

## Bonding Procedures for Loose Tube Cables

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### 1. General

**1.1** This practice provides general suggestions and recommendations for bonding the metallic armor layer of OFS loose tube optical fiber cables. If local, state, or federal practices or requirements differ from these recommendations, those practices or requirements shall supersede this document.

**1.2** Bonding is defined as the permanent joining of metallic parts to form an electrically conductive path to assure electrical continuity and the capacity to safely conduct any electrical current that is likely to be imposed on the cable. *Grounding* the cable requires additional bonds or connections through conductive components to earth. This is typically accomplished by bonding the cable to a ground rod or an effectively grounded conductor. Detailed grounding procedures are not covered in this document.

**1.3** Optical fiber cables are typically bonded and grounded at splice closures, cabinets, equipment frames, and building entrances. Consult local, state, or federal requirements to determine the bonding and grounding requirements for your particular application.

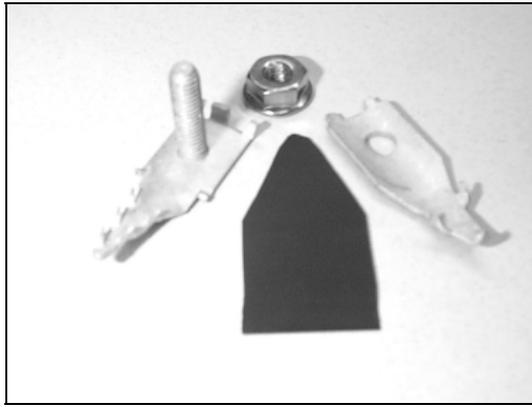
**1.4** Article 770-33 of the 1998 National Electric Code (NEC) requires that the non-current carrying metallic members (e.g., metallic strength members and armor shields) of optical fiber cables be bonded and grounded at the point of entrance into a building. For additional information see TIA/EIA-607, *Commercial Building Grounding and Bonding Requirements for Telecommunications*. The outside plant engineer or planner should consult with state or local regulatory agencies to determine if local practices supersede the NEC requirements.

**1.5** There are several different types of bonding clamps available for use on optical fiber cables. This practice shows a few common bond clamps. If a different style of bond clamp is supplied with your closure or apparatus, follow the installation instructions provided by the equipment manufacturer.

**1.6** Procedures for bonding and clamping metallic central strength-members in a splice closure are dependent on the closure design and the hardware provided by the closure manufacturer. Refer to the manufacturer's documentation for their recommended procedures.

### 2. Light-Armored Cable with 3M 4460-S Bond Clamp

**2.1** This section describes installation of the 3M 4460-S bond clamp (Figure 1) on a light-armored cable.



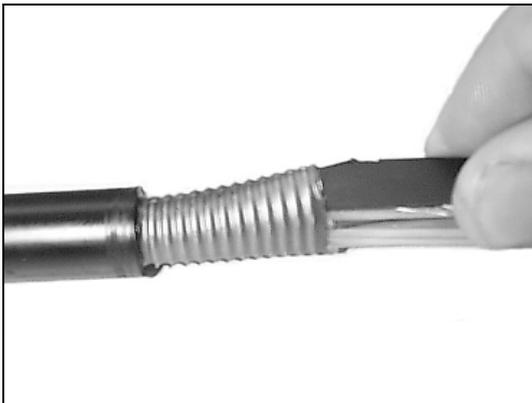
**Figure 1 - 3M 4460-S Bond Clamp**

**2.2** Prepare the cable as described in OFS IP-011B, *Sheath Removal and Mid-Span Access for Light-Armored and Armored Cables*. Expose about 1-inch of armor for attachment of the bond clamp as shown in Figure 2. The actual length of armor that must be exposed may vary with the length of the bond clamp.



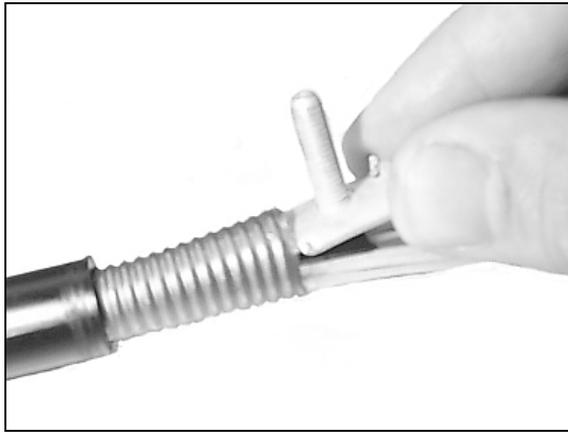
**Figure 2 - Expose 1-inch of armor.**

**2.3** Trim the plastic guard as required to fit under the armor and insert the plastic guard between the armor and the stranded core (Figure 3).



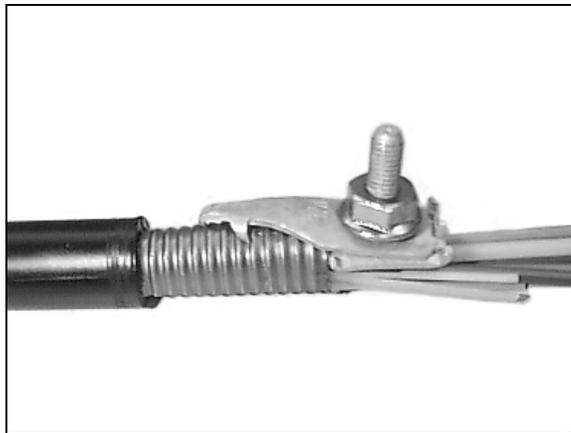
**Figure 3 – Insert the plastic guard.**

**2.4** Insert the bottom half of the bond clamp between the plastic guard and the armor (Figure 4). Exercise caution when inserting the bond clamp to prevent damage to the buffer tubes.



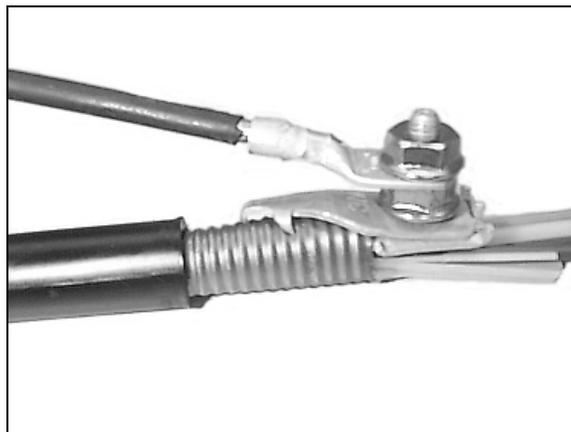
**Figure 4 - Insert bottom half of the bond clamp.**

**2.5** Install the top half of the bond clamp over the armor and fasten to the stud with the locking nut (Figure 5.)



**Figure 5 - Install the top half of the bond clamp.**

**2.6** Attach a bond wire to the bond clamp stud and fasten with a nut (Figure 6). Connect the bond wire to an approved ground as required by local practice.

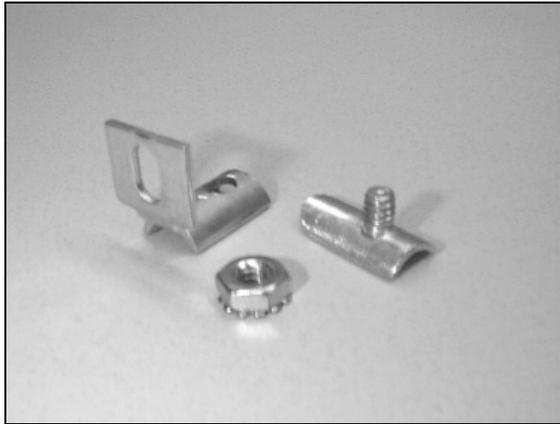


**Figure 6 – Attach a bond wire to the bond clamp.**

**2.7** Wrap the exposed armor and bond clamp with electrical tape. Over wrap adjacent layers of tape by one-half wrap.

### 3. Armored Cable with B-Bond Clamp

3.1 This section describes installation of a B-Bond Clamp (Figure 7) onto an armored cable.



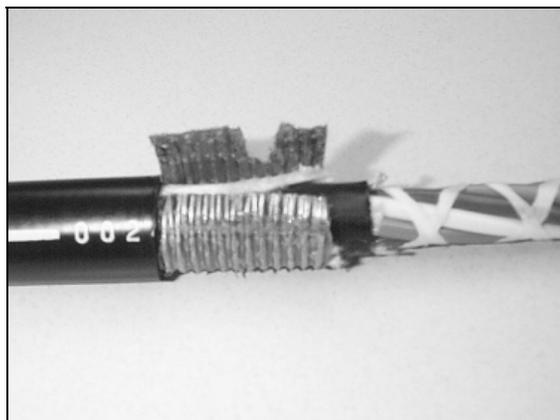
**Figure 7 - B-Bond clamp.**

3.2 Prepare the cable as described in OFS IP-011B, *Sheath Removal and Mid-Span Access for Light-Armored and Armored Cables*. Expose about 1-inch of armor for attachment of the bond clamp as shown in Figure 8. The actual length of armor that must be exposed may vary with the length of the bond clamp.



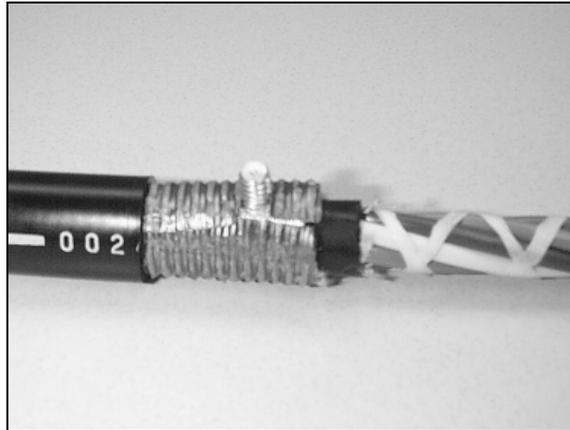
**Figure 8 - Expose 1-inch of armor.**

3.3 Locate the armor overlap. Lift the armor overlap and cut a small slot in the armor for the stud as shown in Figure 9.



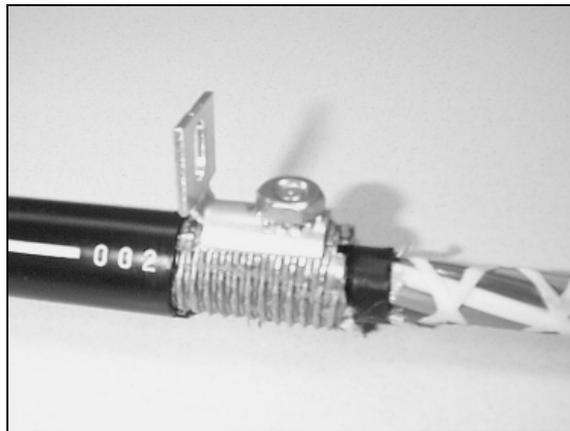
**Figure 9 - Cut a slot in the armor.**

**3.4** Insert the bottom half of the bond clamp between the armor and the inside cable jacket. Align the stud with the slot. Fold the armor back over bond clamp (Figure 10).



**Figure 10 - Install bottom half of bond clamp.**

**3.5** Install the top half of the bond clamp over the armor and fasten to the stud with the locking nut (Figure 11).



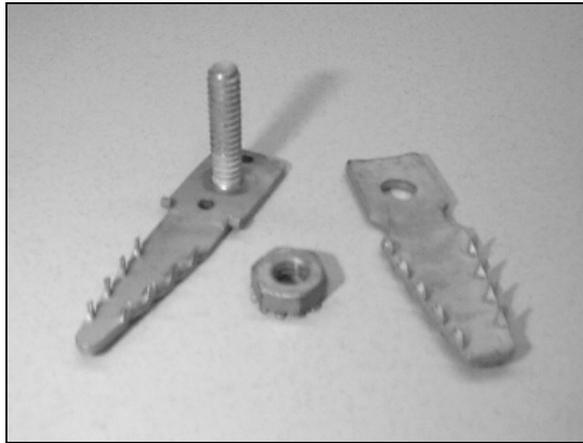
**Figure 11 - Install top half of bond clamp.**

**3.6** Attach a bond wire to the tab of the bond clamp. Connect the bond wire to an approved ground as required by local practice.

**3.7** Wrap the exposed armor and bond clamp with electrical tape. Over wrap adjacent layers of tape by one-half wrap.

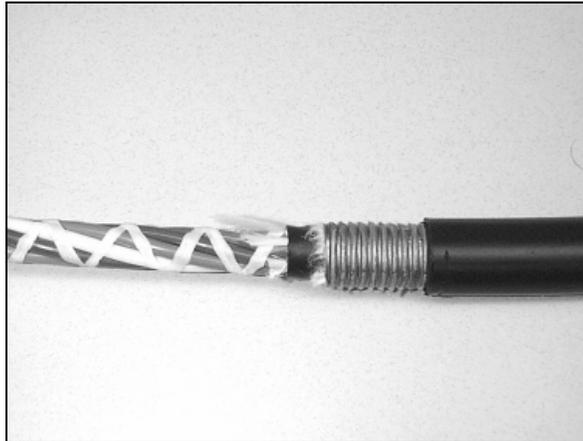
#### **4. Armored Cable with Alligator-Type Clamp**

**4.1** This section describes installation of an alligator-style bond clamp (Figure 12) onto an armored cable.



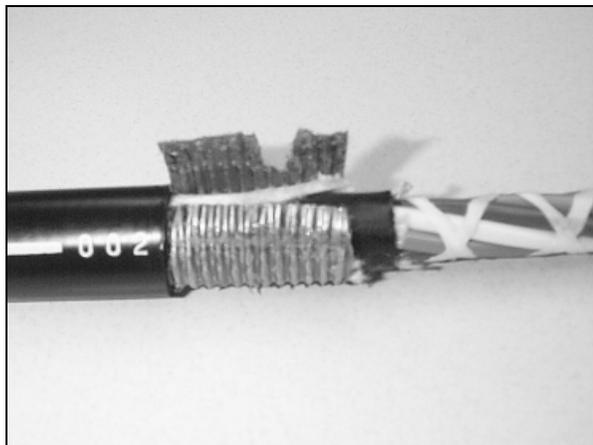
**Figure 12 – Alligator-style bond clamp.**

**4.2** Prepare the cable as described in OFS IP-011B, *Sheath Removal and Mid-Span Access for Light-Armored and Armored Cables*. Expose about 1-inch of armor for attachment of the bond clamp as shown in Figure 13. The actual length of armor that must be exposed may vary with the length of the bond clamp.



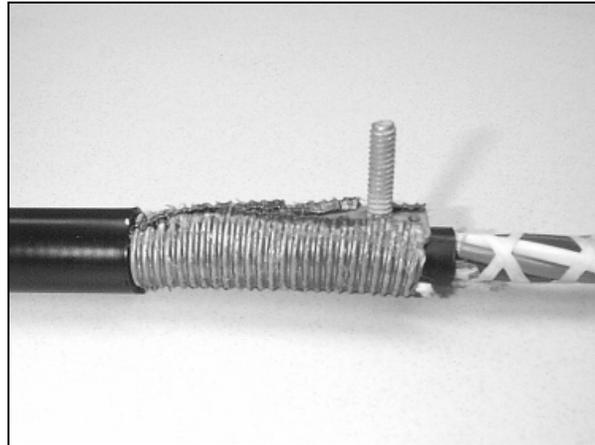
**Figure 13 - Expose 1-inch of armor.**

**4.3** Locate the armor overlap. Lift the armor overlap and cut a small slot in the armor for the stud as shown in Figure 14.



**Figure 14 – Cut a slot in armor.**

**4.4** Insert the bottom half of the bond clamp between the armor and the inner cable jacket. Align the stud with the slot. Fold the armor back over clamp (Figure 15).



**Figure 15 - Insert bottom half of bond clamp**

**4.5** Install the top half of the bond clamp over the armor and fasten to the stud with the locking nut (Figure 16).



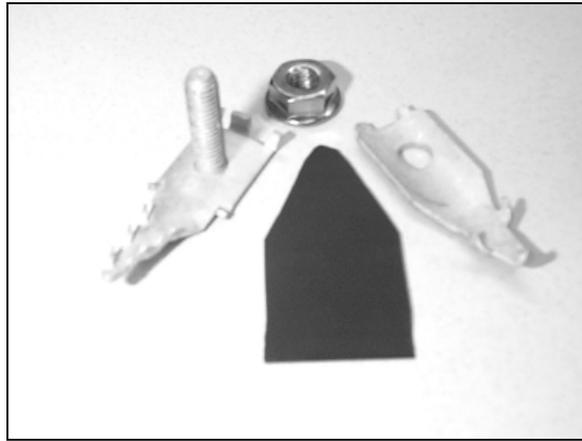
**Figure 16 - Install top half of bond clamp.**

**4.6** Attach a bond wire to the stud and fasten with a nut. Connect the bond wire to an approved ground as required by local practice.

**4.7** Wrap the exposed armor and bond clamp with electrical tape. Over wrap adjacent layers of electrical tape by one-half wrap.

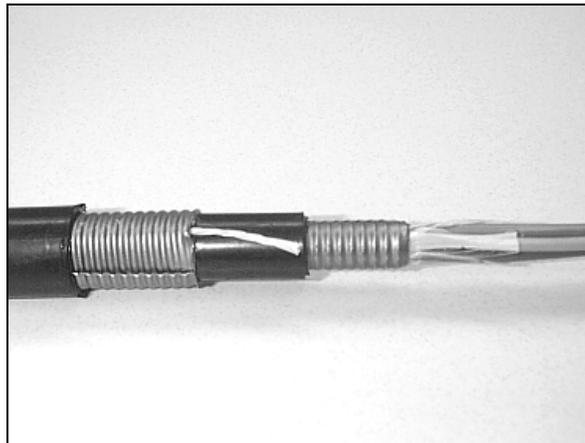
## **5. Double-Armored Cable with 3M 4460-S Bond Clamp**

**5.1** This section describes installation of two 3M 4460-S bond clamps (Figure 17) on a double-armored cable.



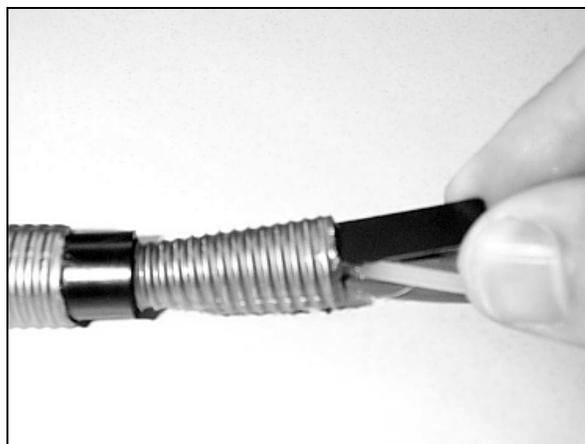
**Figure 17 - 3M 4460-S bond clamp.**

**5.2** Prepare the cable as described in OFS IP-011B, *Sheath Removal and Mid-Span Access for Light-Armored and Armored Cables*. Expose about 1-inch of both armor layers for attachment of the bond clamps as shown in Figure 18. The actual length of armor that must be exposed may vary with the length of the bond clamps.



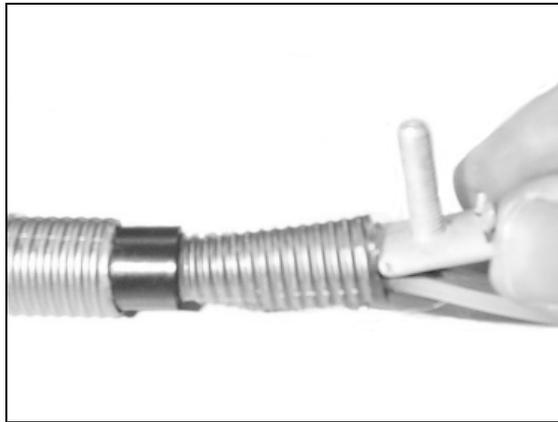
**Figure 18 - Expose 1-inch of both armor layers.**

**5.3** Trim a plastic guard as required to fit under the inner armor layer. Insert the plastic guard between the inner armor and the core (Figure 19).



**Figure 19 – Insert the plastic guard.**

**5.4** Insert the bottom half of a bond clamp between the plastic guard and the inner armor (Figure 20). Exercise caution when inserting the bond clamp to prevent damage to the buffer tubes.



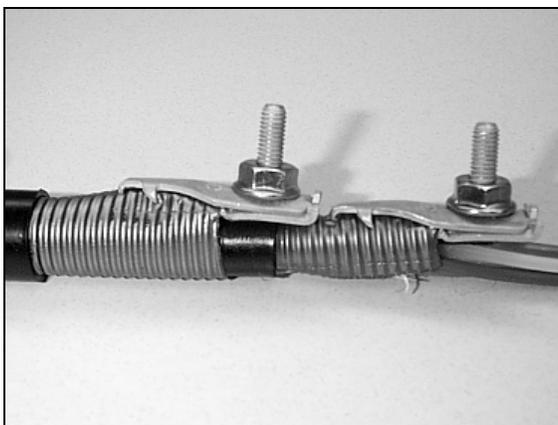
**Figure 20 - Insert bottom half of bond clamp.**

**5.5** Install the top half of the bond clamp over the armor and fasten to the stud with a locking nut (Figure 21).



**Figure 21 - Install top half of bond clamp.**

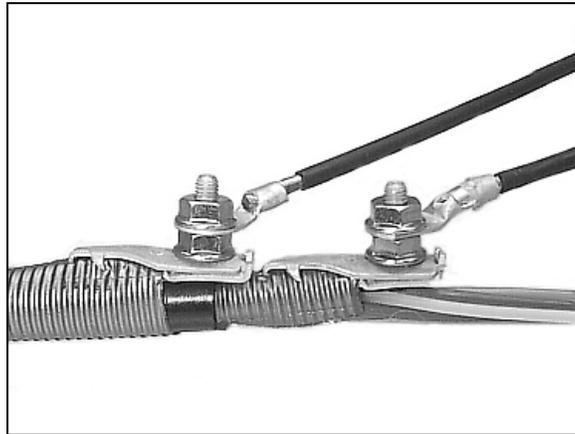
**5.6** Repeat steps 5.4 and 5.5 to install the second bond clamp under the outer armor layer (Figure 22). Exclude the plastic guard under the outer armor



**Figure 22 – Install Second Bond Clamp**

**5.7** Attach bond wires to each stud and fasten with locking nuts (Figure 23). Connect the bond wires to an approved ground as required by local practice.

**5.8** Wrap the exposed armor and bond clamps with electrical tape. Over wrap adjacent layers of tape by one-half wrap.



**Figure 23 – Attach bond wires to the clamp studs.**

***If you have any questions or need additional information, please contact OFS Customer Support at 888-FIBER-HELP (888-342-3743).***