



# 3M™ Fiber Optic Splice Closure 2178-L/S Series with Gasket

Instructions for:

**3M™ Fiber Optic Splice Closures 2178-L/S Series**

**3M™ Flame Retardant Fiber Optic Splice Closures 2178-L/S/FR**

**3M™ Cable Addition Kit 2181-L/S**

**3M™ Flame Retardant Cable Addition Kit 2181-L/S/FR**

# Contents

1.0	General	3
2.0	Specifications 3M™ Fiber Optic Splice Closure for 2178-L/S Series	3
3.0	3M™ Fiber Optic Splice Closure Configurations and Capacity for 2178-L/S Series	5
4.0	Kit Contents	6
5.0	Cable Preparation	8
6.0	Remove the Tray Support	9
7.0	Cable Installation	9
8.0	Cable/Port Seal Assembly	13
9.0	Buffer Tube/Fiber Management	16
10.0	Splice Closure Assembly	17
11.0	Splice Closure Reentry	19
12.0	3M™ Cable Addition Kit 2181-LS and 2181-LS/FR Installation	19
14.0	Closure Accessories	22

# 1.0 General

- 1.1 This instruction bulletin details the installation of the 3M™ Fiber Optic Splice Closures 2178-L/S Series.
- 1.2 The L closures consist of two series: the 2178-LS Series closure for outside plant applications and the 2178-LS/FR Series closure for inside building applications (See below for application details). The product can be used for butt, inline or branch splicing configurations.

<b>2178-LS Series</b>		<b>Closure Locations</b>
2178-S	Small fiber optic splice closure	<b>Black closures for outdoor applications: underground (manhole, handhole), buried (pedestal), direct buried and aerial.</b>
2178-LS	Large fiber optic splice closure	
2178-LL	Extra large fiber optic splice closure	
2178-SL	Small fiber optic closure with extra storage area	
2181-LS	Cable addition kit	
<b>2178-LS/FR Series</b>		
2178-S/FR	Small flame-retardant fiber optic splice closure	<b>Gray closures for indoor flame retardant applications: vault and building ONLY.</b>
2178-LS/FR	Large flame-retardant fiber optic splice closure	
2178-LL/FR	Extra-large flame-retardant fiber optic splice closure	
2181-LS/FR	Flame retardant cable addition kit	

# 2.0 Specifications for 2178-LS Closures Series

Maximum cable diameter	1.0" (25 mm)
Minimum cable diameter	0.2" (5 mm)
Closure length	21.9" (55.7 cm)
2178-S closure height	4.7" (11.9 cm)
2178-LS closure height	8.0" (20.3 cm)
2178-LL closure height	11.3" (28.7 cm)
2178-SL closure height	8.0" (20.3 cm)
Available splice chamber space: length	16.4" (41.6 cm)
Available splice chamber space: width	5.5" (14 cm)
2178-S height	1.2" (3 cm)
2178-LS and 2178-LL height	3.7" (9.4 cm)
2181-LS height (1)	1.5" (3.8 cm)
2181-LS height (2)	3.0" (7.6 cm)
2181-LS height (3)	4.5" (11.4 cm)
2181-SL height	1.2" (3 cm)

## 2.1 3M™ Fiber Optic Splice Tray Capacities

2524 Splice Tray 2524-FT Splice Tray	24 3M™ Fibrlok™ Splices 24 Fusion Splices (3.0 mm x 60 mm Heat Shrink Sleeves)
2523 Splice Tray	24 Fibrlok Splices 12 3M™ Fibrlok™ Multi-Fiber Splices* (12 fibers each) 48 Discrete Fusion Splices (3.0 mm x 60 mm Heat Shrink Sleeves) 12 Mass Fusion Splices (12 fibers each)
2522 Splice Tray	12 Fibrlok Splices 8 Fibrlok Multi-Fiber Splices* (12 fibers each) 24 Discrete Fusion Splices (3.0 mm x 60 mm Heat Shrink Sleeves) 10 Mass Fusion Splices (12 fibers each)
2543 Splice Tray	24 Discrete Fusion Splices (2.4 mm x 60 mm Heat Shrink Sleeves) 24 Discrete Fusion Splices (3.0 mm x 60 mm Heat Shrink Sleeves) 18 Mass Fusion Splices (12 fibers each)
2527-48-DF Splice Tray	48 Discrete Fusion Splices (3.0 mm x 60 mm Heat Shrink Sleeves)
2527 Splice Tray	12 Fibrlok Splices 24 Discrete Fusion Splices (3.0 mm x 60 mm Heat Shrink Sleeves) 12 Mass Fusion Splices (12 fibers each)

\*Varies with ribbon size

### 3.0 3M™ Fiber Optic Splice Closure Configurations and Capacity for 2178-L/S Series

#### 3.1 Port Configurations

Closure	Size (L x W x H)	Splice Application	Max Cable Entry Ports	
			Main	Branch
2178-S	21.9" x 8.5" x 4.7" (556 x 216 x 119 mm)	Butt or Inline	2 Butt/2 Inline	0 Butt/2 Inline
2178-S with one 2181-LS	21.9" x 8.5" x 6.2" (556 x 216 x 157 mm)		2 Butt/2 Inline	2 Butt/6 Inline
2178-S with two 2181-LS	21.9" x 8.5" x 7.7" (556 x 216 x 196 mm)		2 Butt/2 Inline	4 Butt/10 Inline
2178-S with three 2181-LS	21.9" x 8.5" x 9.2" (556 x 216 x 234 mm)		2 Butt/2 Inline	6 Butt/14 Inline
2178-LS	21.9" x 8.5" x 8.0" (556 x 216 x 203 mm)		2 Butt/2 Inline	0 Butt/2 Inline
2178-LS with one 2181-LS	21.9" x 8.5" x 9.5" (556 x 216 x 241 mm)		2 Butt/2 Inline	2 Butt/6 Inline
2178-LS with two 2181-LS	21.9" x 8.5" x 11.0" (556 x 216 x 279 mm)		2 Butt/2 Inline	4 Butt/10 Inline
2178-LS with three 2181-LS	21.9" x 8.5" x 12.5" (556 x 216 x 318 mm)		2 Butt/4 Inline	6 Butt/14 Inline
2178-LL	21.9" x 8.5" x 11.3" (556 x 216 x 287 mm)		2 Butt/2 Inline	0 Butt/2 Inline
2178-LL with one 2181-LS	21.9" x 8.5" x 12.8" (556 x 216 x 325 mm)		2 Butt/2 Inline	2 Butt/6 Inline
2178-LL with two 2181-LS	21.9" x 8.5" x 14.3" (556 x 216 x 363 mm)		2 Butt/2 Inline	4 Butt/10 Inline
2178-LL with three 2181-LS	21.9" x 8.5" x 15.8" (556 x 216 x 401 mm)		2 Butt/4 Inline	6 Butt/14 Inline
2178-SL	Same as LS		2 Butt/2 Inline	0 Butt/2 Inline

*Note: 2181-LS cable addition kits may be added to increase cable entry ports OR splice capacity.*

## 4.0 Kit Contents

*Note: 3M™ Fiber Optic Splice Closure 2178 L/S-FR Series is gray in color.*

4.1 3M™ Fiber Optic Splice Closure 2178-S and 2178-S/FR Kit Contents (Figure 1):

4.2 3M™ Fiber Optic Splice Closure 2178-LS and 2178-LS/FR Kit Contents (Figure 2):

4.3 3M™ Fiber Optic Splice Closure 2178-LL and 2178-LL/FR Kit Contents (Figure 3):

- a) Closure assembly includes tray support, gasket, air valve, bolts, and cable strain relief
- b) Sealing washer trees.....6 ea.
- c) Plugs.....2 ea.
- d) Cable ties, blue and green.....4 ea.
- e) Sheath scuff.....1
- f) Hose clamp.....3 ea.
- g) Scotch® Linerless Rubber Splicing Tape 130C.....1 roll
- h) Silicone grease (5 cc tube).....2 ea.
- i) Small allen wrench.....1
- j) 3M™ Dual Lock™ Reclosable Fasteners (for tray support).....4
- k) Brass nut and washer .....2 ea. (varies)
- l) Tape collar gauge .....1
- m) Tray strap .....1
- n) Back cover clip.....4 ea.
- o) K-connector (large).....3 ea.
- p) Screw (large).....3 ea.
- q) K-connector (small).....3 ea.
- r) Screw (small).....3 ea.
- Transition tube tie-down bracket (not shown).....1

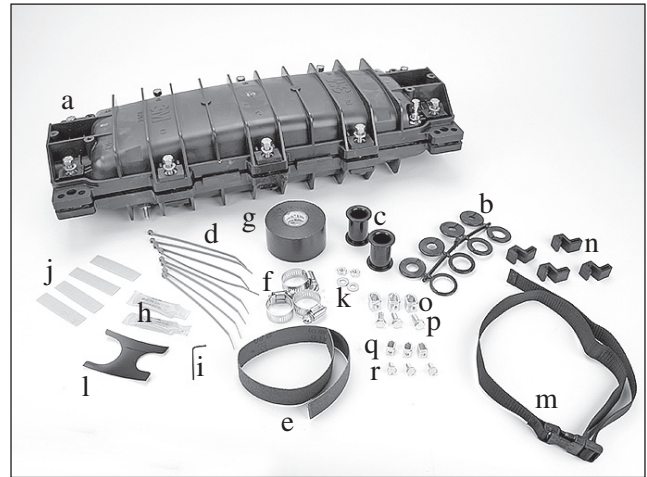


Figure 1

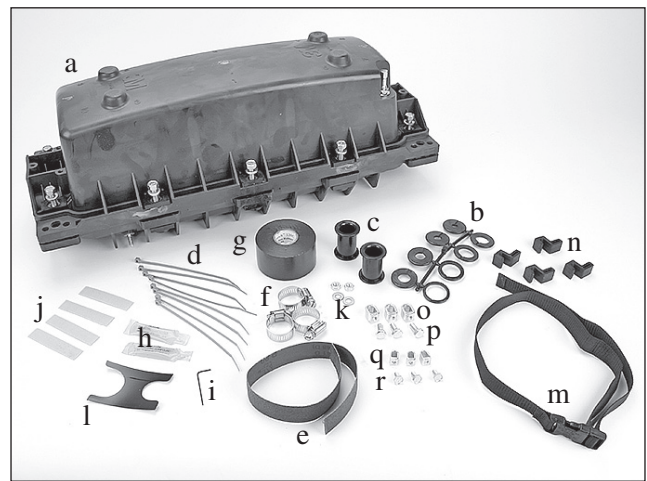


Figure 2

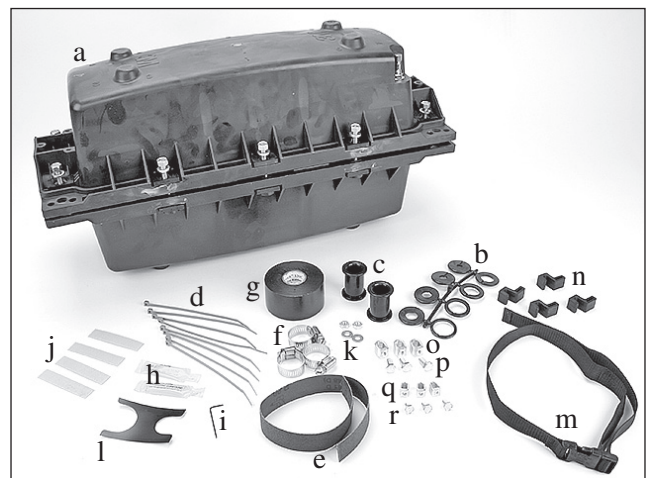


Figure 3

4.4 3M™ Splice Closure 2178-S +81 Kit Contents (Figure 4):

4.5 3M™ Splice Closure 2178-LS +81 and 2178-LS/FR +81 Kit Contents (Figure 5):

- a) Closure assembly includes tray support, gasket, air valve, bolts, and cable strain relief
- b) Sealing washer trees.....6 ea.
- c) Plugs.....6 ea.
- d) Cable ties, blue and green.....4 ea.
- e) Sheath scuff.....1
- f) Hose clamp.....3 ea.
- g) Scotch® Linerless Rubber Splicing Tape 130C.....1 roll
- h) Silicone grease (5 cc tube).....2 ea.
- i) Small allen wrench.....1
- j) 3M™ Dual Lock™ Reclosable Fasteners (for tray support).....4
- k) Brass nut and washer .....2 ea. (varies)
- l) Tape collar gauge .....1
- m) Tray strap .....1
- n) Back cover clip.....4 ea.
- o) K-connector (large).....3 ea.
- p) Screw (large).....3 ea.
- q) K-connector (small).....3 ea.
- r) Screw (small).....3 ea.
- s) 3M™ Cable Addition Kit 2181 Transition tube tie-down bracket (not shown).....1

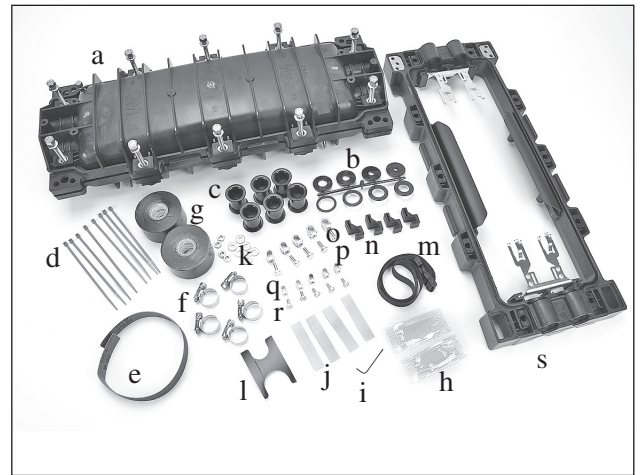


Figure 4

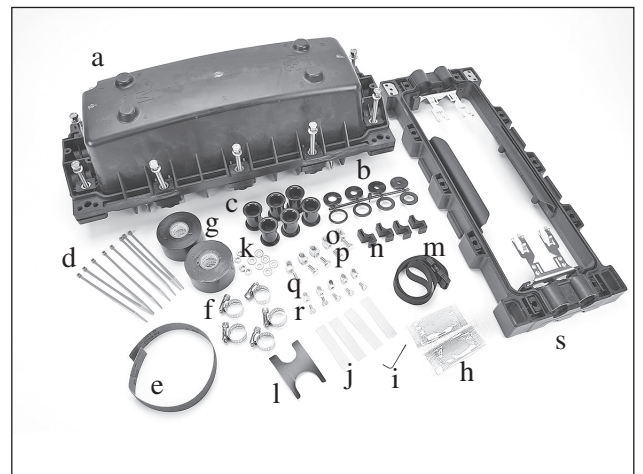


Figure 5

4.6 3M™ Cable Addition Kit 2181-LS and 2181-LS/FR Contents (Figure 6):

- a) Adapter with gasket .....1
- b) Sealing washer trees.....6 ea.
- c) Plugs.....4 ea.
- d) Cable ties, blue and green.....4 ea.
- e) Sheath scuff.....1
- g) Scotch® Linerless Rubber Splicing Tape 130C.....1 roll
- g) Silicone grease (5 cc tube).....2 ea.
- h) Small allen wrench.....1
- i) Bolts .....10 ea.
- j) Tape collar gauge .....1
- k) K-connector (large).....2 ea.
- l) Screw (large).....2 ea.
- m) K-connector (small).....2 ea.
- n) Screw (small).....2 ea.
- o) Buffer tube retention .....2

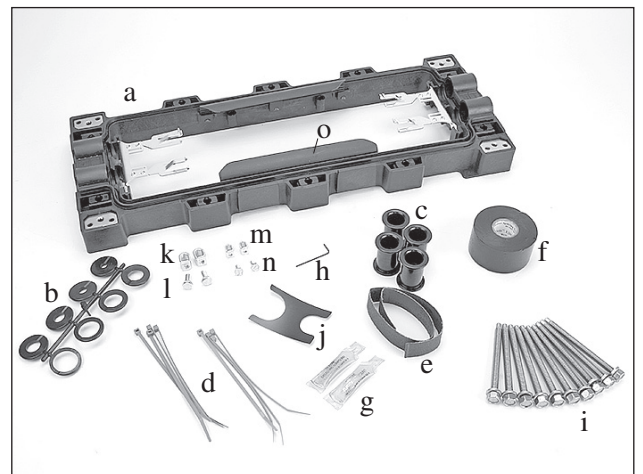


Figure 6

*Note: 3M™ Fiber Optic Splice Closure L/S-FR Series is gray in color.*

#### 4.7 Additional Materials Required:

- 3M™ Cable Cleaner 4415
- #6 AWG ground wire or equivalent
- Splice tray/organizer
- 3M™ Scotchlok™ Shield Bond Connector 4460-D or 4460-D/FO, if using shielded cables
- Cable ties

#### 4.8 Tools Required for Closure Assembly

- 3/8" (10 mm) hex driver
- 1/2" (13 mm) hex driver
- 7/16" (12 mm) hex driver
- Snips
- Torque wrench
- Phillips-head screwdriver

#### 4.9 Tools Required for Cable Preparation

- Tape measure
- Electrician's pliers
- Snips
- Splicer's knife

## 5.0 Cable Preparation

**Note:** For clarity, the 3M™ Fiber Optic Splice Closure 2178-S has been shown. Installation procedures are the same for all combinations of the 2178-L/S series of splice closures.

**Note:** When removing cable sheathing, do not cut, kink or damage underlying layers. If damage occurs, cut back sheath to adequately inspect and repair.

5.1 Remove 96" (244 cm) of outer cable sheath (and shield or armor, if present). Remove successive sheath layers and wrapping to expose buffer tubes protecting fibers. Stagger layers as recommended by cable manufacturer or per standard practice.

5.2 Remove all cable grease. Clean all buffer tubes and dielectric strands with approved cleaner.

**Note:** Carefully follow health, safety and environmental instructions as given on Material Safety Data Sheet or container label for cable cleaner solvent being used.

5.3 Trim off any solid filler tubes and discard.

**Note:** Strength member may be trimmed back to no less than 3" (76 mm).

5.4 Scuff 5" (127 mm) of each cable sheath end using the supplied sheath scuff.

**Note:** All cables must be scuffed.

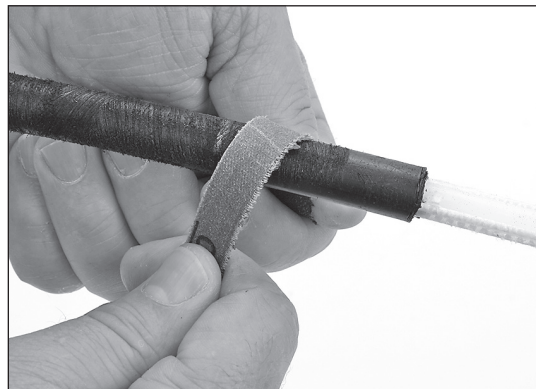


Figure 7



## 6.0 Remove the Tray Support

- 6.1 Remove the tray support by loosening the captive screws, then sliding the tray forward and lifting straight up from closure base. There is no need to fully remove the screws.

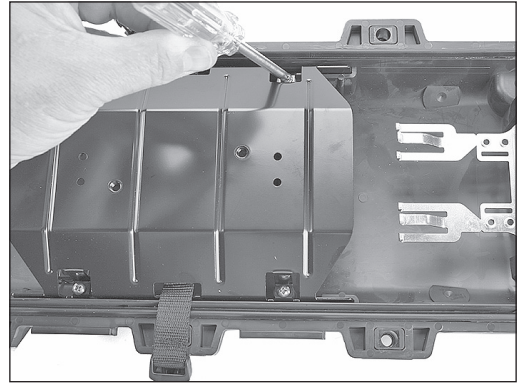


Figure 8

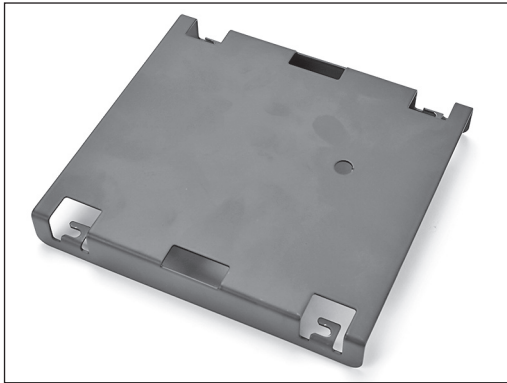


Figure 9

Tray support in 3M™ Fiber Optic Splice Closure  
2178-S & 2178-SL

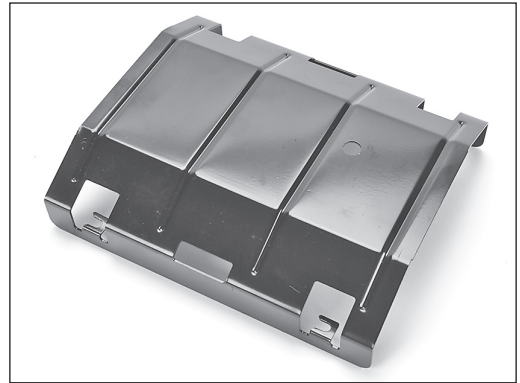


Figure 10

Tray support in 3M™ Fiber Optic Splice Closure  
2178-LS & 2178-LL

## 7.0 Cable Installation

- 7.1 Take the cable and place it into the cable port, aligning the end of the cable sheath with the cable strain relief bracket as shown. The cable sheath should end approximately 1/4" (6 mm) beyond the hose clamp tied-down.

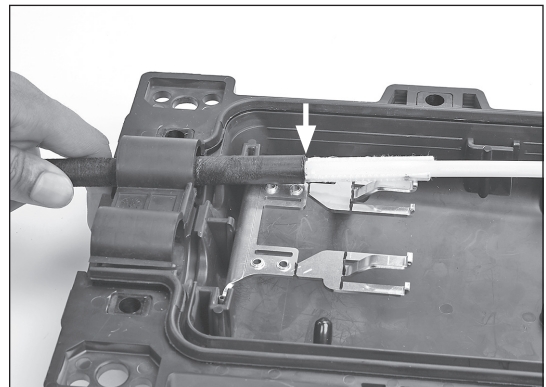


Figure 11

7.2 Mark both the cutoffs on the strain relief bracket and the placement of the washers.

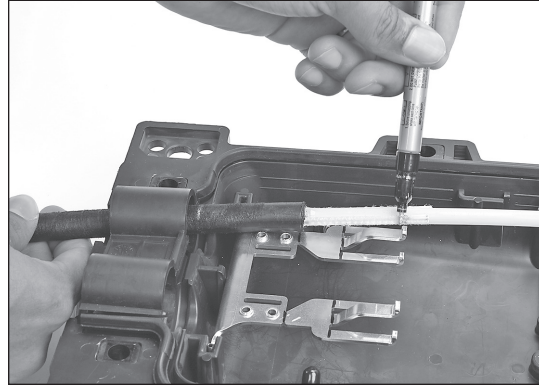


Figure 12

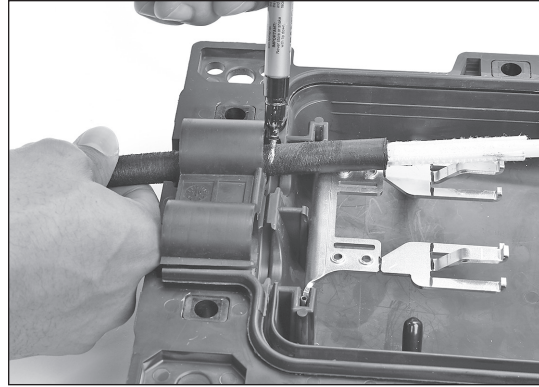


Figure 13

7.3 Cut the strength members.

7.4 Select the sealing washers. Use the smallest inside diameter sealing washer that will fit onto the cable.

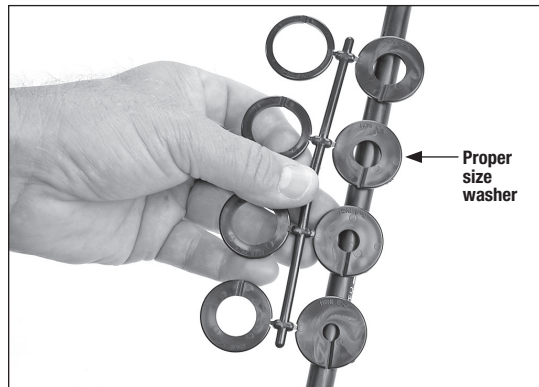


Figure 14

7.5 For midspan, express or loop-through applications, split the washer using snips and place on the cable.



Figure 15

- 7.6 The set screws which hold the cable tie down brackets are factory installed. One set screw may be removed. Remove the cable strain relief bracket using the allen wrench included in the kit. It is recommended to tape the allen wrench to the inside of the closure for later use.

**Note: SET SCREW MUST NOT EXTEND ABOVE PLASTIC “U” CHANNEL.**

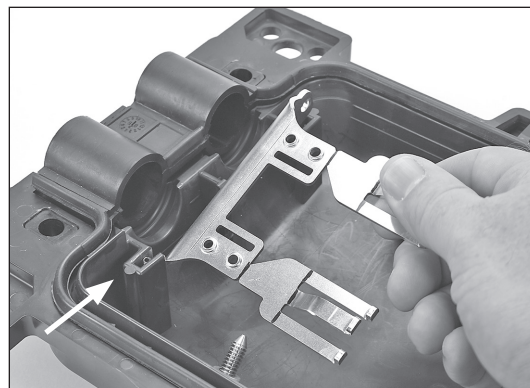


Figure 16

#### For Dielectric Cables:

- 7.7 **For cables with no central strength member:**  
Bend down or break off the center leg and tie town outside strength members as shown.

Slide strength members under retention lugs and tighten bolts to 40 in./lbs.  $\pm$  5 in./lbs. (4.6 N•m  $\pm$  0.6 N•m).

Install hose clamp around cable and through slot in strain relief bracket. Tighten to 40 in./lbs.  $\pm$  5 in./lbs. (4.6 N•m  $\pm$  0.6 N•m).



Figure 17

**Note: Tighten first then remove prongs**

- 7.8 **For cables with central strength member:**  
Assemble strength member clamp onto strain relief bracket as shown. Mark and cut the central strength member at end of strength member clamp. Bend down or break off outside legs.

Slide central strength member under retention lug and tighten bolt to 40 in./lbs.  $\pm$  5 in./lbs. (4.6 N•m  $\pm$  0.6 N•m).

Install hose clamp around cable and through slot in strain relief bracket. Tighten to 40 in./lbs.  $\pm$  5 in./lbs. (4.6 N•m  $\pm$  0.6 N•m).

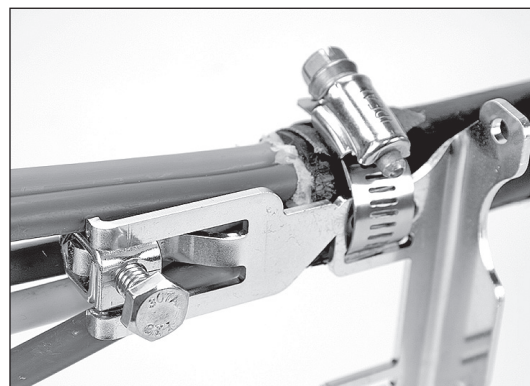


Figure 18

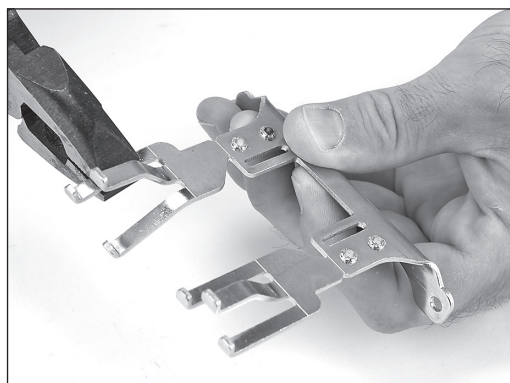


Figure 19: Prongs being bent

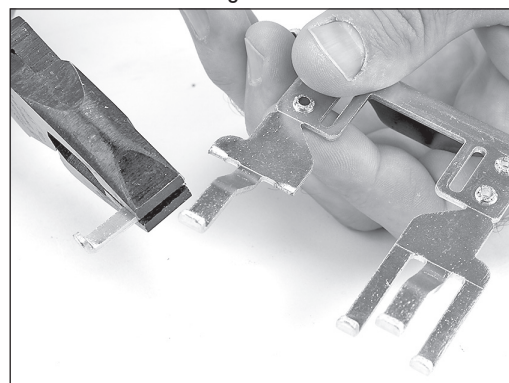


Figure 20: Prongs being broken off

- 7.9 If securing the strength member is not required, the front half of the sheath retention insert can be removed as shown.
- 7.10 Reinstall set screws.

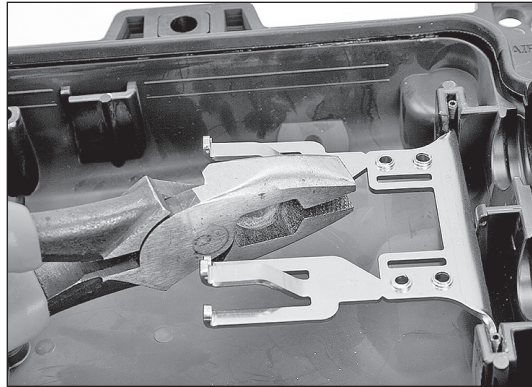


Figure 21

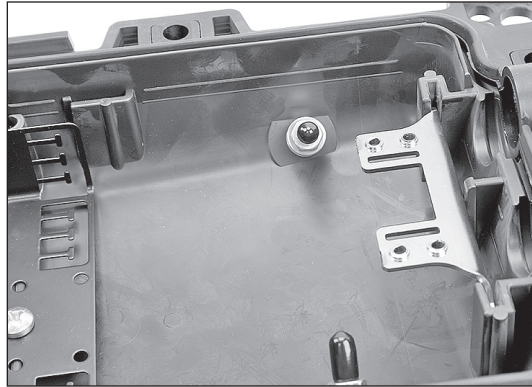


Figure 22

**For Armored Cables:**

- 7.11 Install a 3M™ Scotchlok™ Shield Bond Connector 4460-D under cable shield per company practice. Install ground braid per company practice.

*Note: Refer to vendor instructions for shield bond connector installation.*

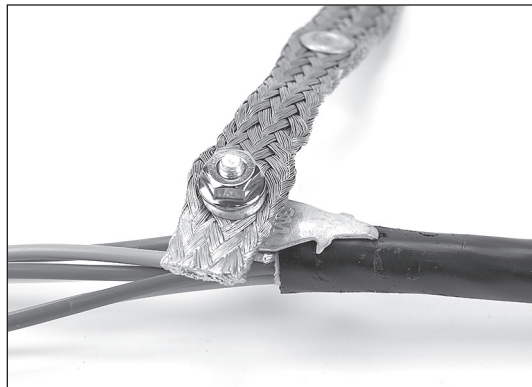
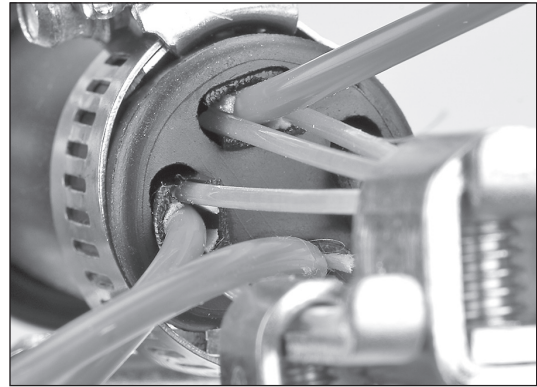
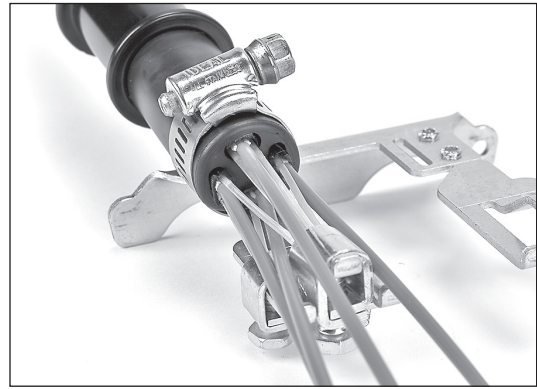


Figure 23

- 7.12 Install one green cable tie on the “Feeder Cable” and trim. Install one blue cable tie on each “Distribution Cable” and trim.

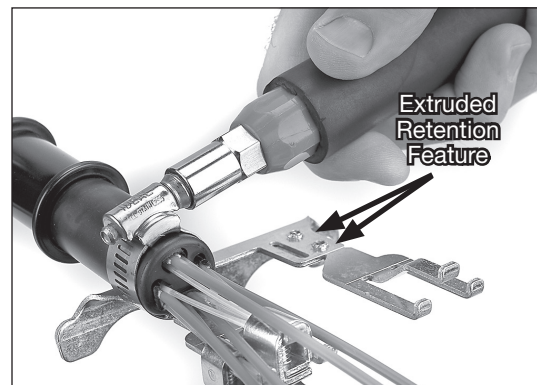
## 3M™ Multiport Grommet 4-Port (1.0") Installation

- 7.13 Orient the grommet as shown with one drop port positioned at top. Insert the two strength members from the top drop cable and the upper strength members from the drop cables on either side (four total) into the center large K-connector. Insert the remaining strength members into the small K-connectors on either side.

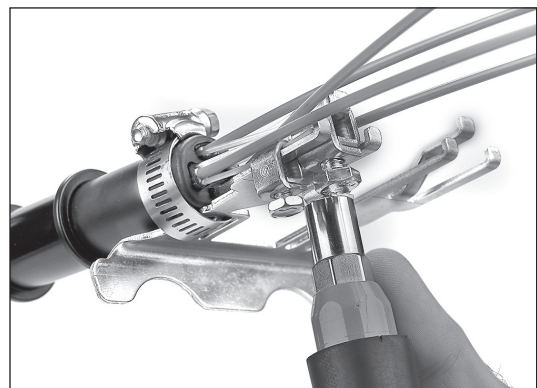


- 7.14 Secure the cable strain relief bracket to the grommet with the hose clamp as shown. Tighten the hose clamp to 40 in.-lbs.  $\pm$  5 in.-lbs. (4.6 N•m  $\pm$  0.6 N•m).

**Note:** *Ensure that the extruded retention feature of strain relief has sufficient contact with surface of grommet.*



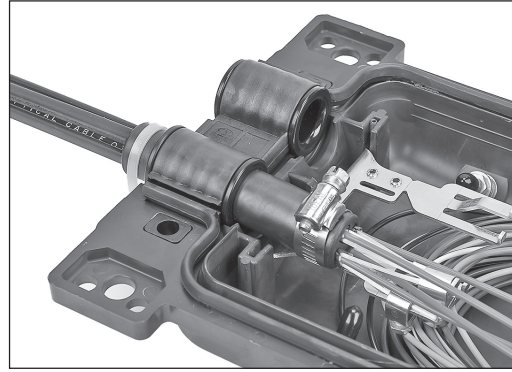
- 7.15 Tighten the three K-connector nuts to 40 in.-lbs.  $\pm$  5 in.-lbs. (4.6 N•m  $\pm$  0.6 N•m) each.



- 7.16 Place cable strain relief and the 3M™ Multiport Grommet Assembly into the closure.
- 7.17 Place cable ties around multiport grommet assembly inside and out as shown.

**Note:** *White cable ties are shown for clarity.*

- 7.18 Follow closure instructions for all other preparation leading up to and including sealing closure.



3M™ Fiber Optic Splice Closure 2178-S  
 3M™ Fiber Optic Splice Closure 2178-LS  
 3M™ Fiber Optic Splice Closure 2178-LL

**For Flat Cables:**

- 7.19 Install flat cables in 3M™ Multi-port Grommet per instructions 78-8135-4313-5.
- 7.20 Place cable strain relief on the grommet so that the hose clamp center is approximately 1" (25 mm) from the end of the grommet.

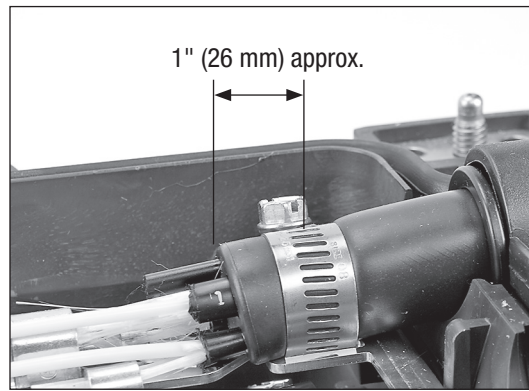


Figure 24

- 7.21 Tighten the hose clamp around grommet and cable strain relief to 20 in.-lbs. ± 5 in.-lbs. (2.3 N•m ± 0.6 N•m).

**Note:** *Ensure that the extruded retention feature of strain relief has sufficient contact with the surface of the grommet.*

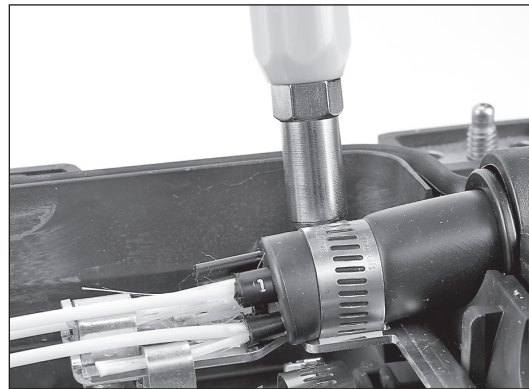


Figure 25

## 8.0 Cable/Port Seal Assembly

*Note: For installation into 3M™ Multiport Grommet, use the instructions provided in grommet kit.*

- 8.1 The rubber gasket is factory installed in all 3M™ Fiber Optic Splice Closures 2178-L/S Series.

If the gasket becomes damaged, replace using the 3M™ Gasket Kit 2178-LS/GSKT.

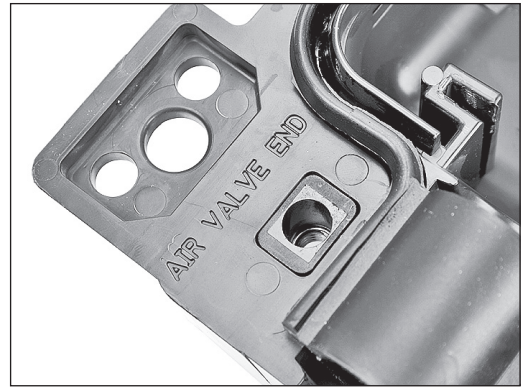


Figure 26

- 8.2 Use the Scotch® Linerless Rubber Splicing Tape 130C included with the closure to build the cable seals. Check the placement of the tape by positioning the strength member clamp where it will be anchored.

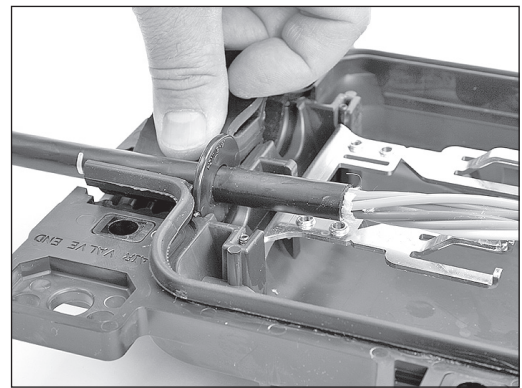


Figure 27

- 8.3 Wrap the tape around the cable, ensuring that the edges stay even and flush with the sealing washers.

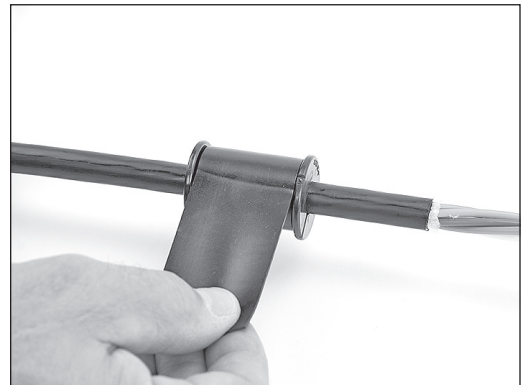
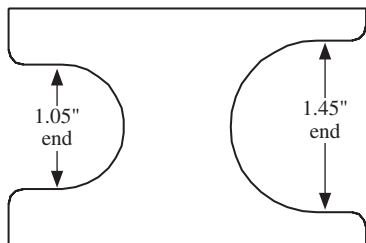


Figure 28

- 8.4 The tape should be wrapped to 1.05" (27 mm) outside diameter. Use the tape collar gauge to determine tape wrap. Wrap all cables to proper diameter.



for use in  
1.0" ports

for use in 1.4" ports  
Not used in 2178-L/S Series

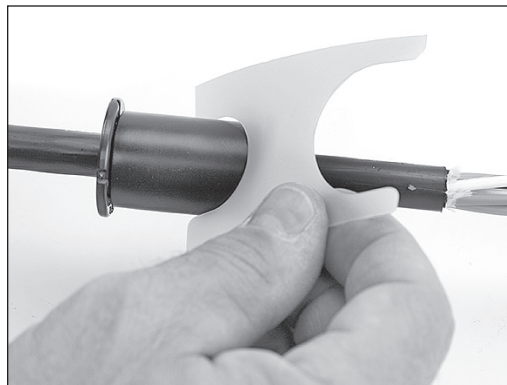


Figure 29

- 8.5 Apply a thin layer of the supplied silicone grease to the bottom side of the gasket in the port area.

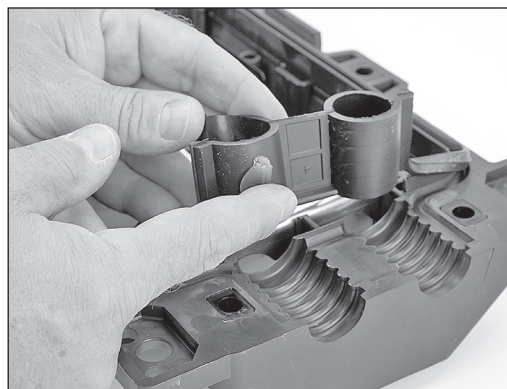


Figure 30

- 8.6 Apply silicone grease to the outside of the port area on the gasket, the area between the ports, and to the top of the gasket along the sides of the closure.

**Note:** Carefully follow health, safety and environmental instructions as given on Material Safety Data Sheet for the silicone grease.

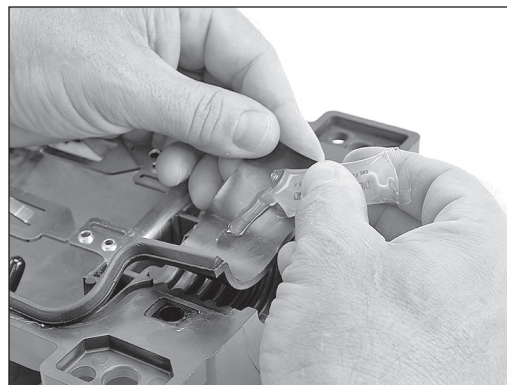


Figure 31



- 8.7 Apply silicone grease to the split or cut edge of the gasket.

**Note:** *Reinstall bracket with assembled cables using set screws.*

**Note:** *Carefully follow health, safety and environmental instructions as given on Material Safety Data Sheet for the silicone grease.*

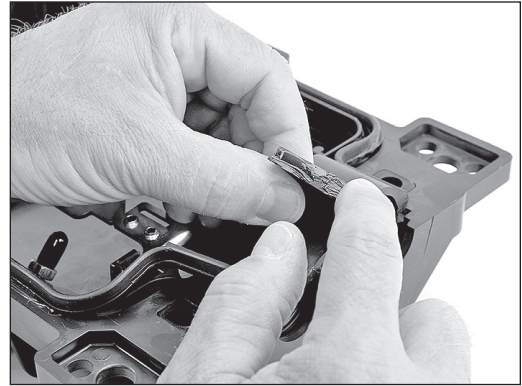


Figure 32

- 8.8 Apply the silicone grease to the tape collar between the washers and to the outside of the sealing plugs, if any.

Plugs should be placed inside gasket at the unused entry ports.

**Note:** *The grease allows the cables and gasket to slide into place and helps seal the cable port area.*

**Note:** *Carefully follow health, safety and environmental instructions as given on Material Safety Data Sheet for the silicone grease.*

- 8.9 Place cables inside the port area on the gasket. Ensure that the rubber tape seals are inside the gasket ports.

The two washers should be placed in the port grooves on the closure with one washer on each side of the gasket.

**Note:** *Be sure that both washers are perpendicular (90°) to cable.*

- 8.10 Apply a thin coat of the grease to the top of the gasket around the entire closure perimeter.

- 8.11 Install back cover clips with cable ties (not provided) until snug.

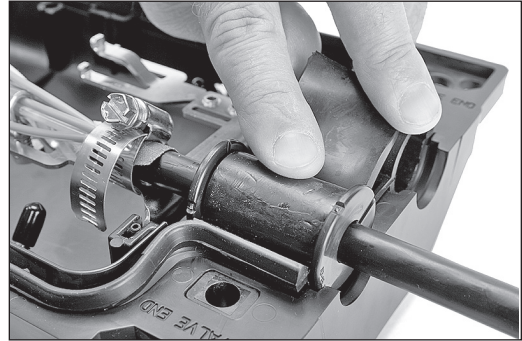


Figure 33

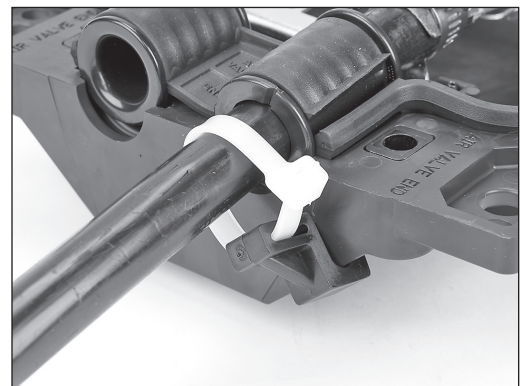


Figure 34

## 9.0 Buffer Tube/Fiber Management

- 9.1 Gather all buffer tubes from “Feeder Cable” and install one green cable tie. Install one blue cable tie on the “Distribution Cable” buffer tubes. Install two blue cable ties on “Branch Cable” buffer tubes.
- 9.2 Coil buffer tube bundles inside closure base per company standard.
- 9.3 For ribbon transition to tray applications, secure the transition tube to the bracket mounted in the base as shown.

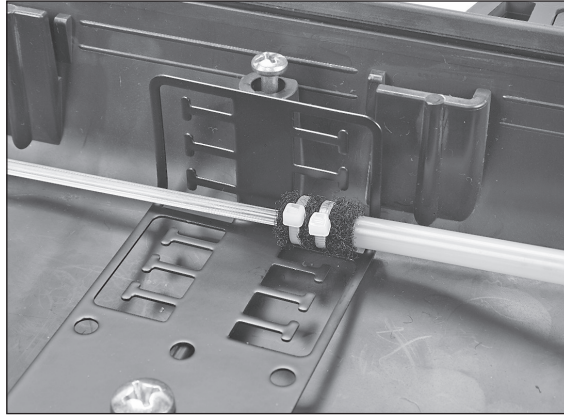


Figure 35

- 9.4 Install tray support into slots on the closure base, slide into place, and tighten screws until snug.
- 9.5 Install splice trays and splices per company standard and installation instructions.

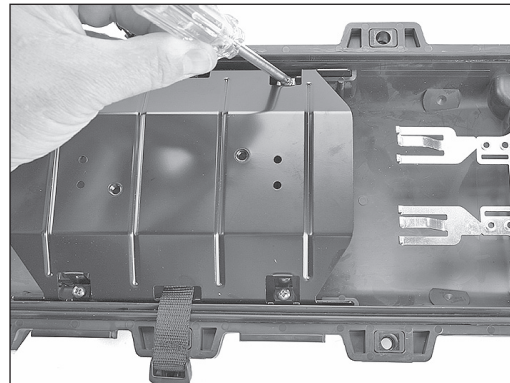


Figure 36

- 9.6 When the tray support and tray are in place, mount the other end of the transition tube to the tray. Ensure buffers or transition tubes keep the largest possible bend radius when routed in the closure.

**Note:** 3M™ Fiber Optic Splice Tray 2543 shown for illustration purposes. Refer to individual tray instructions for more information.

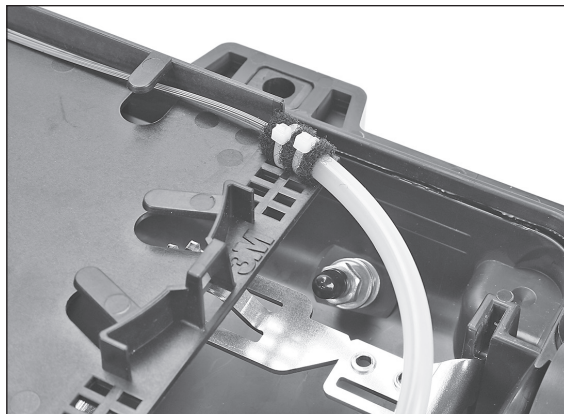


Figure 37

## 10.0 Splice Closure Assembly

- 10.1 Before placing the closure cover on either the closure base or the 3M™ Cable Addition Kit 2181-LS or 2181-LS/FR (top adapter), ensure that the air valve matches up with “**AIR VALVE END**” note on the base or top adapter.
- 10.2 Screw all bolts until they have been threaded several complete turns into threaded inserts.

**Note:** *If 3M™ Universal Aerial Hanger Bracket 2183 or 2197 is to be used, follow its practice prior to splice closure assembly.*

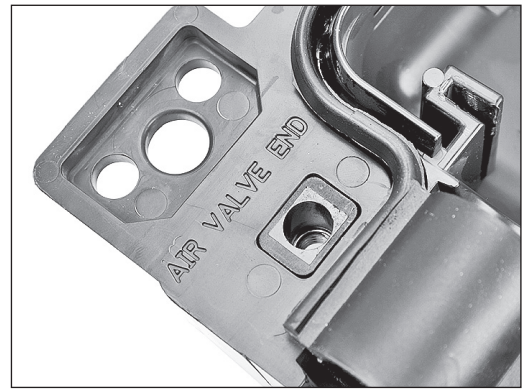


Figure 38

- 10.3 Hand-tighten ten bolts in sequence shown.

**Note:** *See numbers on splice closure.*

Final tightening should be done with a torque wrench in sequence to 240 in/lbs. (27.12 N•m) torque. **Closure leakage may occur if procedure is not followed.**

- 10.4 To check for leaks, flash test the splice closure by applying air to 10 psi (0.67 bar) **MAXIMUM, THEN RELEASE PRESSURE.**

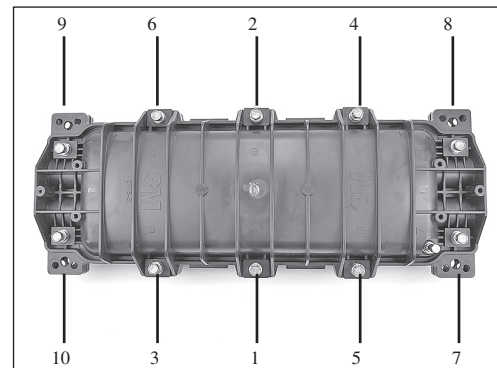


Figure 39

**Note:** *Use only clean, dry air or nitrogen from your company-approved source.*

**Note:** *Use only E-pressure testing solution or diluted dish washing soap for flash testing.*

## 3M™ Fiber Optic Splice Closure 2178-L/S Series Notes

**Note:** *Information on accessories available for the 2178-L/S and FR Series closures can be found in the back of this instruction document.*

**Note:** *If wall mount bracket is required for the 3M™ Fiber Optic Splice Closure 2178-S, 2178-S/FR, 2178-LS or 2178-LS/FR use the 3M™ Mounting Bracket Kit 2198. Attach brackets to base (as shown) prior to cable preparation.*

**Tighten bracket screws securely.**

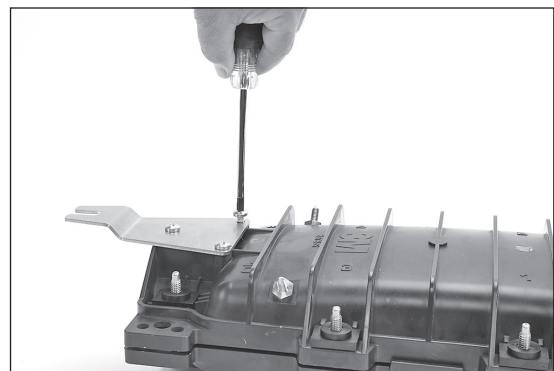


Figure 40

*Note: If wall mount bracket is required for the 3M™ Fiber Optic Splice Closure 2178-LL, 2178-LL/FR, 2178-S, 2178-S/FR, 2178-LS or 2178-LS/FR, use the 3M™ Mounting Bracket Kit 2199. Attach brackets to base (as shown) prior to cable preparation.*

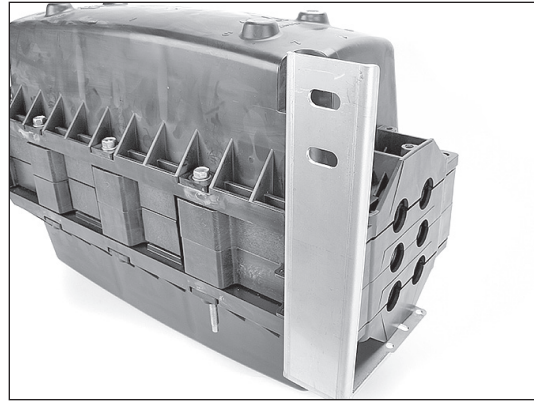


Figure 41

*Tighten bracket screws securely.*

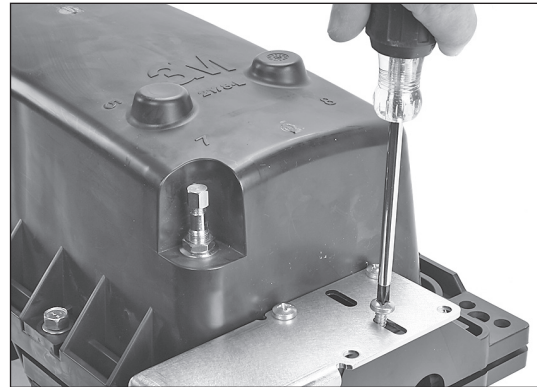


Figure 42

*Note: Proper sealing of the 3M™ Fiber Optic Splice Closure 2178-L/S and 2178-L/S-FR Series depends on strict adherence to these instructions and the use of specified materials. Deviations can cause leakage or closure damage. Maintain clean sealing surfaces to ensure proper sealing.*

## 11.0 Splice Closure Reentry

- 11.1 Remove the ten bolts holding the splice closure halves together. The cover can easily be separated from the base by hand.
- 11.2 When resealing the closure, reapply silicone grease to the gasket.
- 11.3 Follow steps 10.3–10.4 to reseal closure.

## 12.0 3M™ Cable Addition Kit 2181-LS and 2181-LS/FR Installation

- 12.1 Installation procedures for the 2181-LS cable addition kit are the same as the 2178-L/S series splice closures with the following exceptions:

For **SINGLE** cable addition kit installation, replace all ten bolts inserted in the closure cover with the ten bolts supplied with the 2181-LS or 2181-LS/FR cable addition kit.

For **DOUBLE** cable addition kit installation, replace all ten bolts inserted in the closure cover with the ten longer bolts supplied with the **3M™ Double Adapter Bolt Kit 2181-B**.

For **TRIPLE** cable addition kit installation, replace all ten bolts inserted in the closure cover with the ten longer bolts supplied with the **3M™ Triple Adapter Bolt Kit 2181-C**.

*Note: The 2181-B and the 2181-C kits contain only the longer bolts. These are needed for two and three cable addition kits respectively.*

12.2 The tray support can be installed in the closure base or any of the cable addition kits. Install the tray support onto the desired level by placing it into the slots on closure base or adapter, and tightening the screws until snug.

12.3 **The following steps are for all adapters installed:**

a. To prevent buffer tubes and fibers from being damaged or pinched between adapters and the closure, the adapters must be pulled down into place before the closure cover is installed.

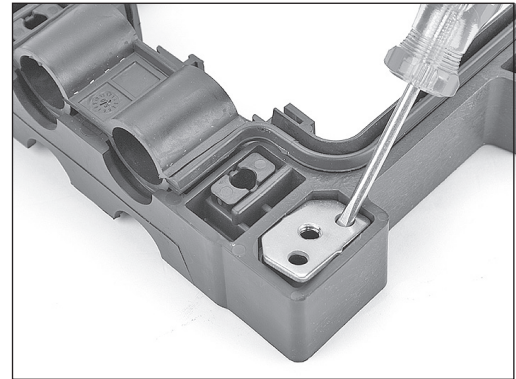


Figure 43

b. Add buffer tube retention into each adapter being installed.

c. For double and triple applications, remove all corner inserts on the lower level adapter(s). A screwdriver can be used to take out the corner inserts.



Figure 44

d. The threaded inserts should be in the four corners on the top portion of the top adapter only.

e. Prior to placing an adapter on the closure base, ensure that the note “**AIR VALVE END**” on the adapter is aligned with the “**AIR VALVE END**” note on the gaskets and the closure base.

f. If placing one adapter on another adapter, make certain the note “**AIR VALVE END**” lines up for all adapters, gasket and the closure base.

g. Set adapter, with the word “**BOTTOM**” facing down, on top of the closure.

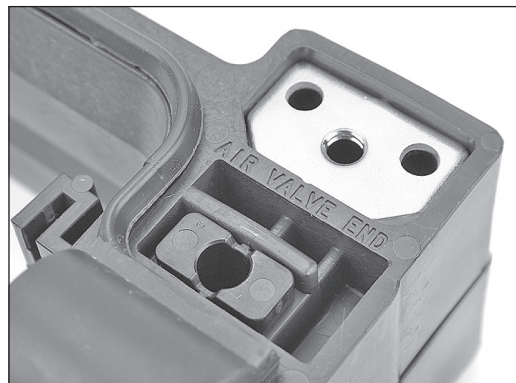


Figure 45

**Note:** *It is important to orient the gaskets correctly on each level of the assembly (see Section 6.2 and 6.3).*

h. Continue assembly for each level, following the instructions from Section 4.0 to 8.0.

- i. After cables have been installed on the lower levels and top adapter is in place, insert the bolts from underneath into the four corner inserts. Screw the four bolts until they have been threaded several complete turns into the corner inserts.

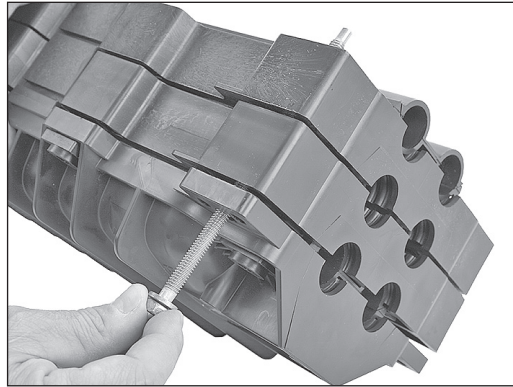


Figure 46

- j. Slowly bring adapters down by working from corner to corner (as shown) until snug. Ensure no buffer tubes have been pinched between the adapters and the closure base.

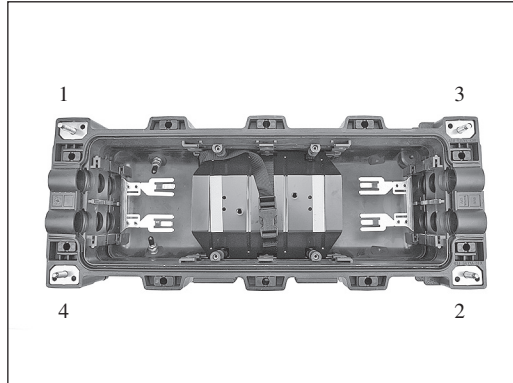


Figure 47

- 12.4 After assembly is complete, follow the instructions in 9.0 except only tighten bolts 1 to 6 in the sequence shown. After cover has been installed with six bolts, remove the four corner bolts. Use these four bolts for the remaining cover bolts, using the sequence shown. Final tightening should be done with a hand wrench to 240 in.-lbs. (27.12 N•m) torque. **Torque -FR Closures to 50 in.-lbs. (5.6 N•m). Closure leakage may occur if procedure is not followed.**

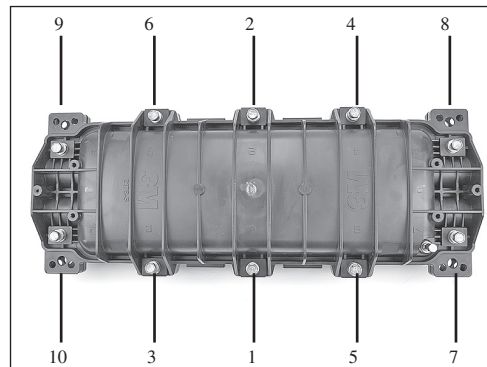


Figure 48

To check for leaks, flash test splice closure by applying air to 10 psi (0.67 bar) **MAXIMUM**, **THEN RELEASE PRESSURE.**

*Note: Use only clean, dry air or nitrogen from your company-approved source.*

*Note: Use only E-pressure testing solution or diluted dish washing soap for flash testing.*

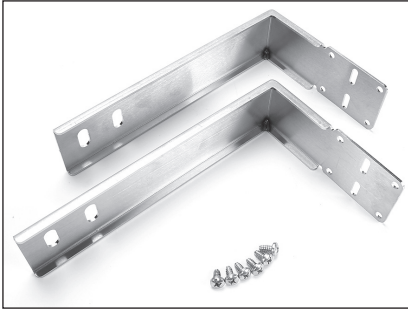
## 13.0 3M™ Fiber Optic Splice Closure Re-entry with Adapters

- 13.1 Remove bolts 7, 8, 9 and 10. Install these four bolts from underneath into the four corner inserts. Tighten until snug. Remove remaining bolts. The cover can then be easily removed by hand. This procedure will keep the adapters in place while the cover is removed.

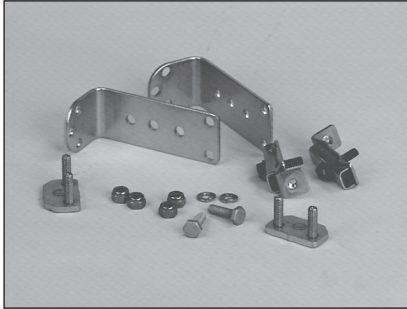
# 14.0 Closure Accessories



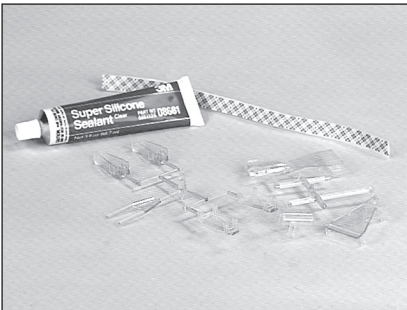
**3M™ Ground Isolation Kit 2178-EGI-External**



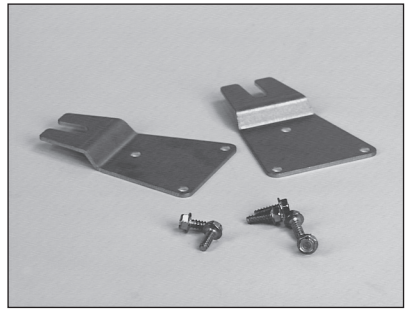
**3M™ Wall Mount Bracket 2199**



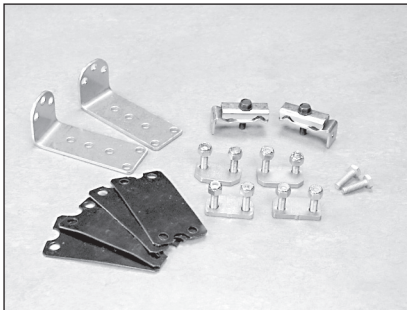
**3M™ Aerial Hanger Kit 2183**



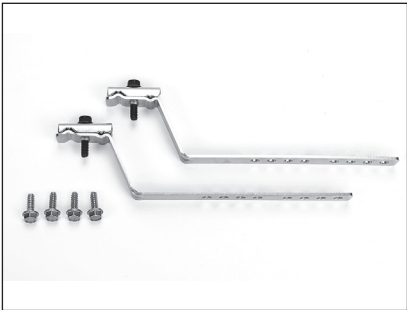
**3M™ Cable Fanout Kit 2519 and 2519-X**



**3M™ Mounting Bracket Kit 2198**



**3M™ Aerial Hanger/Hinge Kit 2197**



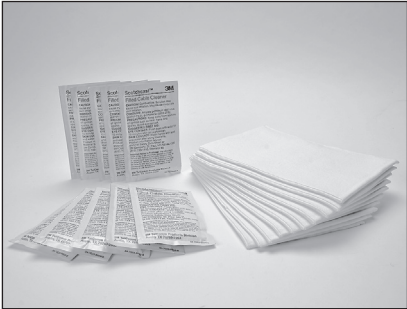
**3M™ Adjustable Aerial Hanger Bracket Kit 2184**



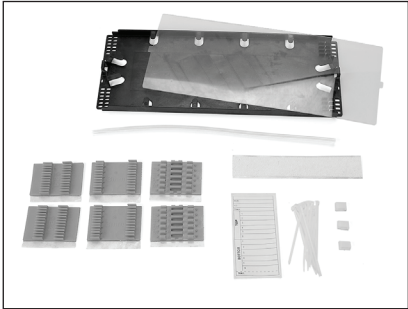
**3M™ 1.0" O.D. Multiport Grommet 2178-4PGA**



**3M™ Gasket Kit 2178-LS/GSKT**



**3M™ Cable Cleaner 4415**



**3M™ Fiber Optic Splice Tray 2543**



**3M™ Scotchlok™ Shield Bond Connector 4460-D**

3M, Fibrlok, Dual Lock and Scotchlok are trademarks of 3M Company. Scotch is a registered trademark of 3M Company.

#### **Important Notice**

All statements, technical information, and recommendations related to 3M's products are based on information believed to be reliable, but the accuracy or completeness is not guaranteed. Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use. Any statements related to the product which are not contained in 3M's current publications, or any contrary statements contained on your purchase order shall have no force or effect unless expressly agreed upon, in writing, by an authorized officer of 3M.

#### **Warranty; Limited Remedy; Limited Liability.**

This product will be free from defects in material and manufacture for a period of one (1) year from the time of purchase. **3M MAKES NO OTHER WARRANTIES INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.** If this product is defective within the warranty period stated above, your exclusive remedy shall be, at 3M's option, to replace or repair the 3M product or refund the purchase price of the 3M product. **Except where prohibited by law, 3M will not be liable for any indirect, special, incidental or consequential loss or damage arising from this 3M product, regardless of the legal theory asserted.**



#### **Communication Markets Division**

6801 River Place Blvd.  
Austin, TX 78726-9000  
1-800-462-8688

[www.3MTelecommunications.com](http://www.3MTelecommunications.com)

Please Recycle. Printed in USA.  
© 3M 2010. All Rights Reserved.  
78-8130-1910-2-G