Sustainability from Microduct Knet

Knet

Knet Microduct Solutions
Small in size
but it is BIG on Connection Delight with
GREAT environment Impact

Reducing Carbon Footprint

The use of Microduct leads to lower installation cost and reduced carbon footprint, thanks to its lighter weight and longer length

Reducing Civil Work waste

By using the microduct installation method, we can reduce land damage and energy consumption while ensuring cost-effective installation

Saving Energy from Transportation

Using smaller microducts and cables can result in considerable energy savings during the transportation of materials


Solutions


Applications


Microduct


Specialty Duct


Connectivity


ABF/ABC

This catalog is printed on eco-friendly paper using soy ink

Knet Microduct Solution

The use of microduct can result in faster, more cost-effective, and scalable fiber optic installations, with improved protection for the cables and greater flexibility for future network expansion.

K-NNECTIES
Connectivity Series

Knet connectivity product series
"K-NNECTIES" delivers product solutions within the fiber optic area while focusing on FTTx broadband communication networks.

Sustainability

Reduced excavation : microducts are smaller in size than traditional ducts, which means they require less excavation during installation. This can reduce the amount of fossil fuel used in heavy machinery and transportation, which can significantly reduce CO_2 emissions associated with installation.

Contents

About Knet

Since its establishment in 2002, Knet has been contributing to the development of Telecommunication technologies by Supplying excellent products and providing Microduct total solutions to customers all over the world.
Our best expertise and professional R&D teams have always focused on high quality and longevity of every single product we supply with respect to our nature.
Knet has played a vital role in the development of broadband network. We have been cooperating with various telecom operators and telecom infrastructure providers, and participating in numerous projects in Europe, America, Africa, Asia and Oceania.
As a total solution provider, Knet implements the project from network design to Installation phase, providing all the necessary technical training, service and maintenance with its own resources.
Almost 20 years later, our devotion to find the very best solutions we can provide to the customer is shown through our participation in projects worldwide.
Knet is never afraid to challenge conventional method, so our expert of teams will be very happy to meet the demands of global customers and help for most efficient and low-cost infrastructure system.

History

2023	Awarded Microduct supplier for Deutsch Telecom Received the "70 Million USD Export Tower Award" from the Korean government agency
2022	Recognized as "Outstanding Export" by Korean Government Agency and receiving the " 50 million USD Export Tower Award" Knet Microduct selected as " World-class product of Korea" by Ministry of Trade, Industry and Energy of Korea. Knet became a part of Hexatronic Group with acquisition
2019	Provided Microduct duct for Energy pipe line infrastructure using digital technology in the USA. Chosen as main supplier for Dark Fiber, FTTH & National Broadband project in Philippines Added 20 more new countries to export microduct in 2019 and expanded more than 70 countries in Knet's supply chain profile
2017	Developed and applied Enhanced Silicone Liner to improve the blowing performance. Released new developed product Micro Drop Duct for Major service provider in Korea
2014	Participated in the development of GR-3155-Core, Issue2
2013	Telcordia compliant with GR 3155/Verizon TRP9442, UL Rate
2012	Malaysia Branch office open
2011	USA & Indonesia Branch office open
2010	10 million USD export award
2009	Korea National Excellent Product (Microduct)
2008	ISO 14001:2004/KS A 14001:2004 certified
2007	Chosen as Small and medium-sized company with technology innovation (INNO-BIZ) Launch of microduct for FTTH in European market
2006	Quality Management System TL9000 certified
2005	Quality System ISO 9001 certified
2004	Factory in Jeong-eup established
2003	Development of microduct system for FTTH
2002	Company established

Knet Provides Solutions for Next

Our Business

PE Pipe Systems – Microduct Manufacturer

Knet has produced HDPE pipe for civil engineering and communication since 1998 in Korea. Knet participated in choose a world-various or multiple huge projects by the government and has experienced of working for project internationally.

Total Solution Provider

Our extensive knowledge has enabled us to create a name for ourselves as a leading system provider for PE piping solutions.

Communication- Global Microduct Solution Provider

Knet expanded its overseas business with the launch of the microduct communication tube business in 2003.
Currently, we export to more than 70 countries all over the world.
In addition to product export, we also provide network consulting, engineering, other solutions and services.
By providing solutions, we are widely known not only as a manufacturer, but also as a solution provider to our overseas customers. We contribute throughout the completion of the project by proposing products, applications, and designs suitable for any individual project by strategizing closely with our clients from the moment we converse to project completion.

Europe FTTH in Netherland

Fiber Connect in USA

Technology Service

Microduct Network Design & Engineering

The optical network construction based on microduct system is a proven in flexible and cost-effective solution, but some of the design concept is relatively new compared to the old conventional cabling system. With our accumulated knowledge of 15+ years from manufacturing to design and installation, Knet provides a complete solution including consulting services and network design by experienced engineers.

Network Deployment & Installation

The civil works for deploying microduct and fiber cable generally require elaborated job scheduling and experiences in order to guarantee a long-term stable operation without unexpected or added expense costs. For several years, KNET has successfully carried out microduct projects ranging from in-building, FTTH, intra-city to long distance in many countries like Korea, Indonesia and Myanmar etc. With our knowledgeable skilled engineers and quality products of BluLight, Knet provides microduct total solution to our customers.

Operation & Maintenance

Fiber cable transmit high speed data through long branched network, so any service disruption causes serious problems for both service provider and their customers. Knet also supplies fiber monitoring system (FMS) that measures fiber integrity by switched OTDR, which enables real time alert and provides fault location when a cable damage happens. FMS has become the solution for enhancement of optical network reliability.

Specialized Training

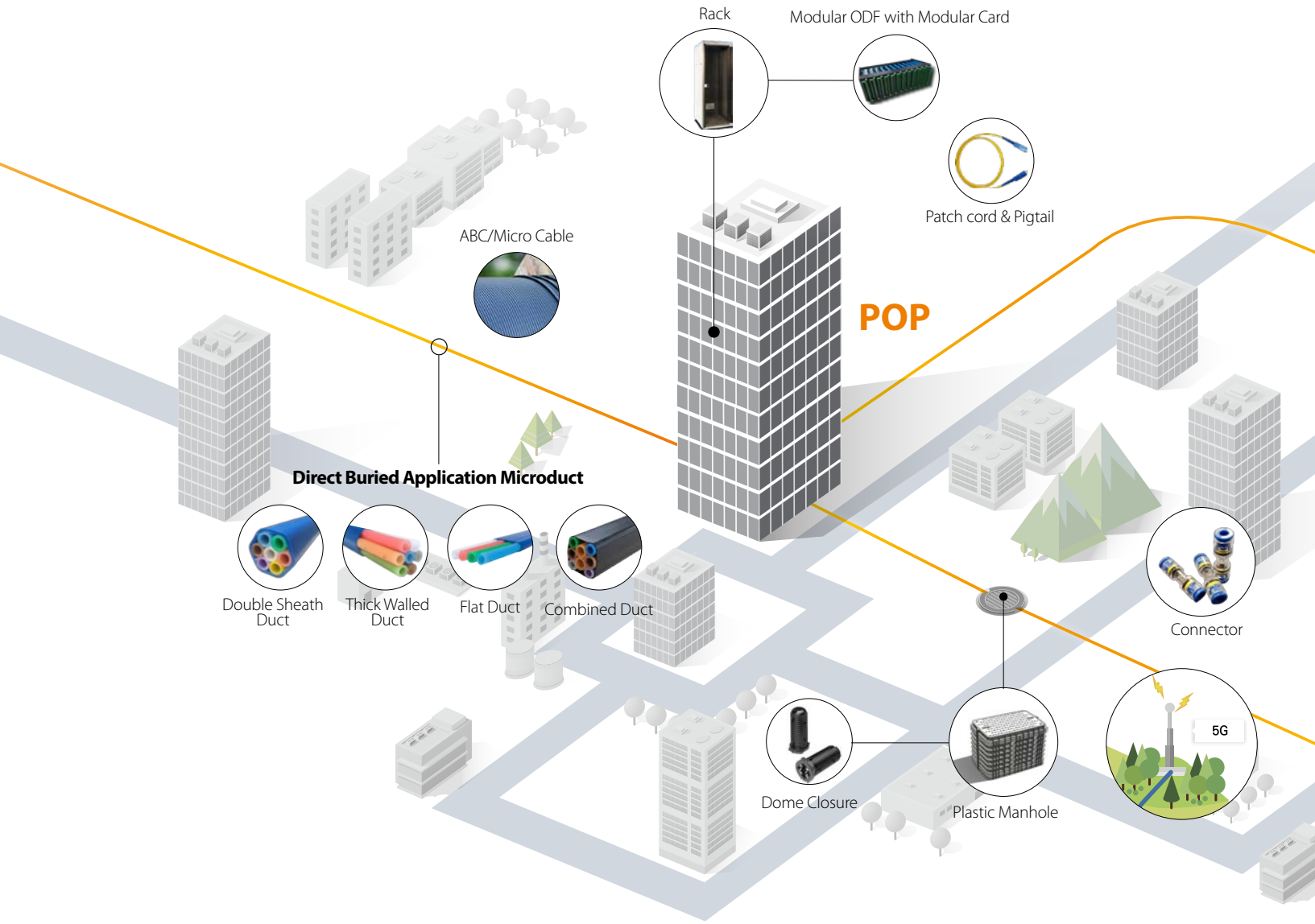
Knet experts are trained in the air blown system and various trenching techniques. We have, the facilities available to other customers and partners who require training on microduct and air blown solution. We have the ability to support network design, deliver knowledge about this advanced technology, providing Fiber Network Management System as well as presenting consulting services. We have, also provide a fully integrated demonstration of microduct total solution where our clients can learn directly.

Microduct Product Development

A fiber network is designed according to the environment and the existing network. Accordingly, the microduct configuration will also change. Knet supports developing microduct designs that fit the customer's unique network design. Knet continuously contributes to our customer network construction by designing, developing, and customizing commercial microduct to customer needs.

Solutions

The technology is more and more connected as the world is.
Our solution from Greenfield
to Last Mile will help the telecommunication network connected.



Feeder Network

The PoP (Point of Presence) is the heart of a network and the place where connections come together. Its setup needs to be able to cope with different demands in capacity and support, speed and quality, and automatic configuration. Having said that, in order to have a smooth transition from PoP to FDH, Microduct solution is used with various configuration and application- an efficiently proven solution especially future. There are different types of Direct Buried microduct options to be chosen from. In case that HDD is needed, we recommend the double sheath multi duct as your best choice for a successful installation. For Micro /Mini trenching, either thick walled duct or Flat duct can be used. Even High capacity of fiber such as 144 or 288 core for feeder, it does not need a large size of Conduit like 100mm PVC duct. The 14/10mm 7way will be a better used for the feeder. Some part of the area such as brownfield with old infrastructure, the issue with live rodent will be solved with Knet's Steel Armored duct. Combined Duct for 14/10mm, 10/8mm combined size, for example, is used for saving Civil cost for service provider to chose different duct depends on their demand rather than building feeder network separately.

Microduct

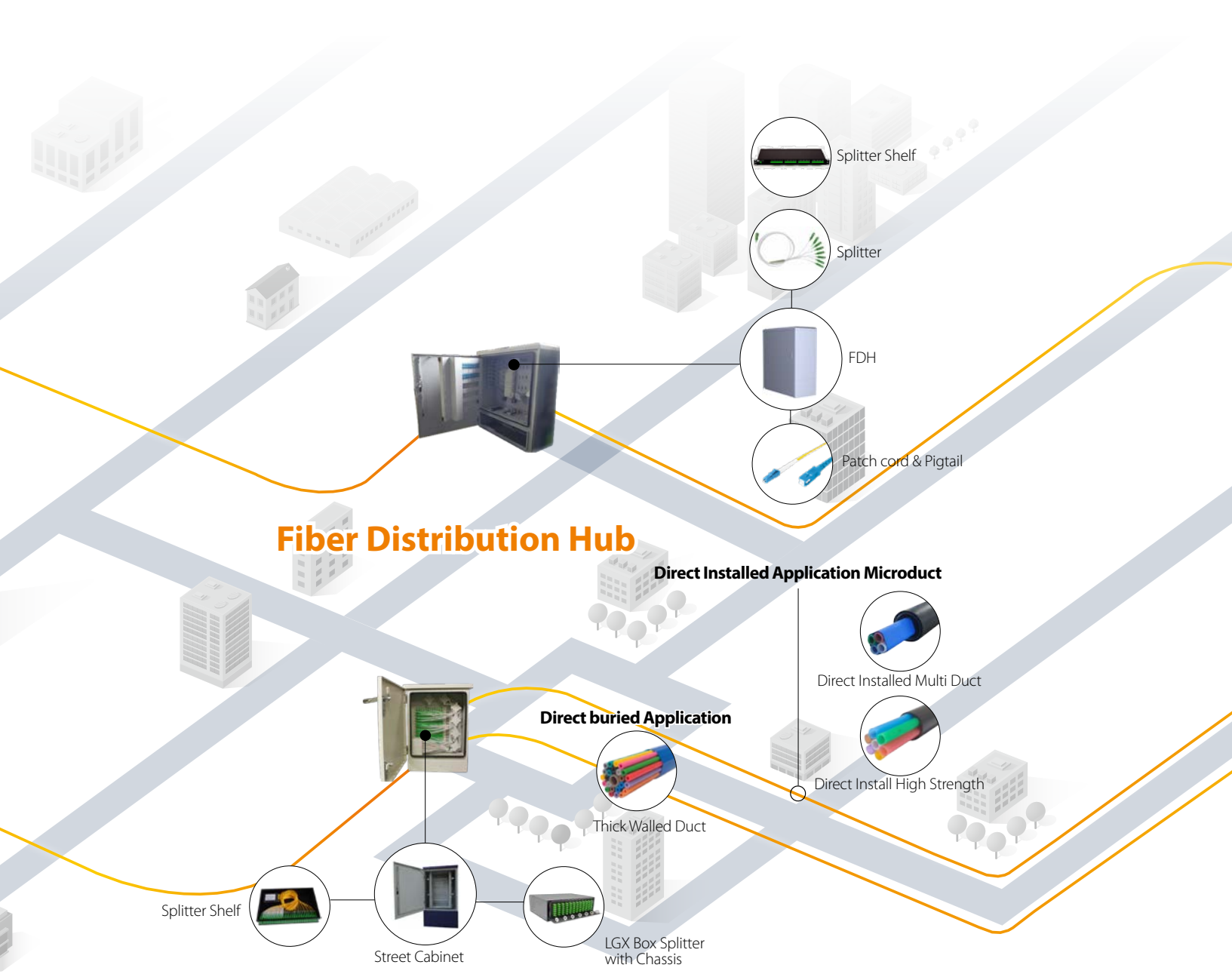
- Thick Walled Duct
- Flat Duct
- Double Sheath Duct
- Combined Duct

Connectivity Product

- Rack / Modular ODF with Modular Card
- Patch Cord & Pigtail
- Plastic Manhole
- Dome Closure

5G / FTTA

Knet will support your fiber to the antenna or wireless project with Fiber cables & Power cable , breakout boxes, and microducts designed to lower your pole attachment profile. Combined with our wide variety of microduct types we support any desired construction method to get you to the connection point including microtrenching, direct install, direct buried, or aerial.



Fiber Distribution

High capacity of fiber from Feeder will be splicing in FDH to distribute using Microduct such as up to 24 way. Direct Buried Microduct for new built pathway and Direct Installed Microduct will be used for pre-existing conduit.
Newly trenched underground will have 24way microduct to branch 1 way to each subscriber to terminate on FDH (with Splitter, Splicing Tray) without splicing on manhole. The service provider is able to manage all customers on a FDH efficiently, save the cost from removing splicing and reduce optical attenuation.
For pre-existing conduit, you will be able to install 6,048F (288Core X3 set of 12/10mm 7way) capacity on microduct on 100 mm Outer duct (conduit) without additional trenching to save Civil work cost and blowing the cable easily.

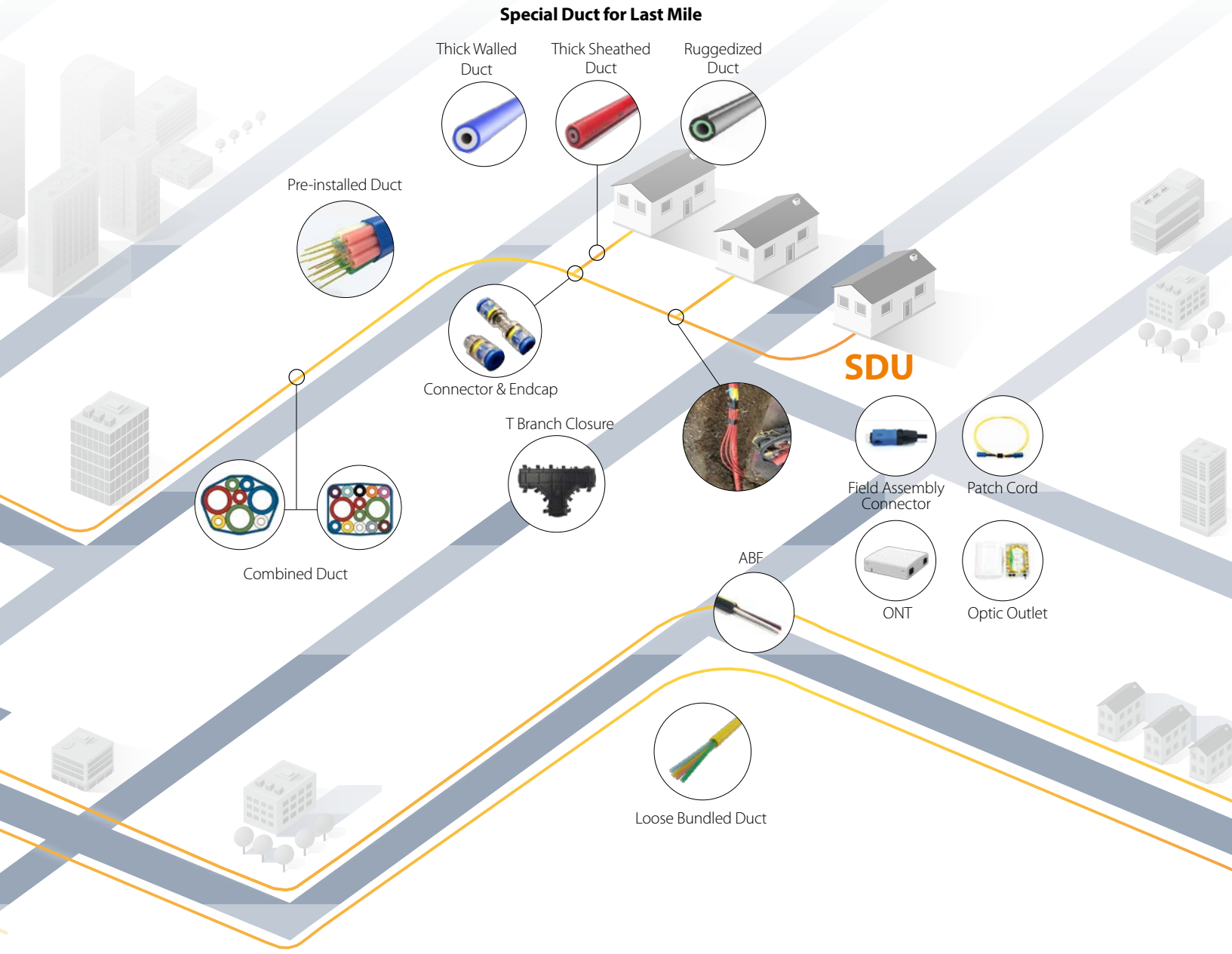
Pre-existing FDH can be used especially to save the time and labor for distributing the cable and this FDH is customized with microduct management. Optical passive splitter to the distribution network installed.

Microduct

- Thick Walled Duct
- Direct Installed

Connectivity Product

- FDH/ FDH(Pre-terminated)
- Splitter Shelf
- ODF
- Patch Cord



Last Mile

For FTTH, the optimal "last mile" solution must be used. Microduct last mile solution has shorter installation time, lower construction cost and simpler management than Conventional solution. Some of the fibers in the tube are cut and spliced so a delicate and elaborate skill are required however, branching the microduct will be much easier than to provide direct fiber path and increase reliability with reduced construction cost. Knet's last mile solution, SDU, MDU and Aerial application has various microduct configurations.

SDU

All subscribers' management can be done in FDH by installing splitter and connecting fiber(generally 2 Core) to each subscriber.
You can install Ruggedized duct, TWD or Thick Sheathed Duct to protect fiber, which connects the distribution point and each subscriber.

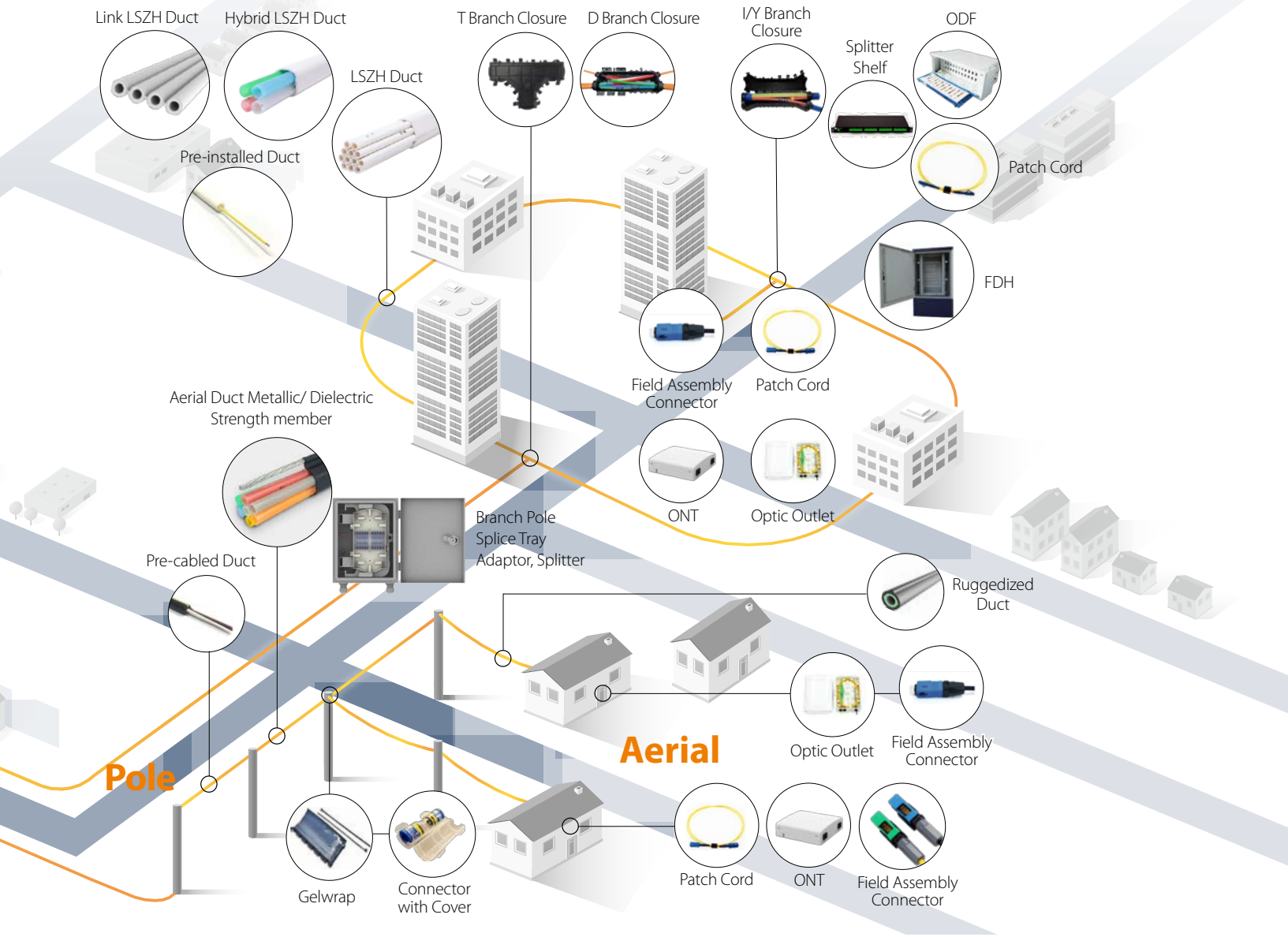
Microduct

- Thick Walled Duct
- Thick Sheathed Duct
- Ruggedized Duct
- Pre-Installed Duct

Connectivity Product

- ONT
- Optic Outlet
- Field Assembly Connector
- Patch Cord

MDU/High Rise Indoor Buildings



MDU and High - Rise Buildings often offer the highest subscriber density and can be very rewarding project but offer unique challenges as well. It is often very difficult or impossible to re-access infrastructure after the building is complete. With microduct pre-installed to each unit fiber drops can be blown in by a single installer as customers take service, saving the majority of material cost such as fiber drops until a customer takes service.
For low and high rise, Ducts with LSZH fire retardant material should be used inside of building and link type of microduct for easy branched out technique.
For old building without pathway inside, Micro drop duct can be installed on outside of building for aesthetic reason and also easy to Distribute to each floor.

Microduct

- Link LSZH Duct
- Hybrid LSZH Duct
- LSZH Duct
- Pre-Installed Duct

Connectivity Product

- ONT
- Optic Outlet
- Field Assembly Connector
- Patch Cord

Aerial

Microduct may be installed above ground along aerial pole lines when underground installation is difficult due to rocky soil or where freezing makes the ground impossible to dig during lengthy periods of time. Knet aerial microducts are self supporting with either a dielectric fiberglass strength member or steel strength member preinstalled. Fibers are installed and protected through micro-tube path. So, chance of fiber splice is minimized as well diminishes possible damages caused by rodents. Microduct and cable blowing are combined allowing to have future growth at considerable lesser cost.

Microduct

- Aerial Duct Metallic / Dielectric Strength member
- Drop Duct / Ruggedized Duct
- Pre-cable Duct

Connectivity Product

- ONT
- Optic Outlet
- Field Assembly Connector
- Patch cord

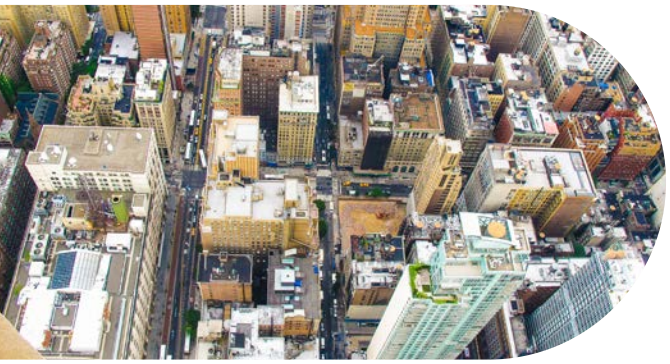
Greenfield

Planning or designing new fiber networks?

- Direct buried
- Direct Install
- Aerial
- Pre-cabled and special duct

Greenfield projects present many opportunities and offer the best chance to plan for the future. In the past it was difficult to foresee that bandwidth demands would skyrocket as they have, but today it is no secret that bandwidth demands will continue to increase. In a greenfield installation, it is extremely easy to future-proof your network with built in pathways for simple fiber installation down the road, without the cost of installing spare unused fibers today.

Brownfield



If you have an under-utilized conduit?

- Direct Install
- Direct buried
- Aerial
- Pre-cabled and Micro Drop duct

Brownfield projects can offer challenges when it comes to fitting in today's technology with yesterday's infrastructure. Luckily, Knet has a variety of options. Microduct is flexible enough to connect to existing microducts of the same size or ducts of slightly larger sizes with couplers. Microduct can also be installed inside of bigger conduits, pipes, sewer lines, and more. And of course it can be installed alongside other infrastructure as well. With its low profile, it is easy to install without disturbing existing infrastructure.

FTTA/Wireless

Need fiber network for wireless, especially 5G?

- 5G wireless Breakout box
- Special duct
- Pre-cabled
- Direct Install
- Direct Buried

The need for stronger and more robust wireless infrastructure is greater than ever with the rising popularity of 5G and wireless home internet. When planning a fiber connection to an antenna, it will often be necessary to share a pole location with other providers, and typically space on the pole must be leased. An FTTA project's main goal should be reducing the overall size, weight, and number of connections while maintaining the requisite bandwidth and providing adequate power to the antenna or small cell.

Smart City

The Smarty city concept is becoming more popular, need solution?

- 5G wireless
- Special duct
- Pre-cabled
- Direct Install
- Direct Buried

The Smart city concept is becoming more popular, using an IoT network to optimize the efficiency of city operations and services and connect to citizens. Smart city technology allows city officials to interact directly with both community and city infrastructure and to monitor what is happening in the city and how the city is evolving while enhancing quality, performance and interactivity of urban services. A Smart city is more prepared to respond to challenges than a traditional city.

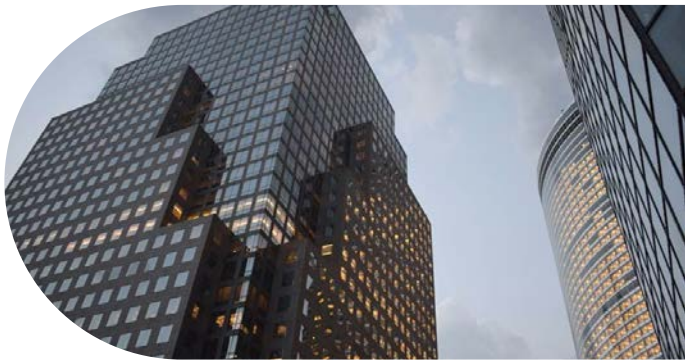
FTTx

Need quicker connection for new subscribers ? FTTx solution has the answer

- Pre-cabled
- Direct Install
- Direct Buried
- Aerial Duct
- Special duct

FTTx connections for homes and businesses are quickly becoming a requirement for new subscribers. For the first time in history, end users are beginning to demand not only quality service, but a specific technology and specific speed requirements. Users are becoming more savvy to different technologies and demand fiber. In fact, high speed fiber connections have been cited as the number one desired amenity for tenants and property owners. Knet has a solution for you to make it easy and to lower your cost per subscriber.

MDU/High Rise



Requiring Fiber regulation for high density of subscribers indoor?

- Lower Smoke Zero Halogen
- Pre-cabled
- Direct Install
- Special duct

MDU and high-rise buildings often offer the highest subscriber density and can be very rewarding projects but offer unique challenges as well. It is often very difficult or impossible to re-access infrastructure after the building is complete.
With other service providers competing for subscribers in the same space, this often means additional material expense for non-subscribers.
With microduct preinstalled to each unit fiber drops can be blown in by a single installer as customers take service, saving the majority of material cost until a customer takes service. Pre-connected fibers are available to reduce fiber splicing, further reducing installation cost.

Last Mile

Need solution for Last Mile?

- Special duct for last mile
- Direct Buried
- Direct Install
- Aerial
- Pre cabled

For an FTTx project, smart city grid, or wireless small cell deployments, the last mile of a fiber installation can be extremely complex with careful planning required. The biggest challenge can be staying within an acceptable loss budget while branching fibers along often pre-determined routes that the operator has no control over such as existing pipe or conduit, streets or sidewalks, or telephone poles. This requires limiting splice points and cross connects wherever possible.

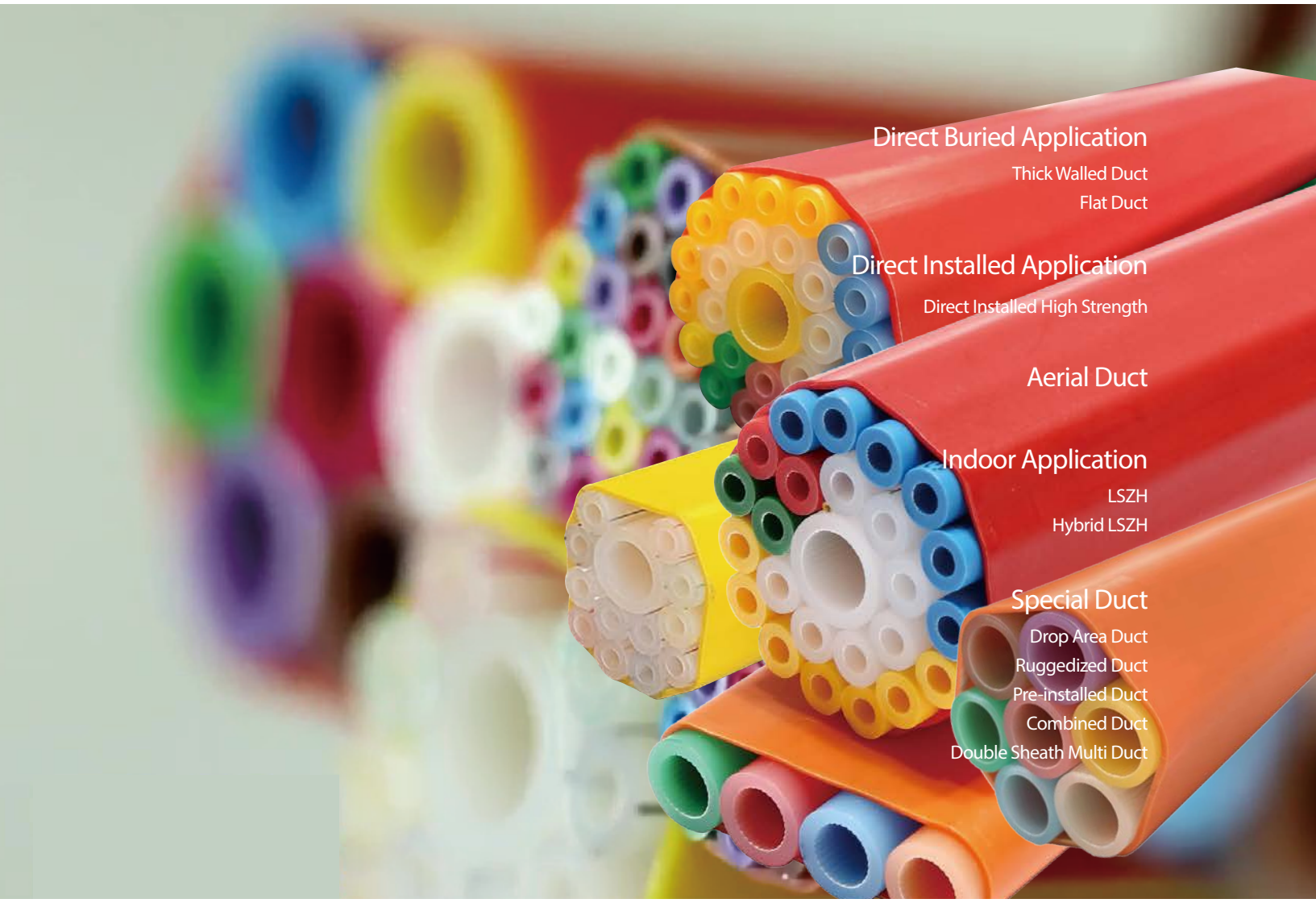
Long Haul

Require the solution for future proved solution?

- Direct Buried
- Direct Install
- Aerial
- Pre cabled

Many operators believe that their long-haul fiber network will never need to be upgraded. This has been proven to be untrue time and time again due to population booms and increasing downstream demand. Traditional future proofing requires a large investment in spare fiber that may not be used for a long time.

Microduct Products



The products are designed to enable carriers to bring fiber optic service to business and residential customers with greater speed and efficiency while dramatically reducing carrier deployment costs and disruption to existing roadways and landscaping.

Sustainability

Reducing Carbon Footprint

The carbon footprint of plastics piping systems is considerably lower than the traditional, non-plastic piping products. The lighter weight, longer length of microduct add up to lower installation costs and reduce carbon footprint.

Energy saving from Transportation

Smaller microduct and micro cable but same capacity is offering significant energy savings in the transport of material to a job site comparing to other large size of piping solution.

Civil Work

Significant cost reduction in civil work and soil reclaiming/processing.

Installation method of microduct with minimum damage to the land, lower energy consumption.

Lower life Cycle Cost

Microduct systems provides lower life cycle costs comparing to non plastic piping systems and large size of piping systems.

Sustainability from Microduct Knet

Benefit of Microduct

KNET Microduct infrastructure provides high flexibility and accessibility allowing additional access network to be newly developed and restructured.
From Feeder to lastmile all kinds of projects can be implemented more effectively and economically than expectation.

- Reducing the number of splice closures means less splicing, less pedestals, and greater savings.
- Utilizing and intercepting the pre-installed multiduct when installing house drop microduct allows for greater flexibility and shorter installation times when customers request service.
- There are spare ducts available for future drops. This helps to reduce labor costs related to reworking the area and provides ease of growth for future developments.

Advantages of Microduct Technology over Traditional Cabling Outlays

- Microduct products are easily and quickly installed in direct buried application using minimally invasive micro-trenching equipment.
- Microduct offer superior mechanical and environmental protection for lightweight microfiber optical cables, which can be easily installed using various air blowing techniques, or traditional cable pulling and/or pushing method.
- Microduct pathway systems offer telecom carriers increased flexibility due to the ease at which service laterals and drops can be reconfigured and installed as customer demand increases.
- KNET small diameter microduct products are offered in a wide variety of configurations. This gives carriers the option to install microduct pathways into existing occupied conduits. Microducts helps to future proof carrier networks as additional fiber cables can be placed at a later time as the demand for additional capacity increases. Furthermore, whether for additional capacity or for general replacement, fiber optic cables are easily removed and replaced with high density, higher fiber count cables.
- KNET's Indoor microduct products provide safe, flexible, lightweight, durable and easy to install pathways to deploy bare fiber and microfiber cables inside a multi-dwelling unit (MDU) and commercial building.

Installation Method

Open Cut Trench Excavation

Open cut trench excavation is the most popular method for installing conventional ducts, microducts. Many types of equipment can be used depending on the conditions of site, methods of construction. This method is generally the least expensive if the site to be excavated is non-pavement area which can be backfilled with soft soil and original soil which doesn't damage the ducts.

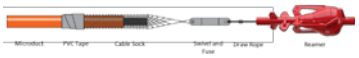
Micro/mini Trenching

Micro/Mini trenching is a relatively new installation method which can reduce the time and lessen impacts on the environment. And if this trenching method is used with Vacuum equipment that sucks the all dust, the impact on environment can be reduced effectively. Conventional trenching method can be time-consuming, labor intensive, and disrupting traffic and passengers due to need spaces for construction and restoration.

Cut by Micro trencher
Indonesia Bandung Municipal project

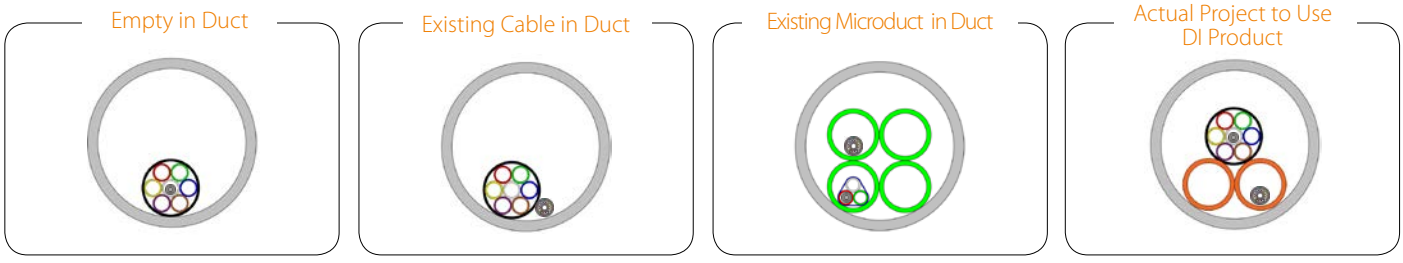
Horizontal Directional Drilling

Horizontal Directional Drilling is a trenchless method designed to install ducts from one point to another without breaking all route of trench.
A pilot bore is drilled and guided underground along a pre-determined bore path, then the Microduct is dragged through the bore during back reaming. By boring underground, horizontal directionally drills are able to avoid existing utilities, landscaping, driveways, sidewalks, and other obstructions by equipment detecting the exact location of microduct.



Direct Install

Microducts are ideally suited for use in occupied conduit systems where additional Microducts are needed and space is limited.



Knet Provides Solutions for Next

Knet Microduct Configuration

Information We Need from You

- Outer Diameter (OD)/Inner Diameter (ID) of an inner tube (mm)
- Number of inner tubes
- Outer sheath thickness (inch or mm)
- With or without tracer wire

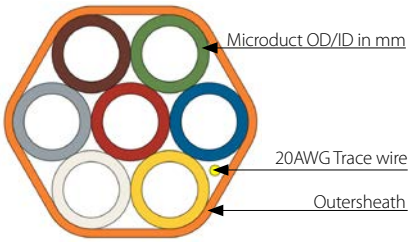
If you don't have these information, we are here to help if you need assistance to choose right configuration for your project.

Certified by Telcordia

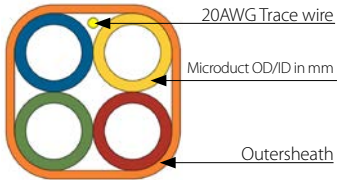
OD/ID	Single tube	1way	2way	3way	4way	5way	6way	7way	12way	14way	19way	24way	24+1way
18/14mm	V	V	V	V	V	V	V	V					
16/13mm	V	V	V	V	V	V	V	V					
16/12mm	V	V	V	V	V	V	V	V					
14/10mm	V	V	V	V	V	V	V	V					
12.7/10mm	V	V	V	V	V	V	V	V	V	V	V		
10/6mm	V	V	V	V	V	V	V	V	V	V	V	V	V
7/3.5mm	V	V	V	V	V	V	V	V	V	V	V	V	V
4/2.1mm	V	V	V	V	V	V	V	V	V	V	V	V	V

Many more configuration available, and customized configuration (including Riser UL Listed duct for indoor application)

Diagram Sample for three configuration



Number of Microduct – 7 tubes (7way)



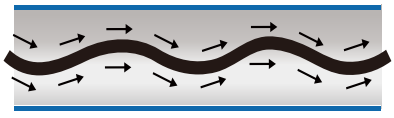
Number of Microduct – 4 tubes (4way)

Number of Microduct – 2 tubes (2way)

Enhanced Silicone Liner

Air Blown Installations are done by an air blowing technique that reduces the risk of damage to the fiber cable, accelerates installation time and increases the installation distance. Permanent solid lubricant is coated inside the tube of microduct.
Knet introduces upgraded silicone liner to Increase the speed and reduce the time on installation of the cable.

Legacy Silicone liner

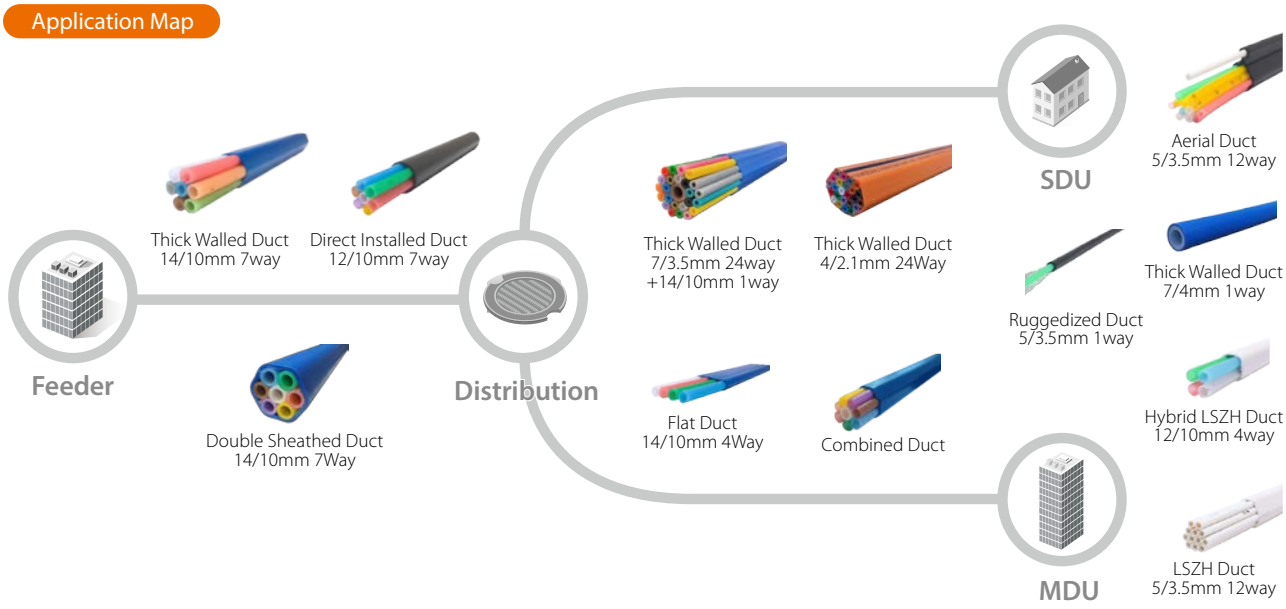


Enhanced Silicone liner

Microduct Solutions

Knet offers a broad range of products to meet the various deployment scenarios facing global telecom carriers.

Application Map



Here are many types of microduct and each of them are suitable for different applications in the field. This figure shows the various types of microduct utilized on microduct application map.

Starting out with **the feeder**, the most common installation method is open trenching or HDD. For this it would be appropriate to use a thick-walled duct, or a direct buried high strength duct assembly. Because the feeder cable is likely a higher capacity cable, you will want a duct that is large enough such as a 12 by 10mm or 14 by 10mm if using thick walled duct. Choose a duct assembly with enough tubes for the cables that you plan to use, plus at least one for emergency repair. If future expansion is a possibility, it is wise to leave several spare empty ducts.

Next are **the distribution lines** which are located closer to the subscriber in what is referred to as the last mile. Because this is in a populated area and the pathways will clearly be along the streets and sidewalks that pass by each home, you may use micro or mini trenching, in which case a flat duct or link duct would be best. Or you may continue to use an open trenching or HDD method, in which case Thick Walled Duct or direct buried high strength is a better choice. If this is a brownfield area, there may be an existing conduit, in which case direct install microduct will be the best choice to make best use of space constraints within the conduit. In either case, choose a microduct size and configuration that suits your needs. The fiber counts will likely be lower for the last mile, so a 10 by 8mm could work. Again, make sure spare capacity is factored in for emergency repair and future expansion.

Finally, for **the secondary distribution or drops**, A smaller 5/3.5mm duct or 7/3.5mm duct if using Thick Walled Duct is sufficient for blowing in ABF directly to the customer. If you plan to install all drops straight to the home from the secondary concentration point, a series of individual tubes can be utilized. If you plan on using duct branch closures, pick a microduct assembly with up to 24 tubes inside, which can be broken out of the bundle at the customer's property line. These are available in Thick Walled Duct, flat style, direct buried high strength, or even LSZH if installed indoors.

Thick Walled Duct

THICK WALLED DUCT is designed for direct burial by having thicker inner tube. It has advantage for easy and fast termination with thin outer sheath. The thickness of each inner tube allows individual tubes to be used direct buried solution. This item is suitable for any construction sites such as open cut, Micro trenching, Mini trenching and HDD.
This product is usually recommended to the site which requires fast and easy sheath cutting during fiber branch off from the FCP.

4/2.1mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	5.6	21	1,000	320
7way	13.6x12.5	92	2,000	40
12way	17.6x16.0	144	2,000	32
24way	25.6x19.5	263	1,000	32

7/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	9.0	52	2,000	104
2way	16.0x9.0	93	2,000	40
3way	16.0x15.1	128	2,000	32
4way	16.0x16.0	162	2,000	32
5way	23.0x15.1	195	2,000	24
6way	21.1x19.5	228	2,000	24
7way	23.0x21.1	258	2,000	21
12way	30.0x27.2	415	2,000	14
14way	37.0x21.1	485	2,000	14
19way	37.0x33.3	627	1,000	19
24way	44.0x33.3	777	1,000	14
24+1way	43.6x43.6	855	1,000	12

10/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	12.0	81	1,000	104
2way	22.0x12.0	149	2,000	32
3way	22.0x20.7	206	2,000	22
4way	22.0x22.0	264	2,000	21
5way	32.0x20.7	320	2,000	18
6way	29.4x27.0	374	2,000	14
7way	32.0x29.3	426	2,000	12

12/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	14.0	99	2,000	40
2way	26.0x14.0	182	2,000	24
3way	26.0x24.4	254	2,000	19
4way	26.0x26.0	325	2,000	18
5way	38.0x24.4	395	2,000	12
6way	34.8x32.0	463	2,000	12
7way	38.0x34.8	527	2,000	11


1way


2way


3way


4way


5way


6way


7way

14/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	16.0	117	2,000	88
2way	30.0x16.0	216	2,000	21
3way	30.0x28.1	301	2,000	13
4way	30.0x30.0	386	2,000	12
5way	44.0x28.1	470	2,000	11
6way	40.2x37.0	551	1,000	13
7way	44.0x40.2	628	1,000	12

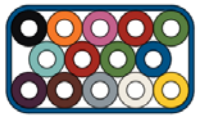
16/12mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	18.0	135	2,000	27
2way	34.0x18.0	250	2,000	19
3way	34.0x31.9	349	2,000	12
4way	34.0x34.0	448	2,000	11
7way	50.0x45.7	729	1,000	11

18/14mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	20.0	153	1,000	36
2way	38.0x20.0	283	1,750	18
3way	38.0x35.6	395	1,000	14
4way	38.0	508	1,000	12
6way	51.2x47.0	728	1,000	10
7way	56.0x51.2	828	1,000	10

20/16mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	22.0	170	1,000	33
2way	42.0x22.0	316	1,000	21
3way	42.0x39.3	443	1,000	12
4way	42.0	569	1,000	12
7way	62.0x56.6	929	500	11

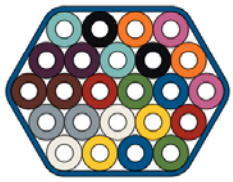
Horizontal Directional Drilling
Microduct – Thick Walled Duct

12way



14way

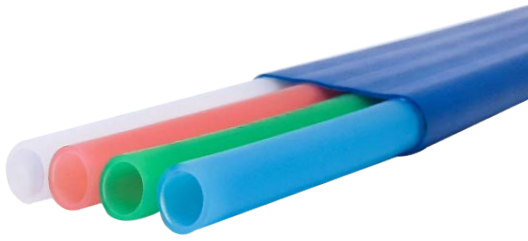
19way



24way

24+1way

Flat Duct



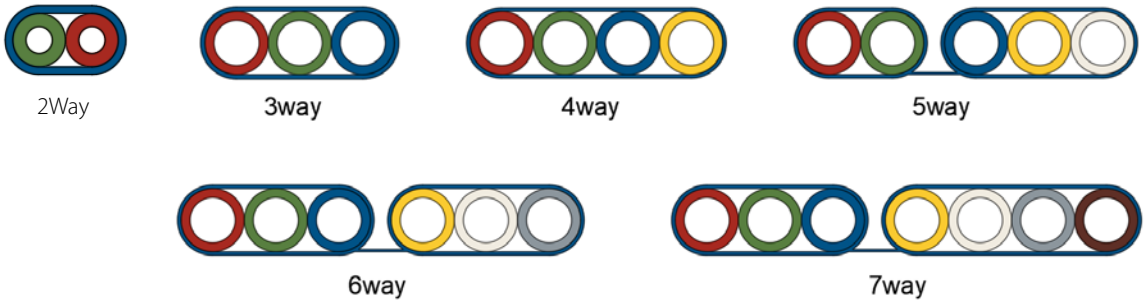
FOR MICRO-TRENCHING with narrow width, Direct Bury Flat Duct is the most compatible item. The product itself can be placed vertically to fit on micro-trenching dimension.
The size of the product is relatively tiny which allows better shipping and handling with the smaller reel size. As Direct Bury Flat Duct has the same thickness of the Multi duct, customers can enjoy the same benefits of Multi duct.

7/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
2way	16.0x9.0	93	2,000	40
3way	23.0x9.0	135	2,000	33
4way	29.6x8.6	162	2,000	32
5way	41.2x8.6	210	2,000	24
6way	48.2x8.6	248	2,000	22
7way	55.2x8.6	286	2,000	21

10/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
2way	22.0x12.0	149	2,000	32
3way	32.0x12.0	216	2,000	24
4way	41.6x11.6	264	2,000	21
5way	56.2x11.6	340	2,000	18
6way	66.2x11.6	403	2,000	13
7way	76.2x11.6	466	2,000	12

12/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
2way	26.0x14.0	182	2,000	24
3way	38.0x14.0	265	2,000	19
4way	49.6x13.6	326	2,000	18
5way	66.2x13.6	420	2,000	12
6way	78.2x13.6	498	1,000	18
7way	90.2x13.6	576	1,000	14

14/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
2way	30.0x16.0	216	2,000	21
3way	44.0x16.0	315	2,000	18
4way	57.6x15.6	388	2,000	12
5way	76.2x15.6	499	1,000	18
6way	90.2x15.6	592	1,000	13
7way	104.2x15.6	685	1,000	12



16/12mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
2way	34.0x18.0	250	2,000	19
3way	50.0x18.0	364	2,000	12
4way	65.6x17.6	449	2,000	11
5way	86.2x17.6	578	1,000	12
6way	102.2x17.6	686	1,000	12
7way	118.2x17.6	794	1,000	11

18/14mm	Nom. OD (mm)	Weight (kg/km)	Length/drrm (m)	Number of drums in 40′
2way	38.0x20.0	283	1,750	18
3way	56.0x20.0	414	1,000	18
4way	73.6x19.6	511	1,000	13
5way	96.2x19.6	657	1,000	12
6way	114.2x19.6	780	1,000	10
7way	132.2x19.6	903	1,000	10

20/16mm	Nom. OD (mm)	Weight (kg/km)	Length/drrm (m)	Number of drums in 40′
2way	42.0x22.0	316	1,000	21
3way	62.0x22.0	462	1,000	18
4way	81.6x21.6	571	1,000	12
5way	106.2x21.6	736	1,000	11
6way	126.2x21.6	873	800	11
7way	146.2x21.6	1,011	800	10

Micro-trenching
Microduct – Flat Duct

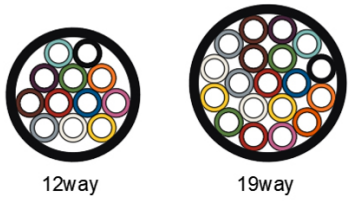
DI-HS Duct

DIRECT INSTALL HIGH STRENGTH DUCT is designed for installation duct and subduct. This product will be installed in the existing infrastructure with relatively high crush resistance. Even though it is solid product, it is very easy to bend or fix the tube inside of cabinet by having thin inner tube. It is also strong against lightning and electrical surge.

5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	8.0	38	2,000	104
2way	13.0x8.0	62	2,000	88
4way	15.1	98	2,000	36
7way	18.0	139	2,000	32
12way	23.3	209	2,000	21
19way	27.3	293	2,000	18
24+1way	32.9	398	2,000	12

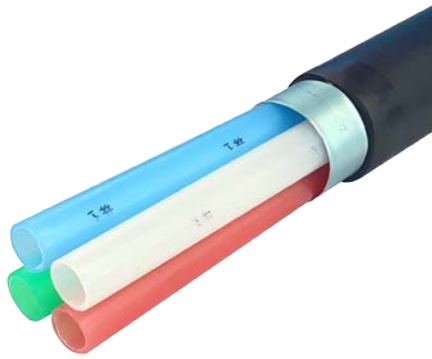
8/6mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	11.0	62	2,000	88
2way	19.0x11.0	106	2,000	33
4way	22.3	175	2,000	22
7way	27.0	257	2,000	18
12way	35.8	418	2,000	11

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	13.0	77	2,000	40
2way	23.0x13.0	132	2,000	30
4way	28.1	259	2,000	18
7way	34.2	383	2,000	12



12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	15.0	91	2,000	36
2way	27.0x15.0	158	2,000	22
4way	33.0	310	2,000	12
7way	40.2	460	1,000	12

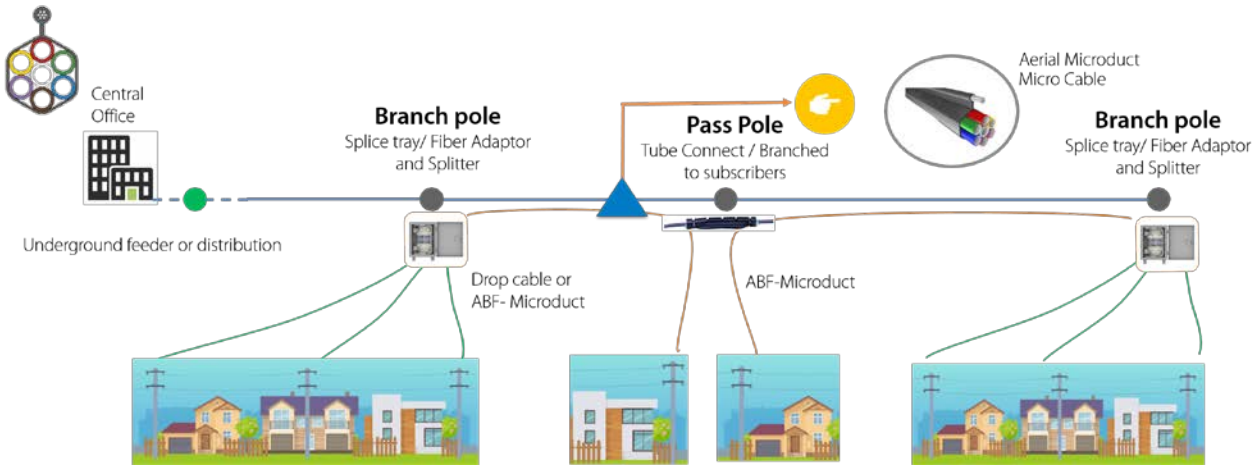
DIRECT INSTALL ALUMINUM DUCT is for installation in existing duct and subduct. This product will be inserted into the existing infrastructure to maximize DI-AL advantage with the Aluminum tape which helps to block the water from the extreme wet soil condition.



Aerial Application

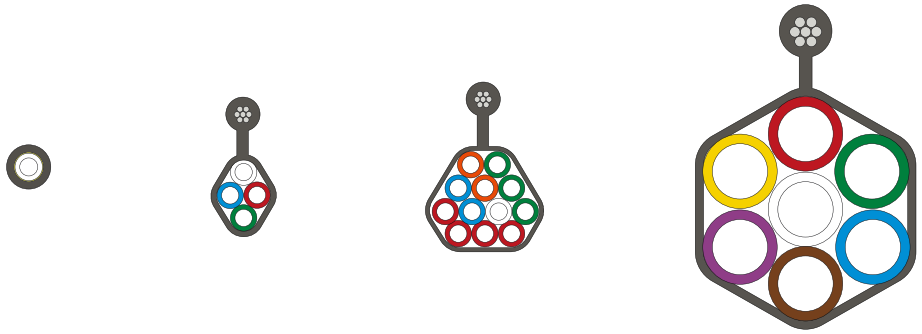
AS AERIAL INSTALLATION PRODUCT, it can deploy cost effective network within a short time. It is very useful product and solution in case of installing existing telecommunication pole or power pole, if there is urgent construction due date and project owner cannot get road construction permit under special condition.

Micro duct can be installed above ground along aerial pole lines when underground installation is difficult due to rocky soil or where freezing makes the ground more difficult to dig during lengthy periods of time. Knet aerial micro ducts are self supporting with either a dielectric fiberglass strength member or steel strength member preinstalled.



Aerial Figure-8 Duct

THE FIGURE-8 SELF-SUPPORTING AERIAL MICRODUCT is used for conditions where microduct cannot be installed to underground such as rocky mountain area, stream crossing or road crossing area and the area where the existing pole exist with cost saving. This microduct has high UV resistance with black polyethylene sheath for outdoor use and their strength member is galvanized wire strand with high tensile strength to withstand severe load.



Indoor Application LSZH

INDOOR APPLICATION requires the best quality of ducting pipe that can provide safety to the building. This method is the most appropriate for in-building infrastructure. Generally, the ducting pipe must comply with municipality and national authority standards and regulations on fire. The ducting pipe must be produced for retardant.

Benefits

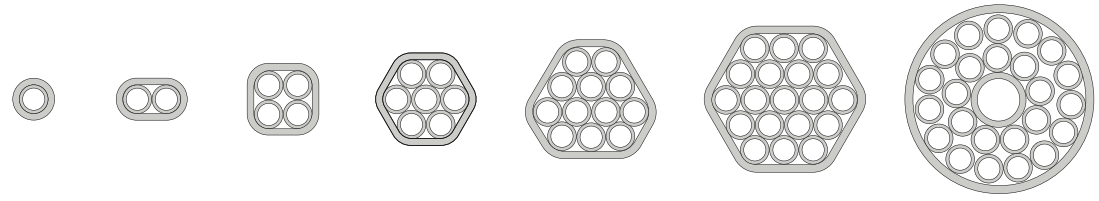
- Flame retardant
- Does not produce much smoke
- Has flexible sheaths
- Inner surface enables cable blowing
- Temperature resistance in very hot and cold area

LSZH

5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	7.0	42	2,000	180
2way	12.4x7.4	80	1,000	130
4way	12.4x12.4	125	2,000	40
7way	17.4x16.1	184	2,000	32
12way	22.4x20.4	278	2,000	22
19way	27.4x24.7	400	2,000	18
24+1way	32.0x32.0	533	1,000	21

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	12.4	105	1,000	104
2way	22.4x12.4	183	2,000	32
4way	22.4x22.4	301	2,000	21
7way	32.4x29.7	460	2,000	12

12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40'
1way	14.4	120	1,000	96
2way	26.4x14.4	211	2,000	24
4way	26.4x26.4	348	2,000	18
7way	38.4x35.2	533	1,000	14



1 way | 2 way | 4 way | 7 way | 12 way | 19 way | 24+1 way

Indoor Application Hybrid LSZH

HYBRID LSZH is composed of LSZH outer sheath and PE inner tube. Hybrid LSZH is a cost effective and a fire protective solution. As an elastic product, it is convenient for installation and low smoke zero halogen characteristics that prevent smoking when fire occurred.

5/3.5mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	7.4	41	2,000	130
2way	12.8x7.8	77	2,000	44
4way	12.8x12.8	114	2,000	40
7way	17.8x16.5	161	2,000	32
12way	22.8x20.8	236	2,000	22
19way	27.1x27.1	330	2,000	18
24+1way	32.7x32.7	438	1,000	19

10/8mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	12.8	94	1,000	104
2way	22.8x12.8	159	2,000	32
4way	22.8x22.8	249	2,000	21
7way	32.8x30.1	366	2,000	12

12/10mm	Nom. OD (mm)	Weight (kg/km)	Length/drum (m)	Number of drums in 40′
1way	14.8	112	2,000	36
2way	26.8x14.8	190	2,000	24
4way	26.8x26.8	299	2,000	18
7way	38.8x35.6	441	1,000	18

Indoor Application
Microduct: LSZH

2 way | 4 way | 7 way | 12 way | 19 way | 24+1 way

Introducing Our New Eco-Friendly Product: Made with Recycled Materials - CLEAN RM

We are pleased to introduce our first "CLEAN RM" (Recycled Microduct)" as one of our ESG programs. We are very few Microduct manufacturers to commercialize Microduct using recycled material sourced inside the production facility. This product results from our enthusiasm for sustainability and the value of using recycled materials.

Sourced recycled material inside of production facility – the reduction in resource consumption and carbon emissions compared to products made from virgin materials.

100% Recycled material except stripe in color with virgin materials.

Compliant with IEC standards. The product has been developed and tested to meet international standards.

You can use this CLEAN RM for your fiber build, just like a regular Microduct.

Single Tube

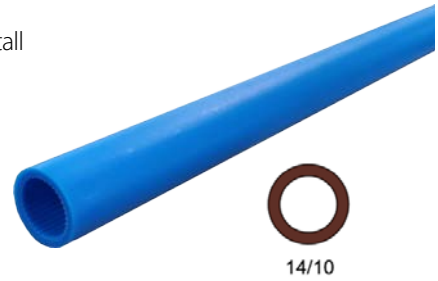
Single tube

Single Tube can be used for either direct buried with thick walled microduct or direct install for overrides with thin walled microduct.

Available size

Thick walled : 4/2.1 ~ 20/16

Thin Walled : 5/3.5 ~20/18



Special Duct for Drop Area

A smaller 5/3.5mm duct or 7/3.5mm duct, if using Thick Walled Duct, is sufficient for blowing in ABF directly to the customer. If you plan to install all drops straight to the home from the secondary concentration point, a series of individual tubes can be utilized. A tracer insulated 1 way is used also.

Thick Walled 1 way with Trace Wire

Microduct With trace wire is used to accurately locate underground microduct.

The tracer insulated during microduct production is laid during installation in order to find them at later date for safe digging.

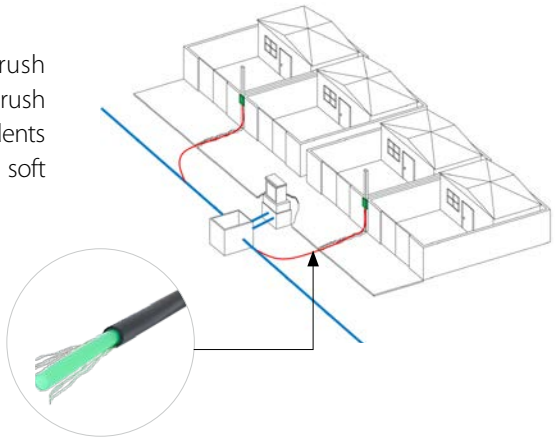
OD/ID

18/14mm , 16/13mm,16/12mm

14/10mm,10/6mm,7/3.5mm,4/2.1mm

Ruggedized Duct

Ruggedized Microduct is Brass coated steel wired duct to enhance crush resistance in drop area. It is designed for drop area which requires high crush resistance. By deploying this product ISP can avoid unexpected cutting accidents in drop section. It can be installed in sidewalk, garden and schoolyard with soft trenching to save cost.



- Easy installation with Soft trenching
- High crush resistance with brass coated steel wired
- Concrete wall, Wooden wall and Other fence Installation
- Side walk with GI pipe
- Cost effective solution to save installation time
- From the footpath or sidewalk to each MTU
- In case of wall or fence

Installation location Examples

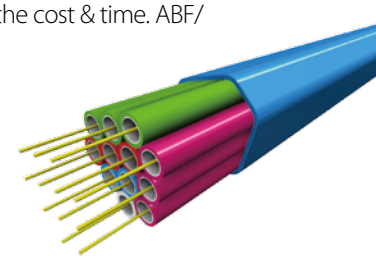
- City Street Shop : From the footpath or sidewalk to each MTU, operator want to deploy more robust MICRODUCT solution.
- Rural Area : More rigid MICRODUCT solution should be deployed to protect against frequent relocation of gardening fence.

Installation Method



Pre-installed cable Duct

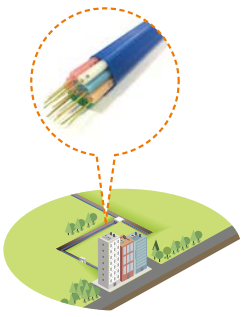
Deploying the duct and then installing cable can be costly and time-consuming. There is a solution to eliminate the installation of cable at job site to reduce the possibility of damage from handling. "Pre Cabled Microduct" is designed to save the cost & time. ABF/ ABC is pre-installed during the microduct production.



KNET "Pre Cabled Microduct" Application

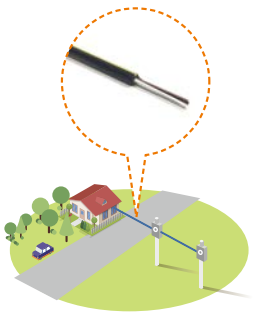
this product can be used in direct buried, directional boring, aerial placement , pre-exisiting pipe and indoor application. Knet provides wide and various microduct configuration depend on the application. Here are the application cases

Installation Procedure	Pre-Cabled Microduct	TWD with Blowing
Deployment of Microduct	O	O
Mid-Span (Window cut or Round cutting)	O	O
Connector and End-cap	O	O
Subscriber Connection with Tube	O	O
ABF pushing to Subscriber	O	x
Compressor preparing (Using Truck)	x	O
Compressor move to each connection	x	O
Blowing machine setting	x	O
Air Test/DIT test/Ball test	x	O
Fiber Blowing	x	O



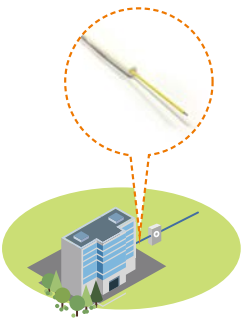
Direct Buried Application

TWD 24way/12way
ABF(EPFU) G652D, G657A1



Drop Application

Aerial Brass wire 7/4mm
ABF(EPFU) G652D, G657A1



Indoor Application

LSZH 5/3.5mm 1way
ABF(EPFU) G652D, G657A1

Combined Duct

COMBINED DUCT is a bundled microduct with different sizes of microduct. Using for both Feeder and Last-mile network with a combined duct is efficient in saving the cost. Depending on the network coverage and customer demands, you can install different sizes of fiber optic cables. Both the time and the cost of civil work dramatically decrease since one-time installation is possible.

Greenfield-Common Ducting

Service providers share "pathway" for building a Backbone network to save the civil works. They are assigned to use individual ducts needed and the size of the inner duct is designed for each provider's request.
Example - 3 different size of a tube (14/10mm, 12/10mm,10/8mm for different cable 144 , 288 C)

Enterprise Market

Enterprise Market – This type of combined duct can be used for an industrial complex where the distance between facilities is far from each other.
Example -14/10mm for 288 core are for Metro Backbone and 8/4mm for 2 core are for the distribution network in one complex.

Full Network

Network owners can enjoy access to build networks easily and efficiently not only saving the cost to use combined duct of one pathway. Distribution and drop network will be built at the same time using 14/10mm and 7/3.5mm duct mixed.

Double Sheath Multi Duct

HDD (Horizontal Directional Drilling) has become commonplace for a method of installation after so much growth in the past decades. Utility owners or network owners have experienced a lot of benefit such as removal of traffic disruption and reduction of surface damage from HDD.
The pipe must withstand pullback loads with tensile pull forces, external pressure, and tensile bending stress. Of course, external service loads.
KNET'S DOUBLE SHEATH MULTI DUCT is designed with double layers of outer sheath applied to thick walled tube to maximize the prevention of duct damage during HDD Installation or Pulling.

- Double sheath double protection
- Prevention from excessive abrasion while installing the duct
- Crush and impact resistance
- Solution specialized in Horizontal Directional Drilling and Open Cut
- Applicable in harsh environment

14/10mm 7way

Unwelcomed method of trenching was driving the customer to chose HDD in Philippines. Trenchless drilling requires the microduct withstanding pullback loads, external service loads and 14/10mm 7way with Double Sheath Multi duct were the right choice for this installation requirement.

14/10mm 4way

This product were used for river crossing with HDD. Two layer of sheath meets the hydraulic requirement. Average 5000ft (1.5Km) were installed under the river at one time in southern area in USA.

Microduct Accessories & Tools

Knet provides a complete array of accessories to fulfill your fiber pathway needs including : Connectors, End Caps, Reducers, Tube Branching Units, Tools and Fiber Installation Machines.

Accessories

Straight Connector

- The Push-fit straight connectors manufactured with high quality materials and transparent body assure easy and quick installation.
- The connector can be re-used 10 times remaining maintained the high performance requirements for air-blown installation systems.

Size (mm)		Product Code
OD	ID	
3	2.1	RC3AU
4	2.1	RC4AU
5	3.5	RC5AU
7	3.5	RC7AU
8	6	RC8CU
10	8	RC10BU
12	10	RC12BU
12	8	RC12AU
14	12	RC14CU
14	10	RC14AU
16	12	RC16AU
18	14	RC18AU

Connector Cover

- The connector cover is typically used in place of a duct closure to protect the connector and the end cap for direct burial.

Size (mm)	Product Code
5	RCC5U
7	RCC7U
8	RCC8U
10	RCC10U
12	RCC12U
14	RCC14U
16	RCC16U
18	RCC18U

End Cap

- The End Cap for permanent or temporarily sealing of unused microducts to prevent obstacles such as water, mud, dust and so on.
- The body is transparent for easy fault location and fix the problem easily during installation.

Size (mm)	Product Code
3	RE3AU
8	RE8AU
10	RE10AU
12	RE12AU
14	RE14AU
16	RE16AU
18	RE18AU

Reducer Connector

- The Reducer allows interconnection between microducts that are difference in outer diameters. Usually, this is used in the point of transition from Direct Bury to Direct install microducts entering the office, house.

Size (mm)		Product Code
7/4	4/2.1	RR74AU
7/3.5	5/3.5	RR75BU
10/6	8/6	RR10GU
12/10	5/3.5	RR12AU
12/10	10/8	RR12HU
14/10	12/8	RR14FU
14/10	12/10	RR14HU
16/12	14/10	RR16DU

Tools

Gas Block Connector

- The design of Gasblock is to prevent the gas leaking at the point where the connection between a duct and fiber optic cable inside.
- Gasblock connector can be installed at home, office, inside building not to allow the inflow of materials which has the harmful gas, water and dust.

Size (mm)		Product Code
MD	Cable	
5	1-2.5	RGAAU
7	1-2.8	RGBAU
12	3-6	RGFAU
12	6-8	RGFBU
12	8-10	RGFCU
14	3-6	RGHAU
14	6-8	RGHBU
14	8-10	RGHCU
14	10-12	RGHDU
16	3-6	RGJAU
16	6-8	RGJBU
16	8-10	RGJCU
16	10-12	RGJDU

Bulkhead Connector

- The Bulkhead Connector is used for distributing and arranging the inner tubes of bundled microduct on the frame combined by Mounting Rack and Patch Panel, which is mostly installed in MDF room of the building. The structure of bulkhead is to fix the connector the hole of the Patch Panel. It's also suitable to apply in Air Blown System.

| Tube patch panel |

Size (mm)	Product Codes
5/3.5	RBC5U

Accessories

Knet's Microduct Tool Kit Case contains a total of 7 tools. It consists of special Microduct tools that can be used efficiently at the installation site. This portable toolbox is an essential item for Microduct cutting, branching and termination. The inside is protected by a sponge and the exterior is made of a lightweight aluminum body.

450X350X100mm
Gross Weight 4kg

Microduct Duct Cutter

Product Code	Cutting Range	Dimension (mm)	Weight (g)
MDC63	63mm	300mm * 75mm	710g
MDC42	42mm	200mm * 55mm	230g

Microduct Duct Sheath Remover & Hook Cutter

Product Code	Cutting depth	Dimension (mm)	Weight (g)
MSR08 (Sheath Remover)	5mm	150mm * 35mm	170g
MHC25(Hook Cutter)	25mm	170mm * 45mm	50g

Microduct Tube Cutter

Product Code	Cutting Range	Dimension (mm)	Weight (g)
MTC14	14mm	150mm * 35mm	30g

Microduct Tube Tube Deburring Tool

Product Code	Blade	Dimension (mm)	Weight (g)
MDBE100	E100	145mm * 10mm	50g

I/Y, T, D type Branch Closure

It is designed by modular method to change the length of closure and branch direction. It is possible to assemble or dis-assemble without any special tools. I/Y, T & D type branch closure is available and maintenance can be done without cutting the ducts and can be completed only by reopening upper modular part. I/Y, T & D type branch closure is designed to connect two microducts and to branch-off tubes without any interruption of connectivity.

Product Code	Product	Size (mm) W x L x H	Application Duct	Weight (g)
RTYXK	I/Y Type	400 x 113 x 76	Max. Φ45	584
RTTXK	T Type	310 x 195 x 80	Max. Φ36	656
RTDXK	D Type	450 x 108 x 187.25	Max. Φ50	830

Using Branch Unit Closure

① Cut duct using duct cutter

② Mark the spot of duct to take off the sheath

③ Cut the sheath using Hook cutter
Or Slitter for double sheathed duct

④ After removing the sheath, taping to fix microtubes and sheath

⑤ Make a hole of rubber sealing cap to insert the microtube

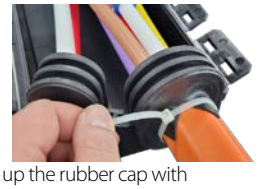
⑥ Insert microduct inside rubber cap and fix with cable ties.

⑦ Align microtubes of both side

⑧ Cut microtubes

⑨ Connect two microtubes after taking out from closure

⑩ After coupling microtubes, sort tubes in zip zap shape.



⑪ Tight up the rubber cap with
Cable ties

⑫ Close the cover and snap the hinges on top and bottom

Equipments

Blowing Machine

The Microjet PRM-196 is designed for the installation of FO fibers and cables into microducts, either by the push-pull method, or by pulling with a traction line.

- Applicable outer diameter of ABF or ABC : 0.8 ~ 8(mm)
- Applicable outer diameter of duct : 3 ~ 14(mm)
- Size (L x W x H) : 285 x 250 x 335mm
- Weight : 6.7kg

The MINIJET is designed for the laying of FO cables into ducts with the jetting or floating methods. These methods are combined with an additional mechanical pushing force, giving the best blowing performance.

- Applicable outer diameter of ABF or ABC : 4 - 16(mm)
- Applicable outer diameter of duct : 7 - 42(mm)
- Size (L x W x H) : 520 x 293 x 373mm
- Weight : 20kg

The ULTIMAZ pusher is designed for the installation of FO fibers and cables into microducts using a pushing, push-pull or jetting method.

- Applicable outer diameter of ABF or ABC : 0.8 - 4(mm)
- Applicable outer diameter of duct : 3 - 12.7(mm)
- Size (L x W x H) : 210 x 100 x 148mm
- Weight : 3.85kg

Optijet is latest compact innovation. It is designed for laying the cable and is electric, digital, smart and connected.

- Applicable outer diameter of ABF or ABC: 1.5-8.0 (mm)
- Applicable outer diameter of duct : 3.0-16.0(mm)
- Size (LxWxH): 310 x 383 x 322(mm)
- Weight : 17kg

Compressor

The M17 compressor is specifically for use with the MINIJET, MICROJET cable blowing machines.

- Air production volume : 1000 liters/min(35.3cfm)
- Max. pressure : 15bar
- Power source : Gasoline engine
- Size (L x W x H) : 1390 x 800 x 790mm
- Weight : 192kg

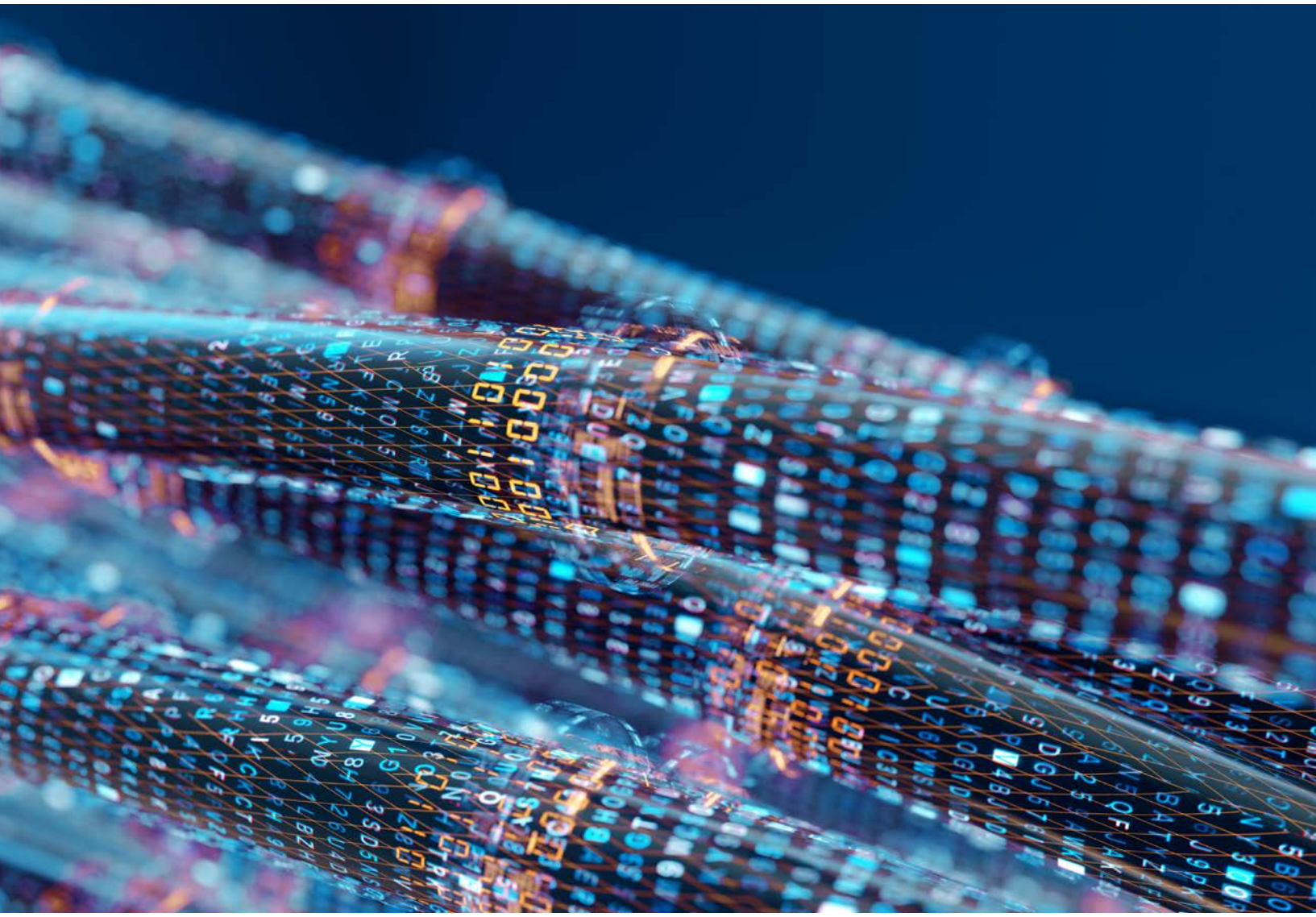
The Premium compact 160/4w is suitable for blowing cable on small building sites with Ultimaz blowing machine.

- Air production volume : 160 liters/min
- Max. pressure : 20bar
- Power source : Gasoline engine
- Size (L x W x H) : 350 x 560 x 560mm
- Weight : 31kg

The FIBRA PLUS compressor is specifically for use blowing machines.

- Air production volume: 1,000 liter/min(35.3cfm)
- Max. pressure: 15bar
- Power source : Gasoline engine
- Size (LxWxH) : 1268 x 774 x 1019
- Weight : 260kg

Air Blown Cable & Fiber



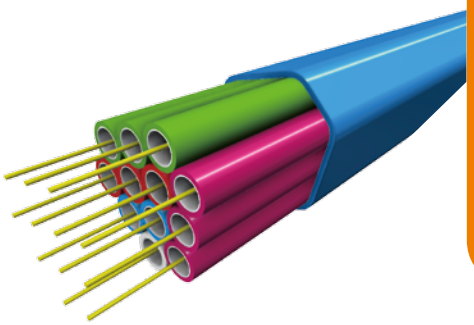
Blowing cable is one of the biggest benefit of using microduct.
Cables can be blown directly from
point to point in a single run over great distances
Blowing distance can reach approximately upto 2Km.

Fiber Optic Cable - ABF/ABC

One main component of Microduct Solution is Air Blown Fiber/Cable (or Micro cable) . To blow/jet the cable into microduct, ABF/ABC can be used.
As called as " Air Blown Solution", it is offering reduced cost, increased design flexibility and other many advantages which can't be competitive by conventional fiber cables.

ABF (Air Blown Fiber)

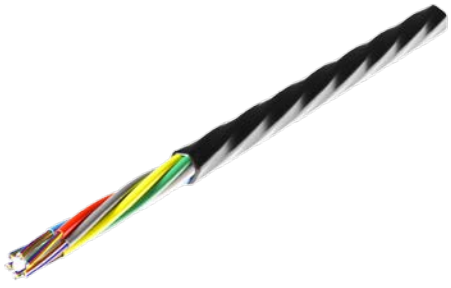
It is a type of cable that has 2~24 cores With 1.1mm~1.6mm of outer diameter and also can be installed in microduct by air blowing method.



- For distribution or drop network
- Lightweight & flexible without strength member
- G.652, G.657 or mixed
- 2, 4, 8, 12, 24core with 1.1~1.6mm diameter

ABC (Air Blown Cable)

It is a type of cable that is installed by air blowing method in a microduct. There are various types of Air Blowing Cables that can be applied according to the inner diameter of the micro duct, and 200/250um of outer sheath is also possible to be applied for materializing the multi cores of cables.



- For feeder or distribution network
- G.652, G.655 or mixed
- GRP central strength member(CSM)
- Up to 432 core of 4.2 ~ 10.3mm diameter
- 12F, 24F, 48F, 72F, 96F, 144F, 216F, 288F, 432F

Fiber	250㎛, G.652.D / G.657.A1				200㎛, G.657.A1		
Fiber Count	Up to 72F	96 ~ 144F	288F	432F	Up to 144F	288F	432F
Cable Diameter	4.2~5.7	6.1 ~ 7.9	10.3	11.7	4.3 ~ 5.6	7.9	8.8

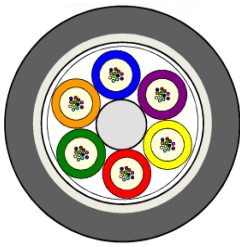
Air Blown Cable & Fiber

Advantage of Micro Cable

Easy to handle and maintain

1) It is light and thin and is suitable for pneumatic installation.
2) I t is easier to handle than conventional cables.
3) Need smaller ducts and handholes.

Number of Fibers	Cable	72c	96c	144c	288c	Average Difference
Cable Diameter (mm)	Air Blown Cable	5.7	6.1	6.7	10.3	Avg. 50% Smaller
	Conventional Cable	11	13	16	18	
Approx. Cable Weight (kg/km)	Air Blown Cable	28	28	35	83	Avg. 80% Lighter
	Conventional Cable	129	174	257	342	



Conventional OSP Loose tube 72 Core 11mm , 129kg/km

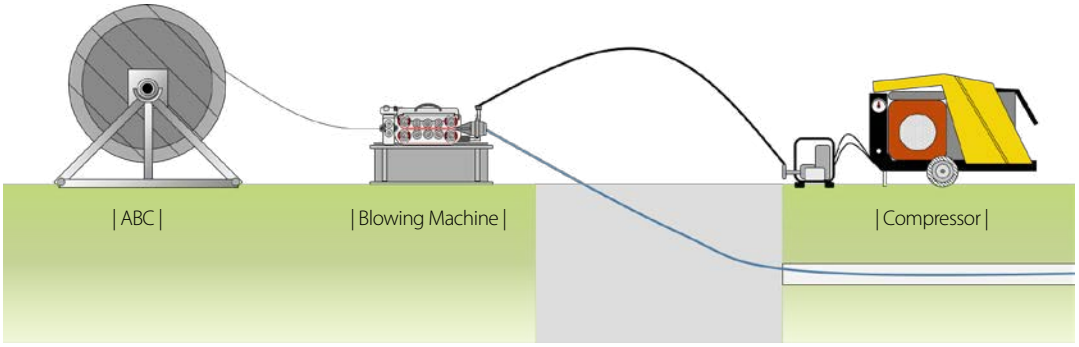
ABC Loose tube 72 core 5.7mm/28kg/km

Smaller Reels

Smaller ducts and handholes

Advanced Installation Method – Air Blowing/Jetting Installation

1) Install the cable with compressed air from the equipment.
2) No cable is installed physically, and no core disconnection occurs.
3) Advanced technology drives costing saving from labor and time.



Comparison of Conventional Pulling VS Air Blowing

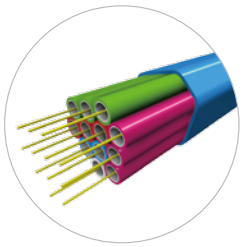
Division	Conventional Pulling method	Air Blown Solution
Required number of people	6~ 8 Person	2~3 Person
Maximum installation distance	250m	2,000m
Speed	1~10m/min	60~100m/min
Installation method	Manpower	Air Blowing

Microduct VS ABF/ABC

Recommended tube size based on ABF/ABC outer diameter, application and installation method. Below table helps to select the right size of microduct but need to consult with our staff to chose the proper size of tube.

Recommended tube size for ABC

	ABF		ABC					
Fiber Type	250㎛, G.652.D / 200㎛ G.657.A1		250㎛, G.652.D / 200㎛ G.657.A1			200㎛, G.657.A1		
Fiber Count	2 & 4 F	8 & 12 F	Up to 72 F	96 ~144F	288 F	Up to 144 F	288 F	432 F
Cable Diameter(mm)	1.1	1.4	5.7	6.1 ~ 7.9	10.3	5.1~ 5.6	8.5	8.8
Tube Size (ID/mm)	2.1, 3.5, 4.0		8	10	12	8	10	12



Example – Last Mile Network 4/2.1mm 12way
ABF 4F (1.2mm) X 12 tubes Total 48 Core

Example - Feeder Thick Walled Duct 14/10mm 7way
ABC – 200um 288F (7.9mm ID of cable)
Total 2,016 Core

Cable Spec VS Microduct Configuration

Cable Type	Cable Count	Cable size (OD/mm)	Microduct (ID/mm)	Microduct Configuration	Microduct Configuration
ABF	2 ~12 F	1.1 ~ 1.4mm	2.1mm	4/2.1mm	1, 7, 12, 24way
	2 ~12 F	1.1 ~ 1.4mm	3.5mm	7/3.5mm	1, 2, 3, 4, 5, 6, 7, 12, 14, 19, 24, 24+1way
	2 ~12 F	1.1 ~ 1.4mm	3.5mm	5/3.5mm	1, 2, 4, 7, 12, 19, 24+1way
ABC	Upto 72 F (250㎛)	5.7mm	8mm	12/8mm	1, 2, 3, 4, 5, 6, 7way
				10/8mm	1, 2, 4, 7way
	Upto 144F (200um)	5.6mm	8mm	12/8mm	1, 2, 3, 4, 5, 6, 7way
				10/8mm	1, 2, 4, 7way
	96 ~216F (250㎛)	6.1 ~ 7.9mm	10mm	14/10mm	1, 2, 3, 4, 5, 6, 7way
				12/10mm	1, 2, 4, 7way
	288F (200㎛)	8.5mm	10mm	14/10mm	1, 2, 3, 4, 5, 6,7way
				12/10mm	1, 2, 4, 7way
	288F (250㎛)	10.3mm	12mm	16/12mm	1, 2, 3, 4, 5, 6, 7way
	432F (200㎛)	8.8mm	12mm	16/12mm	1, 2, 3, 4, 5, 6, 7way

K-NNECTIES
Connectivity Series

Connectivity Product

Knet's new connectivity product series " K-NNECTIES" delivers product solutions within the fiber optic area with a focus on FTTx broadband communication networks for Telecom operators, Network Owners, Utility, Enterprise and Installation companies worldwide.

- Splicing closure
- FDH-Cabinet
- Termination Box
- Accessories

K-ridgeDome

Mechanical Dome type closure
Model # : K-ridgeDome-144C /288C

Application

K-ridgeDome Series provides high performance for protection and distribution of fiber optical splice point, division of optical signal and connecting individual subscribers in various application. Fiber optic splice closure for fiber optic cable may be exposed to severe environment conditions. The closure for fiber optic cable shall provide excellent durability and long-term reliability in those severe conditions.
K-ridgeDome 144, 288 Core consists of Dome Base with Cover, Dome assembly and trays and inner kits. The closures have 4 / 6 main entry ports on end. The outer case consists of base and dome and constructed of highly chemical resistant material. The trays are able to accommodate 6 /8 individual fiber fusion splices.

Features

- The ribbed body has high mechanical strength against impact and compression.
- Reduction of the working time and the safety by using just catch clips.
- Great quantity of fiber optic cable make an excellent environment performance.

Specification

	A type	B Type
Size	403 x 201mm / 16 x Ø8 inch	450 x 298mm /17.5 x Ø11.6inch
Inlet Port	4 port	6port
Cable Dia.	Main cable Ø6.5~ Ø16.5 / Drop Optional	Main Ø18 ~ Ø20mm / Drop Optional
# of Splice tray	6EA	8EA
Tracy capacity	24C	36C
Max Splicing Capacity	144C	288C

Tray Type

Splice Chip

Heat Shrinkable Sleeve(12C)

Ribbon Chip

Ribbon - Heat shrinkable sleeve (9slot)

Splitter Chip

Heat shrinkable sleeve (3C)

Adaptor Tray option (6~8 port with 2 splitter)

Grommet type

A Type						
Cable Range Inches(mm)	0.512 ~ 0.590 (13 ~ 15)	0.570 ~ 0.649 (14.5 ~16.5)	0.315 ~ 0.433 (8 ~11)	0.250 ~ 0.312 (6.35 ~ 7.9)	0.42 ~ 0.60 + 0.125 (10.7 ~ 15.2 +3.2)	0.320 x 0.180 (8.1 x 4.5)
Description	1way	1way	2way	4way	7way	Flat 4way

Installation

Aerial

Underground

Wall Mount

Aerial Splicing Compact Closure
Model # : K-ridgeCOM

Application

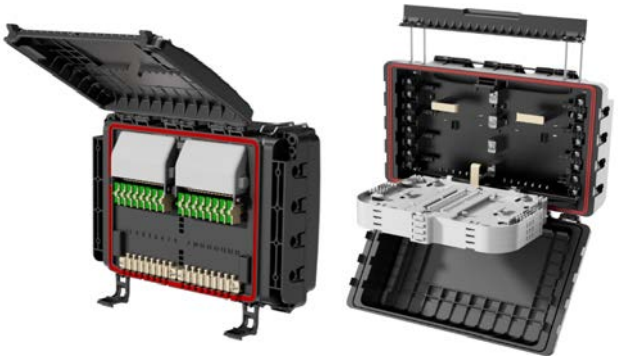
The aerial network access point is used to connect between aerial plant optical fiber cable and Pre-connectorized.
Aerial NAP includes the plastic casing, 16 SC/APC adapters, four splice trays (max splice capacity 192F), strand mounting brackets, and other necessary materials for the termination of optical fiber cable.
The Aerial NAP has built in holders for splitters up to 1:16.

Features

- Mounting space to accommodate various splitters in Tray
- Two types of Cable Holder according to cable diameter
- Separation of main cable working space and drop cable working space (front / rear)
- The cable inlet consists of main cable 8ports(2x4Drop) and drop cable 16ports enough space to arrange surplus units
- The operation for Mid-Span Branching is possible

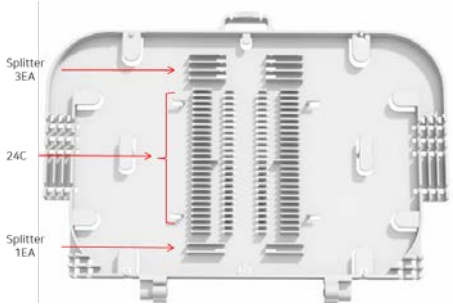
Specification

	KN 804
Dimension	330 x 220 x 139mm (13.0 x 8.6 x 5.5 in)
Inlet Ports	Main : 8ports, Drop: 8ports (Option.16ports)
Cable Dia(mm)	Main cable : Ø6 ~ Ø13 Drop cable : Ø1.8 ~ Ø3.5
No. of Splice Tray	4 EA
Tray Capacity	24C (Max. 48C)
Splice Capacity	96C (Max. 192C)



16 port

Tray Type



FDH (Fiber Distribution Hub)
Model # : K-ridgeHUB 144/288/432C

Application

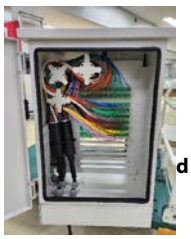
K-ridgeHUB is the complete solution for managing up to 432port distribution fibers for an outside plant FTTx PON application.

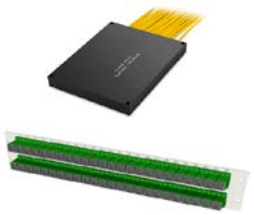
Cabinet incorporates a modular design, allowing the provider to repair or replace a damaged cabinet, without disrupting existing service. Cabinet includes a new pyramid shaped roof/solar shield and venting ports, providing additional protection for deployed fiber. Mounting options pad/vault mounted with either 100 or 300mm riser.

ITEM	FDH-144C(288C)	FDH-432C	REMARKS
Dimension (mm/in)	660H X 465W X 476D (25.98"X 18.3"X 18.74")	960H X 515W X 476D (37.8H X 20.28W X 18.39D)	Without Riser
Dimension (mm) Riser	100H(300H) X 465W X 476D (3.93H(11.81H) X 18.3W X 18.39D)	100H(300H) X 465W X 476D (3.93H(11.81H) X 18.3W X 18.39D)	-
Port Density	144f (288 fiber)	432 fiber	-
Feeder	48 fiber (12fiber- option)	48fiber	-
Cable Entry Trunk In	2	1	C/Gland PG - 16
Cable Entry Secondary	2	3	C/Gland PG - 21
Mounting Options	Pole mount Stand Alone	-	With pole mount Accessories
Splitter Slot	9 or 18 (Optional)	9 (Max.27) Optional	Standard SC/APC
Connector Type	SC/APC, SC/UPC, LC/UPC, LC/APC	SC/APC, SC/UPC, LC/UPC, LC/APC	Standard SC/APC

Front

Rear





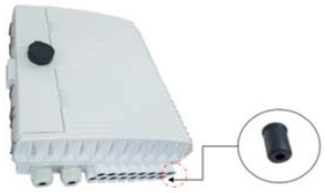
Termination Box : K-ridgeTor 16

Application

K-ridgeTor series 16 is designed to be comprised of PLC splitters allowing optical power to be split of into Max. 32 channels. They easy-to-sure gasket sealing system further simplifies the installation process and provider superior protection from the external environments.
The unit can support up to 16 drop cables in FTTH applications and shall be served with all of the mechanical requirement such as waterproof, impact resistance and securing feeder and drop cables. Included adaptor panel and splice panel is for pre-termination PLC splitter installations and fiber optic cable splicing.

Features

- Hold Max 1x16 Splitter (Max 1x32Splitter with LC connector)
- Industry standard user interface, be made of high impact plastic
- Hold 2 inputs & 16 output port
- Wall & Pole mount use
- Total enclosed structure



Specification

- Dimension (W x D x H)mm : 300 x 235 x 100
- In / Out ports : 2 / 16
- Installation splitter : 1x4 / 1x8 / 1x16/ 1x32 (LC)
- Adaptor : SC /LC
- Operating temperature : -40 ~ 80℃
- Installation : Wall mount or pole

K-ridgeTor Series –Outdoor

K-ridgeTor –OM 8/24/32

- Cable port : 3/12,24,32
- Connection : 8,16,32
- Cable Diameter (Main/Drop) : 3-16, 3-17, 3-18mm
- Aerial, Pole, Wall mount

K-ridgeTor –OB

- Cable port : 2/8
- Connection : 8
- Cable Diameter (Main/Drop) : 3.5-13mm
- Aerial ,Pole, Wall mount

K-ridgeTor –16B

- Cable port : 3/18
- Connection : 16
- Cable Diameter (Main/Drop) : 3-16.5mm
- Aerial ,Pole, Wall mount

KridgeTor Series –Indoor

FTTH 4C Termination outlet box is used for final termination for FTTH Telecommunication. It can hold 4C SC adaptor & pigtails, 8C LC adaptor & pigtails (LC Duplex)

KridgeTor –FP4

- Cable port : 2
- Connection : 4
- Cable Diameter (Main/Drop) : 3-15mm
- Pole, Wall mount

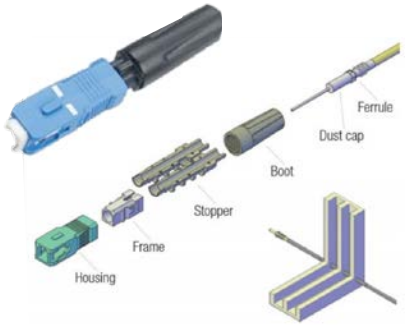
Pre-Connetorized Cable Kits

Pre-connectorized cable kits are designed to use for pre-terminated fibers with Optical Interior Termination Device for FTTH applications. Composed of 1, 2 or 4 fibers directly connected in Adaptors inside a terminal socket to ensure rapid installation.

- CPR Certified

Item (SPPT)	Cable	Sheath color	Fibers	Adaptor	Ferrule	Cable length
Precon-KIT	2.0mm	Black	1 - 4	SC	PC	Optional
	3.0mm round	White		LC	APC	
	3*2mm flat	Optional		FC		
	4.2mm					
	4.5mm					

FDAC



- Only 4.5mm hole required
- Quick and easy assembly in the field
- High stable mating and de-mating characteristics
- Designed for variable cable
- Comply with : JIS C-5973, IEC, Bellcore

Model No.	Type	Connector	Cable
FDAC	Drop cable connector	SC/PC, SC/APC	3.0mm

Worldwide Projects

Eastern of Canada - Telecommunication Service Provider

Broadband Network - Canadian Tier 1 service provider was using Knet microduct to provide high speed service to end subscribers. Drilling had been used as one of their major installation method.

Open Access Network

Open access networks have become popular for changing the way cities receive broadband. They allow multiple service providers, enterprises, and carriers to connect to the network, broadening competition and choice. Microduct and Micro trenching is the best way to complete open access networks building.

The international oil and gas company's digital technologies, USA

To manage the stability of pipeline infrastructure is driving to adapt the digital technologies such as smart sensors, cloudy systems which makes real time data collect from oil field. Drilling optimization, detecting leakage faster and reducing repair response times are now possible to use telecommunication infrastructure. Using microduct , it is possible for energy company to deploy fiber optic cable easily along with their own energy (gas or oil) pipe line.

Business Park New Development, Costa Rica

The Business park was just 60mins away from the ports(Air/Sea) in Costa Rica. For building a new business complex, an optimized fiber pathway was a MUST. The developer had already installed a 4 inches duct with four 1.25 inch sub-ducts (OD 31mm). In order to maximize the capacity of cable, microduct solution was used.

Smart City OSP infrastructure, Free Zone Colón, Panama

Due to excessive amount of cables on the power line poles, the telecommunications regulator did not allow to install anymore aerial FO cables in the city. The service provider decided to investigate the option to go underground and the conclusion was to do mini trench and use microducts.

Global Mining company – Fiber Optic cable installation, Brazil

The fibers, which will serve the automation, telephone and internet systems of the new mine, are being installed by means of micro ducts. a rigid cable formed by small grouped ducts, through which the optical microfibers pass. The network can be both aerial and underground.

Network Expansion in North Europe, Sweden & Finland

Telecommunication Service Providers has been building its network in North European regions, mainly for metropolitan area of Sweden and Finland. KNET's air blown solution has been applied since 2014 and thousands kilometers of Microducts were supplied to the local partner. Thick-walled Duct with easier operation advantage and proved resistance of low temperature makes the expansion more efficient. Up till now, the basic network of metropolis is almost fulfilled and some rural areas are being installed according to their increasing demand for fiber network connection.

FTTH in Germany

Knet has supplied Microduct to Deutsche Telekom who is one of the world's leading integrated telecommunication companies. With FTTH, the company building the infrastructure for the future. Yr.2023, Deutsche Telekom has invested more than 2.5 billion euros in pure fiber optic expansion - far more than any other competitor. By 2030, a total of 30 billion euros will flow into the fiber optic rollout.

Turksat Project in Golbasi, Turkey

Turksat project was the first project to implement the microduct technology in Golbasi, Turkey. After mini trenching (50mm Width & 400 mm Depth), the microduct (Microduct Thick Walled Duct 14/10mm 4way and 7/3.5mm 12way) was laid before cable installation. The installed distance of cable was 90 meter per min by air blowing. We had finished 1Km with less than 30 min and consequently we got Turkey KMO project.

National Broadband Network, Greece

Almost fully occupied Manhole and the necessity of migration from copper cable to fiber optic cable stimulates the demand of applying Microduct Solution. Direct Buried Duct is deployed by Micro-trenching method and Direct Install Duct is installed into existing PVC ducting system.

Fast Deployment for Mobile Tower connection : Myanmar

The new Myanmar mobile operators needed to build the backhaul connection in a very short period of time. The expansion of its coverage was essential to increase the market share in this emerging market.Network providers can manage their networks easily since the fiber/cable was shared with individual inner tube compare to conventional case. It's suitable for mobile backhaul connection since Tower provider or Network Provider can easily set up cost effective infrastructure with expandable network. (By blowing empty tube when customer request service)

SINGAPORE In Building Solution

The government subsidiary policy for non-residential buildings offered opportunity for KNET LSZH Microduct supply, which got UL Certificate to guarantee the function of flame-retardation. KNET, aiming at being a total solution provider, also developed customized Mounting Rack and Patch Panel for tube arrangement with bulkhead connector in MDF room.

Nationwide End-to-End Microduct Network, New Zealand

This project has been designed with the microduct from the backbone area to the drop. To complete the project, the owner of the project had to find the manufacturer who could supply the whole product portfolio. KNET was one of the very few suppliers having capabilities to satisfy the demands for providing the wide range of the configuration Various types of customized Microducts to meet subscribers' environment have been suggested and deployed.

Telecommunication Service Provider, Korea

Telecommunication companies such as KT and SKT and utility companies such as KEPCO are focusing on how to efficiently utilize existing infrastructure for network expansion. As a solution, we have installed DI Microduct in existing outer ducts and bundle ducts in existing subducts. It makes subscribers connection faster and time and cost saving for civil work comparing to the conventional installation method.

Prevent risk of damage to existing underground utilities, Philippines

Since required fast deployment for 3rd Mobile Telco launching and avoiding high risk of causing damage to existing underground facilities, micro duct is the efficient solution to satisfy the customer's needs.

MEA Common Ducting & Underground Migration, Thailand

In order to improve the aesthetic view of Bangkok, government own organization, Metropolitan Electricity Authority (MEA), raise 5 years project plan to bring down aerial cable and replace with underground Microduct total distance 500 km. KNET solution is to deploy a common ducting, Thick Walled Duct 4way 14/10mm + 4way 12/8mm inside existing underground MEA's PVC duct to accommodate fibers and serve to population in Bangkok city.

The Municipality's Leading Open Access Network, Indonesia

The Bandung city mayor declared to stop the fiber optic infrastructure deployment since there were a lot of issues and sprawling network constructions from the several operators. Moreover, the municipality did not allow random excavation anymore, mainly due to severe traffic jam. Thus, the infrastructure needed to be shared by the operators and construction had to be done in a short time. Micro trenching was the best solution to minimize traffic disruption and the operator were able to use the extra tube from microduct bundled without additional excavation to comply with municipality's policy.

KNET Global Network

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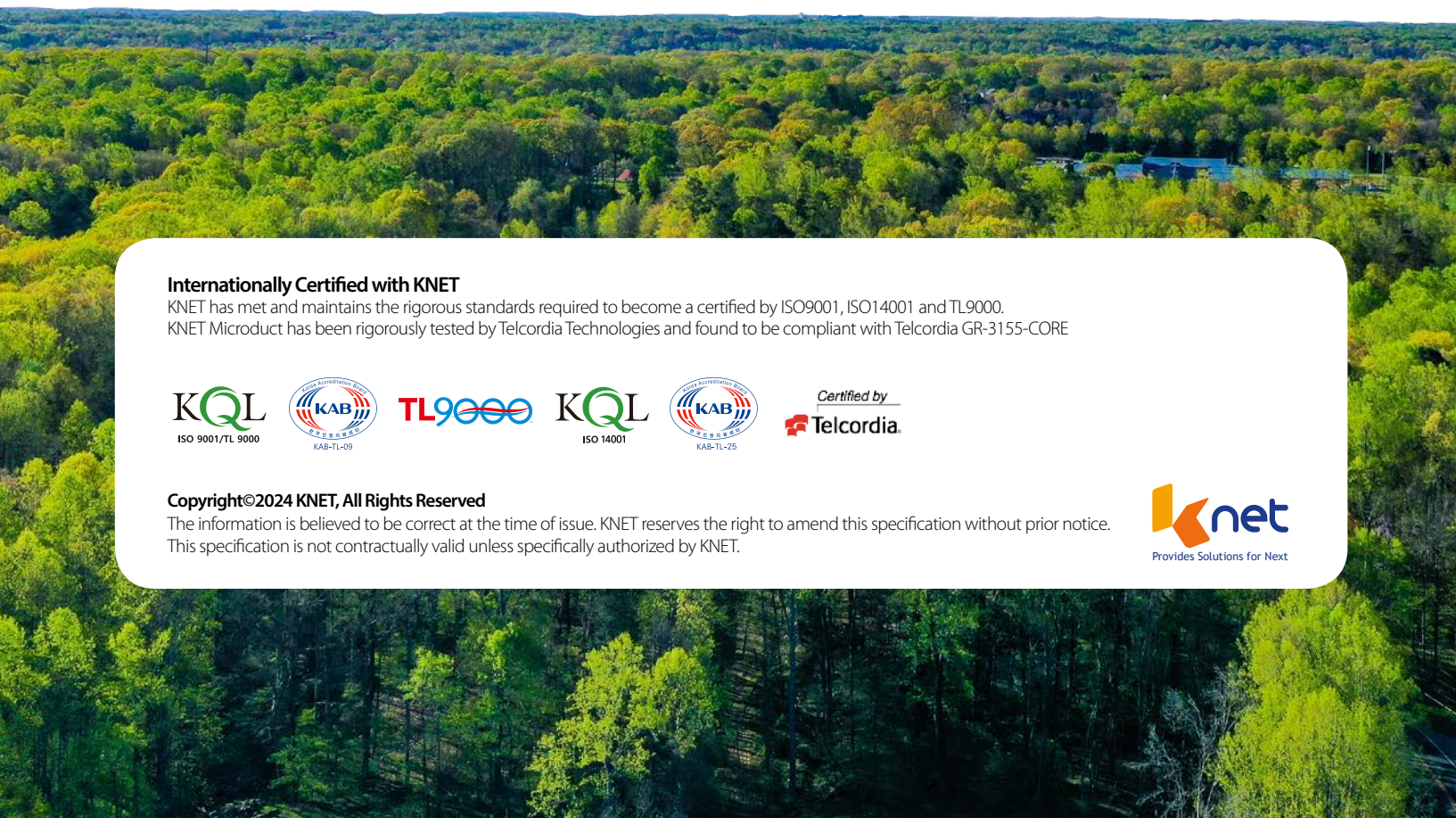

Internationally Certified with KNET
KNET has met and maintains the rigorous standards required to become a certified by ISO9001, ISO14001 and TL9000.
KNET Microduct has been rigorously tested by Telcordia Technologies and found to be compliant with Telcordia GR-3155-CORE

KQL ISO 9001/TL 9000 KAB KAB-TL-09 TL9000 KQL ISO 14001 KAB KAB-TL-25 Certified by Telcordia

knet Provides Solutions for Next