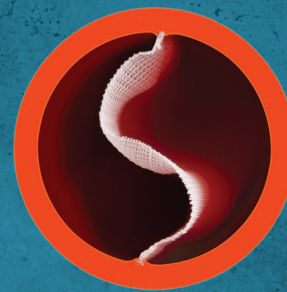


Milliken® Infrastructure

Vis™ Divide

Segmented HDPE Rigid Conduit



Frequently Asked Questions

What is Vis™ Divide?

Vis™ Divide is a segmented HDPE rigid conduit that provides dedicated pathways for the placement of more than one cable in a single conduit. The initial offering will be a 1½ inch nominal diameter conduit with 2 dedicated pathways. Future styles will include additional nominal diameters with 2, 3, and 4 pathways.

What is a “Conduit” compared to an “Innerduct”?

“Conduit” refers to a standalone duct. “Innerduct” is a duct which, due to physical parameters, is placed inside another larger outer duct. “Conduits” are designed with thicker walls and typically have a dimension ratio of 11 or lower (schedule 80 pipe is considered to be a “conduit”). “Innerducts” are designed with thinner walls and typically have a DR of 13.5 or higher (schedule 40 pipe is considered to be an “innerduct”). Pipes considered to be “Innerducts” require the protection of an outer duct to prevent them from being crushed under the weight of the earth in a direct bury application, and their working strength can be too low to be placed via horizontal directional drilling techniques. Pipes considered to be “conduits” are designed to support the weight of the earth when direct buried and are strong enough to be placed in Horizontal Directional Drilling applications.

What is Dimensional Ratio?

The dimension ratio refers to a method that defines a pipes wall thickness. Specifically, it's the ratio of a conduits outside diameter to its wall thickness. The “schedule” of a pipe (i.e. sch 40 or sch 80) is another method of defining wall thickness. As the dimensional ratio or schedule of a controlled OD conduit changes the wall thickness and internal diameter changes, but the outside diameter will remain the same. Wall thickness effects the pipes crush strength and working strength. For example:

For ASTM F-2160 Controlled OD DR 11 Conduit:

Pipe Size	Nominal OD, inch	Wall, inch	Average ID, inch
1 inch	1.315	0.120 +/- 0.020	1.07
1 ½ inch	1.900	0.173 +/- 0.020	1.53
2 inch	2.375	0.216 +/- 0.0216	1.91

For ASTM Controlled OD Schedule 80 Conduit:

Pipe Size	Nominal OD, inch	Wall, inch	Average ID, inch
1 inch	1.315	0.179 +/- 0.020	0.95
1 ½ inch	1.900	0.200 +/- 0.020	1.50
2 inch	2.375	0.218 +/- 0.0216	1.93

Initially Vis™ Divide will be manufactured as a controlled outside diameter DR 11 conduit. As an option in the future, Vis™ Divide may be offered in other dimension ratios, such as DR 9, or as a standard Schedule 80 pipe.

Does Vis™ Divide meet industry standards?

Yes, Vis™ Divide is manufactured from High Density Polyethylene copolymers and conforms to the specifications as defined in ASTM F2160 and ASTM D3350. These standards define the physical properties of the HDPE material used to manufacture Vis™ Divide and the resulting dimensional parameters. Together these specifications provide the toughness and crush strength

required in telecommunication, CATV and electrical/power applications which include the following installation methods: Plowed, Direct Bury, Opened Trench and Horizontal Directional Drilling (HDD).

ASTM F2160: Standard Specification for Solid Wall High Density Polyethylene Conduit based on Controlled Outside Diameter

ASTM D3350: Standard Specification for PE Plastics Pipe and Fittings Materials

Where is Vis™ Divide intend to be utilized? In which applications?

Vis™ Divide is a conduit product which can be installed utilizing the following installation methods: Plowed, Direct Bury, Open Trench and Horizontal Directional Drilling (HDD).

Open trench installations should be performed in accordance with ASTM D2321 or as specified by the Project Engineer. In open trench installations care should be taken to minimize undulation in the conduit to lower cable pulling tensions. As a minimum the conduit should be placed under tension before backfilling and only fine particle backfill material should be used, avoid large rocks with sharp edges.

HDD installations should be performed in accordance with ASTM F1962 recommendations as provided by the Plastic Pipe Institute and the North American Society of Trenchless Technology or as specified by the Project Engineer.

The contractor should observe all appropriate safety requirements in accordance with local, state and federal regulations and codes.

Is Vis™ Divide flexible enough for a directional bore pullback?

Yes, Vis™ Divide is manufactured to the same physical standards as conventional HDPE conduit thus it has the same flexibility, pulling strength, crush resistance, weight, wall thickness, outside and inside diameter as the comparable traditional HDPE conduit. Vis™ Divide conforms to ASTM F2160 and ASTM D3350.

How is Vis™ Divide attached to a pulling mechanism?

Any attachment method utilized to place conventional HDPE rigid conduit can be used to place Vis™ Divide. This includes, but not limited to, standard threaded pulling eyes, half hitches or Kellems grip.

As with any conduit installation, it is recommended to always utilize a break away swivel when installing Vis™ Divide. The swivel should be rated below the safe pulling strength for the conduit being placed. If placing multiple conduits simultaneously, each conduit should have a separate break away swivel.

When installing Vis™ Divide it is important to ensure that excess pull tape is placed in each cell before pulling back the conduit. A good rule of thumb is to place 1 foot of excess tape in each cell for every 100 feet of conduit to be placed, the minimum recommended amount is 4 feet. Once the conduit is placed, several feet of excess tape should be made available on each end of the conduit. This pull tape should be securely fasten to the conduit, with adhesive tape, to prevent the pull tape from “shrinking” back into the pipe as the tension is relieved.

Vis™ Divide Frequently Asked Questions

How do you join/couple two pieces of Vis™ Divide conduit together?

Vis™ Divide can be joined utilizing any conventional HDPE coupling technique. This includes barbed, compression, electro-fusion, self-threaded and butt fusion coupling techniques.

As a standard, Vis™ Divide is supplied with pre-installed color coded pull tape. Prior to coupling the conduit together, a bowline knot is recommended to join the pull tapes together. Care should be taken to tie the same color tapes together. This step will avoid confusion when installing cables in the future. During the coupling process it is not necessary to align the divider fabrics in the same orientation. As the cables are installed the divider fabric will simply move to allow the cables to follow their dedicated pathway.

The recommended procedures and safety guidelines of the joining devices' manufacturer should be observed when utilizing these products. For more information please refer to the Plastic Pipe Institute's *Handbook of Polyethylene Pipe* in the chapter titled "Polyethylene Joining Procedures". Also refer to ASTM D2657.

How is Vis™ Divide cut?

Due to the presence of the fabric divider it is recommended to only cut Vis™ Divide with a standard ratcheted type conduit cutter such as supplied from Reed or Knipex. The use of saws of any type is not recommended.

What installation techniques can be utilized to place cables in Vis™ Divide?

Vis™ Divide is designed to place cables into the dedicated pathways via pulling. As a standard, Vis™ Divide is supplied with 1250 lb, pre-lubricated, color coded and pull tapes. Each cell, or dedicated pathway, is supplied with a pre-installed pull tape. The pre-installed pull tape can be attached to the cable utilizing any standard attachment technique such as half hitch knots, a fabric grip or a Kellems grip.

Air-assisted (i.e. jetting or blowing) cable placement procedures and techniques are under development. At this time, it is not recommended to place cables in Vis™ Divide utilizing air assisted techniques.

How many and what size cable can be placed in Vis™ Divide?

Initially Vis™ Divide is offered in a 2 cell configuration. Thus this product will have two dedicated pathways which are separated by a divider fabric within the conduit. Each pathway can contain one cable. It is recommended that the combined cable OD's should be less than 80% of the inside diameter of the conduit. For example, this 1½" Vis™ Divide product has an inside diameter of approximately 1.55 inches.

Thus:

Cable OD1 + Cable OD2 < 80% x 1.55 inches < 1.24 inches

Therefore:

The combined cable OD's should be less than 1.24 inches for a 1½ inch x 2 cell DR 11 Vis™ Divide Conduit.

What are the available color options?

The industry standard color recommendation for underground telecommunication conduit is orange. Initially Vis™ Divide will be offered as solid orange conduit. Other colors and stripes will be offered in the future.

Will Vis™ Divide be offered with factory installed pull tape?

What are tensile strength options?

As a standard, Vis™ Divide is offered with pre-installed pull tape. The standard offering is 1250 lb pre-lubricated, color coded, Vis™ Tape. Vis™ Divide is not offered without pull tape. Other tensile strengths may be offered in the future.

What is the minimum order quantity and standard order lengths for Vis™ Divide?

Initially, the minimum order size is 2,000 ft. Segmented reels and coils are not currently offered.

Standard lengths are as follows:

Reel Dimensions	Maximum Length	# of Reels per 48 ft Flatbed
70" x 38" x 30"	2,000 ft	16
84" x 42" x 36"	4,000 ft	14
96" x 45" x 36"	6,000 ft	12

It is recommended to lift reels from the side, with the fork inserted through the spokes of the reel. The forks should never come in contact with the conduit.

Is a premise, riser or plenum version available?

Vis™ Divide is not currently offered in premise, riser and plenum configurations.

Is the tensile strength of the fabric divider the same as the fabric innerduct fabric?

Yes, the strength, durability, chemical resistance and physical properties are the same. The fabric itself is different.

How does Vis™ Divide compare to fabric innerduct?

Both Vis™ Divide and fabric innerduct are ducts with more than one dedicated pathway.

Vis™ Divide is a rigid conduit and as such can be direct buried, or placed via HDD.

Fabric innerduct is a flexible inner duct that requires a conduit or outer duct for placement.

Vis™ Divide is a new construction product. Fabric innerduct can be used in new construction or for retrofitting existing conduits.

Both Vis™ Divide and fabric innerduct offer multiple dedicated pathways which allow cables to be separated and facilitates removal and replacement in the future as needed.

Both Vis™ Divide and fabric innerduct offer optimization of the physical space in the plant.

Unlike fabric innerduct, Vis™ Divide provides a rigid shell for protection.

Cable placement pulling tensions are similar for both products.

How does Vis™ Divide compare to Microducts?

Microducts have a fixed ID for 0.50 inch cables or smaller.

Cables are blown into microducts. Microducts typically require the use of proprietary equipment and or certification of the contractor before fiber can be installed.

The application parameters of Vis™ Divide are flexible and can accommodate a variety of cable sizes to the limit of 80% of the conduit's ID.

Cables are pulled into Vis™ Divide using traditional pulling techniques. This placement method does not require any special tools or certifications to place fiber cables.