Kits include correct size of sleeve, couplers, sealant strips, vinyl tape and locate wire connector.

Product Applications

APPLICATIONS DEMONSTRATE how conduit is used in everyday life throughout our modern world. Considered an integral part of the construction phase, the long-term return on investment on installing a flexible, easily scalable conduit network system is priceless. Multiple industries rely on clear, consistent, reliable communication technology. Learn more about how Dura-Line products are integral in providing connection.



Foundational Infrastructure

Dura-Line provides the essential foundational infrastructure for data communications around the globe. Our innovative products serve as solutions that address the key challenges of humanity. The more our society depends on high-speed, low-latency broadband, the more we all depend on conduit as the pathways to connect.

Smart City

A Smart City leverages technology to save energy and resources while improving efficiency and connectivity. By deploying smart cameras, sensors and monitors, city officials are able to increase citizen engagement and resident satisfaction.

The foundation of a Smart City starts with fiber optic cable placed in conduit, which allows for scaling to accommodate new technologies in the future.

Long Haul

Long haul installation connects one central office, or data center, to another. Whether that's 10 miles or thousands of miles, using a conduit system means you only have to Dig Once. Just like in the transportation industry, long haul means Point A to Point B. From Seattle to Salt Lake, Atlanta to Knoxville, or New York to Chicago, a fiber optic network transports large amounts of data between destinations.

MDUs

Residents expect – and will pay a higher premium for – homes with continuous, seamless connectivity. Beyond water, electricity, and gas, now high-speed internet access is part of the base expectations. Limitless broadband capabilities are an essential utility for today's residents. Telecommuters demand speed and reliability and high-speed connectivity supports video-on-demand with little or no buffering.

Rails/Tunnels

Safety is a priority in subways, trains, light rail, and mass transit. Conduit protects the fiber that transmits data throughout these underground and above-ground locations. The concept of sharing common transportation space to the public advantage is still embraced. Technology has improved the amount of data that can be captured and relayed, keeping everyone safer as they travel.

Renewable Energy

Whether building a large wind farm and using Cable-in-Conduit (CIC) to monitor the energy being supplemented to the grid, or supplying power to a solar farm, Dura-Line's conduit can help with communication and power needs. Modern technology is making "green" more affordable and efficient.

Fiber Optic Sensing

Fiber optic sensing utilizes a fiber optic cable to monitor an asset. It provides continuous 24/7 monitoring over long distances. The fiber itself is the sensor, so there are literally thousands of sensing points along the route of whatever asset is being monitored. The fiber is passive, so no power supply is required along the asset. Temperature, strain, or vibration can be monitored with fiber optic sensing. The system can handle sensing and regular communication needs simultaneously.

Fiber to the Home

As residential consumers demand better and faster broadband with near instantaneous connection speeds, service providers are installing fiber optic networks at homes and offices. Using the next generation of technology, more and more of our world will be connected by fiber optics in the future as we outgrow the older copper-based infrastructures.

Cellular/DAS

The cell tower network uses a honeycomb design to cover large area sectors, or macro cells. This concentrated coverage area allows for valuable wireless service to be provided where users need it most.

5G

Network strategies for 5G maximize new radio frequency bands designated for communication, balancing and combining the use of high-band, mid-band, and low-band spectrum for optimal coverage, capacity, and quality performance. 5G promises to be a faster, smarter, seamless, and more responsive network that will change how we talk, text, and connect. To keep up with growing demand, the smartest telecommunication engineers are actually juggling sunsetting old technologies, maintaining current communication equipment while managing final build outs of 4G and simultaneously incorporating infrastructure for 5G.

Trending Topics

As technology advances, the Internet of Things (IoT) and the 4th Industrial Revolution will bring 50 billion new devices online and provide internet access to the rest of the world's population. Check out the latest Trending Topics and other Applications at **duraline.com/applications.**

Read more knowledge-based articles at duraline.com/tech-center. See our installation photo galleries and be sure to register for our enewsletter when you request to download our Project Highlight case studies.

dura·line

CREATING WHAT CONNECTS US

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