SUMITOMO ELECTRIC LIGHTWAVE

SUMITOMO RECOMMENDED PROCEDURE

SRP SP-F04-038

FutureFLEX® AIR-BLOWN FIBER® SOLUTIONS

INSTALLATION PROCEDURES FOR CABLE ENTRY SEALS

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1.0 General

1.1 This procedure describes the standard techniques for installing Heat-Shrinkable Cable Entry Seals to FutureFLEX Air-Blown Fiber (ABF) tube cables in indoor applications only.

1.2 Heat-Shrinkable Cable Entry Seals (CES's) provide a simple, easy, and effective means of securing tube cable ends to Tube Distribution Unit (TDU) entry points.

1.2.1 When properly assembled, CES's will provide a liquid-tight, fume-tight seal between the tube cable and the TDU entry point.

1.2.2 However, CES's do not have a strain relief feature such as the wire mesh provided with a typical Kellems® Grip. CES's should only be used where strain relief is not required.. If strain relief is necessary, select and install a properly sized SEL approved Kellems Grip. **Always Remember;** The use of our Heat Shrinkable CES is restricted to indoor installations where extreme water, dust, fumes, vapors, corrosives or other potentially damaging conditions **Do Not** exist. ***Heat Shrink CES's should Never be installed outdoors.***

2.0 Safety Precautions

2.1 The use of safety equipment (safety glasses, safety shoes, cut-resistant Kevlar gloves) is recommended during this installation procedure.

2.2 Exercise caution when using heat gun to shrink CES boot. Follow manufacturer's recommended operating instructions.

3.0 Reference Documents

3.1 Sumitomo Recommended Procedure, *FutureFLEX Tube Cable Installation Procedures,* SRP SP-F04-008.

4.0 Equipment / Tools Required

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

4.1 **See TABLE 1** for Heat-Shrinkable Cable Entry Seal Part Numbers. Recommended Knockout Hole sizes are also provided.

4.2 Tube Cable Cutter (BETL03)

4.3 Utility Knife with Hook Blade

4.4 Spanner wrench or Channel Lock Pliers

4.5 10-inch (or larger) Adjustable Wrenches

4.6 Hammer

4.7 Hole Punch Set for Knockout Holes

4.8 Felt Tip Pen / Marker

4.9 Tape Measure

4.10 Light Duty Heat Gun; McMaster-Carr 32605K44 or equal

5.0 Equipment Layout

5.1 **See Fig. 1 and Fig. 2** for Heat-Shrinkable Cable Entry Seal layout.

TABLE 1
Heat-Shrinkable Cable Entry Seals

Indoor Tube Cable SEL P/N	Cable Entry Seal SEL P/N	Recommended Knockout Hole Size (Inches)
TC02TRC TC02TP2	DECES3 DECES3	1.5 – 1.625
TC04TRC TC04TP2	DECES3 DECES3	1.5 – 1.625
TC07TRC TC07TP2	DECES3 DECES3	1.5 – 1.625
TC12TRC TC12TP2	DECES4 DECES4	2.00 – 2.125
TC19TRC TC19TP2	DECES5 DECES5	3.315 – 3.450
TC24TRC	DECES5	3.315 – 3.450

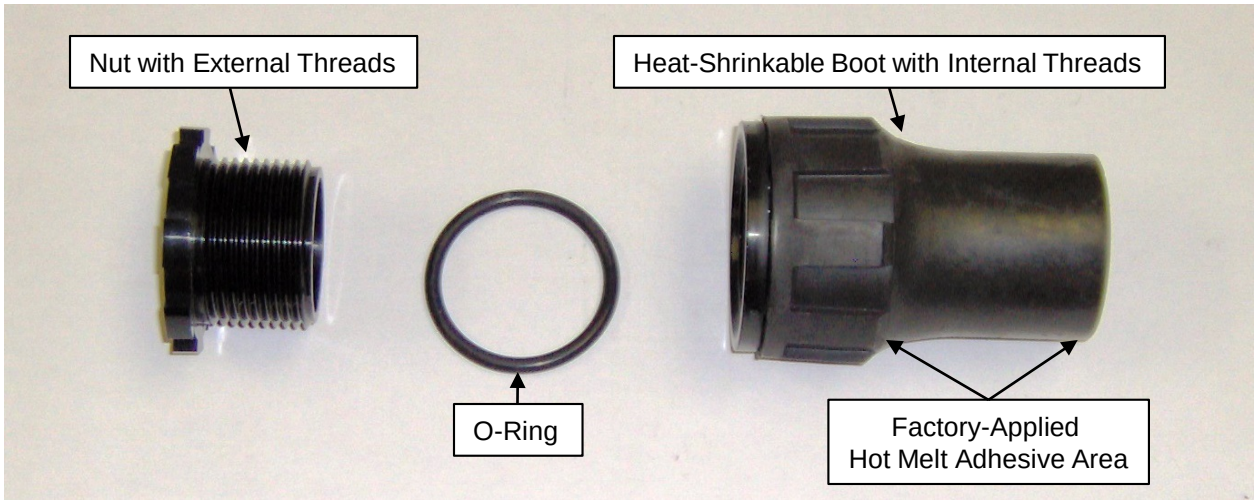

Figure 1
Cable Entry Seal Layout

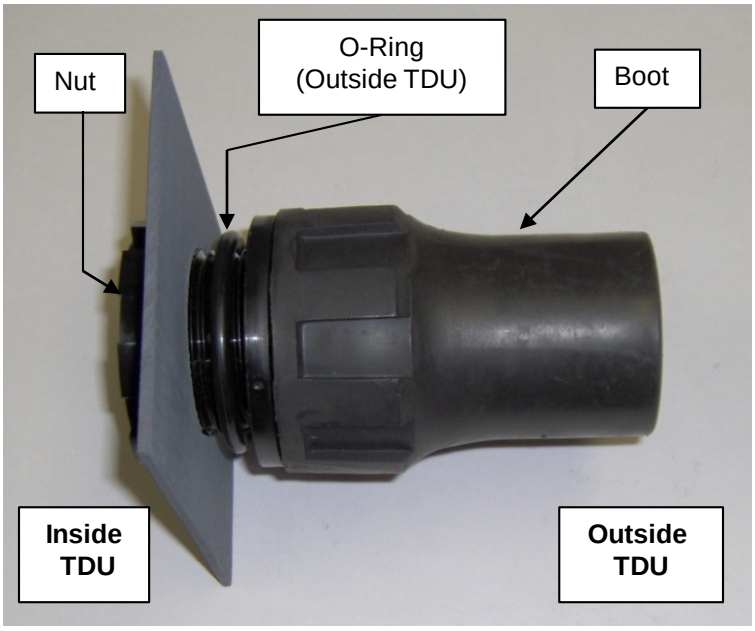

Figure 2
Correct Assembly of a CES is with the O-Ring
Installed on the Outside of the TDU Enclosure

6.0 Preparing TDU Enclosure

6.1 **Refer to TABLE 1** and identify Recommended Knockout Hole size based on the Cable Entry Seal to be used.

6.2 Prepare TDU enclosure by selecting and marking tube cable entry point locations. To best optimize TDU capacity, it is recommended to stagger tube cable entry locations if possible. **See Fig. 3a and Fig. 3b.**

6.3 Use appropriate size hole punch and create opening in TDU.

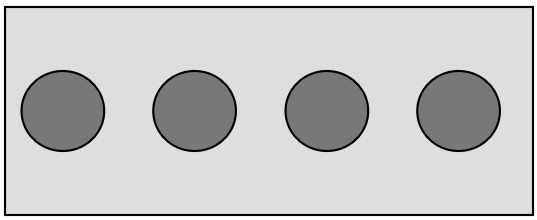

Figure 3a
Inline Tube Cable Entry Locations
Acceptable but Fails to Optimize
TDU Capacity

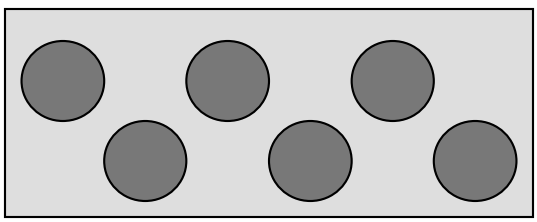

Figure 3b
Staggered Tube Cable Entry Locations
Preferred Method to Optimize
TDU Capacity

7.0 Installing Cable Entry Seals for 2-, 4, 7 and 12-Tube Cables

7.1 After the appropriate size knockout hole is cut into the TDU enclosure, install externally-threaded nut through cable entry hole from inside the TDU.

7.2 Slide O-ring over threads of nut. *Note that O-ring goes on the outside of the TDU enclosure.*

7.3 Install boot onto nut's threads and hand tighten.

7.4 Use a Spanner wrench to finish tightening nut an additional 1/4 – 1/2 turn to properly compress the O-ring. Do not over-tighten..

7.5 With the tube cable external routing to the TDU established and the tube cable cut to its approximate finished length, determine tube cable strip length by measuring the TDU enclosure in the direction the tube cable will be routed through the enclosure. If tube cable will run vertically through the TDU, take the height dimension. If the tube cable will run horizontally through the TDU, take the width dimension.

7.6 Transfer the TDU measurement (taken above) to the tube cable. Measure back from the end of the tube cable and mark the jacket.

7.7 Use Hook Blade Knife to lightly score tube cable jacket at the mark. Pull ripcord and strip jacket away to expose individual tubes.

7.8 Insert tubes / tube cable through CES and make final adjustments to tube cable length and position inside TDU. Position tube cable jacket even with or slightly beyond the nut face. **See Fig. 4.**

7.9 Hold tube cable in place and centered within boot area.

CAUTION: *Minimum boot shrink temperature is about 250° F (121° C). Do not touch boot during or immediately after heating process; it will be very hot.*

7.10 Use Light Duty Heat Gun to slowly shrink boot around tube cable jacket. Exercise care to not damage / burn the tube cable jacket.
Note: **For use with Plenum TP2 tube cables do not shrink, but install as is. Damage can occur over extended time.**

7.11 Continue shrinking boot uniformly until boot conforms to tube cable shape and a small amount of hot-melt adhesive is visible at the end of the boot signifying a good seal was made. **See Fig. 6 for reference.**

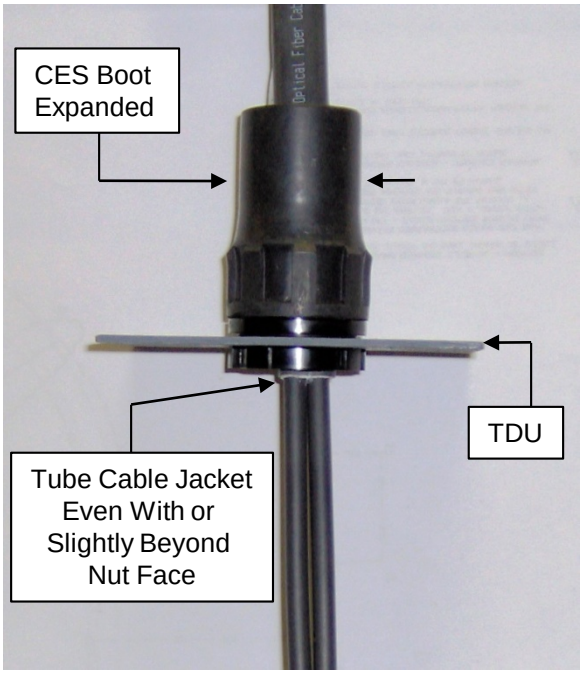

Figure 4
A TC02TP2 Tube Cable Ready for CES Installation

8.0 Installing Cable Entry Seals for 19 and 24 Tube Cables

8.1 After the appropriate size knockout hole is cut into the TDU enclosure, install nut through cable entry hole from inside the TDU.

8.2 Slide O-ring over threads of nut. *Note that O-ring goes on the outside of the TDU enclosure.*

8.3 Install boot onto nut's threads. Only hand-tighten at this time.

8.4 With the tube cable external routing to the TDU established and the tube cable cut to its approximate finished length, determine tube cable strip length by measuring the TDU enclosure in the direction the tube cable will be routed through the enclosure. If tube cable will run vertically through the TDU, take the height dimension. If the tube cable will run horizontally through the TDU, take the width dimension.

8.5 Transfer the TDU measurement (taken above) to the tube cable. Measure back from the end of the tube cable and mark the jacket.

8.6 Use Hook Blade Knife to lightly score tube cable jacket at the mark. Pull ripcord and strip jacket away to expose individual tubes.

8.7 Insert tubes / tube cable into CES until larger diameter tube cable jacket contacts smaller boot / nut opening. *Do not try to force tube cable through these openings. Stop when contact is made.* **See Fig. 5.**

Note: *If having difficulties getting the bare tubes of 19-tube cables through the CES because the tubes have spread apart, disassemble the CES. Slide boot over bare tubes and tube cable. Slide O-ring over bare tubes and tube cable. Insert tubes through cable entry hole. Then, from inside the TDU, slide nut over bare tubes and thread into boot. Hand-tighten nut.*

8.8 Use a Spanner wrench to tighten nut an additional 1/4 – 1/2 turn to compress the O-ring. Do not over-tighten.

8.9 Make final adjustments to tube cable length and position inside TDU.

8.10 Hold tube cable in place and centered within boot area.

CAUTION: *Minimum boot shrink temperature is about 250° F (121° C). Do not touch boot during or immediately after heating process; it will be very hot.*

8.11 Use Light Duty Heat Gun to slowly shrink boot around tube cable jacket. Exercise care to not damage / burn the tube cable jacket.

8.12 Continue shrinking boot uniformly until boot conforms to tube cable shape and a small amount of hot-melt adhesive is visible at the end of the boot signifying a good seal was made. **See Fig. 6a and Fig. 6b.**

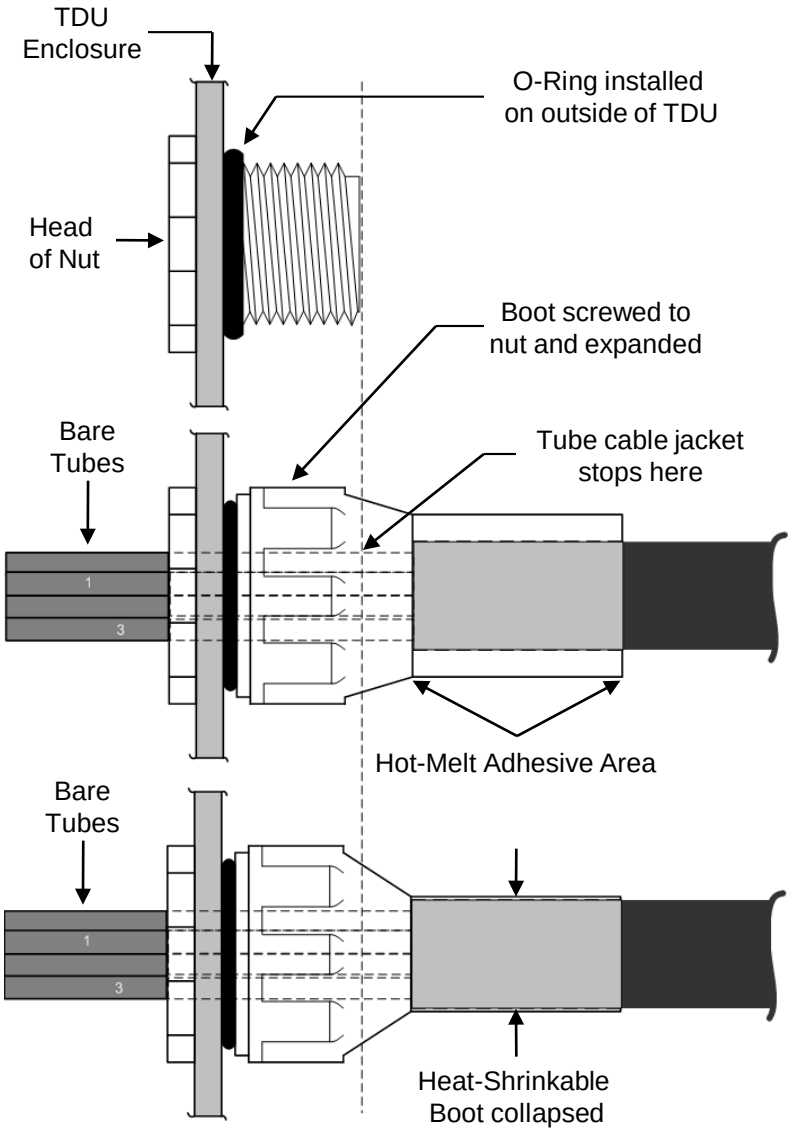

Figure 5
Installation Method for 19-Tube Cables (Riser- and Plenum-rated)
(Tube Cable Jackets Stop at Boot Opening or Nut Opening)

Figure 6a
CES Boot Collapsed on a 7-Tube Cable

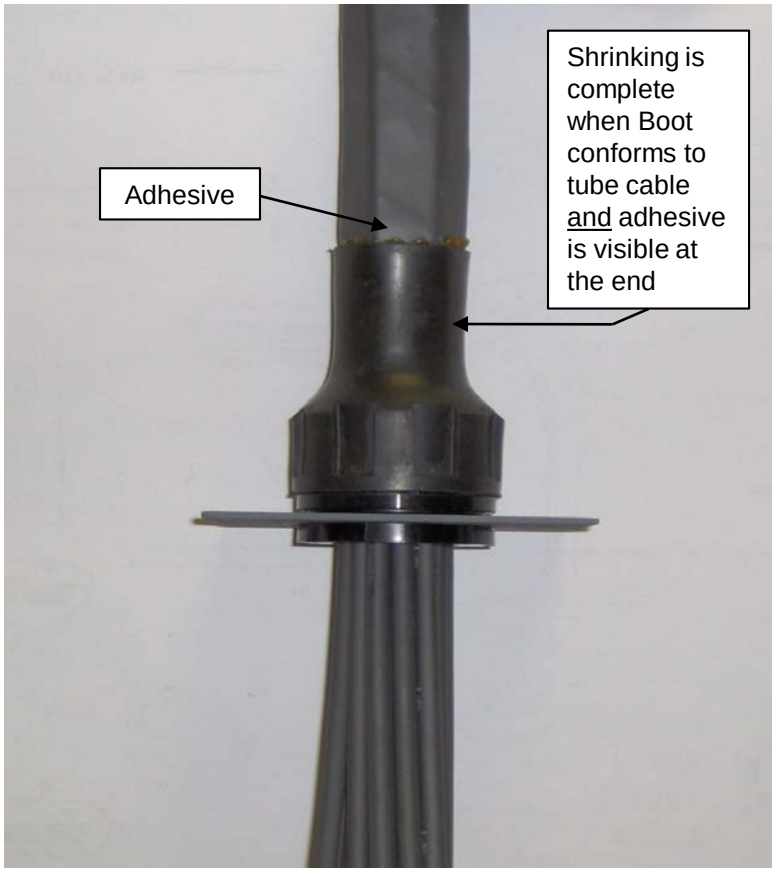

Figure 6b
CES Boot Collapsed on a 19-Tube Cable