

## COMMUNICATIONS RACEWAY/INNERDUCT

### PART 1 GENERAL

To allow for future telecommunications cabling upgrades, a specific number of conduits shall be dedicated for that purpose. To further that effort and achieve maximum conduit utilization, those conduits shall contain innerduct. Each conduit designated for fiber optic and communications cables shall include the number of useable pathways as per the project requirements, drawings and notes.

#### 1.1 SECTION INCLUDES

A. Flexible Fabric Raceway, Innerduct or Conduit

#### 1.2 REFERENCES

A. Innerduct definition per the American National Standards Institute (ANSI)

#### 1.3 SUBMITTALS

A. Product Data - Provide standard details and installation instructions.

### PART 2 PRODUCTS

#### 2.1 GENERAL

A. Materials & Equipment: Labeled and/or listed as acceptable to the authority having jurisdiction (AHJ) and as suitable for the intended use.

B. Flexible raceway for optical fiber, communications, or power cables.

C. Provide wire management in a building for fiber optic and data and communications cabling.

## 2.2 MANUFACTURERS

### A. Provide products offered by:

1. MaxCell Fabric Innerduct  
600 Plum Creek Drive  
Wadsworth, OH 44281  
Phone: 888-387-3828  
www.maxcell.us

## 2.3 MATERIALS

- A. Orange and/or White Polyester resin monofilament
- B. Orange and/or White Nylon resin monofilament
- C. Orange and/or White textured polyester yarn
- D. Pre-applied >2% by weight Polydimethyl Siloxane lubricant (not applied to Premise/Indoor product)
- E. Preinstalled pull tape with color coded identification or Polyethylene monofilament jacketed woven rope

## 2.4 FABRIC INNERDUCT

A. Standard Outdoor Woven Fabric Innerduct: Product ranging in size from 1" – 4" width for communications cable. Single or Multi-cell polyester/nylon fabric in a non-simple weave partial float zone configuration for minimum pulling tension. All cells along said innerduct will be joined along a continuous seam. Seam stitching offered in multiple thread colors for identification and multi-pack applications. Innerduct will have footage markings every five feet on exterior cell. Each cell containing minimum 1250lb polyester flat woven pull tape or 1250lb woven polyester/ polyethylene rope. Multiple packs may be pulled into a single empty conduit.

B. Detectable Outdoor Woven Fabric Innerduct: Product ranging in size from 1" – 4" width for communications cable. Single or Multi-cell polyester/nylon fabric in a non-simple weave partial float zone configuration for minimum pulling tension. All cells along said innerduct will be joined along a continuous seam. Seam stitching offered in multiple thread colors for identification and multi-pack applications. Innerduct will have footage markings every five feet on exterior cell. Each cell containing 1250lb polyester flat woven pull tape or 1250lb woven polyester/polyethylene rope. Each pack will contain a minimum 18AWG solid wire, with solid (non-stranded) polyvinyl/nylon conductor for tracing and rated for a minimum of 6 amps and 600 volts. Conductor shall be placed in the sidewall edge fold of the fabric sleeve.

C. Fire Retardant Low Smoke Zero Halogen Fabric Innerduct (Applicable for Riser and Plenum Applications) Product ranging in size from 1" – 4" width Single or Multi-cell Nylon fabric which meets UL 2024 requirements for flame propagation and optical smoke density for use in air handling spaces. Innerduct will have footage markings every five feet on exterior cell. Innerduct will bear the UL listed logo and OFCR FT-6

D. Plenum-Listed Self Supporting Fabric Innerduct. Product comes in various configuration and will also have a 9/32" galvanized steel strength member with minimum breaking tensile of 900lbs. Product will be low smoke zero halogen and will be pre-installed with 1250lb pull tapes standard. Innerduct will have footage markings every five feet on exterior cell. Product will carry the UL listed seal.

## 2.5 PERFORMANCE

A. OSP rated products will have a minimum longitudinal elongation of <3% at 50lbs

B. OSP rated products will have a minimum breaking strength of >250lbs/inch of fabric. Total product breaking tensile will meet minimum breaking tensile as following:

<u>PRODUCT</u>	<u>LBS</u>	<u>PRODUCT</u>	<u>LBS</u>	<u>PRODUCTS</u>	<u>LBS</u>
4" 3-CELL	5200	2" 4-CELL	4400	1.50" 3-CELL	2300
4" 2-CELL	3500	2" 3-CELL	3200	1.50" 2-CELL	1600
4" 1-CELL	1900	2" 2-CELL	2200	1.50" 1-CELL	900
3" 4-CELL	5400	2" 1-CELL	1200	1.25" 3-CELL	2000
3" 3-CELL	3900	1.75" 4-CELL	1900	1.25" 2-CELL	1400
3" 2-CELL	2700	1.75" 3-CELL	2800	1.25" 1-CELL	800
3" 1-CELL	1400	1.75" 2-CELL	1900	1.10" 3-CELL	1800
		1.75" 1-CELL	1100	1.10" 2-CELL	1300
				1.10" 1-CELL	700

C. Flexible fabric innerduct will meet the pulling tension requirements under the listed parameters as set forth in the table below.

**Parameters:**

3 or 4" PVC Schedule 80 stick pipe

800ft straight pull section

1250lb rated flat pull tape

Straight section with at least 10ft but less than 50ft of gradient change

0.50-0.70" HDPE (high density polyethylene) Fiber Optic Cable

	1.75"-2.50" Product	2.50" – 3.25" Product
Cable #1	<75lbs	<50lbs
Cable #2	<100lbs	<75lbs
Cable #3	<75lbs	<50lbs

D. Physical Testing Requirements All flexible fabric innerduct shall meet the following requirements.

Melting Temperature	ASTM D3418	> 400° F
Working Temperature		-40° F to 200° F
Bending Test	Bellcore 356 4.2.5	Pass
Print Durability	Bellcore 356 5.3.5	Pass
Fungi Resistance	ASTM G21	Pass
Halogen Content	MIL PRF 85045 F	Zero
Coefficient of Thermal Expansion	ASTM 4723	<10 mm/100 M/5° C

## 2.6 FABRIC INNERDUCT FITTINGS

A. Termination Bags: Inflation-type bags for sealing and securing around one or more fabric innerducts and cables within 2-inch outside diameter or larger conduit.

## 2.7 PULLING MEDIUM

A. Pull Tape: measuring and pulling tape constructed of synthetic fiber, printed with accurate sequential footage marks. Color-coded.

B. Pull Rope – woven rope constructed of a strength core with a polyethylene jacket designed for minimal pulling tension.

## 2.8 PENETRATION SEALING MATERIALS

A. Duct Water Seal: products suitable for closing underground and entrance conduit openings where innerduct or cable is installed, to prevent entry of gases, liquids, or rodents into the structure.

## 3. EXECUTION

### 3.1 Protection During Construction

A. Protect products from the effects of moisture, UV exposure, corrosion and physical damage during construction.

### 3.2 Fabric Innerduct Type to Be Used

A. Above Ground, Exterior and Interior Conduit Installations: Outdoor fabric innerduct (Standard or Detectable as desired)

B. Interior Exposed Locations: Use UL 2024 (OFCR FT-6) listed premise/indoor fabric innerduct for areas requiring a Plenum or Riser rating

C. Cable Tray: Use UL 2024 (OFCR FT-6) listed premise/indoor fabric innerduct as per local requirements

### 3.3 Fabric Innerduct Installation

A. Installation site support is required during product installation at the initial phase of the project. Contact factory direct representation or local representative agency to coordinate. [www.maxcell.us](http://www.maxcell.us)

B. Provide fabric innerduct in conduit and wire ways, and place fabric innerduct within and under cable trays using continuous unspliced lengths of fabric innerduct between maintenance holes, pull boxes, and/or termination points as indicated on the drawings.

C. Make a 2" incision, approximately 18" from the end of fabric innerduct. If using standard pull tape, pull out and cut off approximately 2 feet of pull-tape. Thus allowing the pull tape ends to retract back into the cells. If using a pull rope, simply make the 2" incision but do not pull out the ropes.

D. Using roughly 3-4 feet of pull tape, tie a non-slip knot to the incision. Then tie 3 to 6 half-hitch knots down to the end of fabric innerduct. Apply black vinyl tape over all knots and the end of fabric innerduct. Using a bowline knot, tie a swivel to the end of 3 feet pull tape. For multi-pack installations, one swivel is sufficient, but stagger each fabric innerduct.

E. Using a bowline knot, attach the pull rope located in the rigid conduit to the other end of the swivel. Install fabric innerduct – ensuring that no twist is introduced to the innerduct.

F. Provide suitable fabric innerduct slack in the maintenance holes, hand holes, pull boxes, and at turns to ensure there is no kinking or binding of the product.

G. Fabric Innerduct Mountings, Hangers and Attachments: When exposed indoors or in maintenance holes, hold firmly in place using independent support.

a. Design & install hangers and other similar fittings adequate to support loads and so as to not damage innerduct.

b. Do not fasten fabric innerduct to steam, water, or other piping, ductwork, mechanical equipment, electrical equipment, electrical raceways, or wires

c. When securing fabric innerduct, select appropriate cable ties as required by local authority having jurisdiction (i.e. plenum-rated, flame-retardent)

H. Maintenance Hole and Hand Hole Installation:

a. At locations where fabric innerduct will be continuous through a manhole or hand hole, allow sufficient slack so that the innerduct may be secured to the side of the vault while maintaining the minimum bend radius of the cable being placed.

b. At maintenance holes serving as the junction location, pull the exposed end of the innerduct to the far end of the vault, install termination bag, and secure to the vault or pulling eyes.

I. Cable Tray and Runway Installation: Cut incisions every 24 inches into the edge of the fabric innerduct and cable wrap to one side of vertical ladder rack or horizontal ladder-type cable tray at each incision.

### 3.4 Penetrations

A. Seal all conduit and fabric innerduct entering structures at the first box or outlet, to prevent entrance into the structure of gases, liquids or rodents.

B. Inspect fire stopping installation by others between building structure and conduit, wire way, and cable tray to verify integrity of installation.

C. Exposed Fabric Innerduct Penetrations: Install conduit sleeves or fire barrier sealing systems in all openings where open and exposed fabric innerduct passes through fire-rated walls and floors. After installation, install an AHJ approved fire barrier penetration sealing

material between fabric innerduct and sleeves or fire barrier system.

D. Raceway Penetrations: After fabric innerduct installation, install an AHJ fire barrier penetration sealing material between fabric innerduct and conduit or wire way at all exposed penetration locations.

E. Protect adjacent surfaces from damage during water seal or fire stop installation. Repair any damage.

F. Document (photos are suggested) entire installation process for future referral.