

Application Engineering Note

Proc. 002

Recommended Duct Installation Guideline

Rev. 2

Scope:

The scope of this document is to recommend duct installation guidelines for B-Series Breakout, D-Series, and G-Series cables.

Guideline:

1. Tools

A. Fiber Optic Pulling Grips

Optical Cable Corporation recommends using pulling grips that include a swivel eye or using a standard pulling grip that attaches to a breakaway swivel for all B-Series Breakout, D-Series, and G-Series cables. The pulling grip should be sized appropriately for the diameter of the cable. Kellems pulling grips are recommended. Listed below are the model numbers for the Kellems pulling grips with and without the swivel eyes and the corresponding cable diameters.

<u>Kellems Model #</u>	<u>Cable Diameters</u>
<i>With Swivel</i>	
033291007	.10 - .22 inches
033291008	.21 - .35 inches
033291009	.32 - .48 inches
033291010	.42 - .61 inches
033291011	.53 - .74 inches
033291012	.64 - .87 inches

Without Swivel

033291193	.10 - .22 inches
033291194	.21 - .35 inches
033291195	.32 - .48 inches
033291196	.42 - .61 inches
033291197	.53 - .74 inches
033291198	.64 - .87 inches
033291199	.75 - 1.00 inches

B. Cable Pulling Lubricant

Short hand pulls inside buildings may not require lubricants. Use only lubricants compatible with the jacket material.

C. Pull Rope

Pull lines can be either a round or flat cross section. For pulls using "slip" winches, materials with low elasticity such as wire rope and aramid yarn can

minimize surge-induced fluctuation in pull line tension.

D. Pull Boxes

Pull boxes should be used on straight runs at intervals of 250 to 300 feet to reduce the length of cable that must be pulled during any single pull.

Pull boxes should also be located in any area where a conduit makes several bends that total more than 180°.

E. Sheaves and Cable Guides

Sheaves and cable guides as required at bends to conform to the minimum cable bend radius.

F. Tension

Pulling apparatus equipped with a control device to monitor cable tension should be used during installation.

2. Sub Duct

A. The use of a sub duct is recommended but not required to ease pulling strain.

B. The "fill ratio" of the sub duct should not exceed 50%. The "fill ratio" is defined by the following formula:

$$\text{Fill Ratio} = d^2/D^2 \times 100$$

Where d = diameter of all cables in duct and D = inside diameter of sub duct.

3. Installation

A. Install the cable grip directly over the cable end.

1. No end preparation is required for non- armored-cables.

2. For armored-cables, please refer to Optical Cable Corporation Application Note AE001, *Interlock Armor pulling grip procedure*.

3. If the pulling grip does not include a swivel eye, a breakaway swivel must be installed on the pulling grip before the cable is pulled. Optical Cable Corporation strongly recommends using a breakaway swivel on all pulling grips, whether the pulling grips have or do not



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have a swivel eye. The break away swivel should be rated for the maximum pulling tension of the cable.

- B. All cables that exit a manhole or pull box should be laid in a figure-8 in a light traffic area. Hand coiling without placing the cable in figure 8 will introduce twist in each loop. The cable should never be installed in a twisted condition.
- C. Do not exceed the maximum pulling tension (see individual specification) or 2700 Newtons (600 pounds) force, whichever is less.
- D. Be sure to adhere to the minimum installation bending radius. Do not pull the cable around bends with radii less than 15X the cable diameter.

If you have any questions, please contact the Optical Cable Corporation's Engineering Department at (540) 265-0690.

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