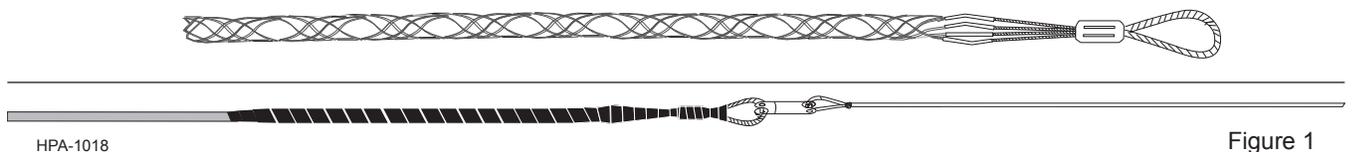


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## 1. General

**1.1** This procedure provides instructions for installing a wire mesh pulling grip on Corning Cable System multifiber tight buffered fiber optic cables that are not connectorized. Examples of such cables include:

- MIC® cables
- Unitized MIC® cables
- Fan-out cables

**1.2** Refer to the appropriate cable specification sheet or catalog for the maximum tensile load rating of the cable to be installed.

**1.3** This issue includes an updated format, revised cable cross sections, and updated information on grip selection.

## 2. Precautions

### 2.1 Personal Safety Precautions

	<p><b>CAUTION:</b> The wearing of cut-resistant <b>safety gloves</b> to protect your hands from accidental injury when using sharp-bladed tools and armored cable is strongly recommended. Use extreme care when working with severed armor. There will be a sharp edge where armor is cut. To minimize the chance of injury from the cut armor, cover the exposed edge with a wrap of electrical tape. To minimize the chance of injury from sharp-bladed tools, always cut away from yourself and others. Dispose of used blades and armor scrap properly.</p>
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	<p><b>CAUTION:</b> Recommend the use of <b>safety glasses (spectacles)</b> conforming to ANSI Z87, for eye protection from accidental injury when handling chemicals, cables, or working with fiber. Pieces of glass fiber are very sharp and have the potential to damage the eye.</p>
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## 2.3 Cable Handling Precautions

**NOTE:** Fiber optic cable is sensitive to excessive pulling, bending, and crushing forces. Do not bend cables more sharply than their minimum recommended bend radius. Do not apply more pulling force to the cable assembly than specified. Do not crush the cable or allow it to kink. Doing so may cause damage that can alter the transmission characteristics of the cable; the cable may have to be replaced.

## 3. Tools and Materials

3.1 The following tools and materials are required to complete this procedure:

- Kellems® pulling grip
- Side cutters (diagonal cutting pliers)
- Measuring tape
- Utility knife with hook blade \* or cable knife
- Friction tape, 3/4 in (19.1 mm)
- Swivel, ball-bearing type
- Friction tape, 3/4 in (19.1 mm)
- Gloves
- Scissors
- Vinyl tape, 3/4 in (19.1 mm)
- Utility knife with hook blade
- Hex wrench or screwdriver (to fit swivel)

## 4. Pulling Grip Selection and Installation on Cables Without Interlocking Armor

4.1 Prior to installation, the proper size grip must be chosen for the cable to be pulled. Grip selection is based on the outside diameter of the cable (Figures 2 and 3).

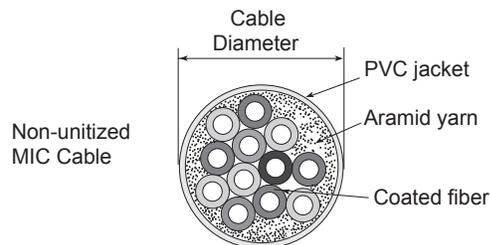
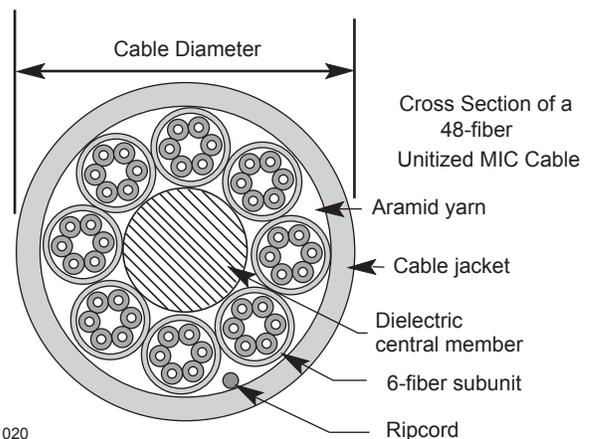


Figure 2

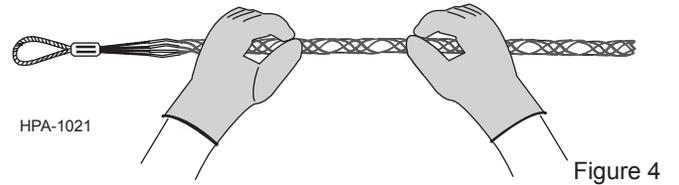


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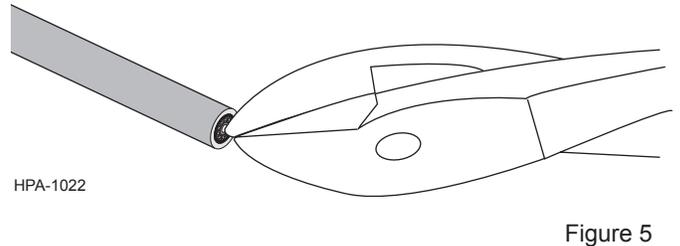
Figure 3

**4.2** Generally speaking, use the smallest grip which will fit over the cable's outer jacket without excessive difficulty. Measure the cable outside diameter and consult the grip manufacturer or vendor for the proper grip size.

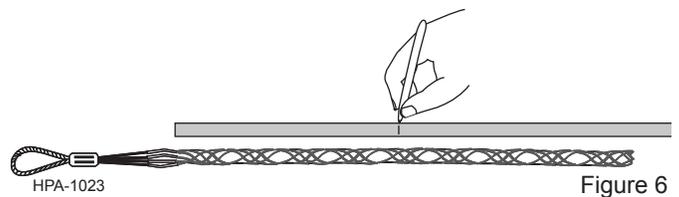
**4.3** Once the proper grip is obtained, inspect it for damage broken wires, bulges due to stress, rust, etc. Grasp the pulling eye in one hand (gloves are recommended) and smooth out the mesh with the other, tightening the wires. Figure 4 illustrates the technique, which is critical when reusing grips



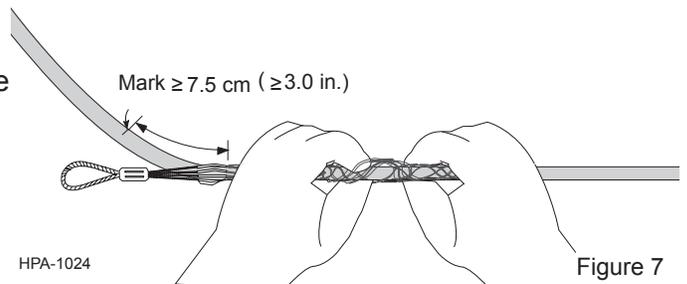
**4.4** To ease installation, trim the end of the cable with side cutters to remove any protruding buffered fibers, yarn, or central member (Figure 5).



**4.5** It is necessary to remove a section of outer jacket equal to half of the length of the mesh area of the grip. Mark this distance from the end of the cable with a permanent marker (Figure 6).

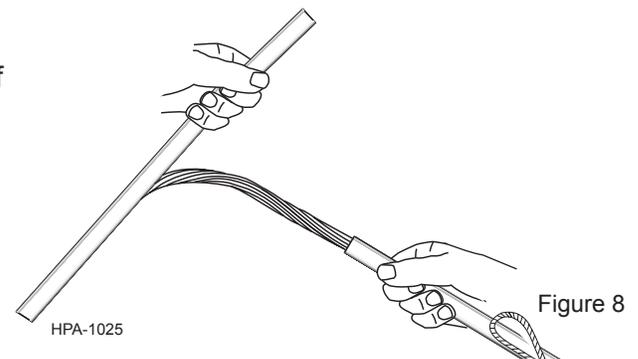


**4.6** Use a pumping action to “walk” the grip over the cable by bringing your hands together and then relaxing them until the end of the grip is at least 7.5 cm (3 in.) beyond the mark made in step 4.5 (Figure 7)



**4.7** Follow the sheath removal procedure for the cable you are installing to remove the marked length of outer jacket (Figure 8).

For non-unitized cables, first remove 15 cm (6 in.) of jacket from the end of the cable. Tape the cable components together with vinyl electrical tape. Then remove the remaining jacket.



**IMPORTANT:** When making ring cuts with a hook blade or cable knife, do not cut all the way through the outer jacket - doing so may damage the sub units or other cable components which lie immediately below it.

**4.8** Beginning at the end of the outer jacket, wrap one layer of friction tape over the entire length of the exposed cable core. The friction tape should follow the direction of the sub-units or buffered fibers twists (Figure 9).

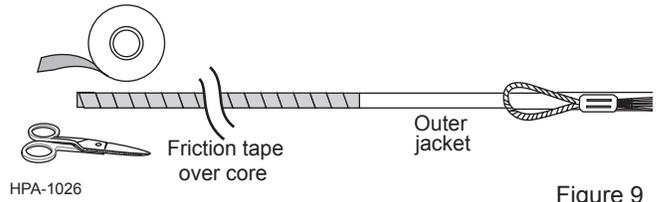


Figure 9

**IMPORTANT:** Do not use black electrical tape in place of friction tape. Electrical tape has a slick outer surface and could affect the pulling grip's performance.

**4.9** “Walk” the grip over the friction tape-covered cable core. Smooth the mesh back over the cable core, moving from the pulling eye to the cable jacket. Tug on the grip to tighten it against the core (Figure 10).



Figure 10

**4.10** Starting at least 2.5 cm (1.0 in.) below the mesh on the cable jacket, wrap vinyl tape TIGHTLY to the top of the grip. The mesh's imprint should show clearly through the tape (Figure 11).

The tape must be tight because it helps compress the mesh against the cable core. Tug on the grip slightly to

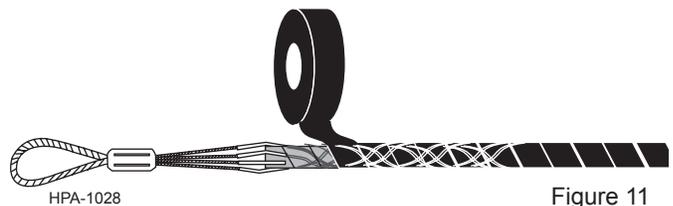


Figure 11

**Note:** When two or more vinyl tape layers are desired, always wrap the final, outside layer from the cable jacket to the pulling eye. This layers the tape like roofing shingles, so that it will not snag as it moves through a duct.

**4.11** Connect the pulling eye to the appropriate ball bearing swivel and pulling tape (Figure 12). The grip installation is now ready for the cable pull.

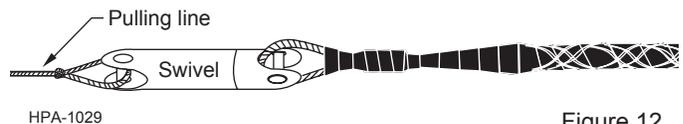


Figure 12

### Grip Removal

**4.12** After completion of the pull, cut the cable 91 cm (36 in.) behind the grip. Place a protective cap over the exposed cable end and tape in place to prevent water intrusion. Store the coiled splicing slack so that it is protected from damage.

## 5. Pulling Grip Selection and Installation on Cables With Interlocking Armor

**5.1** Prior to installation, the proper size grip must be chosen for the cable to be pulled. Grip selection is based on the outside diameter of the cable (Figure 13).

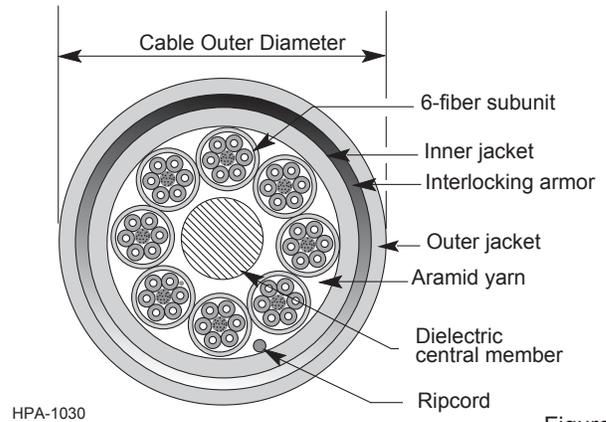


Figure 13

**5.2** Generally speaking, use the smallest grip which will fit over the cable without excessive difficulty. Measure the cable outside diameter and consult the grip manufacturer or vendor for the proper grip size.

**5.3** Once the proper grip is obtained, inspect it for damage broken wires, bulges due to stress, rust, etc. Grasp the pulling eye in one hand (gloves are recommended) and smooth out the mesh with the other, tightening the wires.

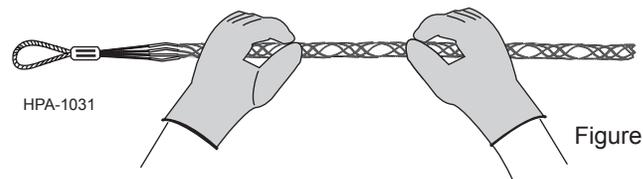


Figure 14

Figure 14 illustrates the technique, which is critical when reusing grips.

**5.4** To ease installation, trim the end of the cable with side cutters to remove any protruding armor, buffered fibers, yarn, or central member (Figure 15).

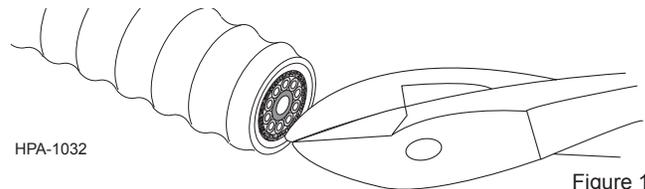
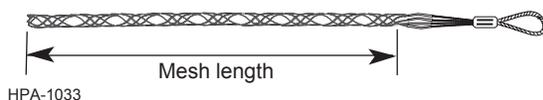


Figure 15

**5.5** Table 1 and Figure 16 indicate the outer jacket strip length (A), exposed armor length (B), and exposed cable core length (C) required for each grip installation.

Mesh Length	A	B	C
45 cm (18 in.)	50 cm (20 in.)	15 cm (6 in.)	35 cm (4 in.)
53 cm (21 in.)	48 cm (23 in.)	18 cm (7 in.)	40 cm (16 in.)
60 cm (24 in.)	65 cm (26 in.)	20 cm (8 in.)	45 cm (18 in.)
68 cm (27 in.)	75 cm (30 in.)	25 cm (10 in.)	50 cm (20 in.)
75 cm (30 in.)	83 cm (33 in.)	30 cm (12 in.)	53 cm (21 in.)

Table 1



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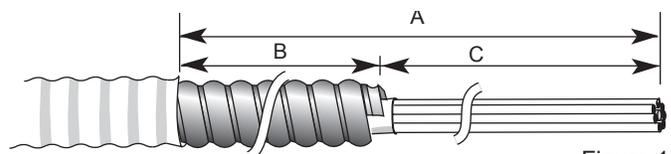


Figure 16

**5.6** Measure and mark lengths A and C from the end of the cable on its outer jacket.

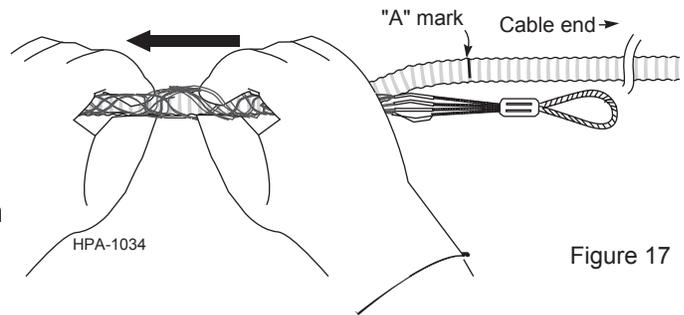


Figure 17

**5.7** Use a pumping action to “walk” the grip over the cable by bringing your hands together and then relaxing them until the end of the grip is past mark A on the cable (Figure 17).

**5.8** Using the hook blade knife, make a ring cut through the outer jacket at the C mark. Remove the outer jacket from this ring cut to the end of the cable to expose the interlocking armor (Figure 18).

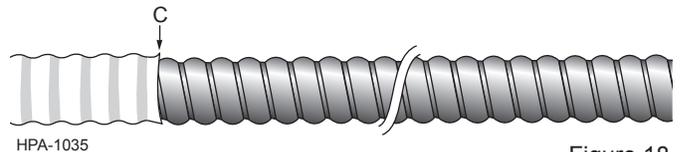


Figure 18

**5.9** FIRMLY grip the cable on both sides of the C mark. While maintaining a firm grip, twist the cable in opposite directions to make the armor expand and the separate (Figure 19).

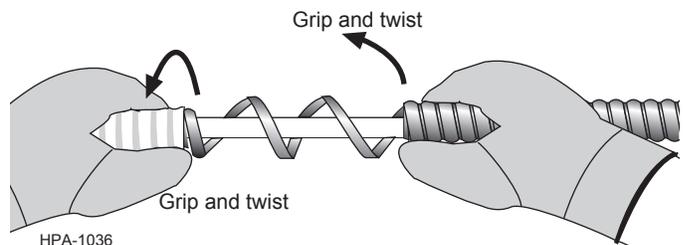


Figure 19

**5.10** Using the side cutters, cut the armor across the narrow separated band. Remove the armor and outer sheath from the free end of the cable by sliding it off (Figure 20).

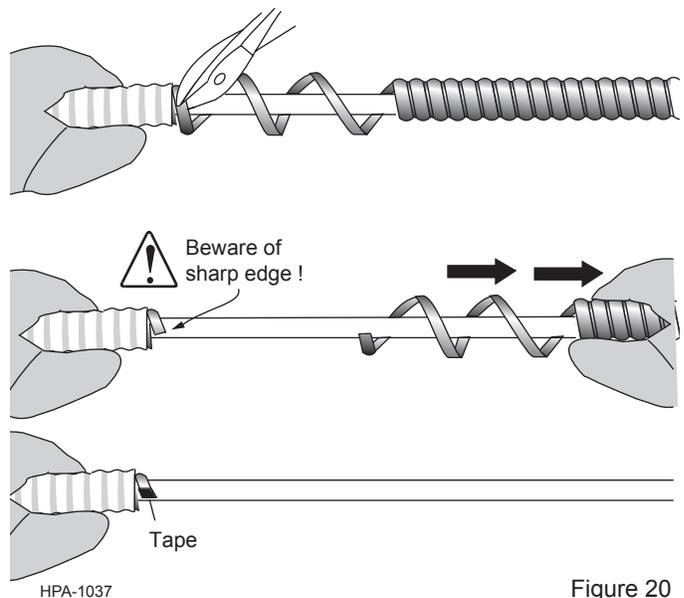


Figure 20

**CAUTION:** There will be a sharp edge where the interlocking armor was cut. To minimize the chance of injury, cover the exposed edge with a wrap of vinyl tape.

**5.11** Ring cut the inner jacket at the end of the exposed armor and 15 cm (6 in.) from the end of the cable (Figure 21). Use care to avoid damaging the aramid yarn strength elements under the jacket.

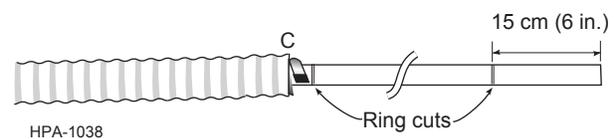


Figure 21

**5.12** Follow the sheath removal procedure for the cable you are installing to remove the marked length of outer jacket.

For non-unitized cables, first remove 15 cm (6 in.) of jacket from the end of the cable. Tape the cable components together with vinyl electrical tape. Then remove the remaining jacket.

**IMPORTANT:** When making ring cuts with a hook blade or cable knife, do not cut all the way through the outer jacket - doing so may damage the sub units or other cable components which lie immediately below it.

**5.13** Remove the jacket from the interlocking armor back to the A mark (Figure 22).

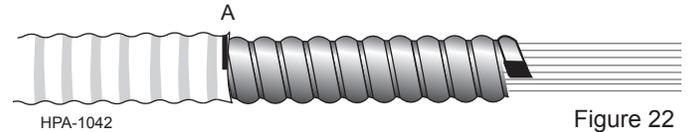


Figure 22

**5.14** Place a wrap of friction tape over the exposed armor and over the entire length of the exposed cable core (Figure 23).

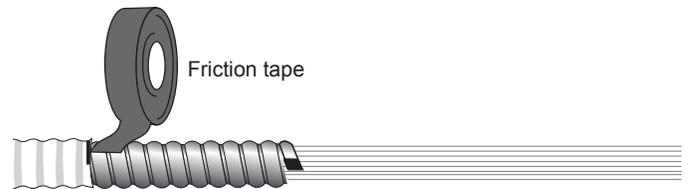


Figure 23

**Note:** Do not apply any friction tape over the outer jacket- the grip will not slide over the cable.

**5.15** Walk the grip over the friction tape-covered cable core until the cable end is in the middle of the grip basket (Figure 24).

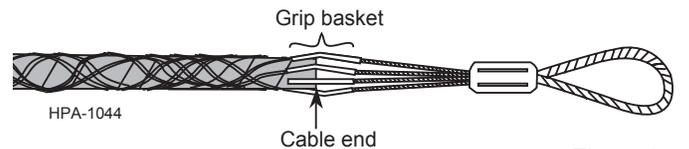


Figure 24

**5.16** Smooth the mesh back over the cable core, moving from the pulling eye to the cable jacket. Tug on the grip to tighten it against the core (Figure 25).



Figure 25

**5.17** Starting at least 2.5 cm (1.0 in.) below the mesh on the cable jacket, wrap vinyl tape TIGHTLY to the top of the grip. The mesh's imprint should show clearly through the tape (Figure 26). The tape must be tight because it helps compress the mesh against the cable core. Tug on the grip slightly to tighten it.

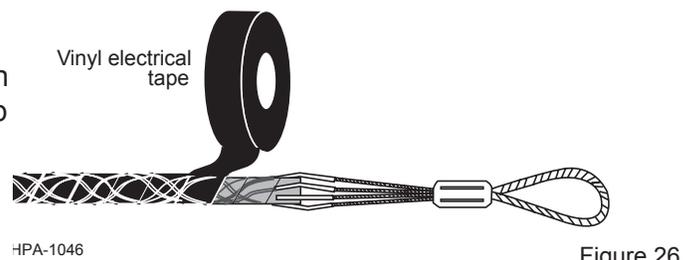


Figure 26

**Note:** When two or more vinyl tape layers are desired, always wrap the final, outside layer from the cable jacket to the pulling eye. This layers the tape like roofing shingles, so that it will not snag as it moves through a duct.

**5.18** Connect the pulling eye to the appropriate ball bearing swivel and pulling tape (Figure 27). The grip installation is now ready for the cable placement.

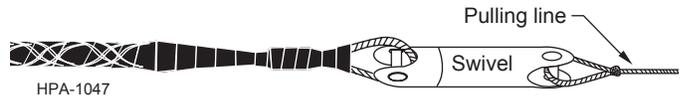


Figure 27

### Grip Removal

**5.19** After completion of the pull, cut the cable 91 cm (36 in.) behind the grip. Place a protective cap over the exposed cable end and tape in place to prevent water intrusion. Store the coiled splicing slack so that it is protected from damage.