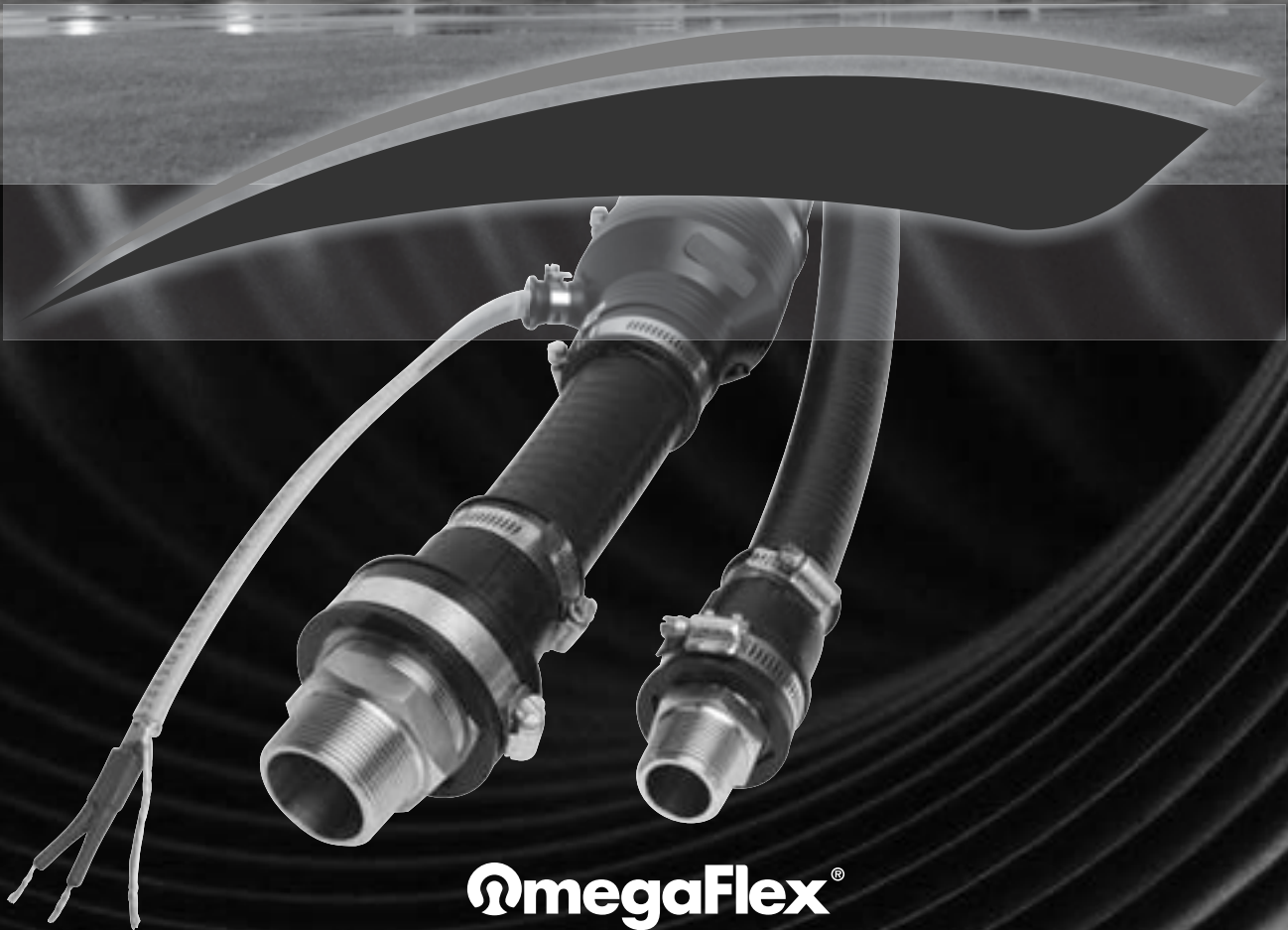


DEF-Trac[®]

Design and Installation Guide

August 2015



megaFlex[®]

DEF-Trac®

Featuring a Flexible Corrugated Stainless Steel Core



OmegaFlex®

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1. USER WARNINGS

The OmegaFlex® DEF-Trac® flexible piping system must only be installed or serviced by a qualified installer who has been trained by an Omega Flex authorized trainer. The use of nontrained personnel or any deviations from these instructions could result in damage to or leakage of the system.

▲ WARNING!

LEAKAGE OF FLUID FROM THE DEF-TRAC® SYSTEM COULD CAUSE CONTAMINATION OF THE GROUND AND/OR GROUND WATER, AND POSSIBLY CAUSE BODILY INJURY. THESE INSTALLATION INSTRUCTIONS AND ALL APPLICABLE CODES AND REGULATIONS MUST BE STRICTLY FOLLOWED.

This document provides the user with general instructions for the design and installation of piping systems using DEF-Trac® flexible piping. Sound engineering principles and compliance with applicable codes and regulations must be exercised for the proper design and installation of the DEF-Trac® flexible piping of fuel gas piping systems. The installation instructions and procedures contained in this Design Guide must be strictly followed in order to provide a safe and effective flexible piping system or system modification.

This information deals primarily with DEF-Trac® flexible piping. Other components may have their own individual installation instructions provided by the equipment manufacturer. The installation instructions provided by all component manufacturers must be followed for the piping system to operate safely as designed.

At the completion of work this installation information must be given to the site operator or owner.

1.1 DEF-TRAC® FLEXIBLE PIPING SYSTEM

DEF-Trac® flexible piping addresses the emerging needs of the DEF supply industry. Unaffected by corrosive effects of DEF, DEF-Trac® is manufactured from corrugated 316L stainless steel, and is supplied in long coils to streamline the installation of the distribution piping from the storage tank to the dispensing pumps.

2. DESIGN SPECIFICATIONS

Maximum Operating Pressure: 50 psig

Maximum Test Pressure: 75 psig

Operating Temperature Range: -20°F to +120°F

Bend Radius / OD

SIZE NOMINAL ID	PART NO.	MINIMUM BEND RADIUS (INCHES)	WT/FT (LBS)	NOMINAL OD (INCHES)
1"	DF-FSP-16	7	0.30	1.41
1½"	DF-FSP-24	12	0.50	1.93
2"	DF-FSP-32	14	0.75	2.51
1"	DF-FSPIN-16	18	1.00	2.65
1½"	DF-FSPIN-24	30	1.30	3.15
2"	DF-FSPIN-32	35	1.75	3.50
1"	DF-FSPHT-16	18	1.10	2.65
1½"	DF-FSPHT-24	30	1.40	3.15
2"	DF-FSPHT-32	35	1.85	3.50

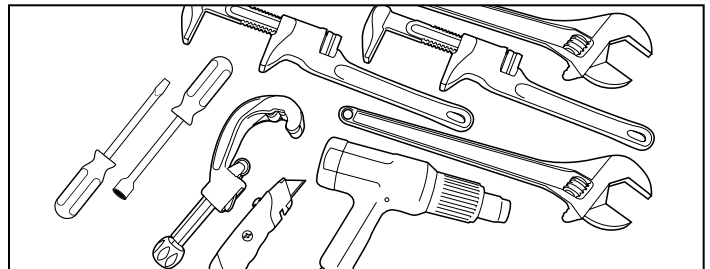
3. INSPECTION / HANDLING / STORAGE

Inspect all piping, fittings and components when they arrive at the job site. Any piping that has been cut, crushed, or otherwise subjected to physical damage during transportation or storage shall be discarded and never used. The piping and fittings shall be handled in such a manner that will not cause any unnecessary damage. Keep all components in the original packaging until ready for use. Inspect fittings prior to installation.

4. TOOLS REQUIRED FOR INSTALLATION

DEF-Trac® can be installed utilizing standard hand tools.

- Adjustable wrenches or pipe wrenches
- Utility knife
- Tubing cutter with sharp wheel
- Heat gun
- 5/16" hex nut driver or slotted screwdriver



FITTING ASSEMBLY PROCEDURE with Heat Shrink Sleeves

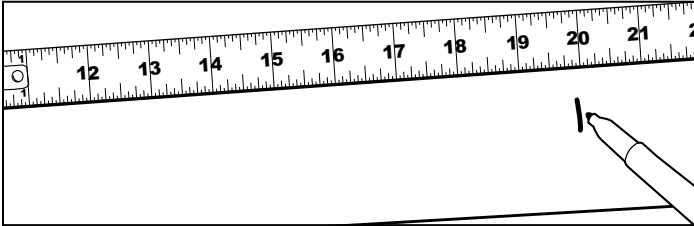
5. DEF-Trac / INSULATED – HEAT TRACED

▲ CAUTION

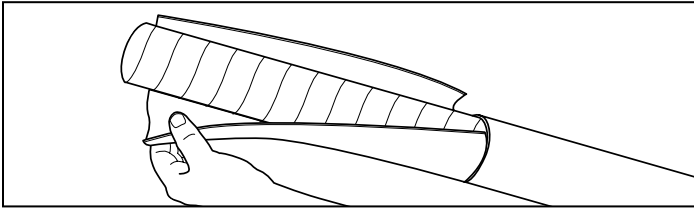
- DEF-Trac® INSULATED PIPING IS MANUFACTURED USING THERMON BSX 3-1 (1" DEF-Trac) & BSX 5-1 (1½" & 2" DEF-Trac) HEAT TRACE.
- THERMON BSX 3-1, & BSX 5-1 HEAT TRACE CAN ONLY BE POWERED USING 120VAC.
- MANDATORY GFI EPD CIRCUIT BREAKER - PER NEC ARTICLE 427-22, ALL HEAT TRACING CIRCUITS MUST HAVE GFI – EQUIPMENT PROTECTION ON THE CIRCUIT. IN THIS SYSTEM, THE HEATER CABLE MUST BE POWERED FROM AN EPD (30MA GFI TRIP) TYPE CIRCUIT BREAKER.

A. CUT TO LENGTH / REMOVE JACKET FOR FITTING ATTACHMENT

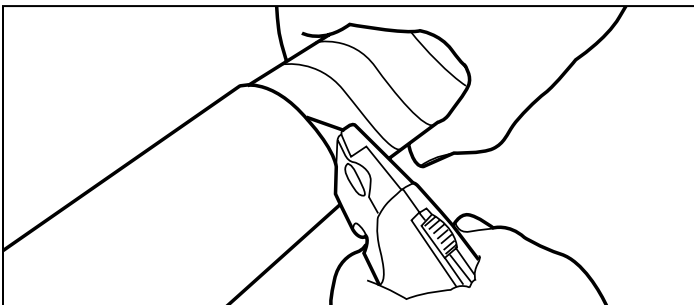
Determine the proper rough cut length, cut with a tubing cutter or reciprocating saw. After measuring and making cut for overall length, remove at a minimum of 20 inches of the outer most black jacket and insulation. More can be removed depending on installation conditions.



Cut through the black plastic layer using a utility knife and remove.



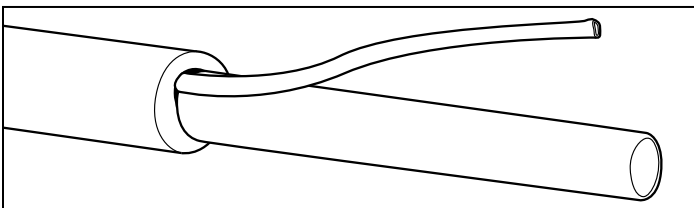
Cut through the insulation and remove. Do not remove the innermost black jacket. Use care to avoid any damage to the heat trace and corrugated piping while removing the insulation.

**▲ CAUTION**

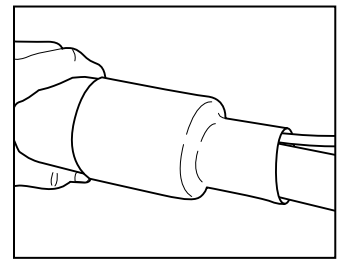
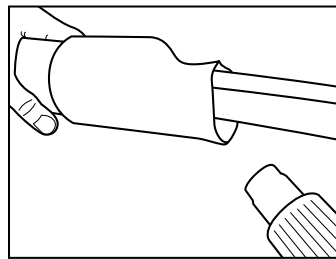
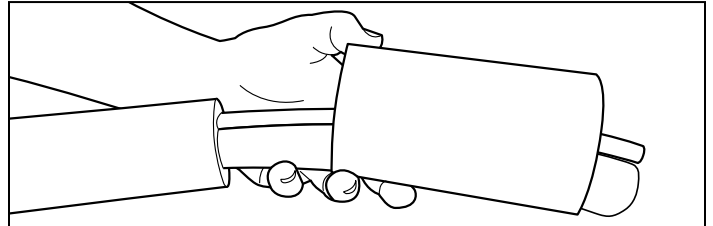
HEAT TRACE IS HELICALLY WOUND ON PIPING.

USE CARE WHEN CUTTING JACKET AND INSULATION.

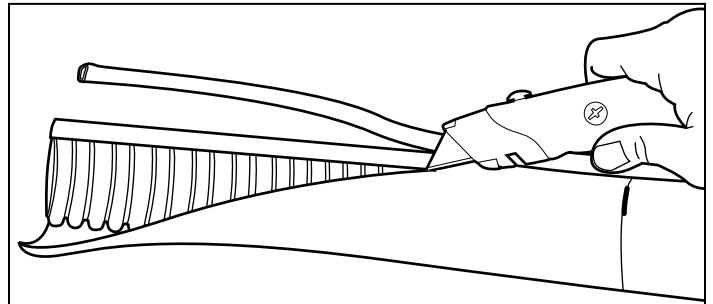
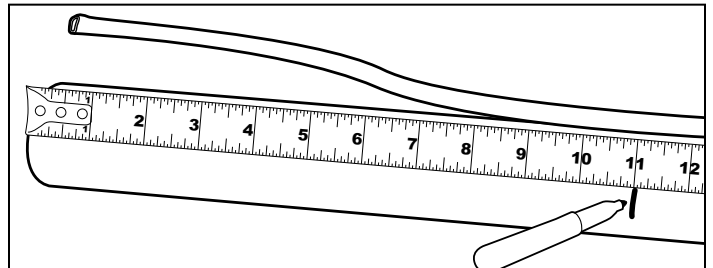
Fully stripped end.

**B. SEAL HEAT SHRINK SLEEVE (OUTER JACKET)**

Slide up the heat shrink sleeve to cover the tubing bundle. About ½ of the sleeve should be covering the tubing bundle and ½ should be on the corrugated piping. (With plastic jacket) The heat trace cable should be underneath the heat shrink sleeve. Using a heat gun, carefully shrink down the sleeve without overheating the inner jacket.

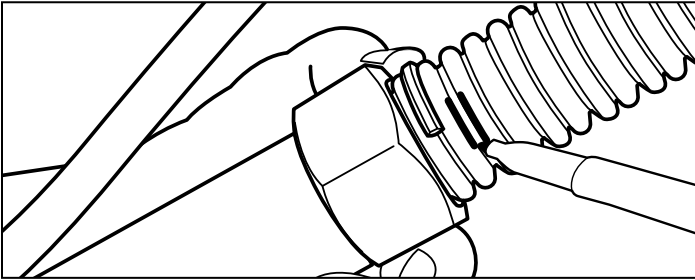
**C. PRECISION CUT**

Remove innermost black jacket leaving 11" of bare corrugated piping exposed.

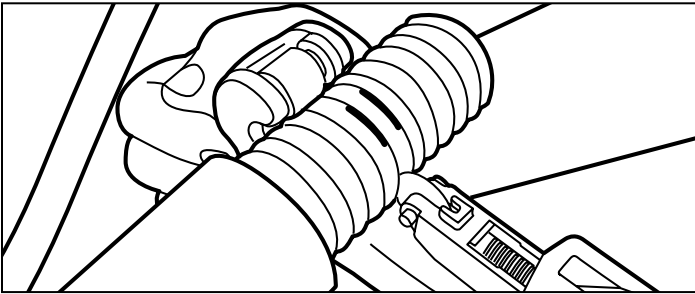


Important Information Follow All Instructions

Slide the nut over the core until it bottoms out on the black jacket. Place a mark on the top of the first two corrugations past where the split rings will sit.



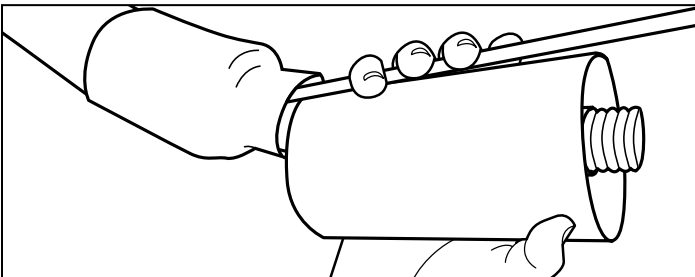
Remove the nut and cut through the corrugated piping using a tubing cutter with a sharp wheel. Cut must be centered in the valley between the two marked corrugations.



Use full circular strokes in one direction and tighten roller pressure slightly after each revolution. DO NOT over-tighten roller which may flatten tube.

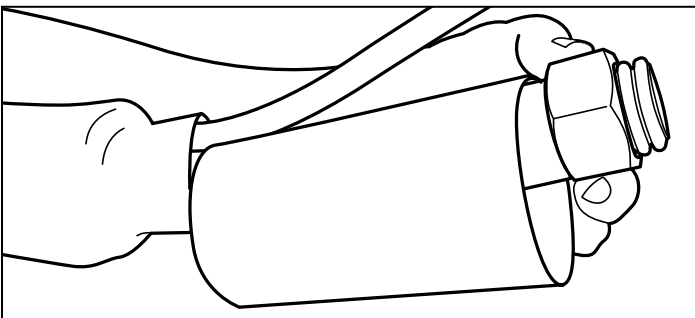
D. HEAT SHRINK SLEEVE (Inner Jacket)

Slide the inner jacket heat shrink sleeve over the corrugated piping and underneath the heat trace cable.

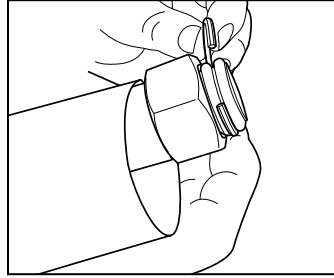


E. INSTALL FITTING NUT

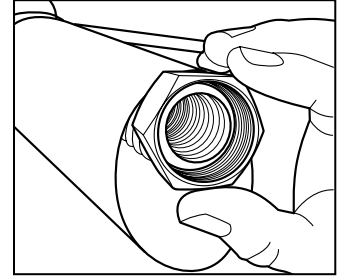
Slide nut over cut tube end.



Place two split-rings into the valley of the first corrugation.



Slide nut forward to trap the split rings.



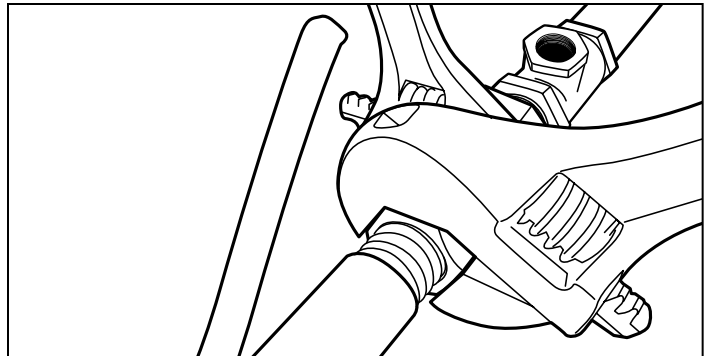
F. TIGHTEN FITTING

Thread the adapter into the mating piece of equipment (elbow, tee, valve etc.). Thread the nut into the adaptor and engage threads. Note that the fitting is designed to form a leak tight seat on the stainless tubing as you tighten the fitting. Using appropriate wrenches; tighten the fitting until the adaptor bottoms and the resistance to wrenching increases greatly. Tighten the nut and adaptor to the torque listed in Table 1.

Table 1

Size	Minimum Torque
1"	150 ft-lbs
1½"	275 ft-lbs
2"	300 ft-lbs

Note the relation between the hex flats at this point and continue to tighten for two additional hex flats (one-third turn) to obtain required torque and final leak tight seal. The flare has now been created on the tubing end creating the metal to metal seal.



SEALANTS ARE ONLY TO BE USED ON THE PIPE THREAD.

▲ CAUTION

DO NOT USE ANY THREAD SEALANTS ON THE STRAIGHT THREADS FOR THIS CONNECTION, THE GREASE ON THE SEALING SEAT IS ANTI SEIZE TO LUBRICATE WHILE TIGHTENING. IF FOR ANY REASON THE GREASE IS REMOVED, LITHIUM BASED GREASE APPLIED TO THE SEALING SURFACE WILL BE ADEQUATE.

G. TIGHTNESS TESTING

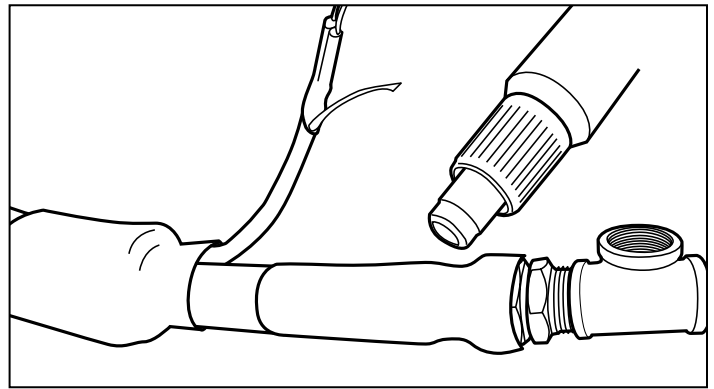
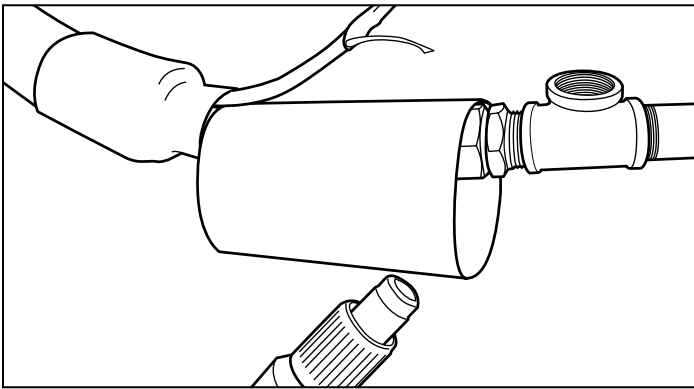
Before shrinking the heat shrink sleeve over the nut, and prior to backfilling, the piping system must be isolated from the tanks and subjected to a pipe tightness test.

For DEF-Trac® it is recommended the piping be pressurized with air to a maximum of 25 psi. Maintain this pressure for

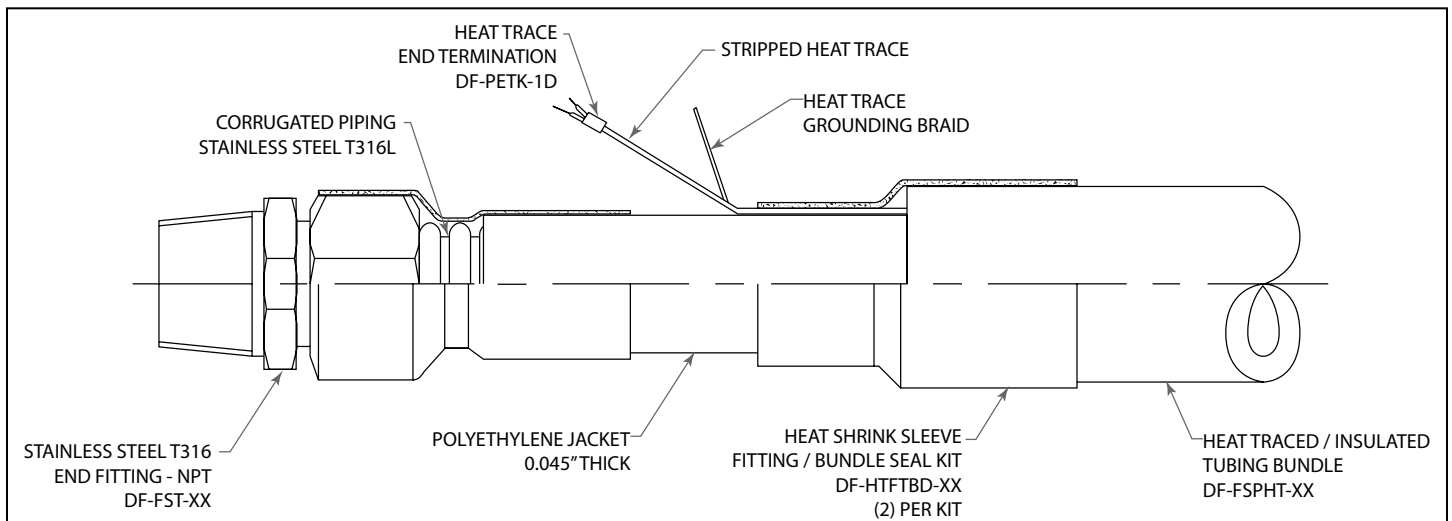
one hour ensuring there is no drop in pressure. Additionally spray fitting with a non-corrosive leak check solution and look for bubbles. Once all heat shrink sleeves (inner and outer) are completed a 75psig max pressure test can be completed if required by code.

H. SEAL HEAT SHRINK SLEEVE (INNER JACKET)

Slide up the heat shrink sleeve to fully cover the back hex nut. Using a heat gun, carefully shrink down the sleeve without overheating the inner jacket.



TYPICAL INSULATED HEAT-TRACED END CONFIGURATION



⚠ CAUTION

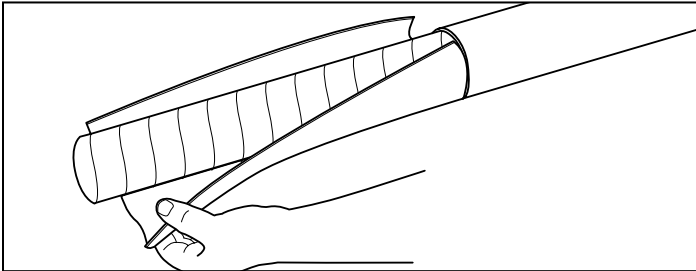
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6. DEF-Trac / INSULATED, NON-HEAT TRACED

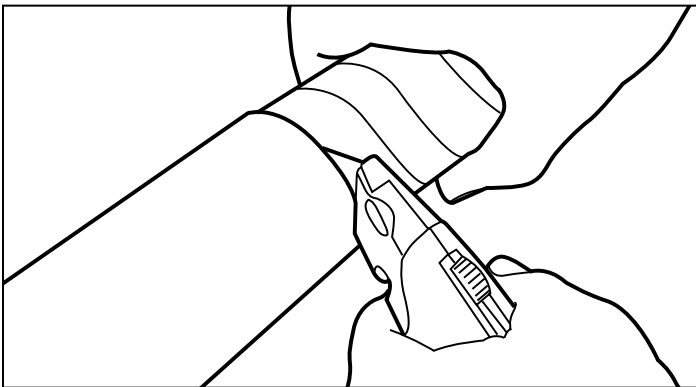
A. CUT TO LENGTH / REMOVE JACKET FOR FITTING ATTACHMENT

Determine the proper rough cut length, cut with a tubing cutter or reciprocating saw. After measuring and making cut for overall length, remove at a minimum of 14 inches of the outer most black jacket and insulation. More can be removed depending on installation conditions.

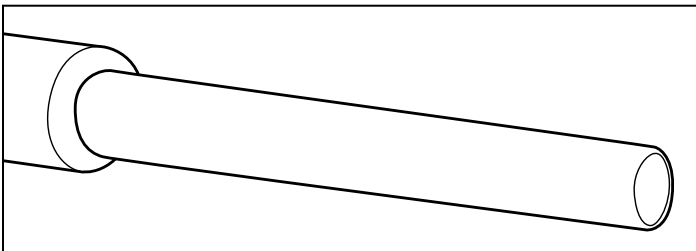
Cut through the black plastic layer using a utility knife and remove.



Cut through the insulation and remove. Do not remove the innermost black jacket. Use care to avoid any damage to the corrugated piping while removing the insulation.

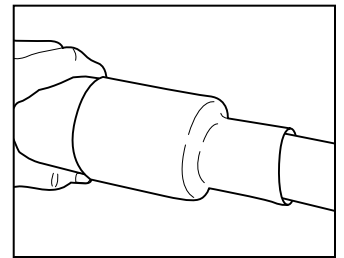
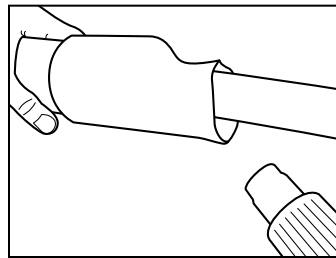
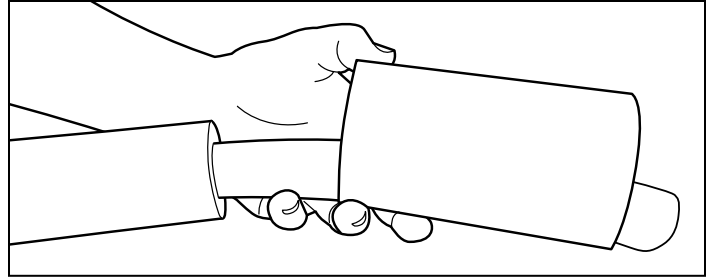


Fully stripped end.



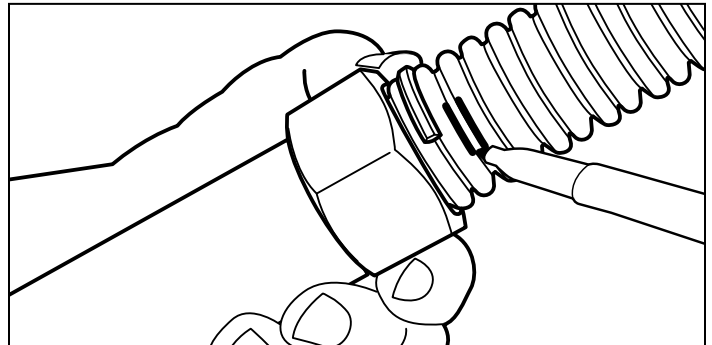
B. SEAL HEAT SHRINK SLEEVE (Outer Jacket)

Slide up the heat shrink sleeve to cover the tubing bundle. About ½ of the sleeve should be covering the tubing bundle and ½ should be on the corrugated piping (with plastic jacket). Using a heat gun, carefully shrink down the sleeve without overheating the inner jacket.

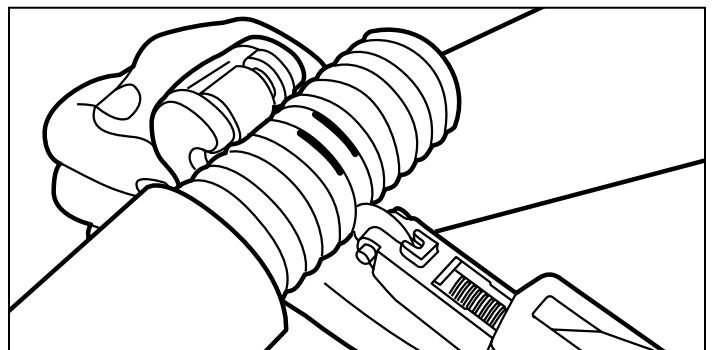


C. PRECISION CUT

Remove innermost black jacket leaving 5" of bare corrugated piping exposed. Slide the nut over the core until it bottoms out on the black jacket. Place a mark on the top of the first two corrugations past where the split rings will sit.



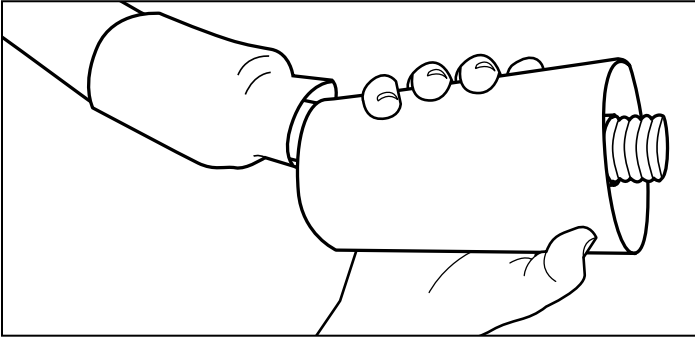
Remove the nut and cut through the corrugated piping using a tubing cutter with a sharp wheel. Cut must be centered in the valley between the two marked corrugations.



Use full circular strokes in one direction and tighten roller pressure slightly after each revolution. DO NOT over-tighten roller which may flatten tube.

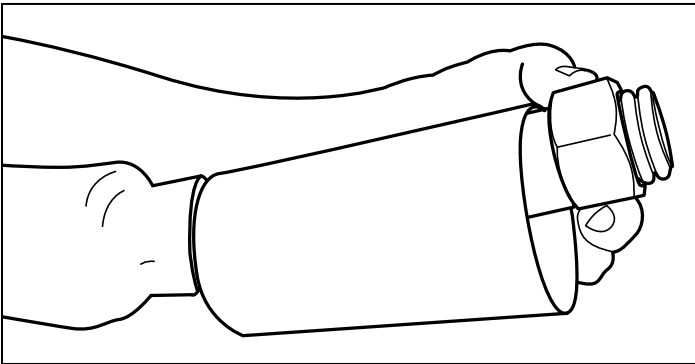
D. HEAT SHRINK SLEEVE (Inner Jacket)

Slide the inner jacket heat shrink sleeve over the corrugated piping.



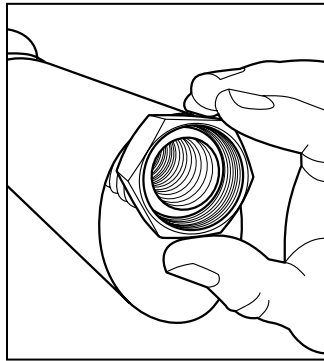
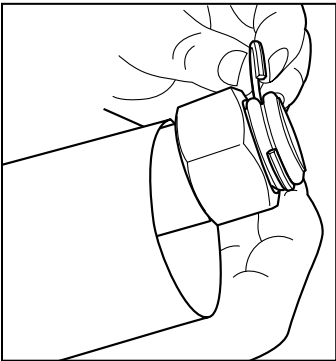
E. INSTALL FITTING NUT

Slide nut over cut tube end.



Place two split-rings into the valley of the first corrugation.

Slide nut forward to trap the split rings.



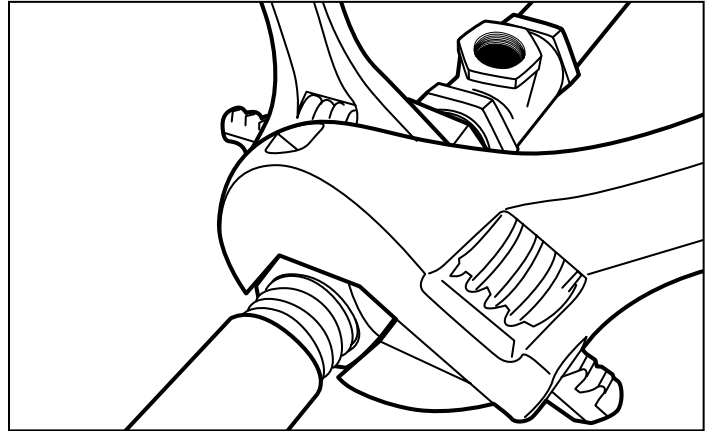
F. TIGHTEN FITTING

Thread the adapter into the mating piece of equipment (elbow, tee, valve etc.). Thread the nut into the adaptor and engage threads. Note that the fitting is designed to form a leak tight seat on the stainless tubing as you tighten the fitting. Using appropriate wrenches; tighten the fitting until the adaptor bottoms and the resistance to wrenching increases greatly. Tighten the nut and adaptor to the torque listed in Table 1.

Table 1

Size	Minimum Torque
1"	150 ft-lbs
1½"	275 ft-lbs
2"	300 ft-lbs

Note the relation between the hex flats at this point and continue to tighten for two additional hex flats (one-third turn) to obtain required torque and final leak tight seal. The flare has now been created on the tubing end creating the metal to metal seal.



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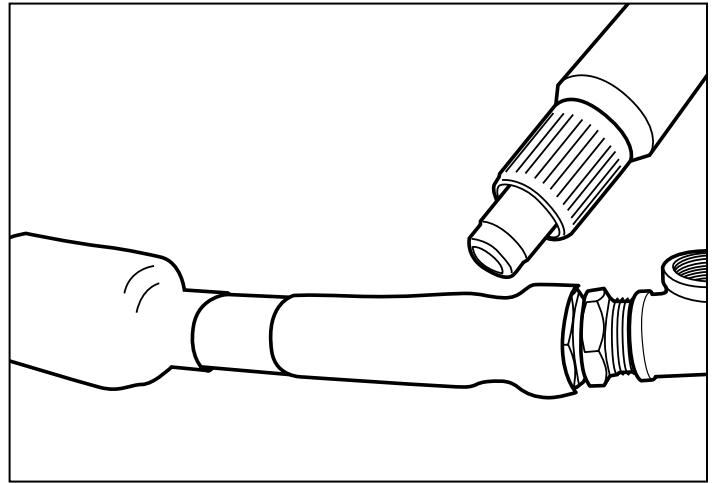
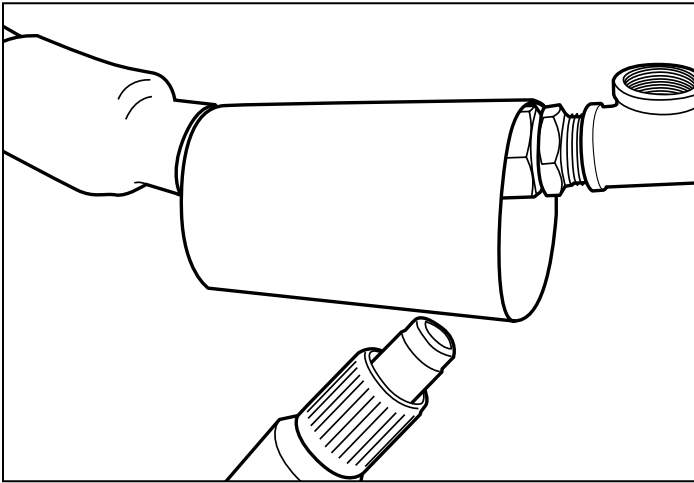
G. TIGHTNESS TESTING

Before shrinking the heat shrink sleeve over the nut, and prior to backfilling, the piping system must be isolated from the tanks and subjected to a pipe tightness test.

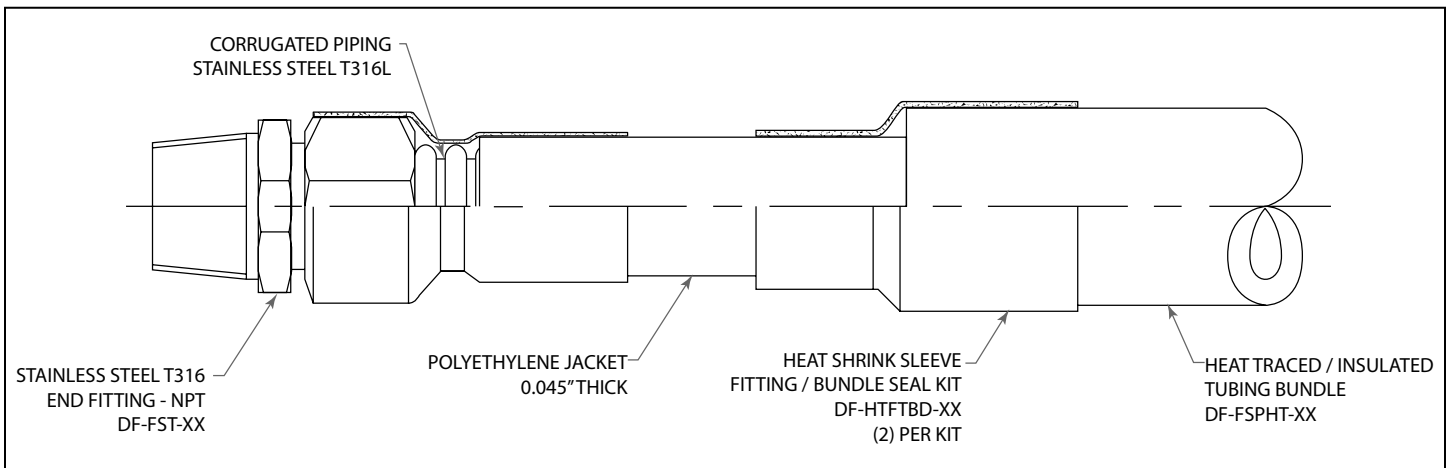
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H. SEAL HEAT SHRINK SLEEVE (Inner Jacket)

Slide up the heat shrink sleeve to fully cover the back hex nut. Using a heat gun, carefully shrink down the sleeve without overheating the inner jacket.



TYPICAL INSULATED NON-HEAT-TRACED END CONFIGURATION

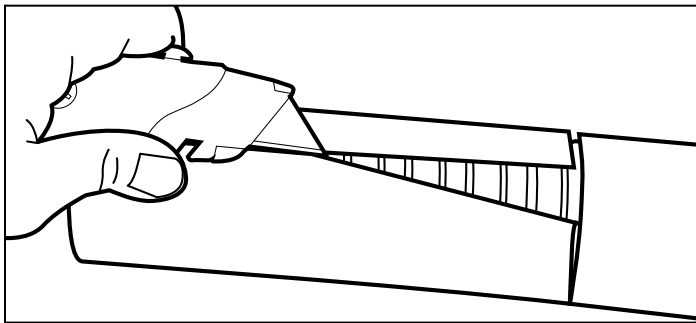
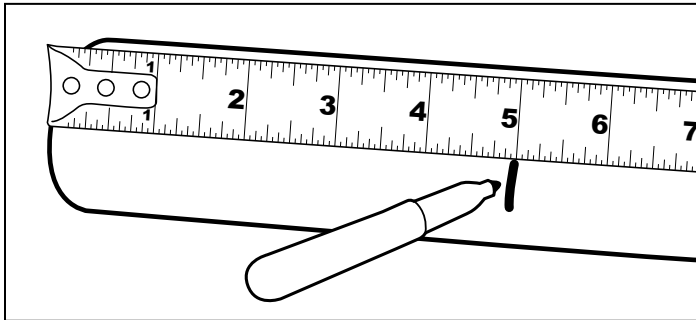


7. DEF-Trac / UN-INSULATED, NON-HEAT TRACED

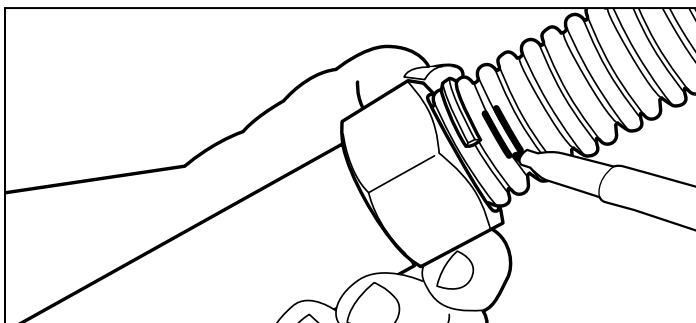
A. CUT TO LENGTH / REMOVE JACKET FOR FITTING ATTACHMENT

Determine the proper cut length, cut with a tubing cutter or reciprocating saw.

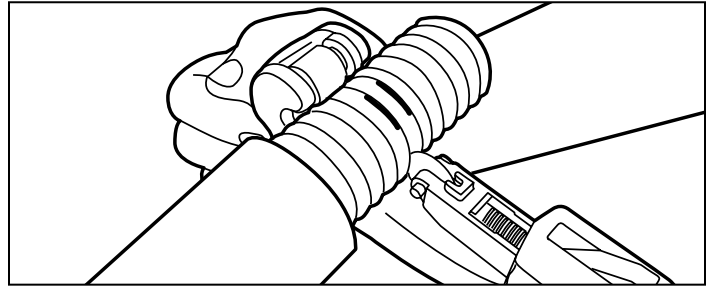
Remove the black jacket exposing 5" of bare corrugated piping.



Slide the nut over the core until it bottoms out on the black jacket. Place a mark on top of the first two corrugations past where the split rings will sit.



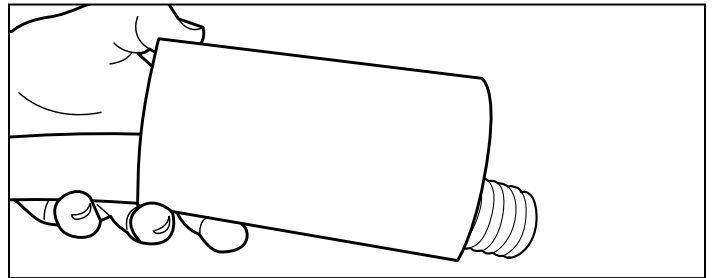
Remove the nut and cut through the corrugated piping using a tubing cutter with a sharp wheel. Cut must be centered in the valley between the two marked corrugations.



Use full circular strokes in one direction and tighten roller pressure slightly after several revolutions. DO NOT over tighten roller which may flatten tube.

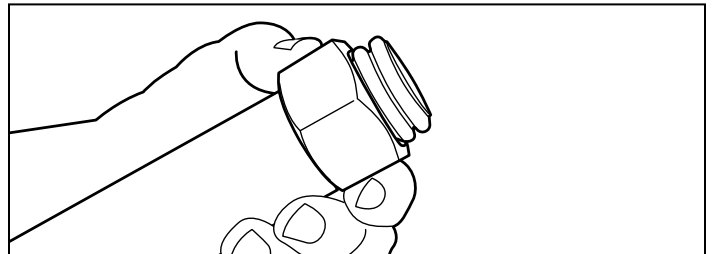
B. HEAT SHRINK SLEEVE

Slide on one heat shrink sleeve.



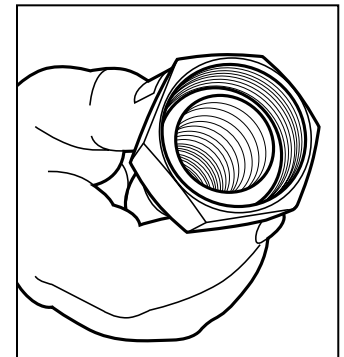
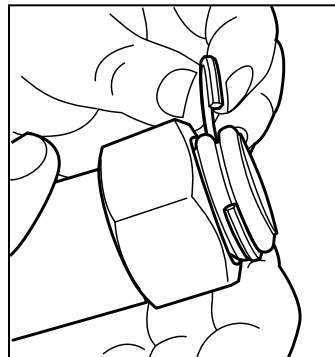
C. INSTALL FITTING NUT

Slide nut over cut tube end.



Place two split-rings into the valley of the first corrugation.

Slide nut forward to trap the split rings.



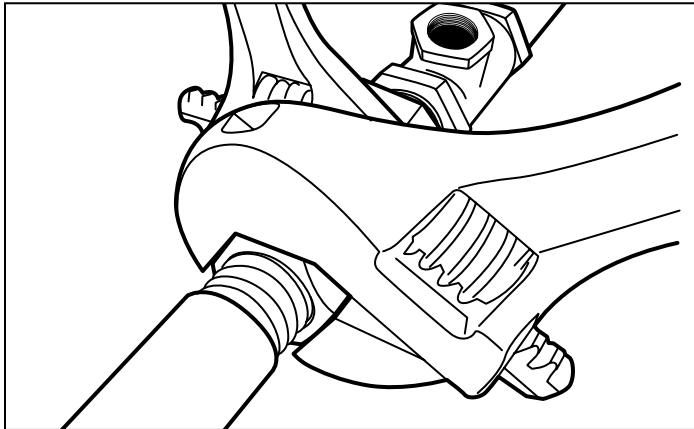
D. TIGHTEN FITTING

Thread the adapter into the mating piece of equipment (elbow, tee, valve etc.). Thread the nut into the adaptor and engage threads. Note that the fitting is designed to form a leak tight seat on the stainless tubing as you tighten the fitting. Using appropriate wrenches; tighten the fitting until the adaptor bottoms and the resistance to wrenching increases greatly. Tighten the nut and adaptor to the torque listed in Table 1.

Table 1

Size	Minimum Torque
1"	150 ft-lbs
1½"	275 ft-lbs
2"	300 ft-lbs

Note the relation between the hex flats at this point and continue to tighten for two additional hex flats (one-third turn) to obtain required torque and final leak tight seal. The flare has now been created on the tubing end creating the metal to metal seal.



SEALANTS ARE ONLY TO BE USED ON THE PIPE THREAD.

▲ CAUTION

DO NOT USE ANY THREAD SEALANTS ON THE STRAIGHT THREADS FOR THIS CONNECTION, THE GREASE ON THE SEALING SEAT IS ANTI SEIZE TO LUBRICATE WHILE TIGHTENING. IF FOR ANY REASON THE GREASE IS REMOVED, LITHIUM BASED GREASE APPLIED TO THE SEALING SURFACE WILL BE ADEQUATE.

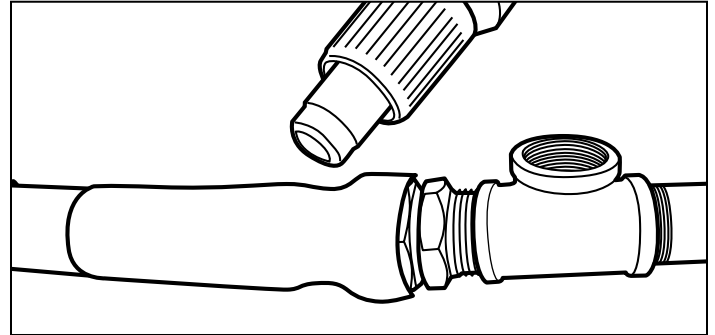
E. TIGHTNESS TESTING

Before shrinking the heat shrink sleeve over the nut, and prior to backfilling, the piping system must be isolated from the tanks and subjected to a pipe tightness test.

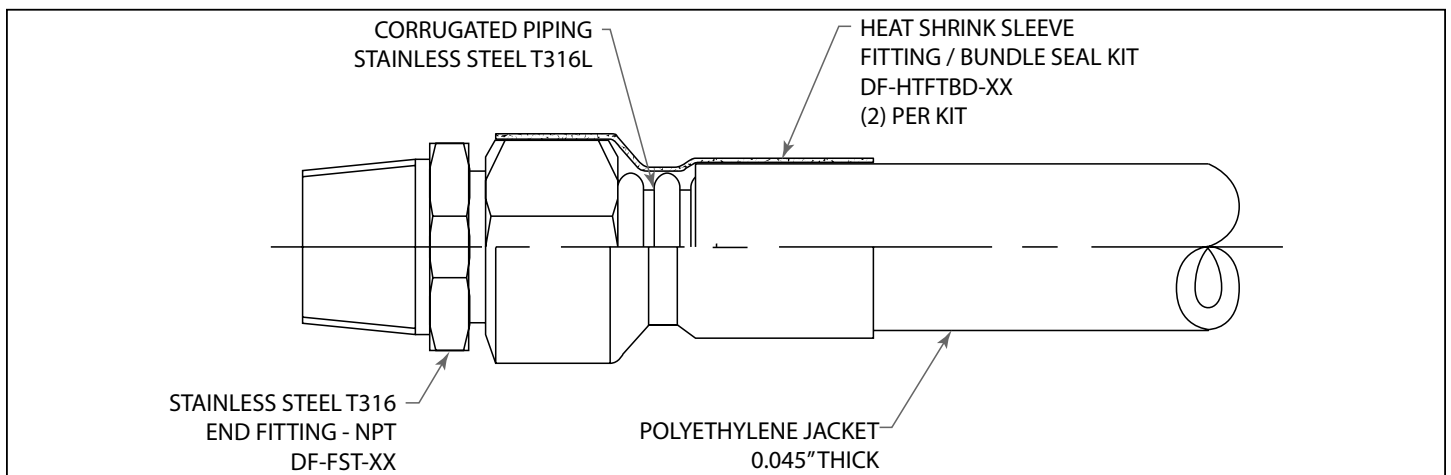
For DEF-Trac® it is recommended the piping be pressurized with air to a maximum of 25 psi. Maintain this pressure for one hour ensuring there is no drop in pressure. Additionally spray fitting with a non-corrosive leak check solution and look for bubbles. Once all heat shrink sleeves are completed a 75psig max pressure test can be completed if required by code.

F. SEAL HEAT SHRINK SLEEVE

Slide up the heat shrink sleeve to fully cover the back hex nut. Using a heat gun, carefully shrink down the sleeve without overheating the inner jacket.



TYPICAL UN-INSULATED END CONFIGURATION



FITTING ASSEMBLY PROCEDURE with Fitted Rubber Seals

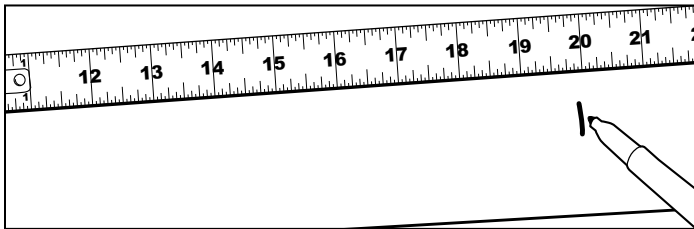
8. DEF-Trac / INSULATED – HEAT TRACED

▲ CAUTION

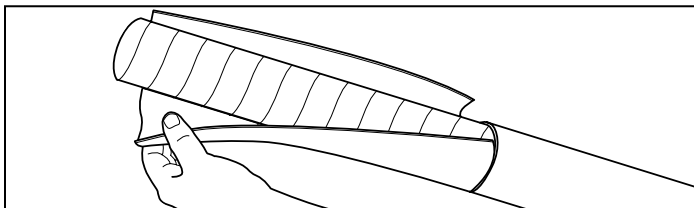
- DEF-Trac® INSULATED PIPING IS MANUFACTURED USING THERMON BSX 3-1 (1" DEF-Trac) & BSX 5-1 (1½" & 2" DEF-Trac) HEAT TRACE.
- THERMON BSX 3-1, & BSX 5-1 HEAT TRACE CAN ONLY BE POWERED USING 120VAC.
- MANDATORY GFI EPD CIRCUIT BREAKER - PER NEC ARTICLE 427-22, ALL HEAT TRACING CIRCUITS MUST HAVE GFI – EQUIPMENT PROTECTION ON THE CIRCUIT. IN THIS SYSTEM, THE HEATER CABLE MUST BE POWERED FROM AN EPD (30MA GFI TRIP) TYPE CIRCUIT BREAKER.

A. CUT TO LENGTH / REMOVE JACKET FOR FITTING ATTACHMENT

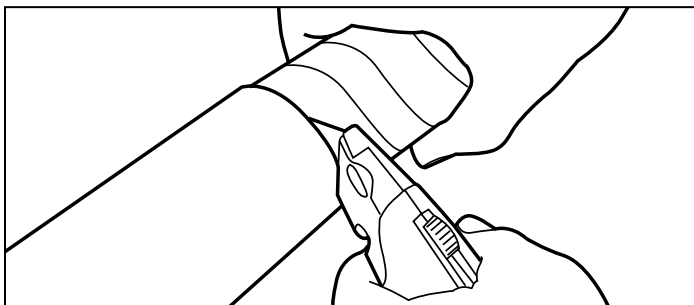
Determine the proper rough cut length, cut with a tubing cutter or reciprocating saw. After measuring and making cut for overall length, remove at a minimum of 20 inches of the outer most black jacket and insulation. More can be removed depending on installation conditions.



Cut through the black plastic layer using a utility knife and remove.

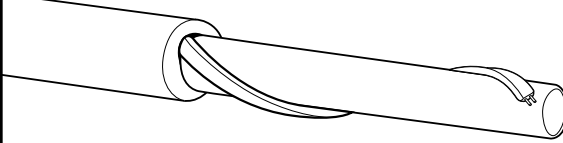


Cut through the insulation and remove. Do not remove the innermost black jacket. Use care to avoid any damage to the heat trace and corrugated piping while removing the insulation.



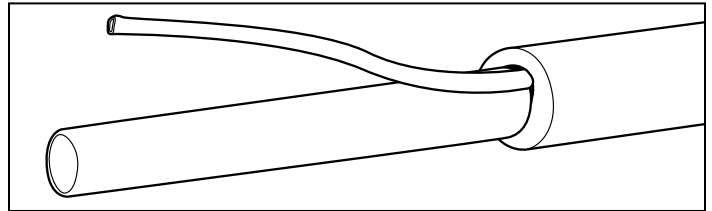
▲ CAUTION

HEAT TRACE IS HELICALLY WOUND ON PIPING.



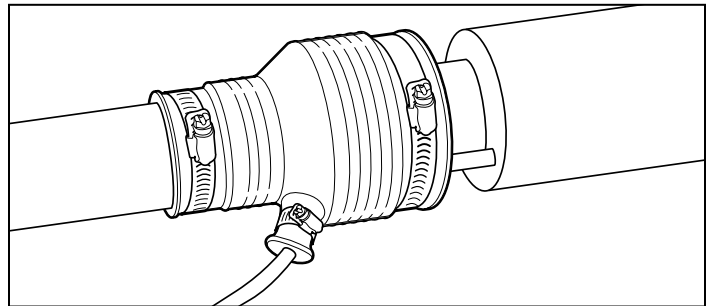
USE CARE WHEN CUTTING JACKET AND INSULATION.

Fully stripped end.

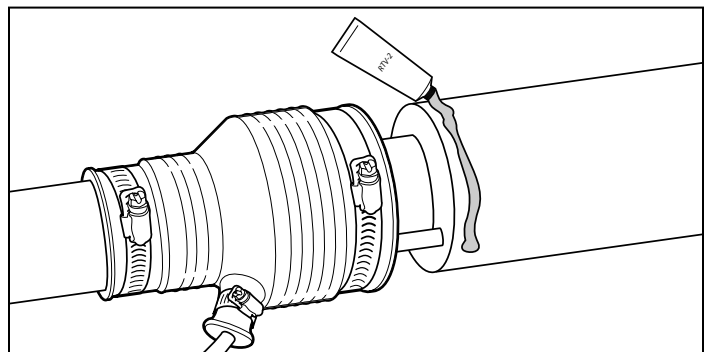


B. OUTER JACKET RUBBER SEAL

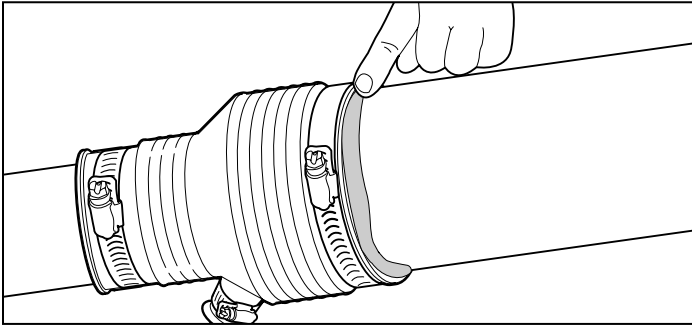
Slide the outer jacket rubber seal to cover tubing bundle. Guide the heat trace cable through the heat trace rubber port. Ensure heat trace does not kink, bind, or fold over while pulling through heat trace rubber port.



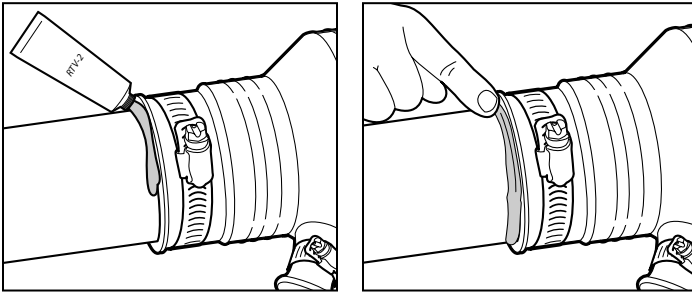
Apply ample amount of RTV sealant to outer jacket tubing bundle.



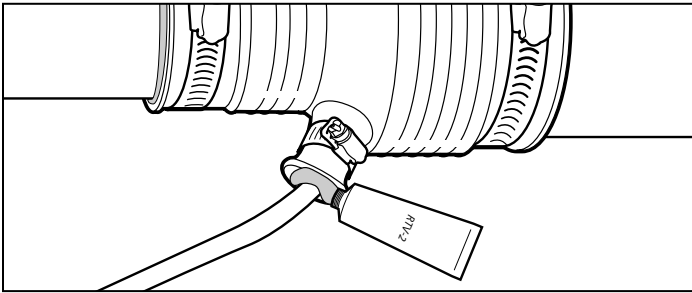
Slide outer jacket rubber seal onto tubing bundle until it bottoms out and tighten band clamps. The excess RTV sealant can be smoothed using your finger.



Apply a bead of RTV sealant on the front side of the outer jacket rubber seal. Smooth RTV using your finger.

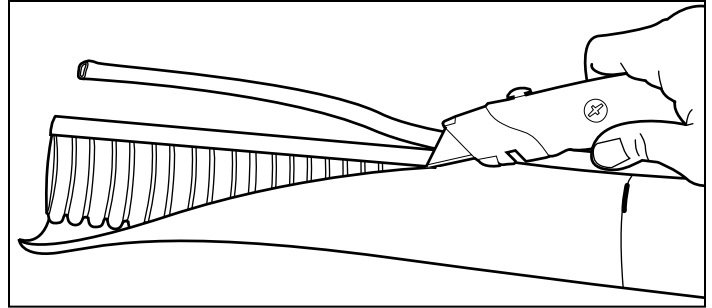
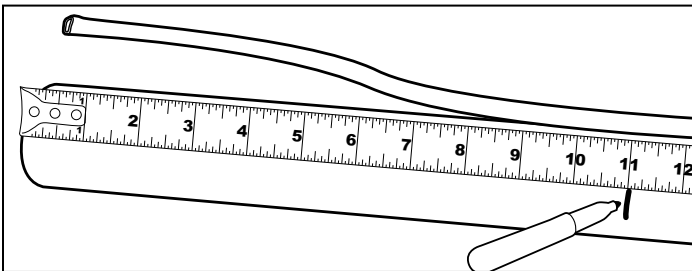


Apply RTV sealant around heat trace cable and smooth excess RTV using your finger.

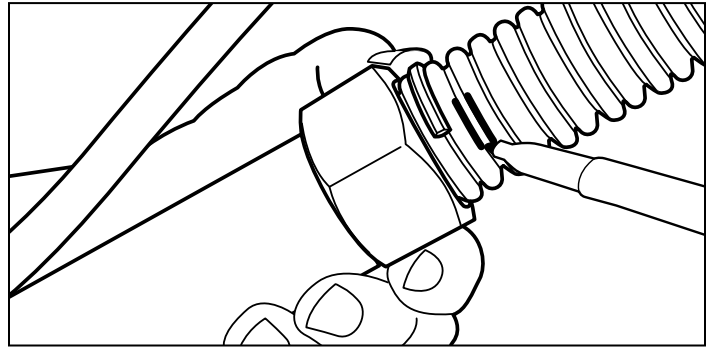


C. PRECISION CUT

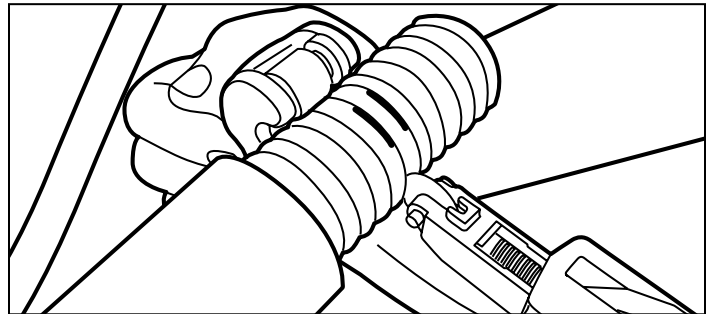
Remove innermost black jacket leaving 11" of bare corrugated piping exposed.



Slide the nut over the core until it bottoms out on the black jacket. Place a mark on the top of the first two corrugations past where the split rings will sit.



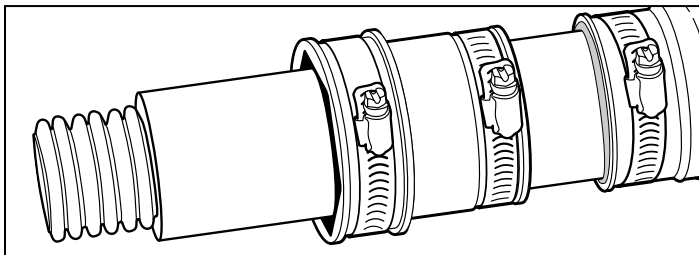
Remove the nut and cut through the corrugated piping using a tubing cutter with a sharp wheel. Cut must be centered in the valley between the two marked corrugations.



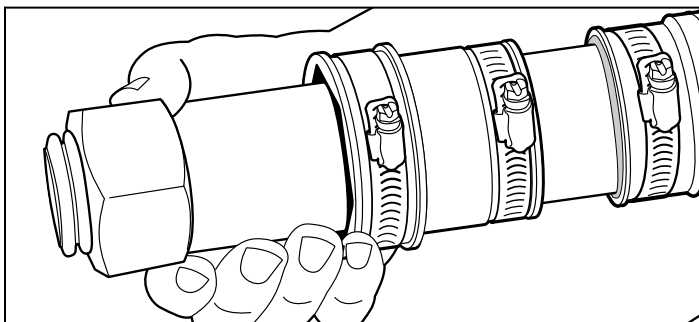
Use full circular strokes in one direction and tighten roller pressure slightly after each revolution. DO NOT over-tighten roller which may flatten tube.

D. INSTALL FITTING NUT

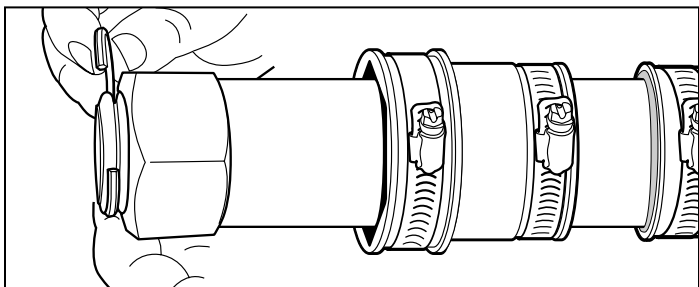
Slide hex rubber seal onto pipe.



Place hex nut onto pipe.



Place two split-rings into the valley of the first corrugation.



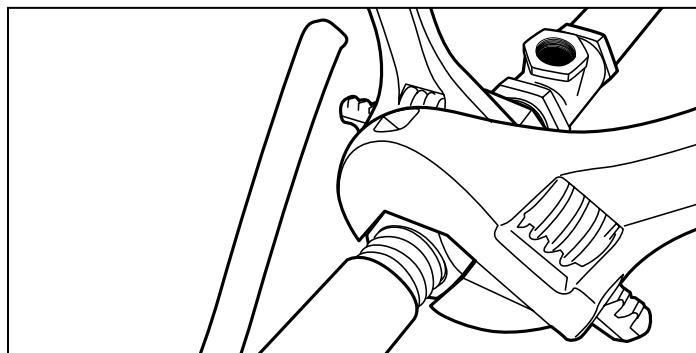
E. TIGHTEN FITTING

Thread the adapter into the mating piece of equipment (elbow, tee, valve etc.). Thread the nut into the adapter and engage threads. Note that the fitting is designed to form a leak tight seat on the stainless tubing as you tighten the fitting. Using appropriate wrenches; tighten the fitting until the adapter bottoms and the resistance to wrenching increases greatly. Tighten the nut and adapter to the torque listed in Table 1.

Table 1

Size	Minimum Torque
1"	150 ft-lbs
1½"	275 ft-lbs
2"	300 ft-lbs

Note the relation between the hex flats at this point and continue to tighten for two additional hex flats (one-third turn) to obtain required torque and final leak tight seal. The flare has now been created on the tubing end creating the metal to metal seal.



SEALANTS ARE ONLY TO BE USED ON THE PIPE THREAD.

▲ CAUTION

DO NOT USE ANY THREAD SEALANTS ON THE STRAIGHT THREADS FOR THIS CONNECTION, THE GREASE ON THE SEALING SEAT IS ANTI SEIZE TO LUBRICATE WHILE TIGHTENING. IF FOR ANY REASON THE GREASE IS REMOVED, LITHIUM BASED GREASE APPLIED TO THE SEALING SURFACE WILL BE ADEQUATE.

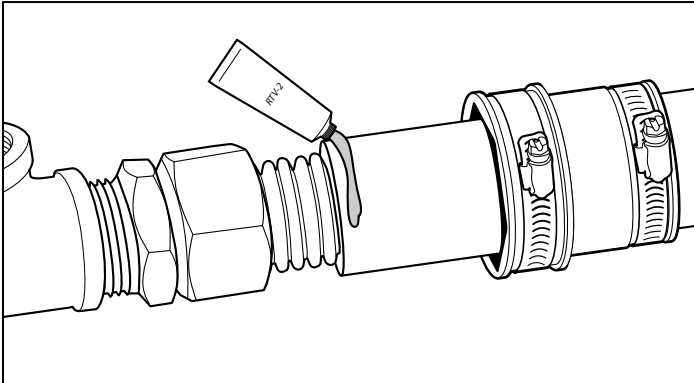
F. TIGHTNESS TESTING

Before fastening the inner jacket rubber seal over the nut, and prior to backfilling, the piping system must be isolated from the tanks and subjected to a pipe tightness test.

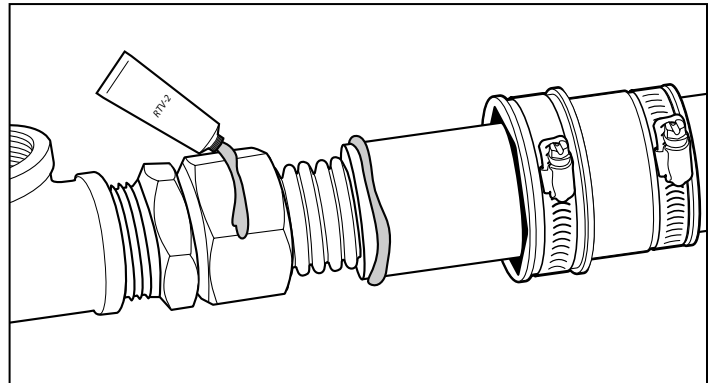
For DEF-Trac® it is recommended the piping be pressurized with air to a maximum of 25 psi. Maintain this pressure for one hour ensuring there is no drop in pressure. Additionally spray fitting with a non-corrosive leak check solution and look for bubbles. Once all rubber seals (inner and outer) are completed a 75psig max pressure test can be completed if required by code.

G. FASTEN HEX RUBBER SEAL

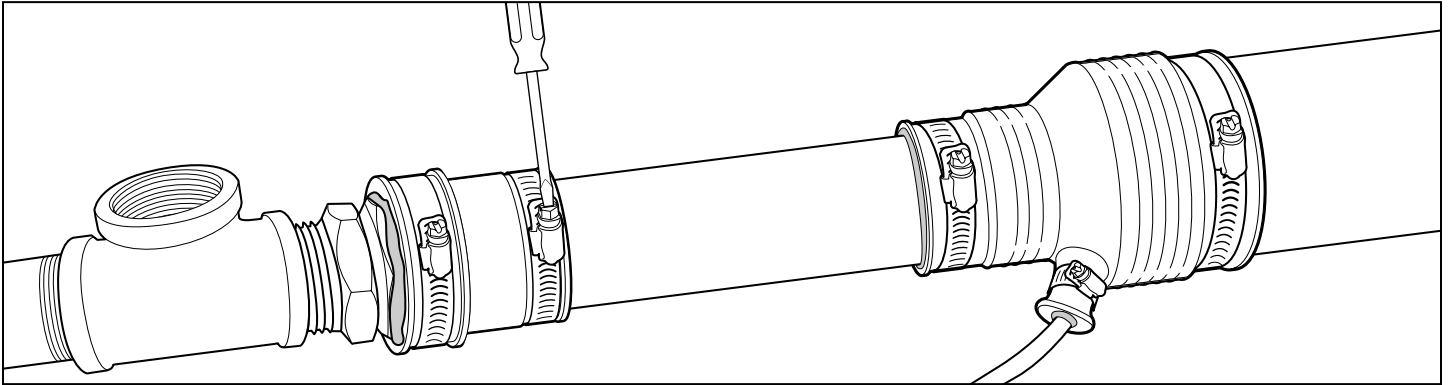
Apply RTV sealant to primary jacket.



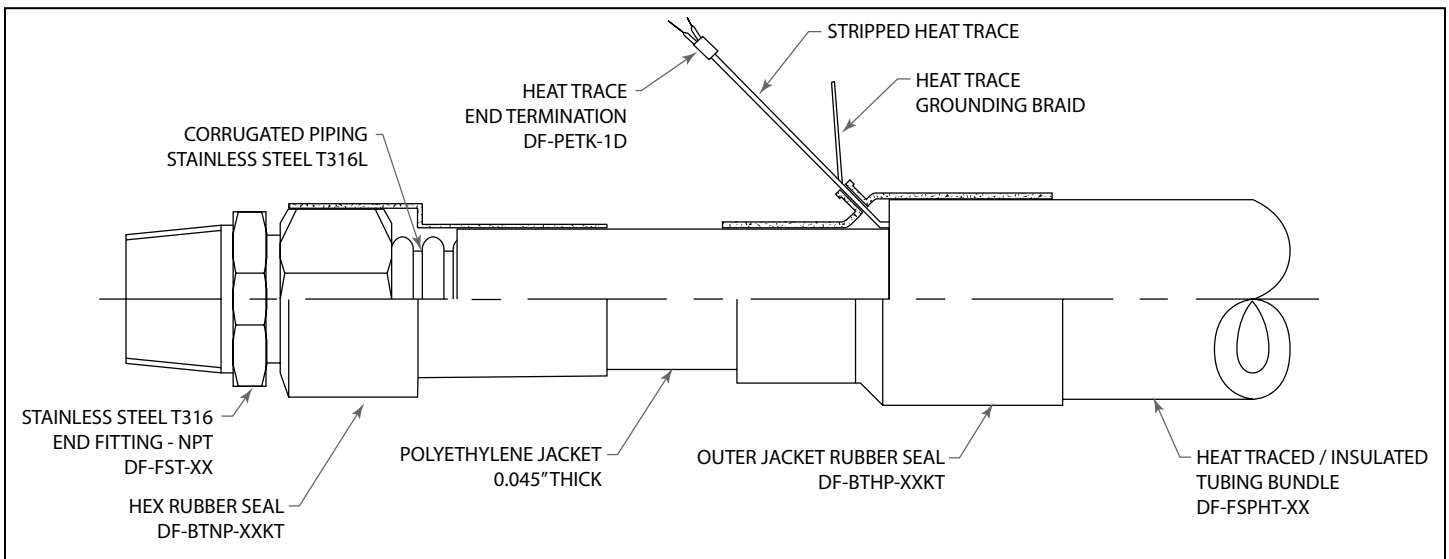
Apply RTV sealant to hex nut.



Slide hex rubber seal over hex nut and tighten band clamps. Smooth excess RTV using your finger.



TYPICAL INSULATED HEAT-TRACED END CONFIGURATION – Clamps not shown for clarity



⚠ CAUTION

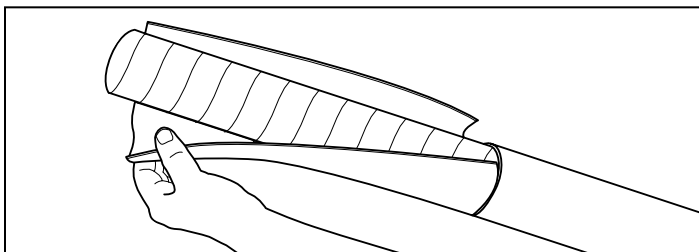
- DEF-Trac® INSULATED PIPING IS MANUFACTURED USING THERMON BSX 3-1 (1" DEF-Trac) & BSX 5-1 (1½" & 2" DEF-Trac) HEAT TRACE.
- THERMON BSX 3-1, & BSX 5-1 HEAT TRACE CAN ONLY BE POWERED USING 120VAC.
- MANDATORY GFI EPD CIRCUIT BREAKER
PER NEC ARTICLE 427-22, ALL HEAT TRACING CIRCUITS MUST HAVE GFI – EQUIPMENT PROTECTION ON THE CIRCUIT. IN THIS SYSTEM, THE HEATER CABLE MUST BE POWERED FROM AN EPD (30MA GFI TRIP) TYPE CIRCUIT BREAKER.

9. DEF-Trac / INSULATED, NON-HEAT TRACED

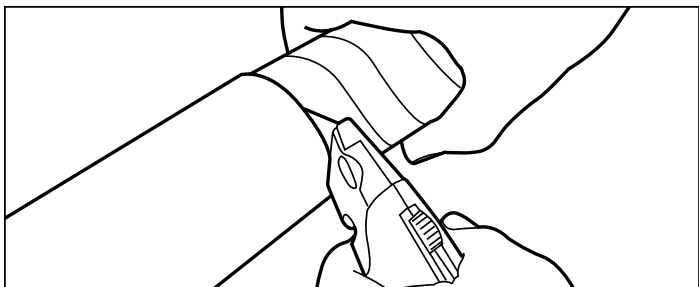
A. CUT TO LENGTH / REMOVE JACKET FOR FITTING ATTACHMENT

Determine the proper rough cut length, cut with a tubing cutter or reciprocating saw. After measuring and making cut for overall length, remove a minimum of 14 inches of the outer most black jacket and insulation. More can be removed depending on installation conditions.

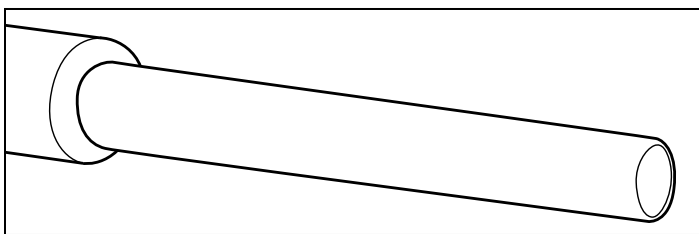
Cut through the black plastic layer using a utility knife and remove.



Cut through the insulation and remove. Do not remove the innermost black jacket. Use care to avoid any damage to the corrugated piping while removing the insulation.

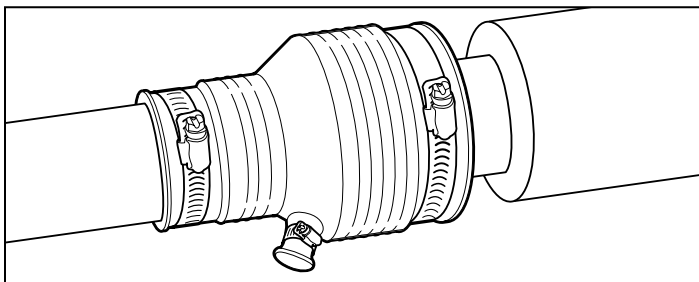


Fully stripped end.

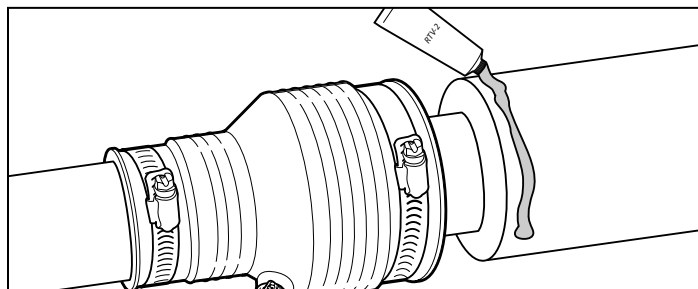


B. OUTER JACKET RUBBER SEAL

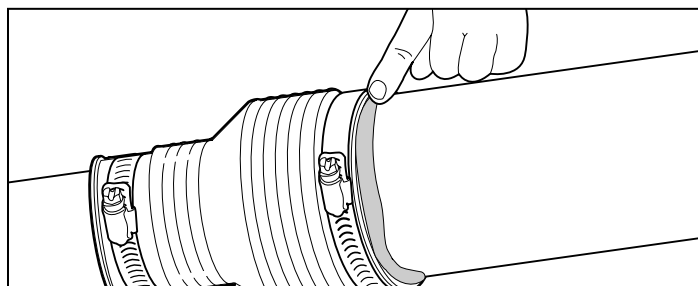
Slide the outer jacket rubber seal to cover tubing bundle.



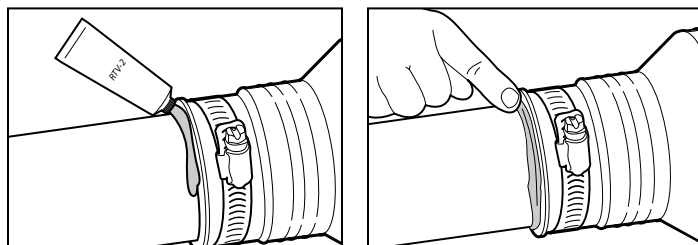
Apply ample amount of RTV sealant to outer jacket tubing bundle.



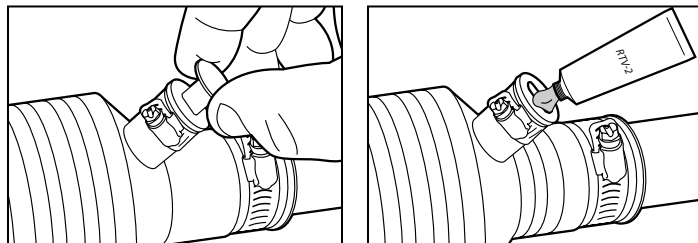
Slide outer jacket rubber seal onto tubing bundle until it bottoms out and tighten band clamps. The excess RTV sealant can be smoothed using your finger.



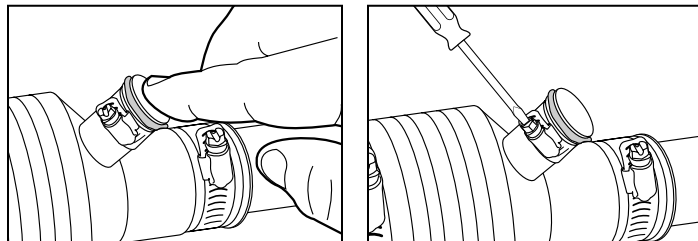
Apply a bead of RTV sealant on the front side of the outer jacket rubber seal. Smooth RTV using your finger.



Remove seal plug. Fill heat trace port with RTV sealant.



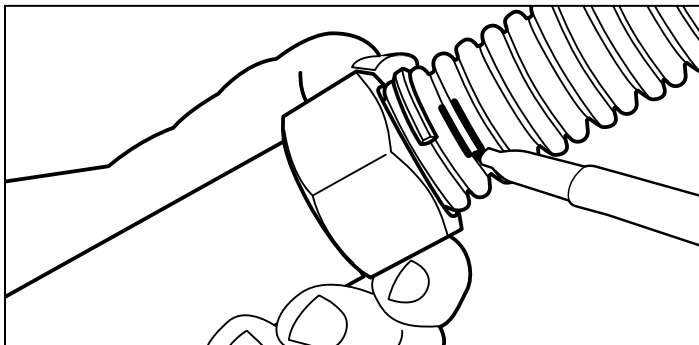
Insert seal plug, pushing plug down firmly. Tighten band clamp securely.



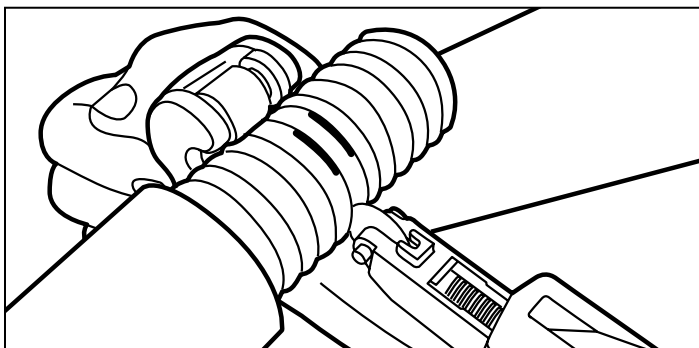
C. PRECISION CUT

Remove innermost black jacket leaving 5" of bare corrugated piping exposed.

Slide the nut over the core until it bottoms out on the black jacket. Place a mark on the top of the first two corrugations past where the split rings will sit.



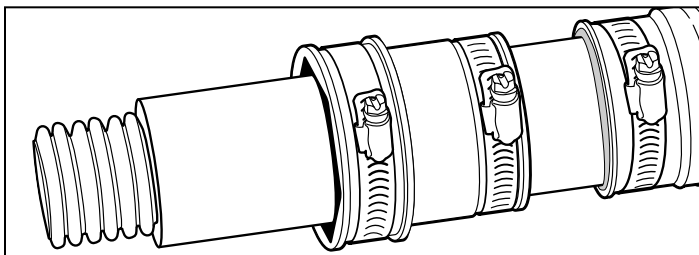
Remove the nut and cut through the corrugated piping using a tubing cutter with a sharp wheel. Cut must be centered in the valley between the two marked corrugations.



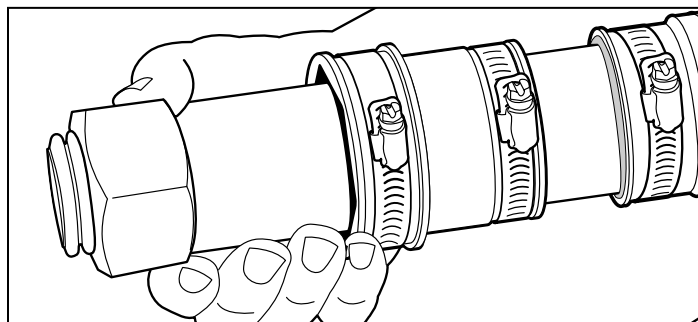
Use full circular strokes in one direction and tighten roller pressure slightly after each revolution. DO NOT over-tighten roller which may flatten tube.

D. INSTALL FITTING NUT

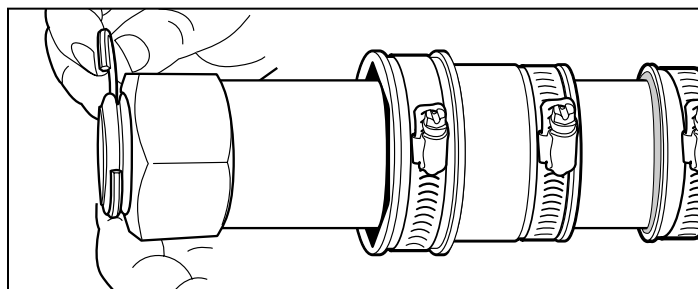
Slide hex rubber seal onto pipe.



Place hex nut onto pipe.



Place two split-rings into the valley of the first corrugation.



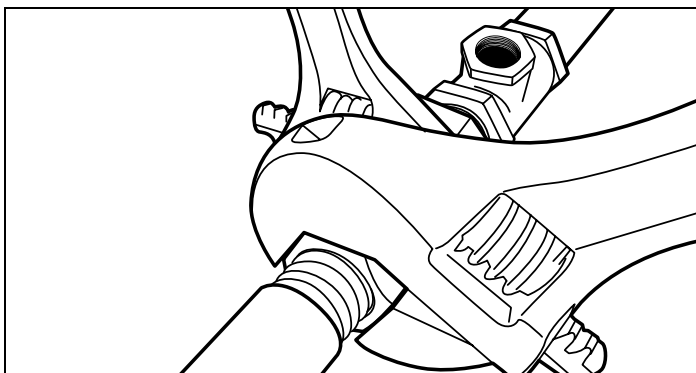
E. TIGHTEN FITTING

Thread the adapter into the mating piece of equipment (elbow, tee, valve etc.). Thread the nut into the adapter and engage threads. Note that the fitting is designed to form a leak tight seat on the stainless tubing as you tighten the fitting. Using appropriate wrenches; tighten the fitting until the adapter bottoms and the resistance to wrenching increases greatly. Tighten the nut and adapter to the torque listed in Table 1.

Table 1

Size	Minimum Torque
1"	150 ft-lbs
1½"	275 ft-lbs
2"	300 ft-lbs

Note the relation between the hex flats at this point and continue to tighten for two additional hex flats (one-third turn) to obtain required torque and final leak tight seal. The flare has now been created on the tubing end creating the metal to metal seal.



SEALANTS ARE ONLY TO BE USED ON THE PIPE THREAD.

▲ CAUTION

DO NOT USE ANY THREAD SEALANTS ON THE STRAIGHT THREADS FOR THIS CONNECTION, THE GREASE ON THE SEALING SEAT IS ANTI SEIZE TO LUBRICATE WHILE TIGHTENING. IF FOR ANY REASON THE GREASE IS REMOVED, LITHIUM BASED GREASE APPLIED TO THE SEALING SURFACE WILL BE ADEQUATE.

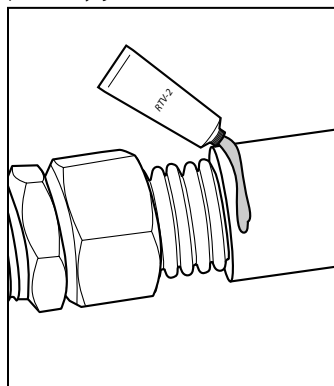
F. TIGHTNESS TESTING

Before fastening the inner jacket rubber seal over the nut, and prior to backfilling, the piping system must be isolated from the tanks and subjected to a pipe tightness test.

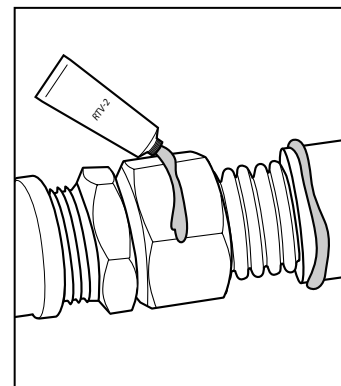
For DEF-Trac® it is recommended the piping be pressurized with air to a maximum of 25 psi. Maintain this pressure for one hour ensuring there is no drop in pressure. Additionally spray fitting with a non-corrosive leak check solution and look for bubbles. Once all rubber seals (outer and hex nut) are completed a 75psig max pressure test can be completed if required by code.

G. FASTEN HEX RUBBER SEAL

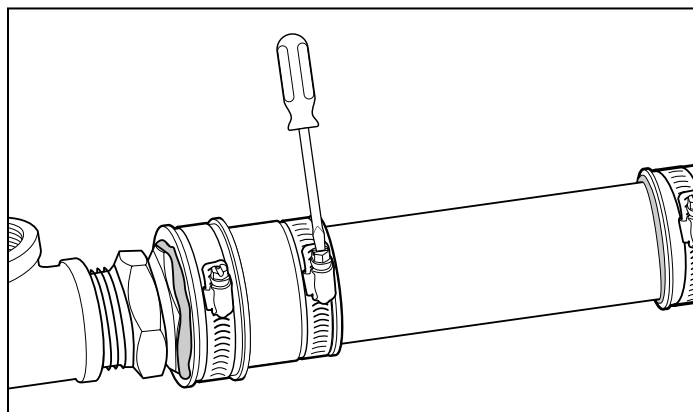
Apply RTV sealant to primary jacket.



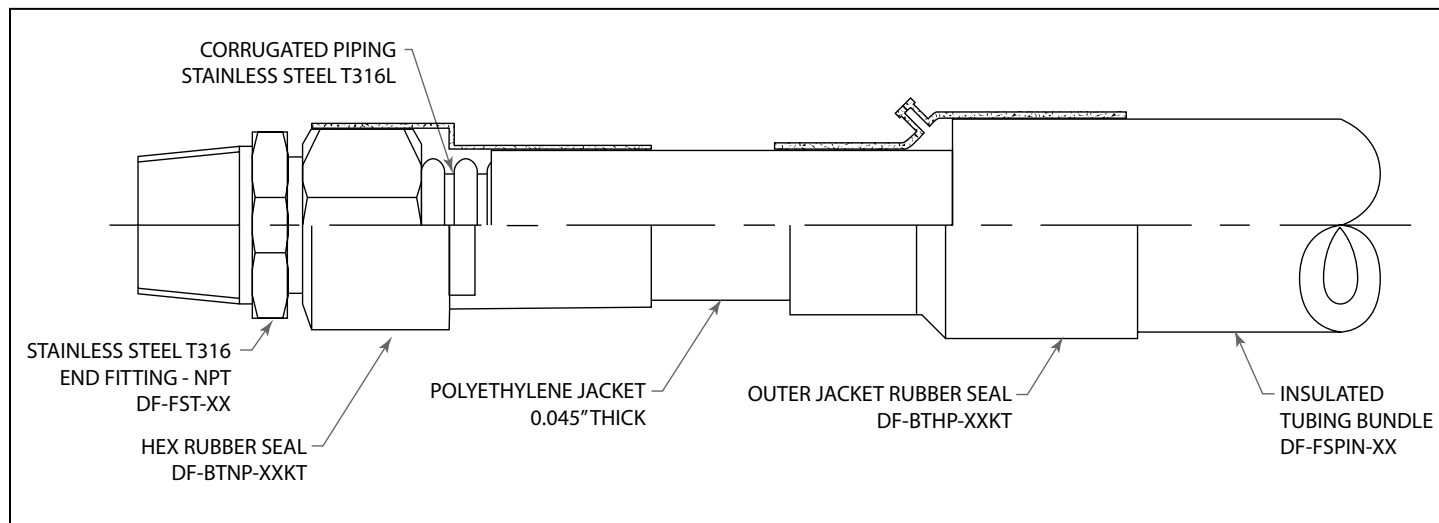
Apply RTV sealant to hex nut.



Slide hex rubber seal over hex nut and tighten band clamps. Smooth excess RTV using your finger.



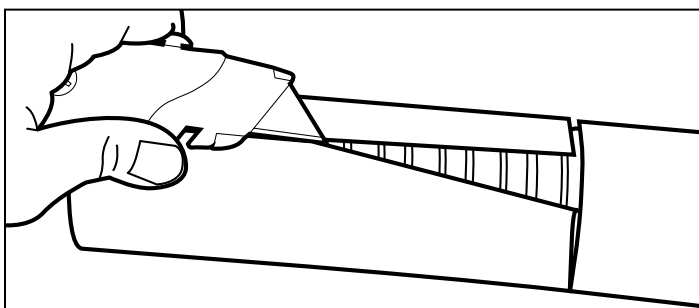
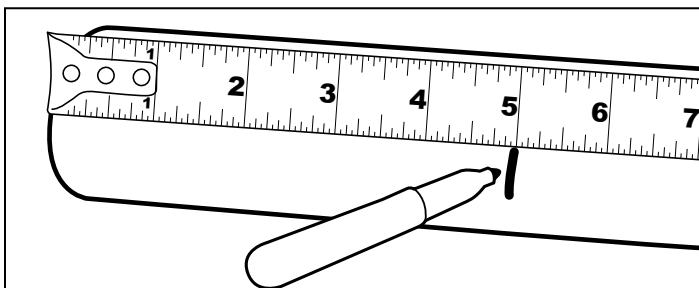
TYPICAL INSULATED NON-HEAT-TRACED END CONFIGURATION – Clamps not shown for clarity



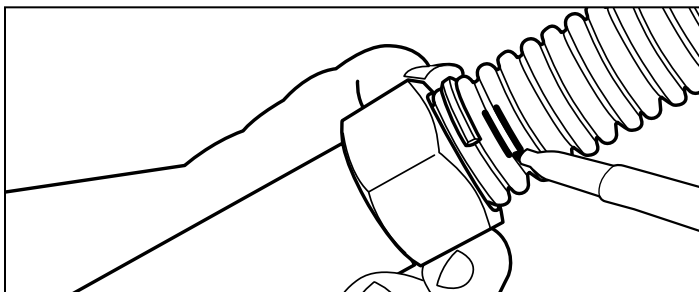
10. DEF-Trac / UN-INSULATED, NON-HEAT TRACED

A. CUT TO LENGTH / REMOVE JACKET FOR FITTING ATTACHMENT

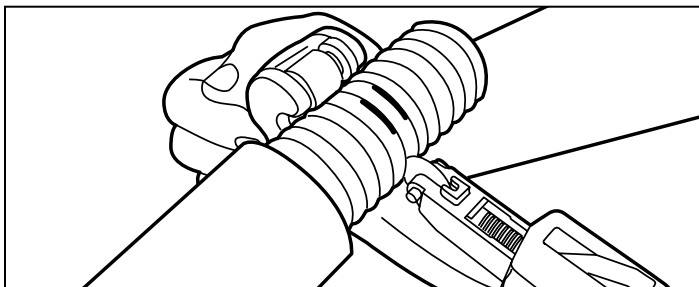
Determine the proper cut length, cut with a tubing cutter or reciprocating saw. Remove the black jacket exposing 5" of bare corrugated piping.



Slide the nut over the core until it bottoms out on the black jacket. Place a mark on top of the first two corrugations past where the split rings will sit.



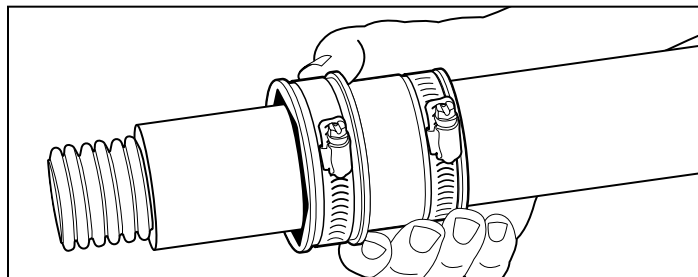
Remove the nut and cut through the corrugated piping using a tubing cutter with a sharp wheel. Cut must be centered in the valley between the two marked corrugations.



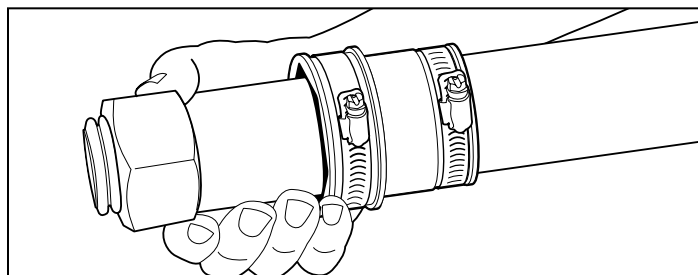
Use full circular strokes in one direction and tighten roller pressure slightly after several revolutions. DO NOT over tighten roller which may flatten tube.

B. INSTALL FITTING NUT

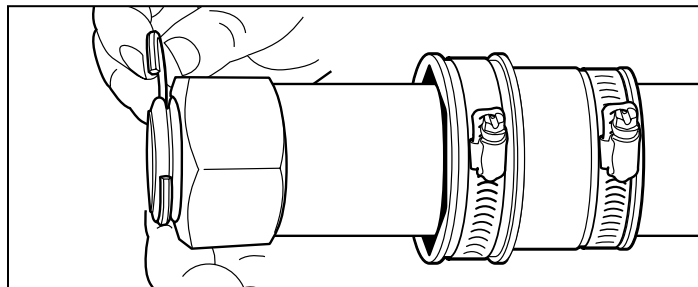
Slide hex rubber seal onto pipe.



Slide nut over cut tube end.



Place two split-rings into the valley of the first corrugation. Slide nut forward to trap the split rings.



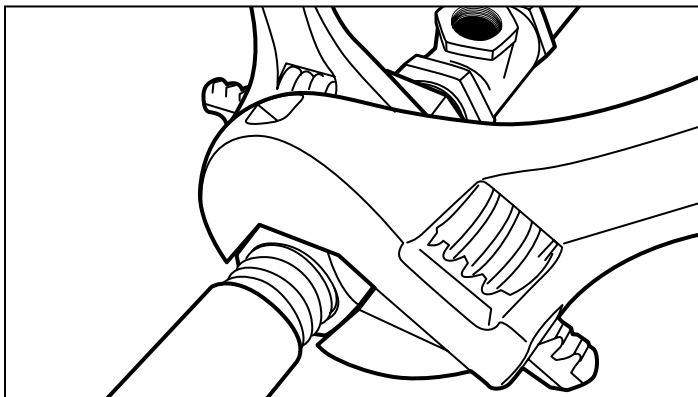
C. TIGHTEN FITTING

Thread the adapter into the mating piece of equipment (elbow, tee, valve etc.). Thread the nut into the adapter and engage threads. Note that the fitting is designed to form a leak tight seat on the stainless tubing as you tighten the fitting. Using appropriate wrenches; tighten the fitting until the adapter bottoms and the resistance to wrenching increases greatly. Tighten the nut and adapter to the torque listed in Table 1.

Table 1

Size	Minimum Torque
1"	150 ft-lbs
1½"	275 ft-lbs
2"	300 ft-lbs

Note the relation between the hex flats at this point and continue to tighten for two additional hex flats (one-third turn) to obtain required torque and final leak tight seal. The flare has now been formed on the tubing end, creating the metal to metal seal.



SEALANTS ARE ONLY TO BE USED ON THE PIPE THREAD.

⚠ CAUTION

DO NOT USE ANY THREAD SEALANTS ON THE STRAIGHT THREADS FOR THIS CONNECTION, THE GREASE ON THE SEALING SEAT IS ANTI SEIZE TO LUBRICATE WHILE TIGHTENING. IF FOR ANY REASON THE GREASE IS REMOVED, LITHIUM BASED GREASE APPLIED TO THE SEALING SURFACE WILL BE ADEQUATE.

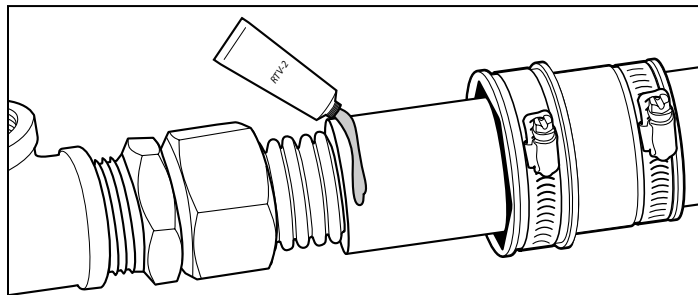
D. TIGHTNESS TESTING

Before fastening the inner jacket rubber seal over the nut, and prior to backfilling, the piping system must be isolated from the tanks and subjected to a pipe tightness test.

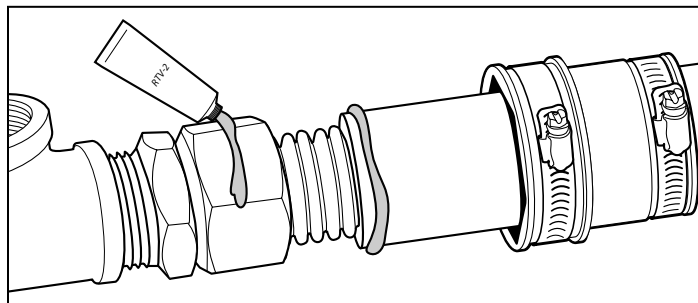
For DEF-Trac® it is recommended the piping be pressurized with air to a maximum of 25 psi. Maintain this pressure for one hour ensuring there is no drop in pressure. Additionally spray fitting with a non-corrosive leak check solution and look for bubbles. Once all rubber seals are completed a 75psig max pressure test can be completed if required by code.

E. FASTEN HEX RUBBER SEAL

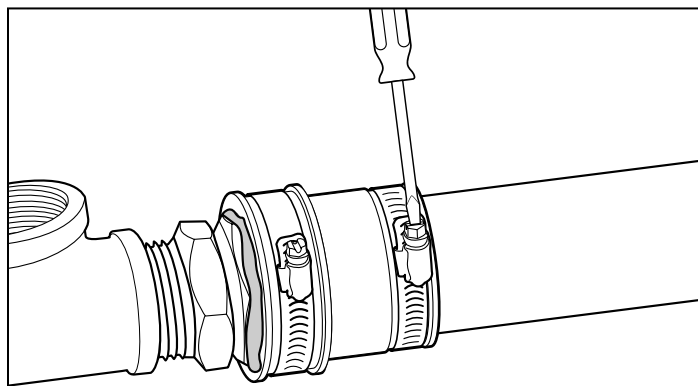
Apply RTV sealant to primary jacket.



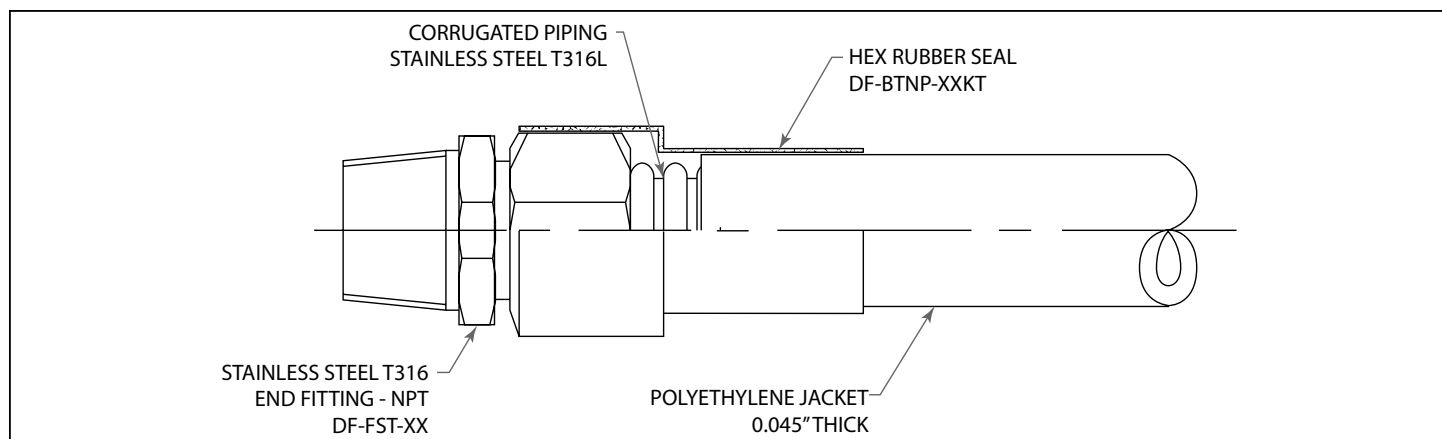
Apply RTV sealant to hex nut.



Slide hex rubber seal over hex nut and tighten band clamps. Smooth excess RTV using your finger.



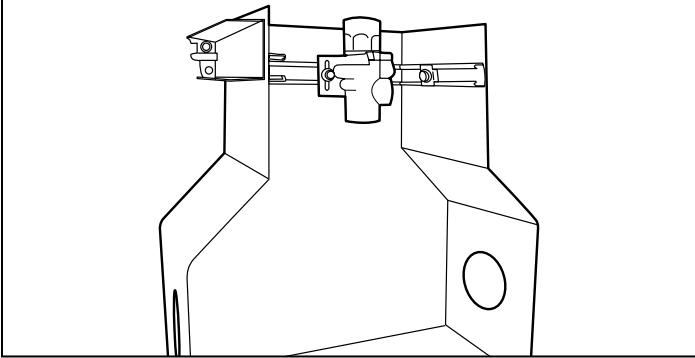
TYPICAL UN-INSULATED END CONFIGURATION – Clamps not shown for clarity



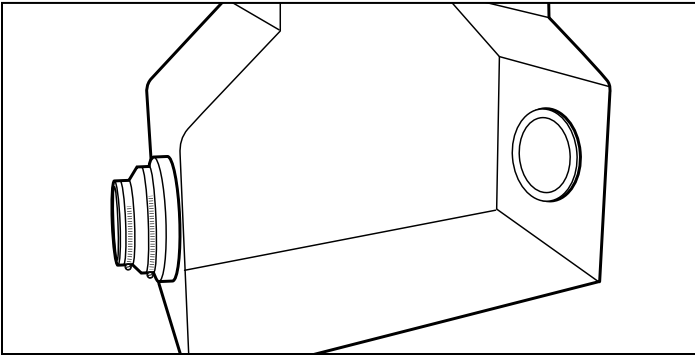
11. DEF-Trac CHASE PIPE ENTRY PROCEDURE

A. PREPARE DISPENSER SUMP / ENTRY FITTING

Properly prepare dispenser sump for entry fitting according to manufacturer's recommendation.

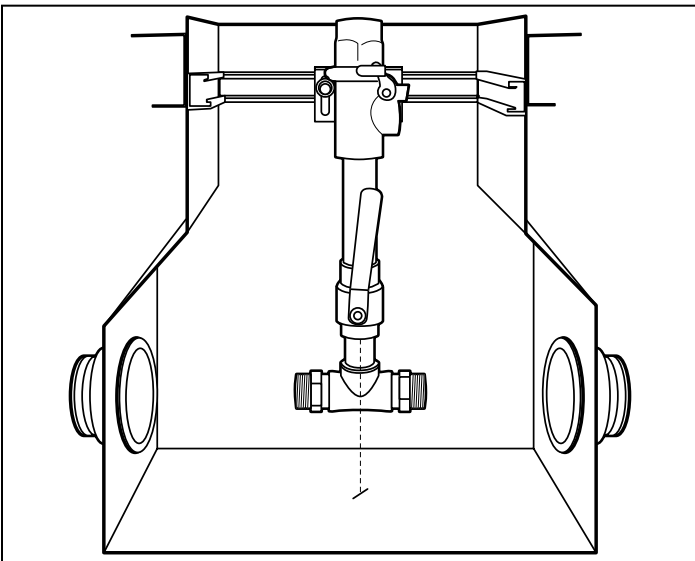


Install entry fitting according to manufacturer's recommendation (DPM, Inc. entry fitting kit inverted for chase pipe entry, OmegaFlex Part Number DF-CP-ENT).

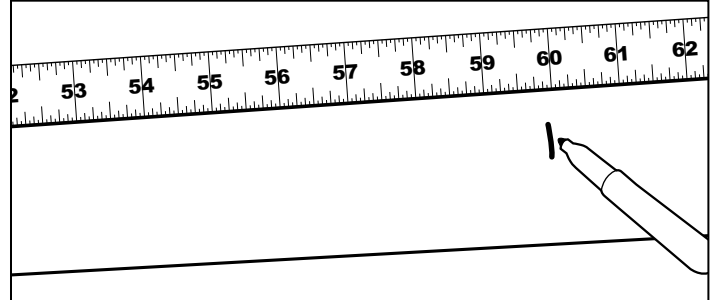


B. CUT TO LENGTH / REMOVE JACKET FOR FITTING ATTACHMENT

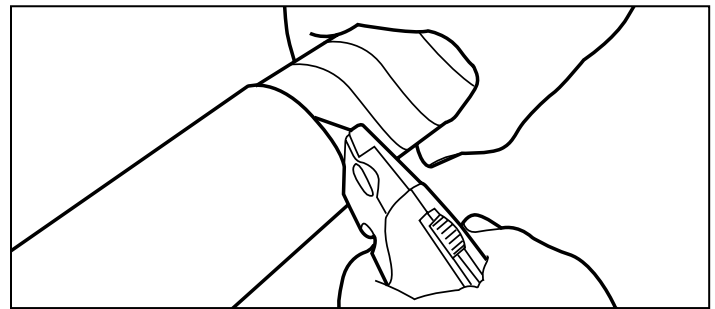
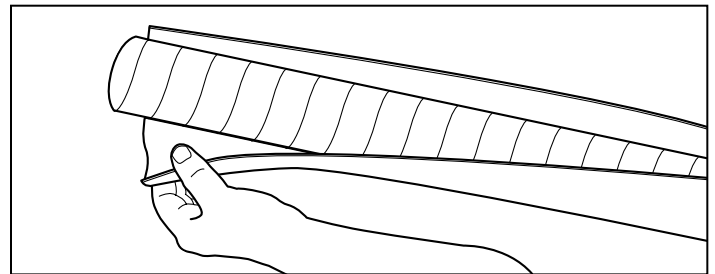
Thread DEF-Trac adapters into ancillary fitting. Determine the layout and center of the dispenser.



Determine the insulation cut length needed to allow for the heat trace wire to wrap around the piping riser and into the top of the containment sump (approximately 60-65"). The insulation cut must begin a minimum of 6" from outside of dispenser sump wall to allow for internal chase pipe boot.



Follow proper insulation cut back procedure to remove outer insulation (page 13). Do not remove the innermost black jacket. Use care to avoid any damage to the heat trace and corrugated piping while removing the insulation.

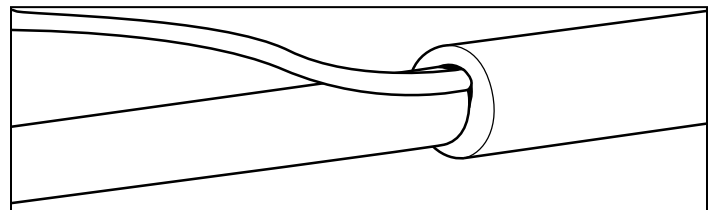


⚠ CAUTION

HEAT TRACE IS HELICALLY WOUND ON PIPING.

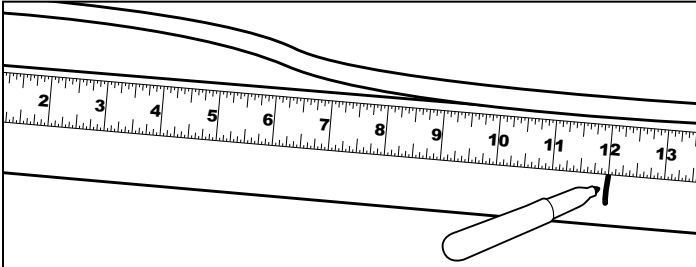
USE CARE WHEN CUTTING JACKET AND INSULATION.

Fully stripped end.



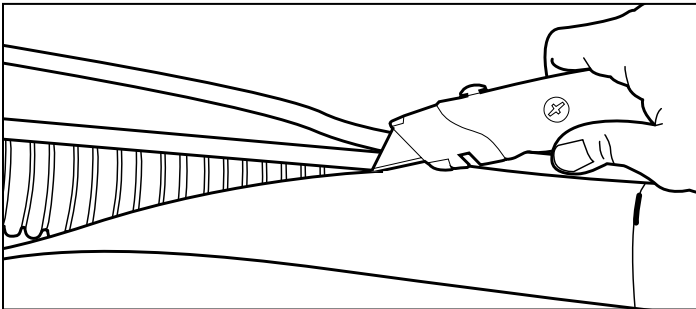
C. ROUGH CUT

Determine the innermost black jacket cut back length. Mock up DEF-Trac through chase pipe and mark the inner black jacket allowing enough room for installation of split rings and hex nut.

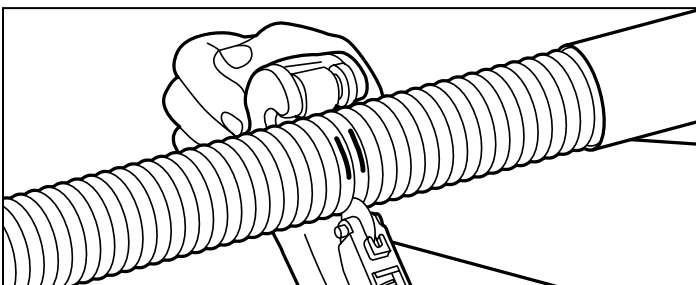
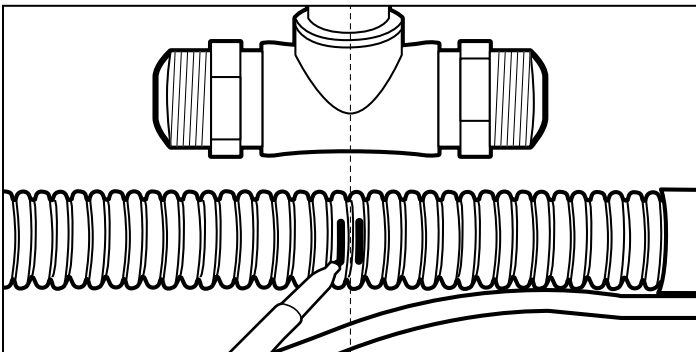


NOTE: When determining the cut back length allow for the final hex sleeve to cover all exposed stainless steel core.

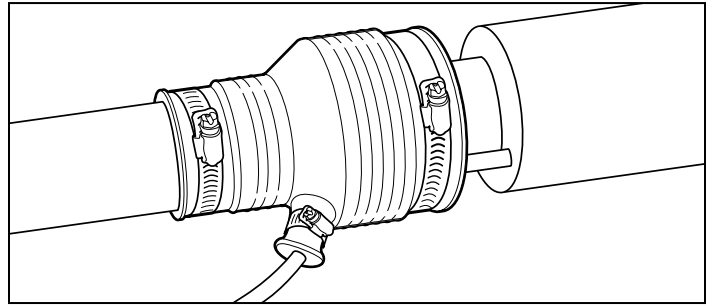
FOLLOW PROPER INNER CORE CUT BACK PROCEDURE (page 14).



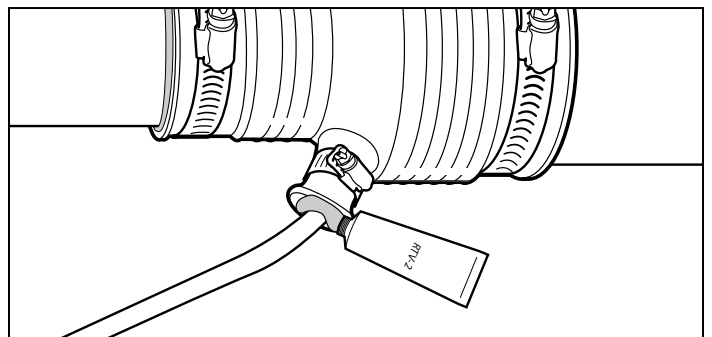
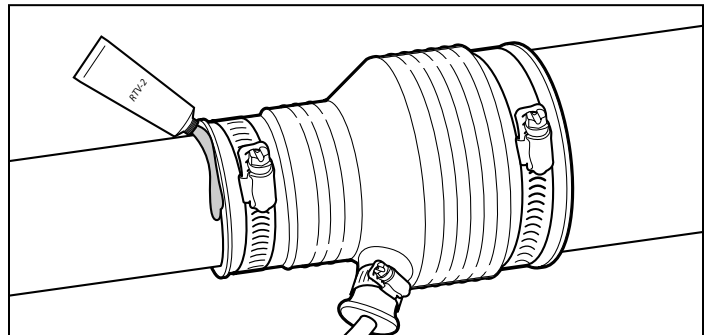
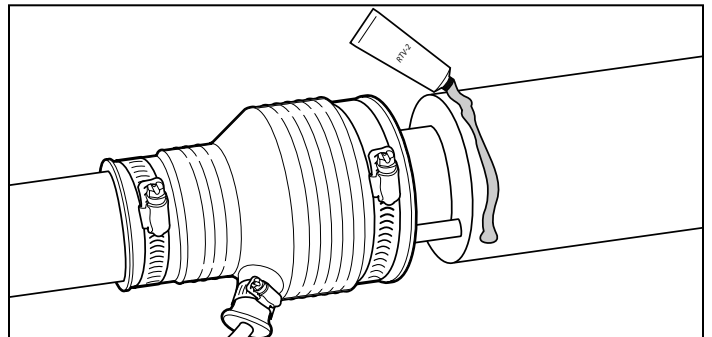
Rough cut exposed stainless steel core at the center point of ancillary fittings.



Slide the insulation bundle sleeve over the core and slide heat trace through port.

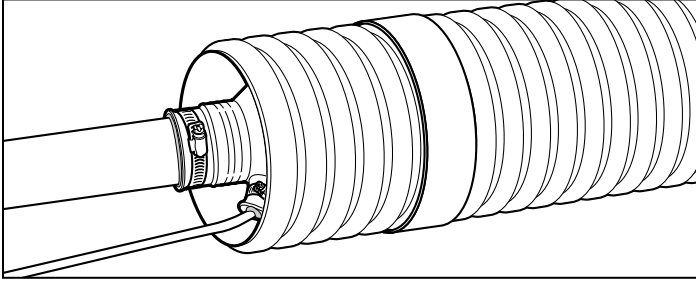


Properly seal insulation bundle sleeve and heat trace port using RTV sealant and tighten all band clamps.

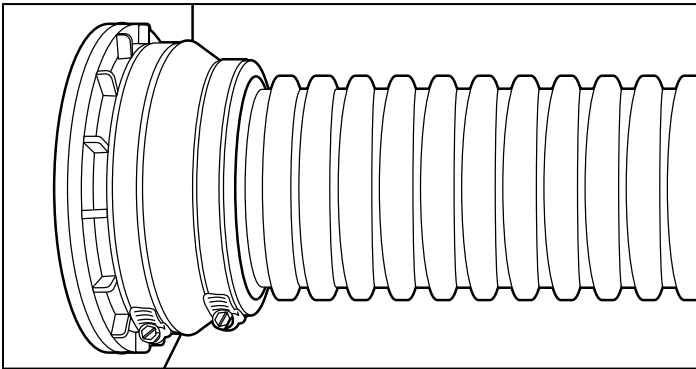


D. CHASE PIPE

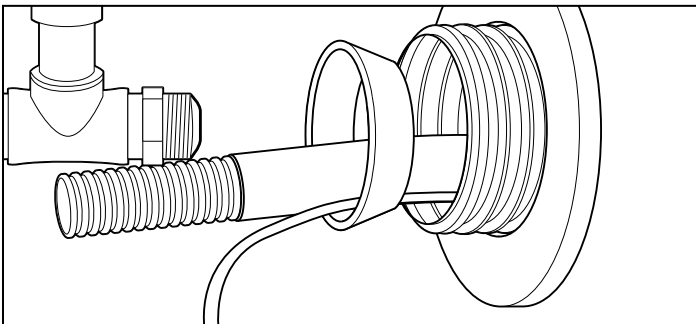
Prepare chase piping for sump connection by installing the duct seal. Allow for 3 corrugation of the chase to be exposed from the inner portion of the entry fitting.



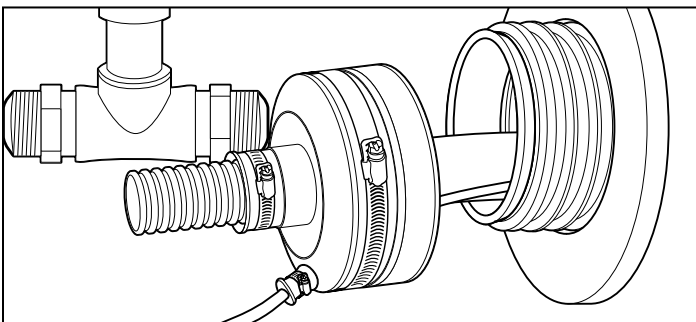
Slide chase piping into entry fitting and securely tighten external clamps on outer chase pipe boot.



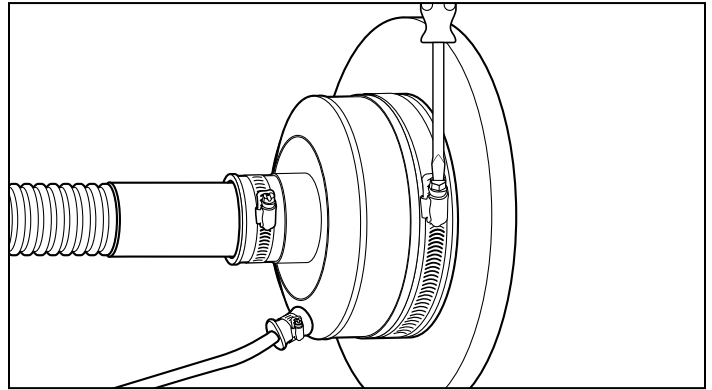
Install chase pipe crush guard on inner portion of chase pipe.



Slide the inner chase pipe boot over the core and slide heat trace through port.

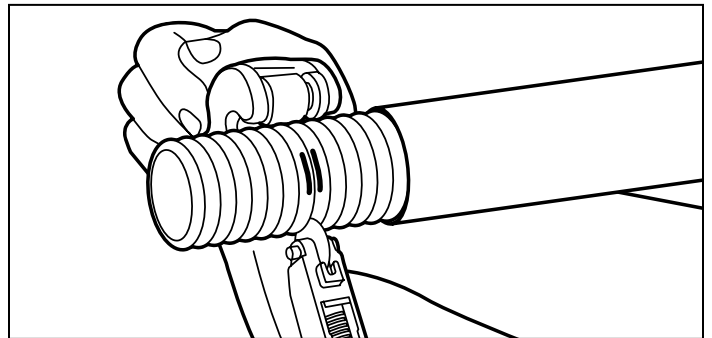
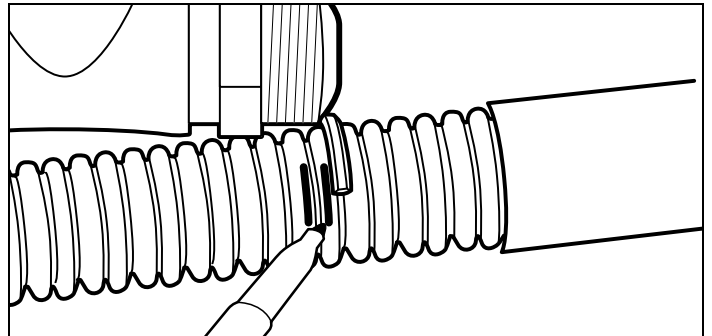


Attach inner chase pipe boot to exposed chase pipe and tighten all band clamps.

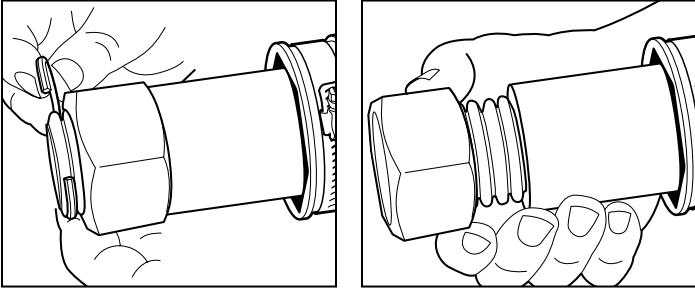
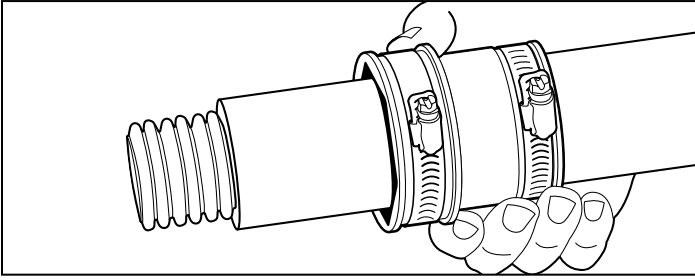


E. PRECISION CUT

Align DEF-Trac piping to DEF-Trac adapter and place split ring in corrugation closest to rounded AutoFlare seat. Place a mark in the valley of the next corrugation past the split ring and follow proper precision cut procedure (page 6).



Slide rubber hex sleeve over core and install hex nut and split rings per proper installation procedure (page 15).



Thread the nut into the adapter and engage threads. Use appropriate wrenches and tighten the fitting until the adapter bottoms and the resistance to wrenching increases greatly. Tighten the nut and adapter to the torque listed in Table 1.

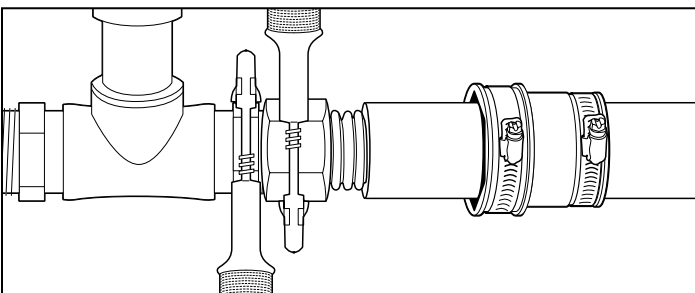
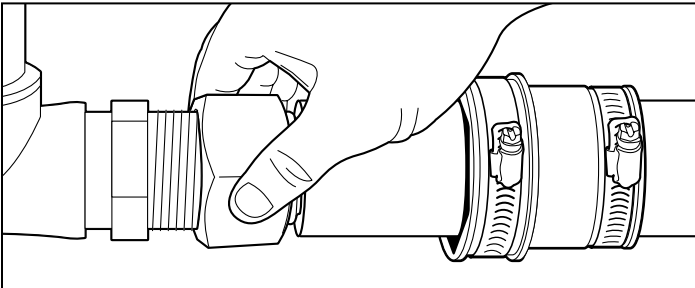


Table 1

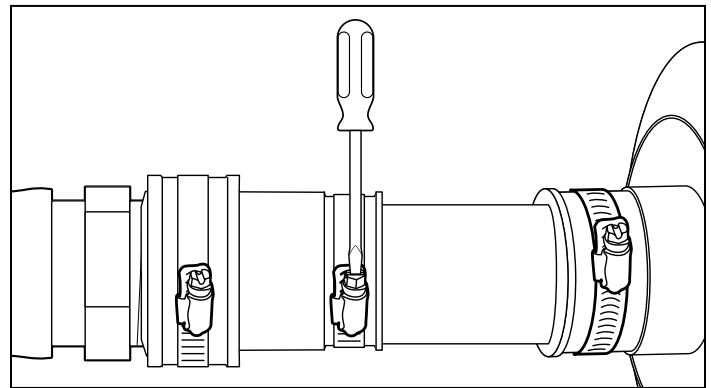
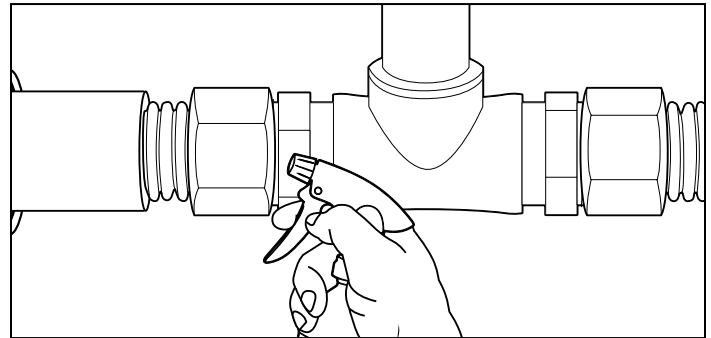
Size	Minimum Torque
1"	150 ft-lbs
1½"	275 ft-lbs
2"	300 ft-lbs

Note the relation between the hex flats at this point and continue to tighten for two additional hex flats (one-third turn) to obtain required torque and final leak tight seal. The flare has now been created on the tubing end creating the metal to metal seal.

F. TIGHTNESS TESTING

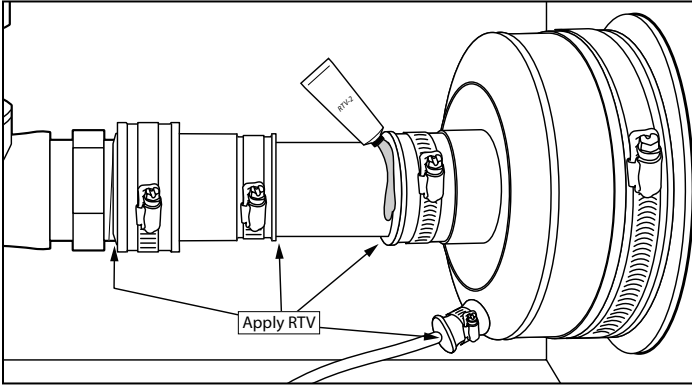
Before tightening the rubber hex nut boot and prior to backfilling, the piping system must be isolated from the tanks and subjected to a pipe test.

For DEF-Trac® it is recommended the piping be pressurized with air to a maximum of 25 psi. Maintain this pressure for one hour ensuring there is no drop in pressure. Additionally spray fitting with a non-corrosive leak check solution and look for bubbles. Once all rubber seals (inner and outer) are completed a 75psig max pressure test can be completed if required by code.



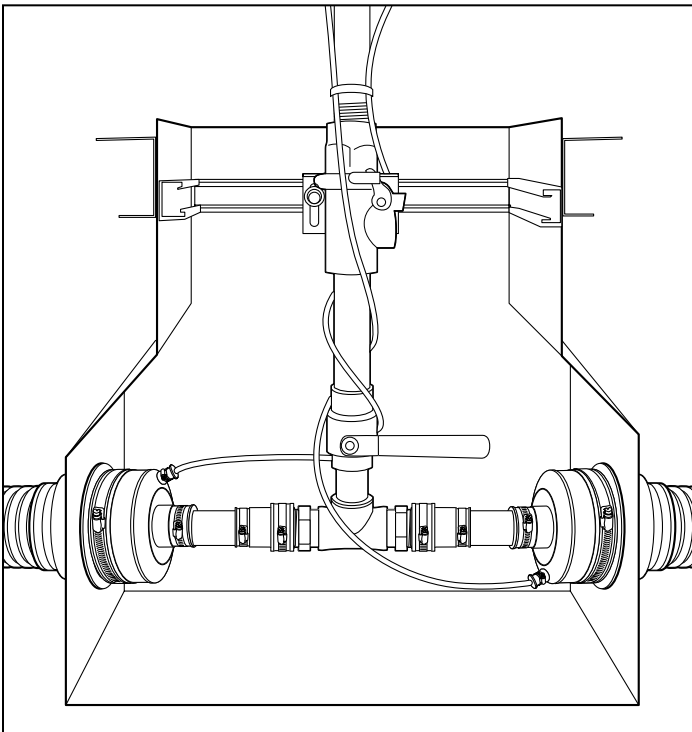
G. APPLY RTV SEALANT

After tightening all inner rubber boots and performing a tightness test, apply RTV sealant at all rubber boot connections and heat trace ports.



H. TERMINATE HEAT TRACE

Wrap heat trace around piping riser and ancillary equipment and follow proper heat trace termination guidelines (page 31 if splicing in DS/DE or page 35 for power terminations).



12. DEF-Trac PIPE CHASING, PIPE BURIAL, TRENCHING, BACKFILL AND CLAMPING REQUIREMENTS

- It is recommended to encase the DEF-Trac pipe in a suitable HDPE corrugated chase pipe (rock guard); to facilitate installation and if necessary removal of pipe at a later date. 1" and 1½" DEF-Trac will easily fit into a 4" ID chase; 2" will require a 5" chase. The chase pipe shall be installed per the manufactures recommendations.
- Additionally, DEF-Trac pipe can be direct buried. If so, provide a trench width equal to the pipe diameter plus six inches on each side. Separate multiple lines by at least 4 inches. The distance between any piping and the trench excavation walls must be at least 6 inches.
- For an installation of three 2" diameter pipes, the trench would be 26" wide and a minimum of 26" deep.
- Whenever possible, product lines should be run in a single trench between the tank area and pump dispenser island area. Where more than one trench is required, piping should not cross over each other or cross over underground tanks.
- The trench bottom must be sloped uniformly from the dispensers back to the tanks or sumps at a minimum slope of 1/8 inch per foot and be free of any sharp or protruding hard objects. The trench bottom must be graded with a minimum of six inches of backfill such as washed sand, or pea gravel.
- For backfilling, provide a minimum of 18 inches of clean backfill between the top of the pipe and unpaved ground surfaces. A minimum of 4 inches of clean backfill is required between the top of the pipe and reinforced concrete pavement (4 inches thick minimum) and a minimum of 8 inches of backfill is required between the top of the pipe and asphalt pavement (2 inches thick minimum).
- DEF-Trac can be installed outdoors above ground. Typically DEF-Trac is mounted in PVC piping or to a unistrut which provides continuous support. Clamping to the unistrut is accomplished utilizing a rubber coated hose clamp. Care must be taken to ensure the piping can not be punctured, crushed or damaged in any way.

NATIVE BACK FILL MATERIALS SHOULD NEVER BE USED.

13. ROUTINE MAINTENANCE AND VISUAL INSPECTION

It is recommended that a visual inspection of the inside of all containment sumps, be completed, at least once per month. Leaks collected in containment sumps must be reported immediately and investigated by the site owner. If leakage or damage to the piping system is suspected, OmegaFlex must be notified immediately.

All sumps must be kept free of fuel, water and debris.

14. ACCESSORIES

All Thermon accessories must be installed per the manufacturer's instructions.

DPM Entry Boots for OmegaFlex Piping

Size	Pipe		DPM Part #
1"	DF-FSP-16		B3.5-1.5
1½"	DF-FSP-24	DEF-Trac	B3.5-2.0
2"	DF-FSP-32	Un-insulated	B3.5-2.5
1"	DF-FSPHT(IN)-16	DEF-Trac Insulated	B3.5-2.7
1½"	DF-FSPHT(IN)-24	or Insulated & Heat	B5-3.0
2"	DF-FSPHT(IN)-32	Traced	B5-3.6

15. USE OF PRESSURE RELIEF VALVES

Due to temperature extremes, the pipe can become over pressurized due to thermal expansion of the internal media. If the DEF-Trac® piping portion of a system can become isolated by means of a check valve or solenoid valve; it is recommended to install a pressure relief valve which drains to tank in line with the DEF-Trac® piping. This will prevent the over pressurization of the piping.

▲ CAUTION

- **DEF-Trac® INSULATED PIPING IS MANUFACTURED USING THERMON BSX 3-1 (1" DEF-Trac) & BSX 5-1 (1½" & 2" DEF-Trac) HEAT TRACE.**
- **THERMON BSX 3-1, & BSX 5-1 HEAT TRACE CAN ONLY BE POWERED USING 120VAC.**
- **MANDATORY GFI EPD CIRCUIT BREAKER PER NEC ARTICLE 427-22, ALL HEAT TRACING CIRCUITS MUST HAVE GFI – EQUIPMENT PROTECTION ON THE CIRCUIT. IN THIS SYSTEM, THE HEATER CABLE MUST BE POWERED FROM AN EPD (30MA GFI TRIP) TYPE CIRCUIT BREAKER.**

16. DEF-TRAC HEAT TRACING (THERMON) INSTALLATION AND TROUBLESHOOTING GUIDE

Installation checklist (pages 51-52) must be faxed to OmegaFlex at 610-524-6484

Warranty is conditional upon receipt of installation check list.

▲ WARNING

Self-Regulating Cable must be installed by a qualified electrician. All installation and test instructions must be followed. Improper installation can result in property damage, serious injury, or death due to electric shock. Please contact OmegaFlex at 1-800-355-1038 with any installation or operating questions.

- DEF-Trac® insulated piping is manufactured using Thermon BSX 3-1 (1" DEF-Trac) & BSX 5-1 (1½" & 2" DEF-Trac) HEAT TRACE.
- **Thermon BSX 3-1, & BSX 5-1 heat trace can only be powered using 120VAC.**
- Mandatory GFI EPD circuit breaker per NEC article 427-22, all heat tracing circuits must have GFI – equipment protection on the circuit. In this system, the heater cable must be powered from an EPD (30MA GFI trip) type circuit breaker.
- Please read these Installation Instructions and all instructions included with kits prior to installation. Observe all warnings. Visually inspect the cable for damage. The cable, including braid, must not be cut, nicked or worn. **DO NOT USE DAMAGED CABLE.**
- Install cable in accordance with the prevailing electric code.
- Cables for classified areas should be tagged for specific classifications.
- All related components and controls should be properly rated for the specified location classification.
- Each self-regulating cable circuit will require at least one power connection kit (sold separately) which includes one end termination. All cable ends must be properly terminated per the instructions.

Electrical Codes: Sections 427 (pipelines and vessels) and 500 (classified locations) of the National Electrical Code (NEC), and Part 1 of the Canadian Electrical Code, Sections 18 (hazardous locations) and 62 (Fixed Electric Space and Surface Heating), govern the installation of electrical heat-tracing systems. All heat-tracing-system installations must be in compliance with these and any other applicable national or local codes.

- Thermon heat-tracing systems must be installed correctly to ensure proper operation and to prevent shock and fire. Read these important warnings and carefully follow all the installation instructions.
- To minimize the danger of fire from sustained electrical arcing if the heating cable is damaged or improperly installed, and to comply with Thermon requirements, agency certifications, and national electrical codes, **ground fault equipment protection must be used on each heating cable branch circuit. Arcing may not be stopped by conventional circuit breakers.**
- Approvals and performance of the heat-tracing systems are based on the use of Thermon specified parts only. Do not substitute parts or use vinyl electrical tape.
- Bus wires will short if they contact each other. Keep bus wires separated.
- Components and cable ends must be kept dry before and during installation.
- The black heating cable core and fibers are conductive and can short. They must be properly insulated and kept dry.
- Damaged bus wires can overheat or short. Do not break bus wire strands when preparing the cable for connection.

▲ WARNING

THE MAXIMUM LENGTH OF ANY CIRCUIT CANNOT BE LONGER THAN 200 FT.

▲ ELECTRIC SHOCK HAZARD

ANY CABLE WITH AN INSULATION RESISTANCE READING LESS THAN 20 MEGOHMS BEFORE INSTALLATION SHOULD NOT BE INSTALLED.

16.2 DEF-TRAC HEAT TRACE ACCESSORIES

1. **Ambient Control Thermostat** – (OmegaFlex Part Number DF-B4X-15140 / non-hazardous location or DF-B7-15140 / hazardous location) Used to control a single heating circuit or as pilot control of a contactor switching multiple heat tracing circuits. Typically installed near a building or structure out of direct sunlight.
2. **Terminator Power Connection Kit** – (OmegaFlex Part Number DF-DP) Used to provide the power connection or can also be used as a splice kit if terminal block connections are required by code. Heat trace connections are made utilizing the cable termination kit (OmegaFlex Part Number DF-PETK-1D / sold separately).
3. **Terminator Splice Kit** – (OmegaFlex Part Number DF-DS/DE) Used to provide splice connection at tee's or can be used as end of circuit termination. For a tee splice, heat trace connections are made utilizing the cable splice kit. (OmegaFlex Part Number DF-SCTK-1D / sold separately) Or end of circuit heat trace connections are made utilizing the cable termination kit. (OmegaFlex Part Number DF-PETK-1D / sold separately)
4. **DEF-Trac End Fitting** – (OmegaFlex Part Number DF-FST-xx) Field attachable Stainless Steel end fitting with NPT thread.
5. **DEF-Trac Heat Traced Piping** – (OmegaFlex Part Number DF-FSPHT-xx) Flexible Stainless Steel corrugated piping, insulated and heat traced.
6. **Rubber Seal** – (OmegaFlex Part Number DF-BTNP-xxKT, DF-BTHP-xxKT and DF-BTHD-xxKT) Provides sealing onto the outer insulated jacket as well as over the back hex nut of the DEF-Trac fitting.
7. **Fixing Tape** – (OmegaFlex Part Number DF-FT-1L) Used to attach the heat trace to the un-insulated piping, tees, valve or end attachments.
8. **Insulation Wrap** - Minimum of three layers of approved insulation wrap/tape must be applied to any un-insulated stainless steel pipe and components.

EPD (Equipment Protection Device) Circuit Breakers for ground fault Protection in NF Panelboards

How EPDs Operate

An EPD compares outgoing load currents with returning currents to determine if there is leakage of current to ground. If it detects a ground fault greater than 30 mA, the EPD will trip and display the "red flag" of the Trip indicator.

NOTE

Unlike residential GFCIs (ground fault circuit interrupters), EPDs are not designed for people protection (UL943 Class A calls for protection above 6 mA). EPDs are designed to meet the UL1053 standard for equipment protection. Although not designed for people protection, they do create a safer environment by reducing the potential for hazards associated with ground faults including fires, and equipment malfunction.

16.3 DF-SCTK-1D

Splice Connection Termination Kit

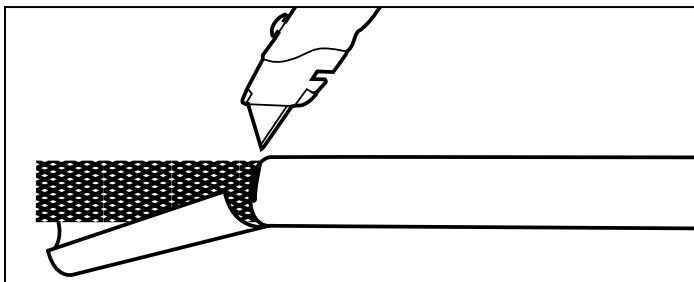
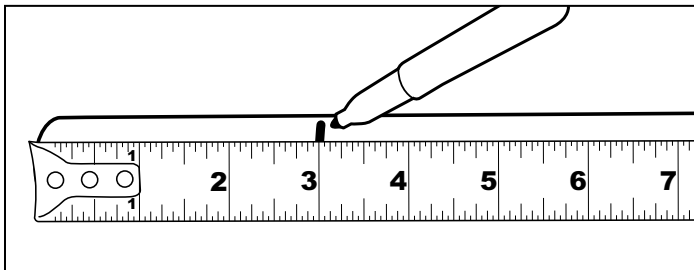
Installation Precautions

- The end termination is used to minimize the potential for arcing and fire caused by product damage or improper installation. Use ground-fault protection. The National Electrical Code (NEC) and Canadian Electrical Code (CEC) require ground-fault protection of equipment for each branch circuit supplying electric heat tracing.
- De-energize all power sources before opening enclosure.
- Keep ends of heating cable and kit components dry before and during installation.
- Individuals installing these products are responsible for complying with all applicable safety and health guidelines. Proper Personal Protective Equipment (PPE) should be utilized during installation. Contact OmegaFlex if you have any additional questions.

Installation Steps

A. REMOVE JACKET

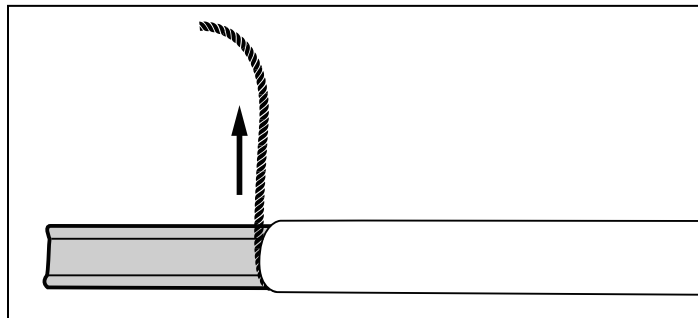
Measure back 3" from the end and remove over jacket using a utility knife.



NOTE

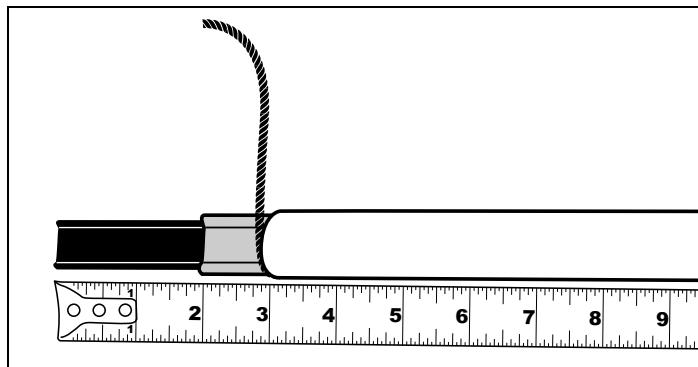
Be careful NOT to damage the metallic braid.

B. SEPARATE METALLIC BRAID AND FORM A PIGTAIL



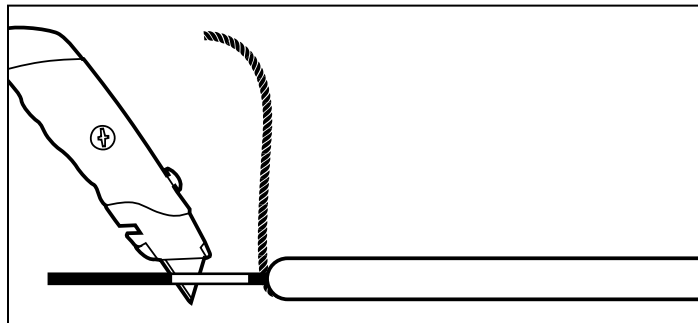
C. EXPOSE HEAT TRACE

Measure 2" of primary insulation jacket and expose the black heat trace matrix.

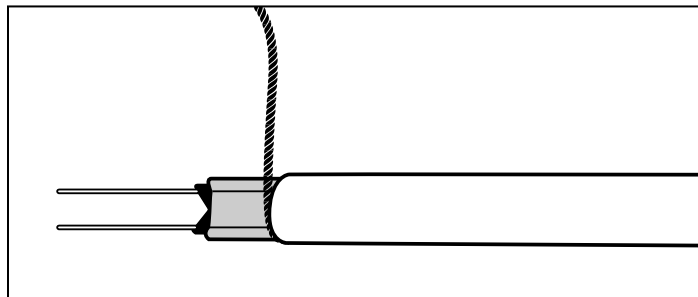


D. EXPOSE THE BUS WIRE LEADS

Skive both edges of the heat trace matrix and expose the bus wire leads.

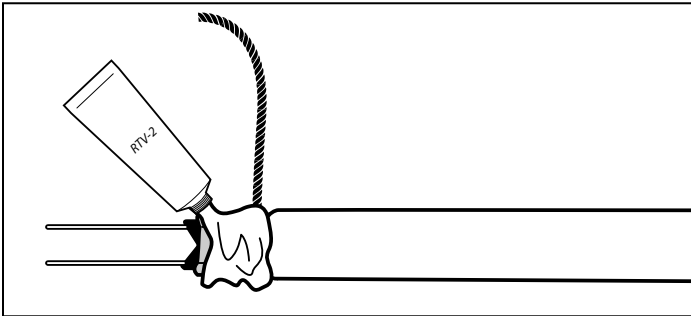


Cut V-notch in matrix and pull bus wires from matrix. Cut and remove center matrix.



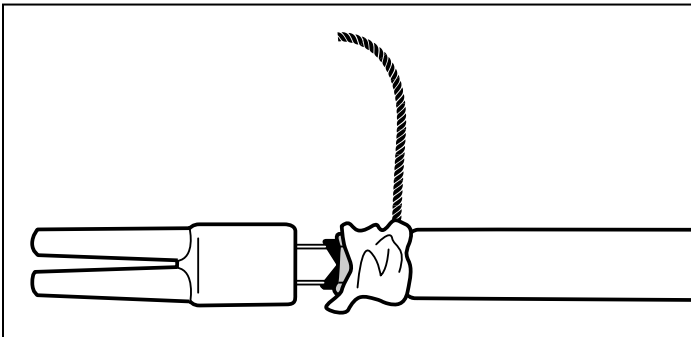
F. APPLY SEALANT

Apply an ample amount of the RTV-2 sealant (RED COLOR) to heat trace cable.

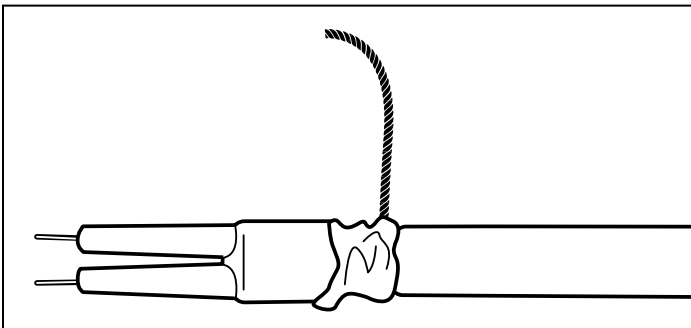


G. INSERT INTO SCTK BOOT

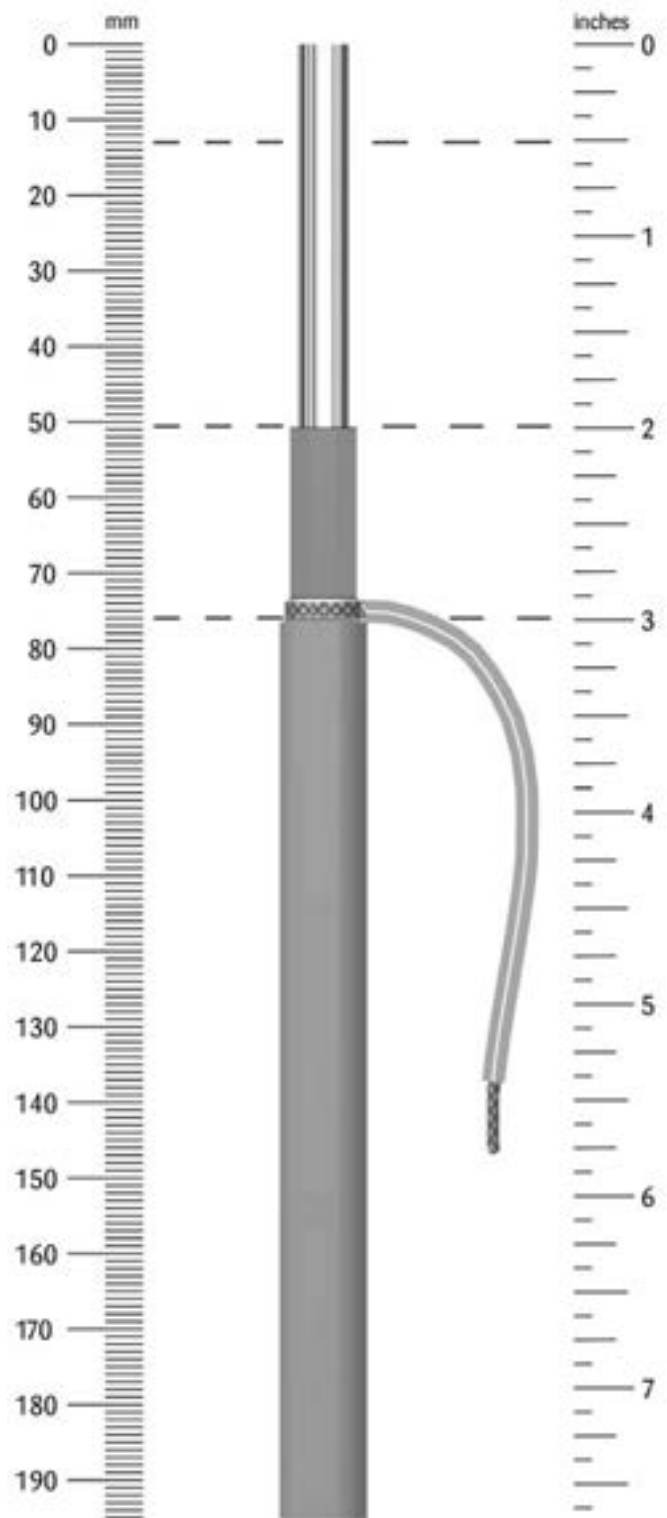
Insert exposed bus wires into SCTK boot



SCTK termination boot should look as depicted below.



Cable Take-off for BSX, RSX, HTSX, KSX and VSX



For Power Connection Boot Termination

16.4 DF-PETK-1D

Power Termination Kit

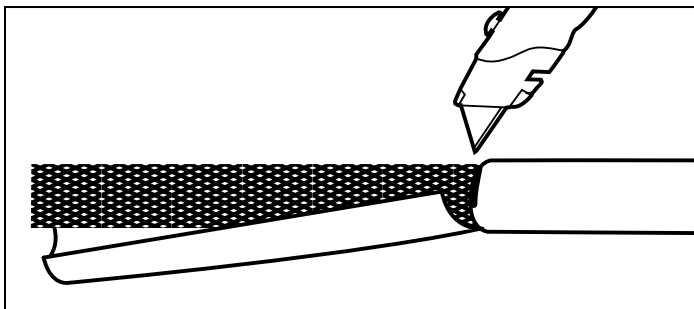
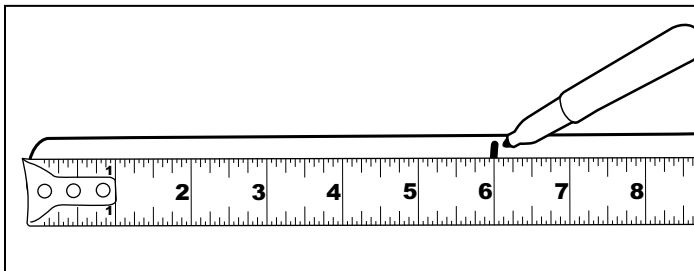
Installation Procedure

- To minimize the potential for arcing and fire caused by product damage or improper installation use ground-fault protection. The National Electrical Code (NEC) and Canadian Electrical Code (CEC) require ground-fault protection of equipment for each branch circuit supplying electric heat tracing.
- Installation must comply with Thermon requirements and be installed in accordance with the NEC, CEC, or any other applicable national and local codes.
- Component approvals and performance ratings are based on the use of Thermon specified parts only.
- De-energize all power sources before opening enclosure.
- Keep ends of heating cable and kit components dry before and during installation.

Installation Steps

A. REMOVE JACKET

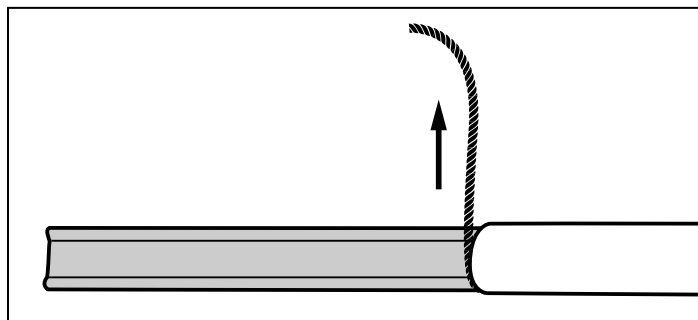
Measure back 6" from the end and remove over jacket using a utility knife.



NOTE

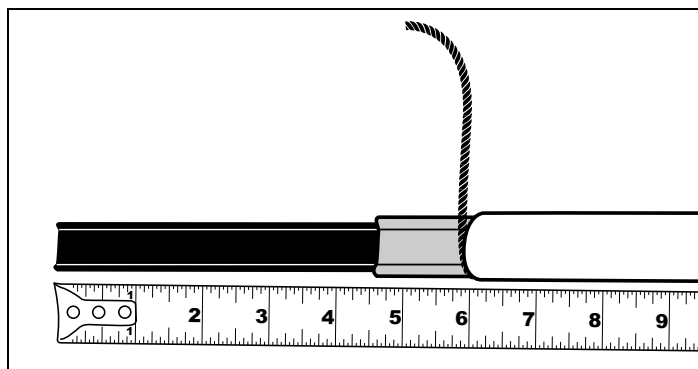
Be careful NOT to damage the metallic braid.

B. SEPARATE METALLIC BRAID AND FORM A PIGTAIL



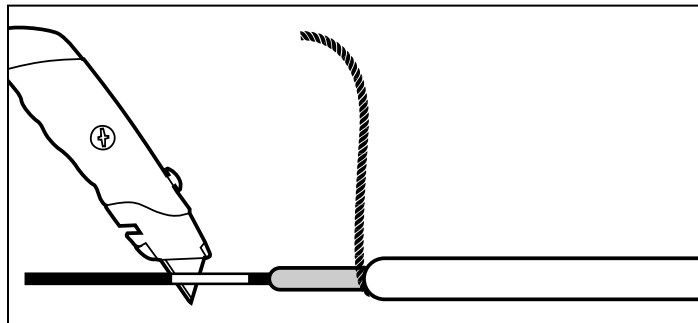
C. EXPOSE HEAT TRACE

Measure 4 5/8" of primary insulation jacket and expose the black heat trace matrix.

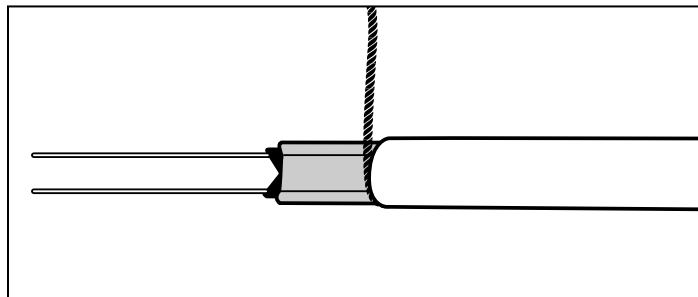


D. EXPOSE THE BUS WIRE LEADS

Skive both edges of the heat trace matrix and expose the bus wire leads.

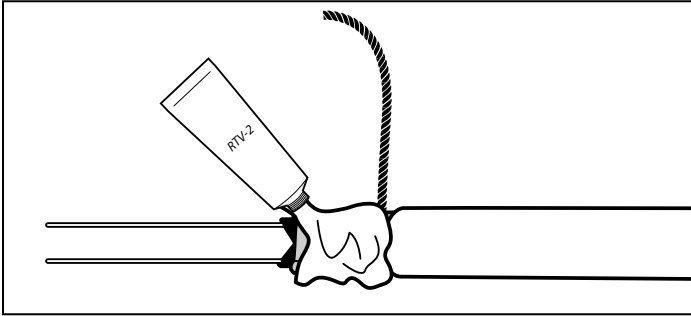


Cut V-notch in matrix and pull bus wires from matrix. Cut and remove center matrix.



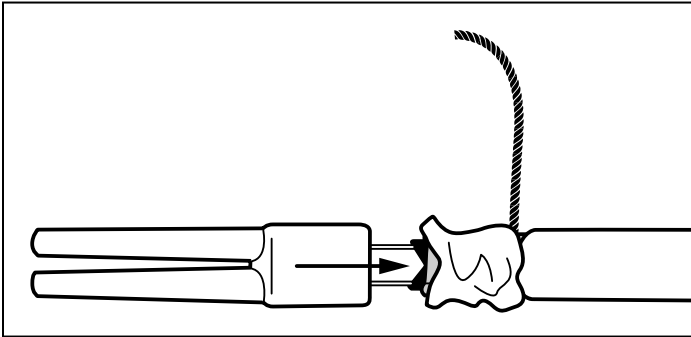
F. APPLY SEALANT

Apply an ample amount of the RTV-2 sealant (RED COLOR) to heat trace cable.

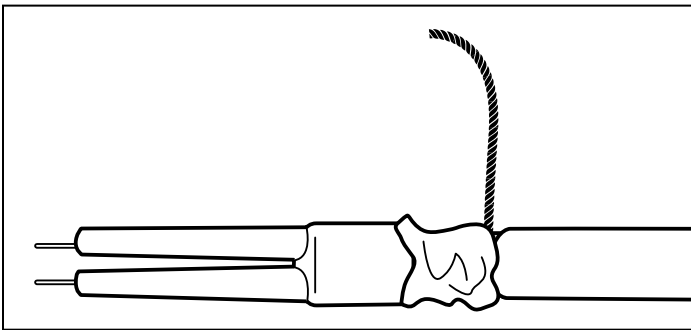


G. INSERT WIRES

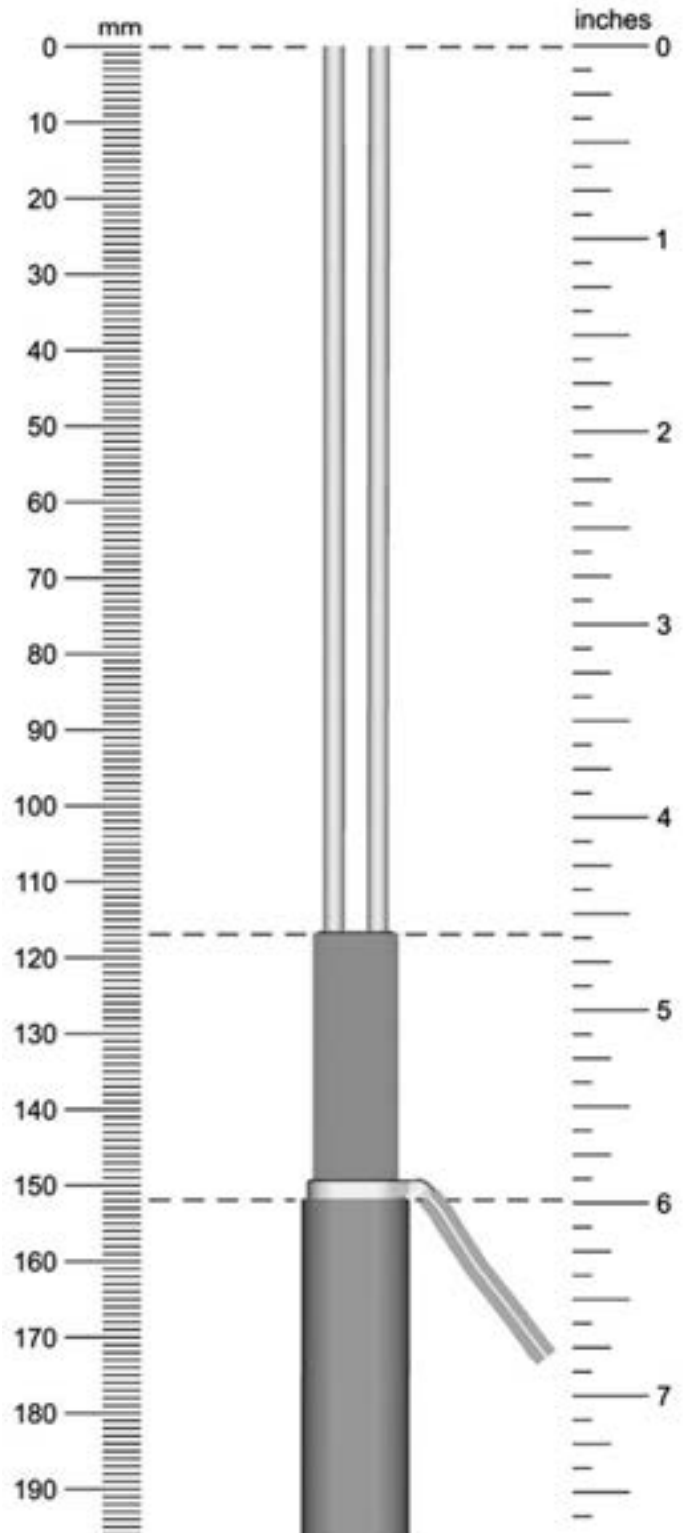
Insert exposed bus wires into PETK boot.



PETK termination boot should look as depicted below.



Template For Power Connection Boot Termination

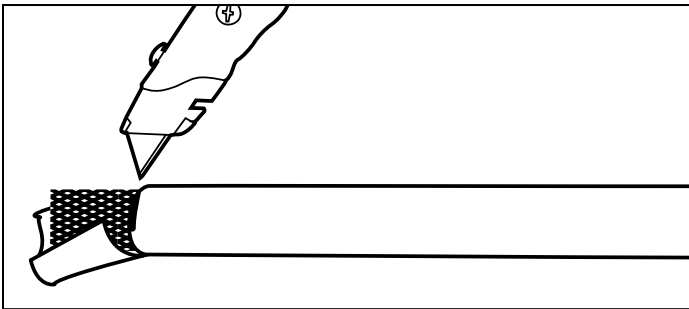
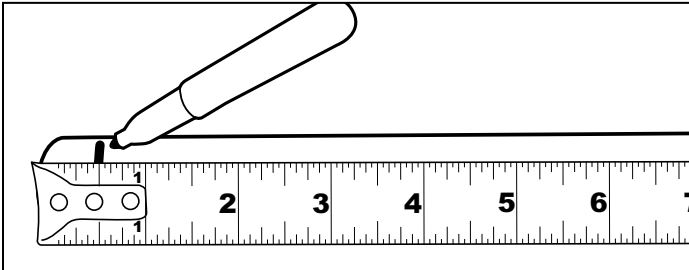


16.5 DF-PETK-1D Power End Termination Kit

Installation Steps

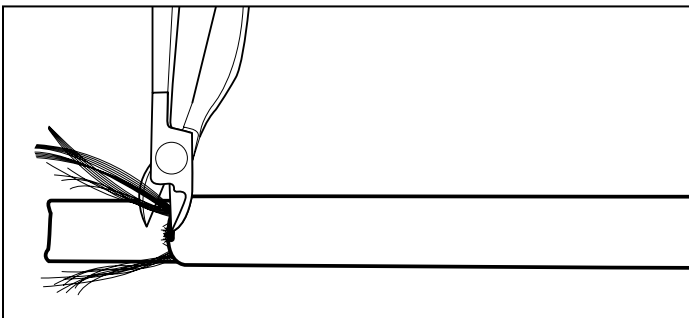
A. REMOVE JACKET

Measure back ½" from the end and remove over jacket using a utility knife.



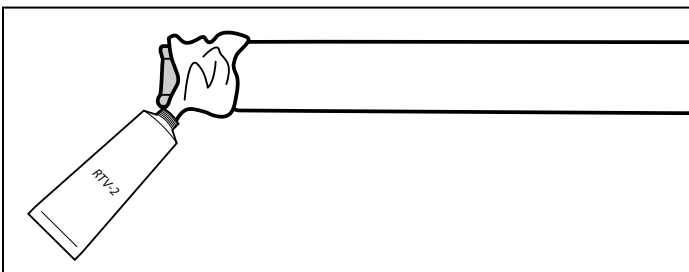
B. REMOVE METALLIC BRAID

Separate metallic braid and **completely** remove .



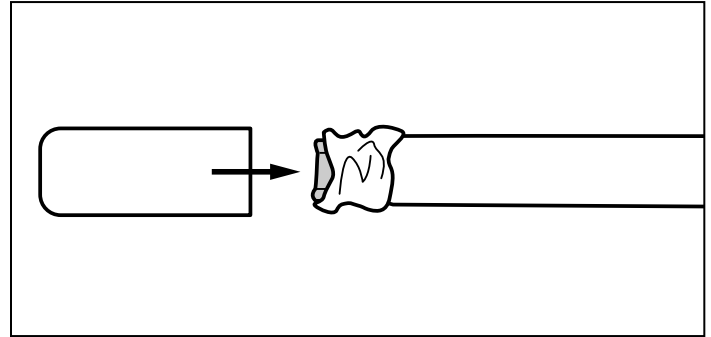
F. APPLY SEALANT

Apply an ample amount of the RTV-2 sealant (RED COLOR) to heat trace cable.

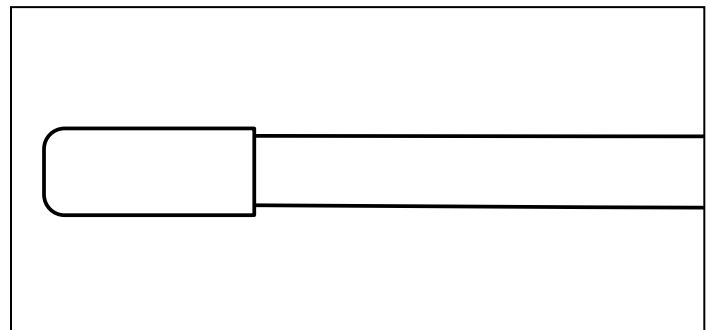


G. INSERT INTO SCTK BOOT

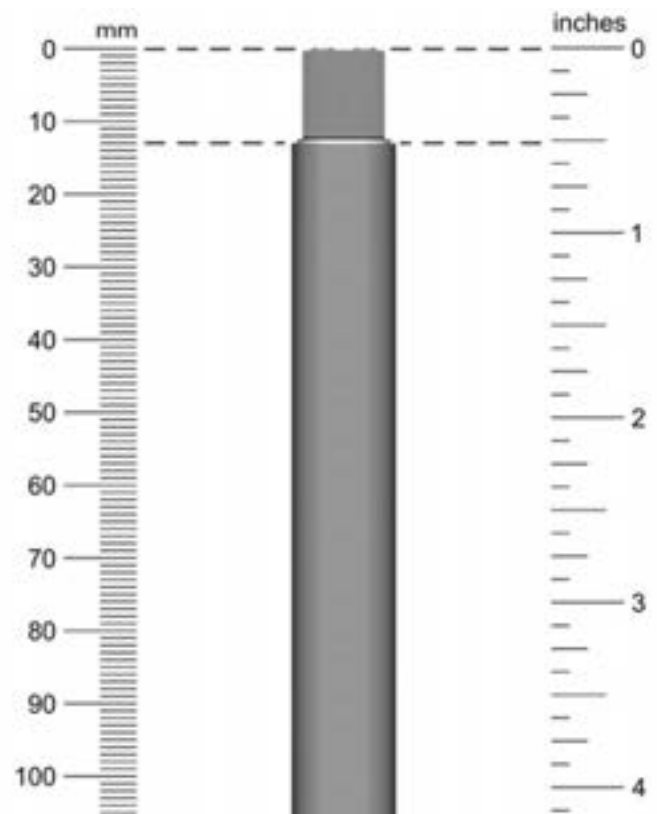
Insert exposed heat trace into PETK end termination boot..



PETK termination boot should look as depicted below.



End Cap Termination Template



16.6 B4X-15140 and B7-15140 Adjustable Ambient Control Thermostats

Application

Electric Heat Tracing Control

The B4X-15140 and B7-15140 are designed to provide ambient sensing control of electric heat tracing circuits for freeze protection of piping and vessels. These adjustable thermostats can be used to control a single heating circuit or as pilot control of a contactor switching multiple heat tracing circuits.

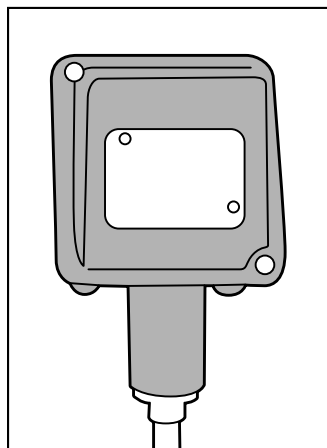
DF-B4X-15140 ... An epoxy polyamide coated die-cast aluminum NEMA 4X enclosure provides watertight, dust-tight and corrosion-resistant protection to the thermostat switch.

DF-B7-15140 ... An aluminum lacquer finished die-cast aluminum enclosure provides NEMA 4 (watertight and dust-tight) and NEMA 7/NEMA 9 (explosion-proof) protection to the thermostat switch. The tamper-resistant, threaded and gasketed aluminum dial cover is externally adjustable. The B4X-15140 thermostat is approved for use in ordinary (nonclassified) locations. The B7-15140 is approved for use in both ordinary (nonclassified) locations hazardous (classified) locations.

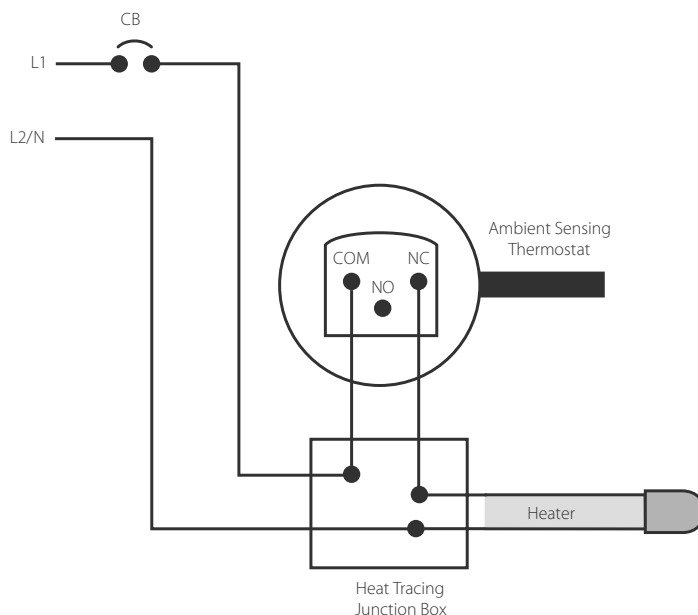
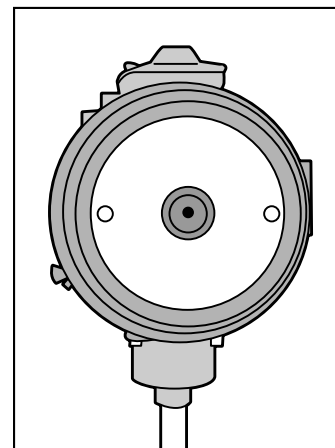
Final Connections

1. Follow the circuit fabrication instructions for the specific cable type. Power connection and end-of-circuit termination kits are designed for each type of cable; substitutions should not be made.
2. For ambient controlled power, the heating circuit should be connected directly to the switched power feed wiring.

DF-B4X-15140



DF-B7-15140



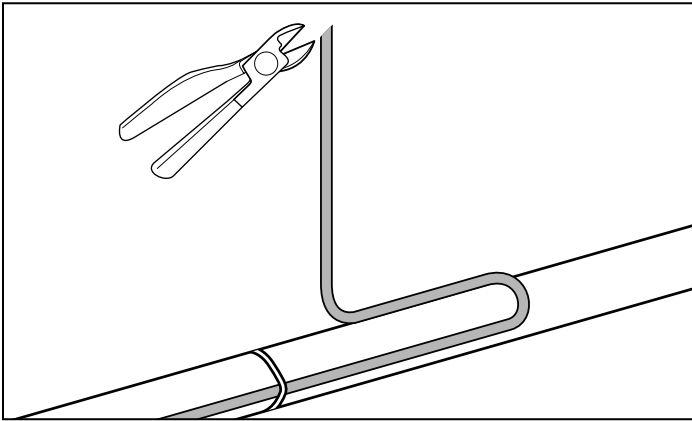
16.7 DF-DP/Terminator Power Connection Kit

Installation Procedure

The following installation procedures are suggested guidelines for the installation of termination connection systems.

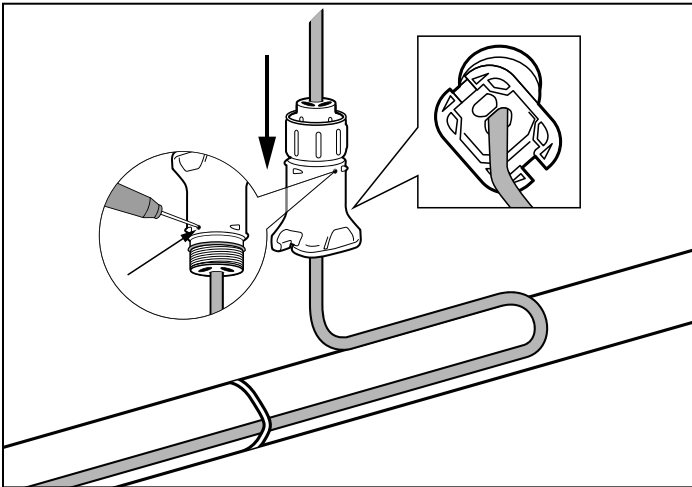
A. LOCATE CONNECTION

Cut end of cable at angle to aid in piercing grommet.



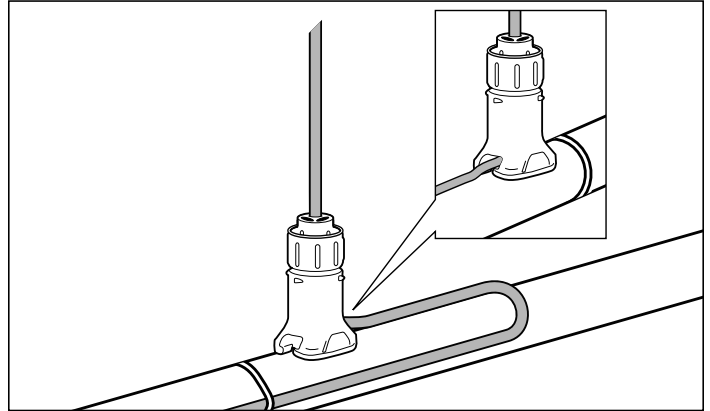
B. INSERT CABLE INTO BASE

Insert cable into the base of DF/DP Terminator. If mounting on bottom of pipe, punch out weep hole.



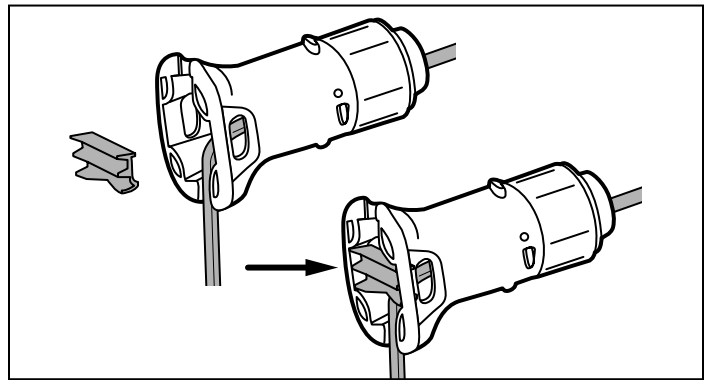
C. ROUTE CABLE

Slide base toward pipe and route cable through support base entry.



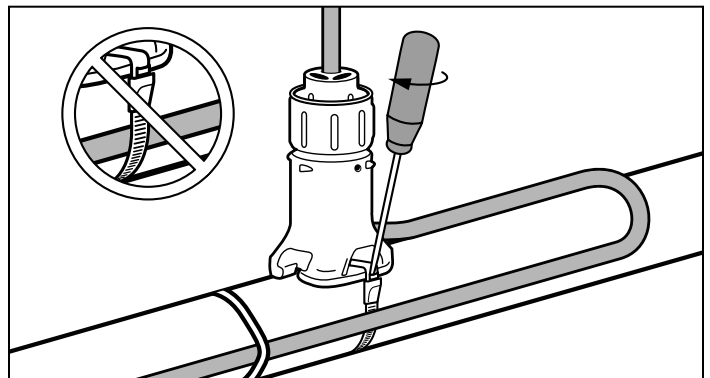
D. INSERT BANDING GUIDE

Insert banding guide into base and snap into place.



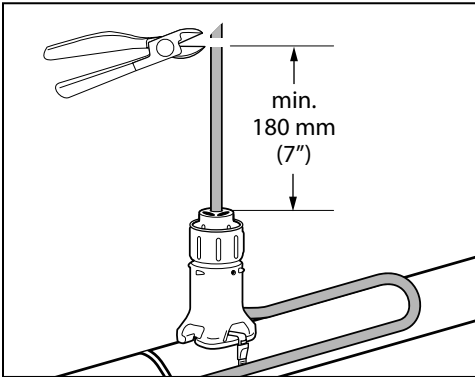
E. MOUNT BASE

Mount base to pipe using pipe band. Do not band over cable.



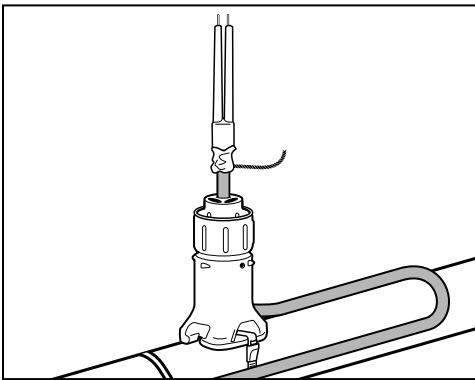
F. EXPOSE CABLE

Cut angle off BSX heat trace cable and expose ample amount in order to prepare end termination.



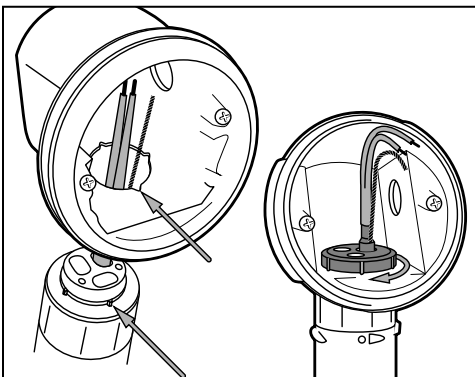
G. TERMINATE CABLE

Terminate BSX cable with appropriate PETK termination kit. Refer to PETK installation instructions.



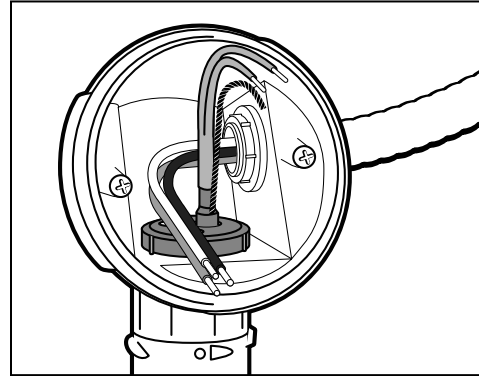
H. MOUNT TOP OF DF/DP

Mount top of DF/DP on base. Make sure to align slots to properly orient junction box base. Tighten inner lock nut securely.

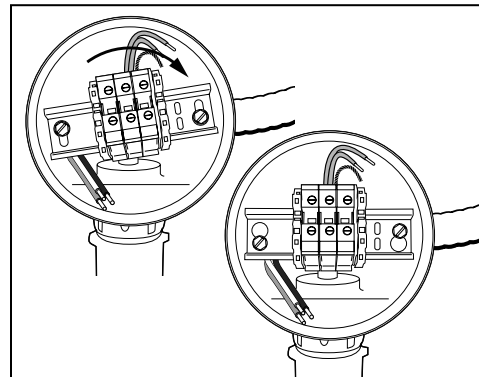


I. INSTALL POWER CONNECTION FITTINGS

For power connection applications: Install power connection fittings (user supplied) and pull in power and ground wires.



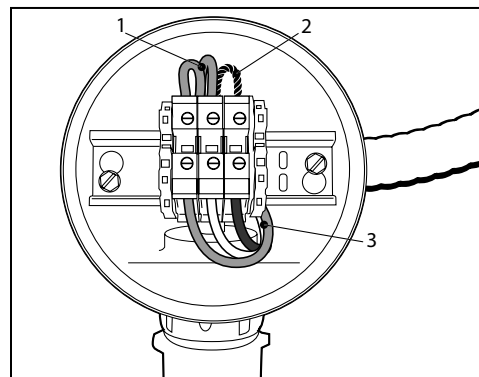
J. INSTALL QUICK MOUNT TERMINAL BLOCKS



K. COMPLETE SYSTEM WIRING

Typical Wiring Detail For DF-DP Terminator

1. DF-PETK-1D Power termination kit
2. Metallic ground braid wire
3. Power/Ground Leads from ambient sensing thermostat (DF-B4X-15140 and DF-B7-15140)



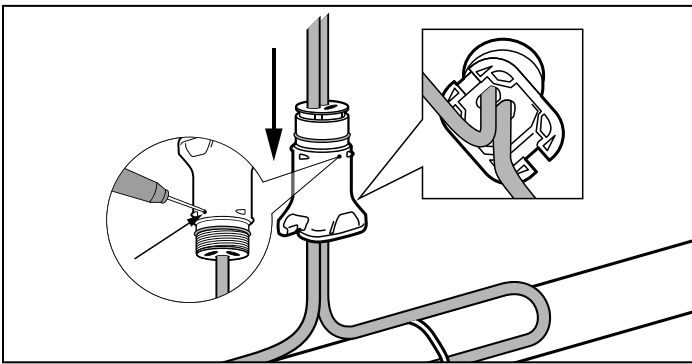
16.8 DF-DS/DE Terminator In-Line Splice/End Termination Kit

Installation Procedure

The following installation procedures are suggested guidelines for the installation of DF-DS/DE splice termination kit.

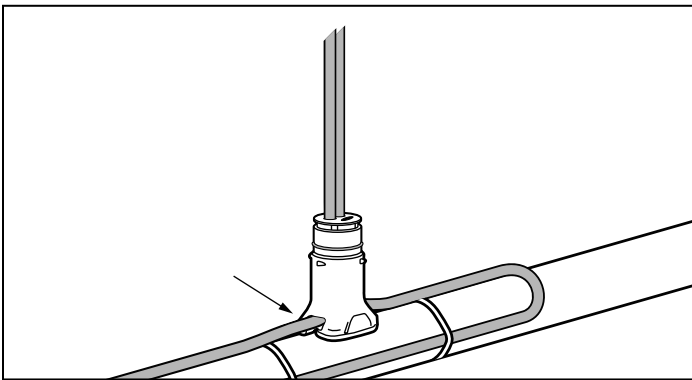
A. INSERT HEAT TRACE CABLES INTO BASE

Insert BSX heat trace cables into the bottom of the DF-DS/DE splice terminator base. Cut each end at an angle to aid in piercing the rubber grommet. If mounting on bottom of pipe, punch out weep hole.



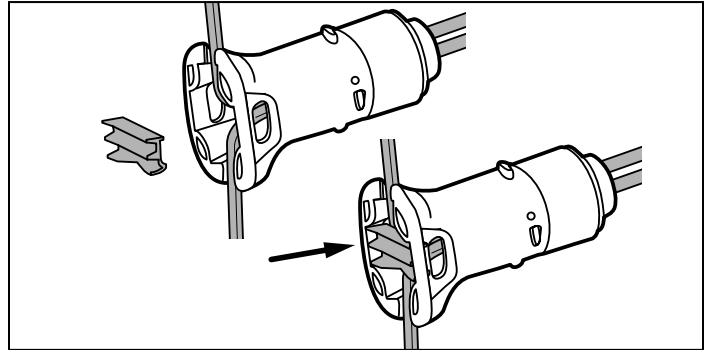
B. ROUTE CABLE

Slide DF-DS/DE base toward pipe and route cables through support base entry.



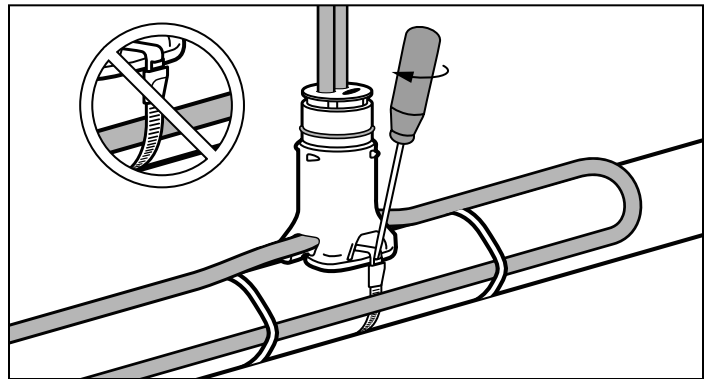
C. INSERT BANDING GUIDE

Insert banding guide into base and snap into place.



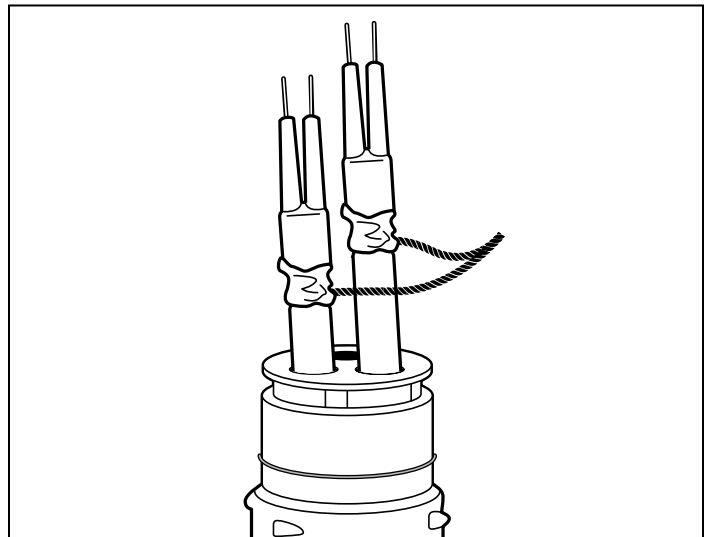
D. MOUNT BASE

Mount base to pipe using pipe band. Do not band over cable.



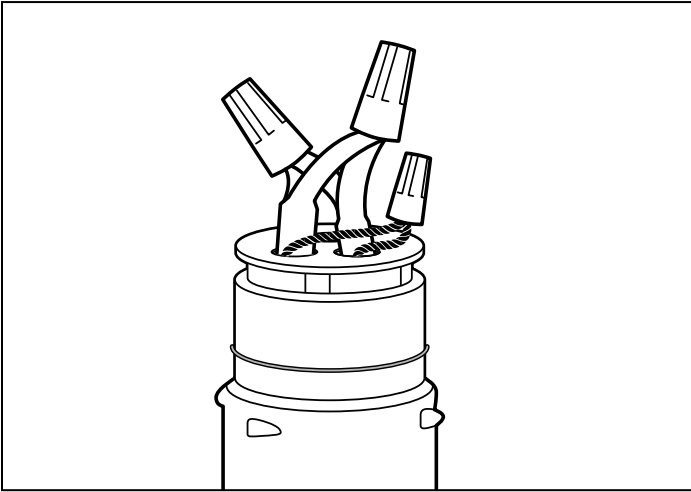
E. TERMINATE CABLES

Terminate cables with appropriate SCKT termination kit. Refer to kit installation instructions.

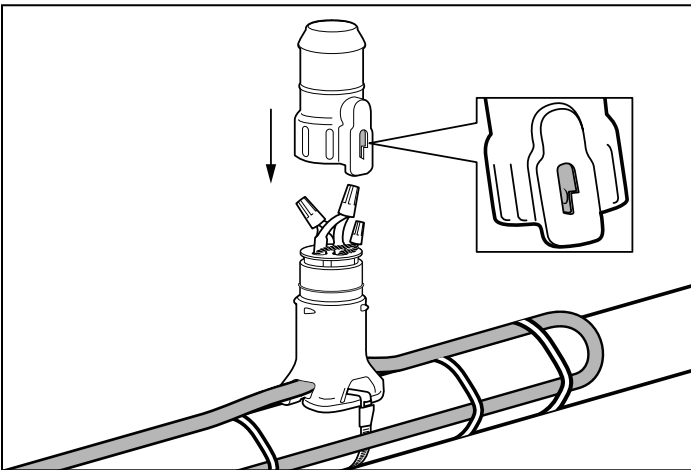


F. CONNECT BUS AND BRAID WIRES

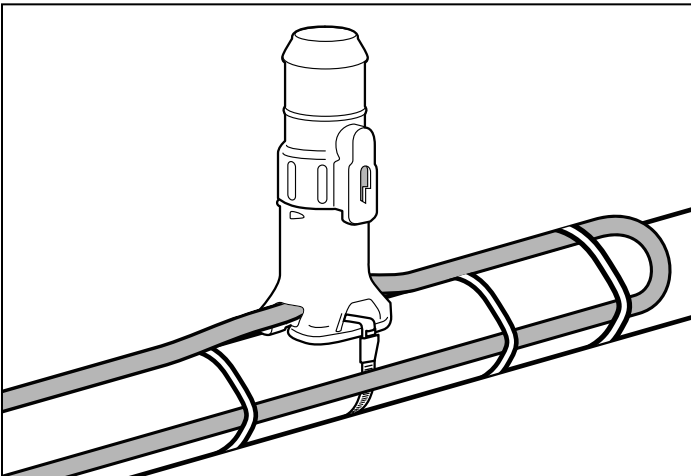
Connect bus and braid wires using wire nuts.



G. TIGHTEN CAP SECURELY.



Completed DF-DS/DE splice kit

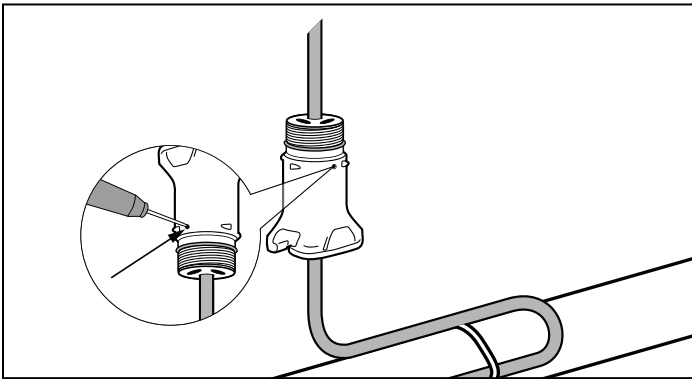


16.9 Beacon Terminator DF-DE-B Pipe Mount LED End of Circuit Light Kit

Installation Procedure

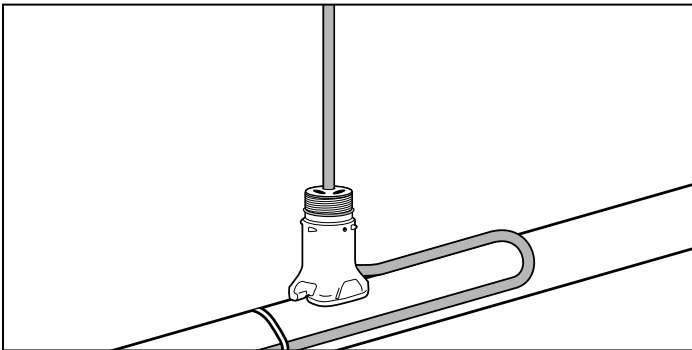
A. INSERT HEAT TRACE CABLES INTO BASE

Insert BSX heat trace cable into the base of the (DF-DE-B or DF-DE-B-FAK) splice terminator base. Cut each end at an angle to aid in piercing the rubber grommet. If mounting on bottom of pipe, punch out weep hole.



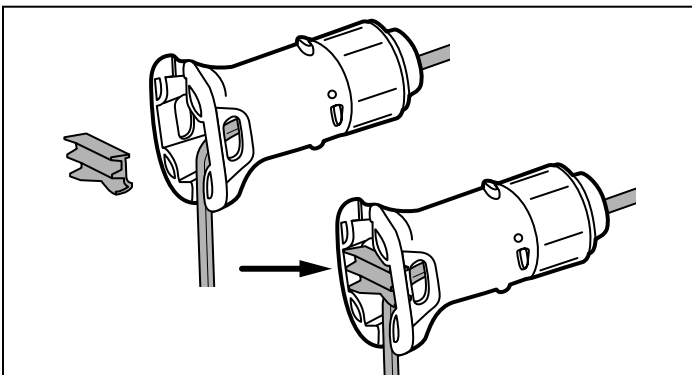
B. ROUTE CABLE

Slide DF-DE-B base toward pipe and route BSX cable through support base entry.



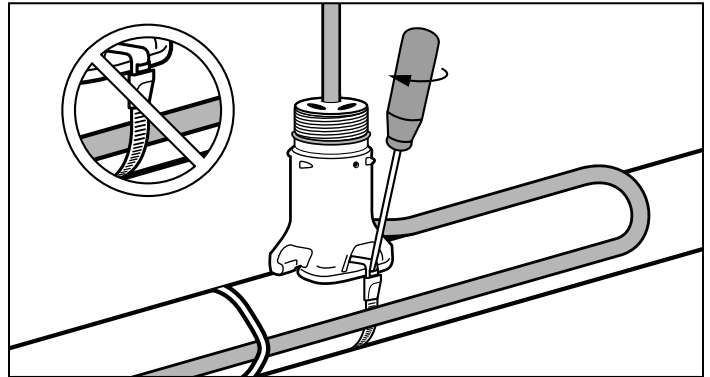
C. INSERT BANDING GUIDE

Insert banding guide into base and snap into place.



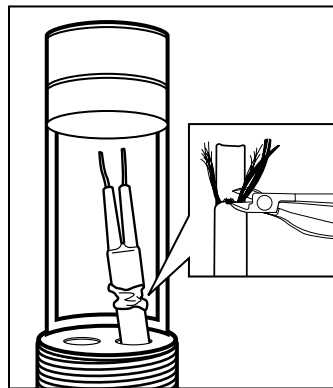
D. MOUNT BASE

Mount base to pipe using pipe band. Do not band over cable.



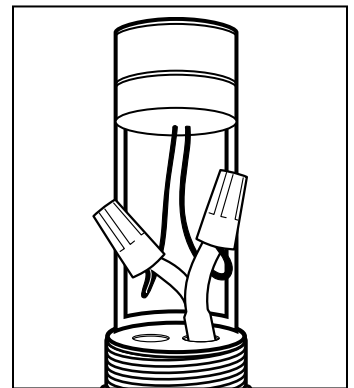
E. TERMINATE CABLE

Terminate cable with appropriate SCTK termination kit. Refer to SCTK installation instructions.



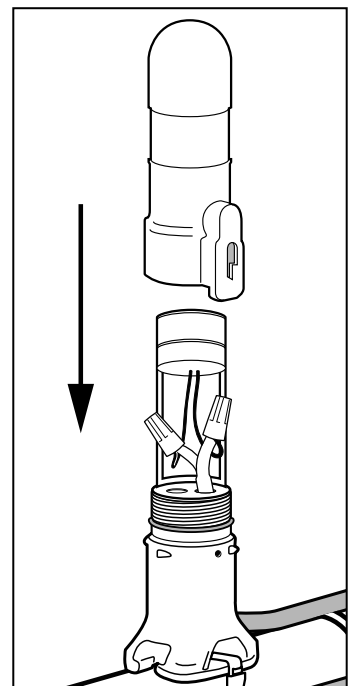
F. CONNECT BSX BUS WIRES

Connect BSX bus wires using wire nuts provided.



G. INSTALL COVER

Slide the light module cover over the light and tighten cap securely.



16.10 Beacon Terminator

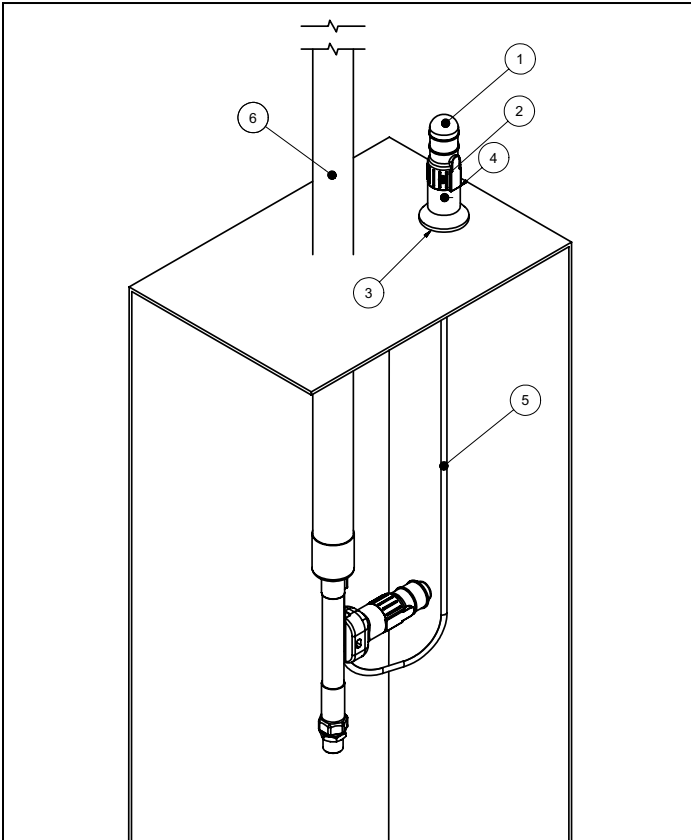
DF-DE-B-FAK Flat Mount

LED End of Circuit Light Kit

Installation Procedure

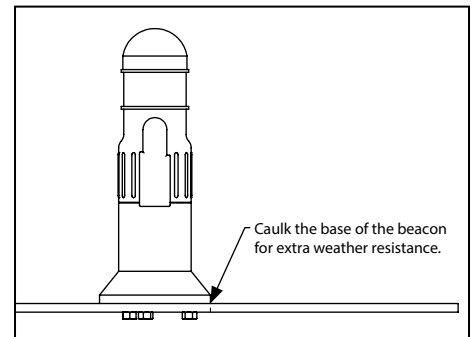
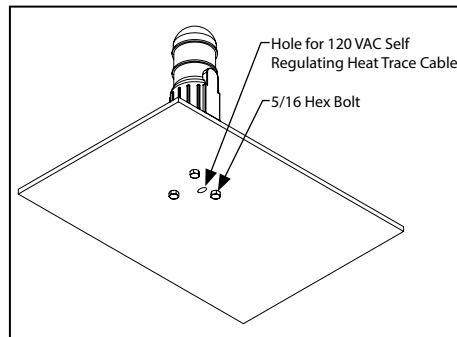
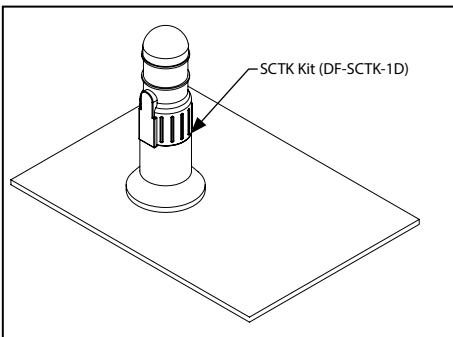
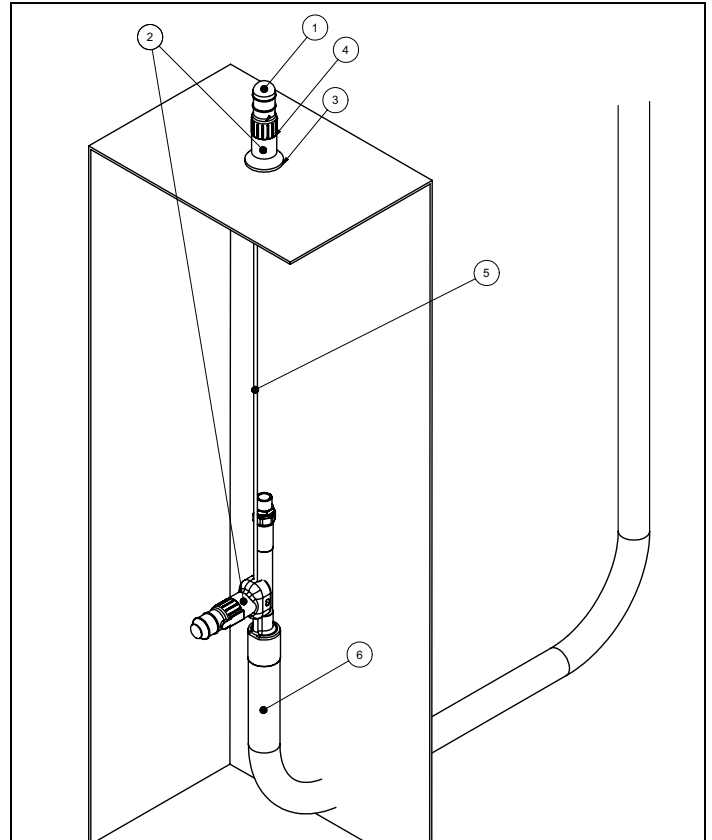
A. PIPE ENTRANCE TOP

1. Green light is on when heat trace is working
2. SCTK kit is used for installation of the flat mount beacon (DF-SCTK-1D)
3. Caulk the base of the beacon for weather resistance
4. Lube O-ring using white lithium/bearing grease
5. 8' of Thermon BSX 120 VAC self regulating heat trace cable (DF-BSX5-10J)
6. DEF-Trac piping (DF-FSPHT-XX-XXX)



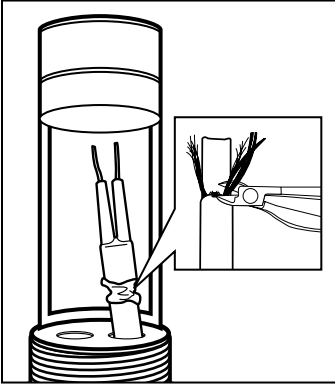
B. PIPE ENTRANCE SIDE

1. Green light is on when heat trace is working
2. SCTK kit is used for installation of the flat mount beacon (DF-SCTK-1D)
3. Caulk the base of the beacon for weather resistance
4. Lube O-ring using white lithium/bearing grease
5. 8' of Thermon BSX 120 VAC self regulating heat trace cable (DF-BSX5-10J)
6. DEF-Trac piping (DF-FSPHT-XX-XXX)



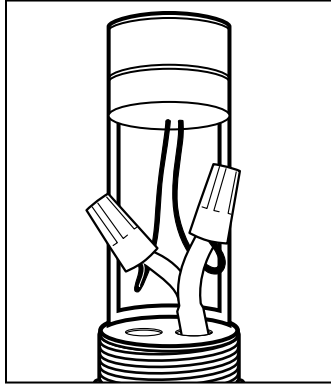
C. TERMINATE CABLE

Terminate cable with appropriate SCKT termination kit. Refer to SCKT installation instructions.



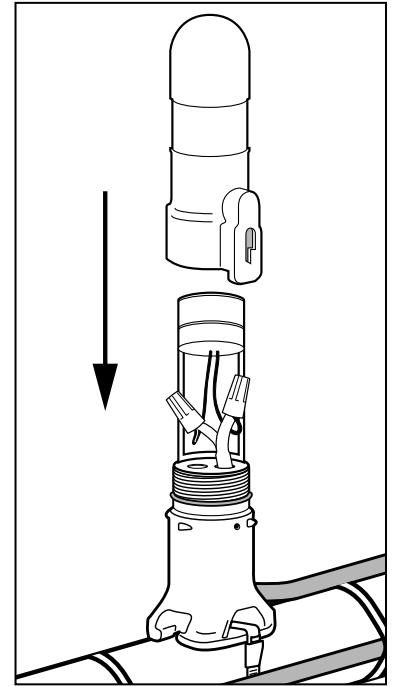
D. CONNECT BSX BUS WIRES

Connect BSX bus wires using wire nuts provided.

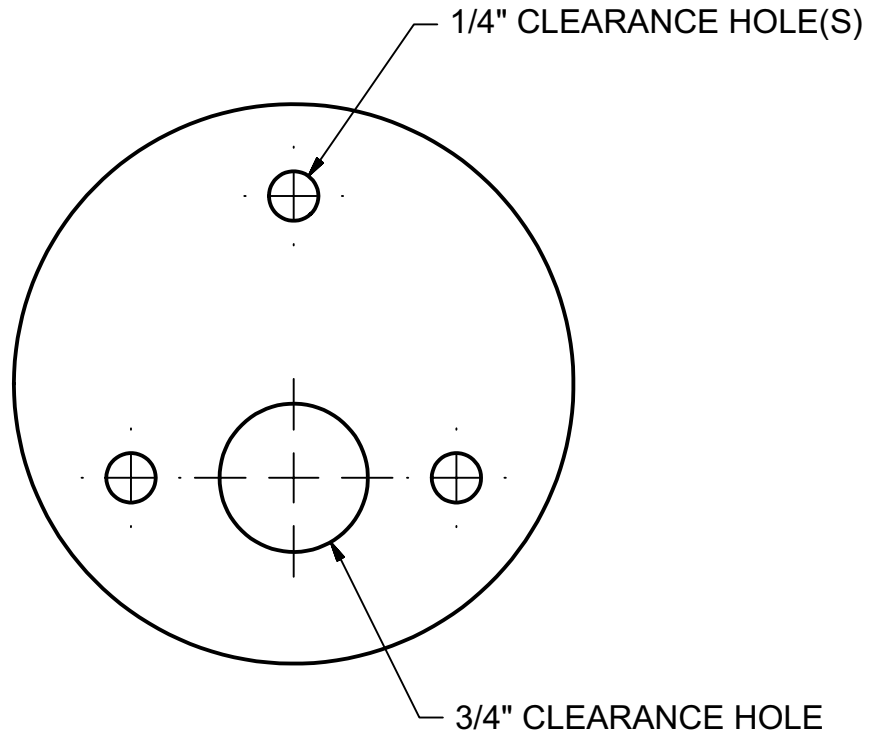


E. INSTALL COVER

Slide the light module cover over the light and tighten cap securely.



DF-DE-B-FAK (FLAT MOUNT) BASE DRILL HOLE TEMPLATE





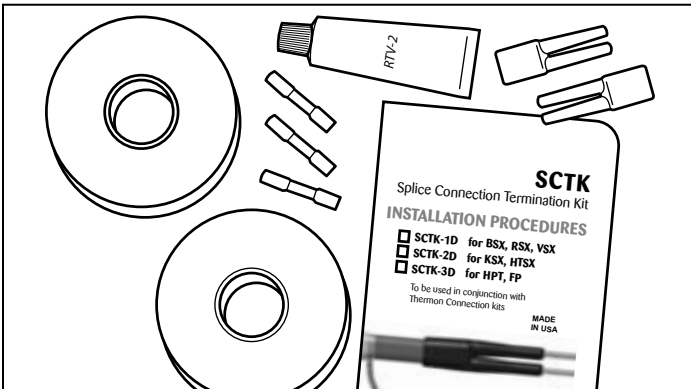
▲ WARNING

FIELD SPLICE DOES NOT REPLACE DS/DE TERMINATION KIT. THIS PROCEDURE IS FOR FIELD REPAIR UNDER INSULATION ONLY.

17. HEAT TRACE FIELD SPLICE PROCEDURE

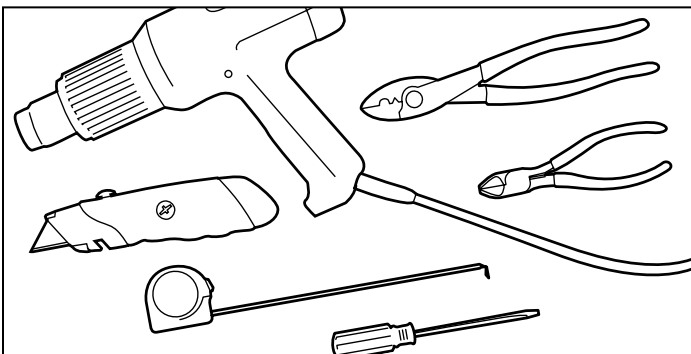
MATERIALS:

- Thermon Splice Connection Termination Kit (SCTK)
- Scotch 130C Linerless Rubber Splicing Tape
- Scotch Super 88 Vinyl Electrical Tape
- Thomas & Betts 2RBS14X 16-14 Heat Shrink Butt Connector (2)
- Thomas & Betts 2RCS10X 12-10 Heat Shrink Butt Connector (1)



TOOLING:

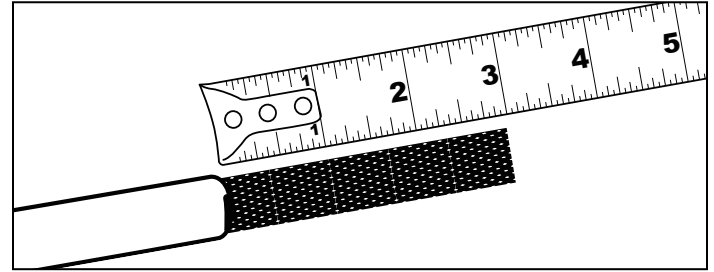
- Heat Gun
- Electrical Crimper
- Cutting Pliers
- Utility Knife
- Tape Measure
- Small Flathead Screwdriver



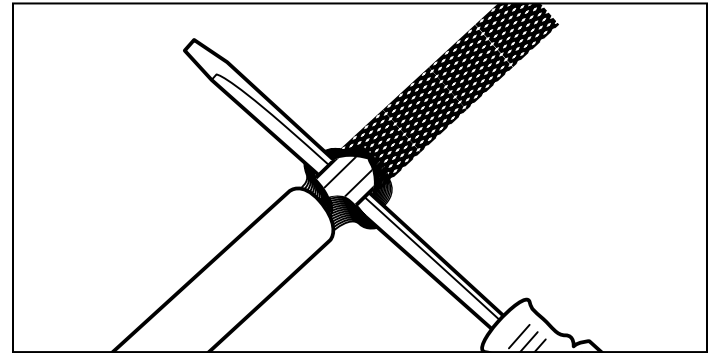
Installation Procedure

A. SPLICE END A (3" GROUND WIRE)

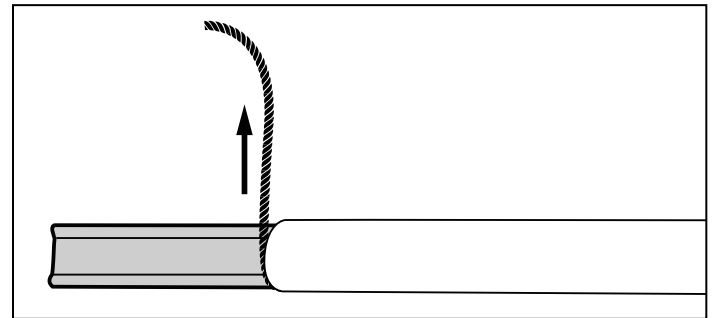
Cut and remove 3" of heating cable overjacket.



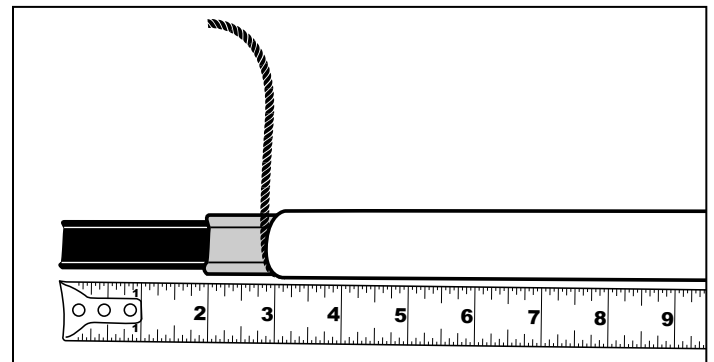
Separate braid strands at edge of overjacket and pull cable through opening in braid.



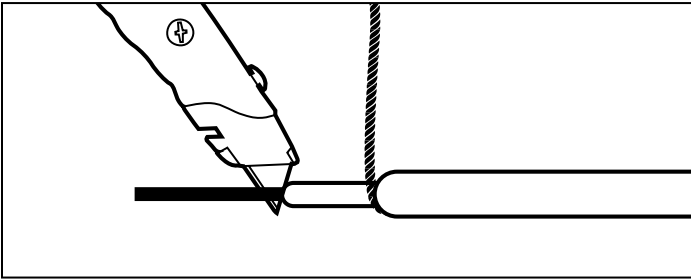
Twist braid into a pigtail. Trim ends of braid.



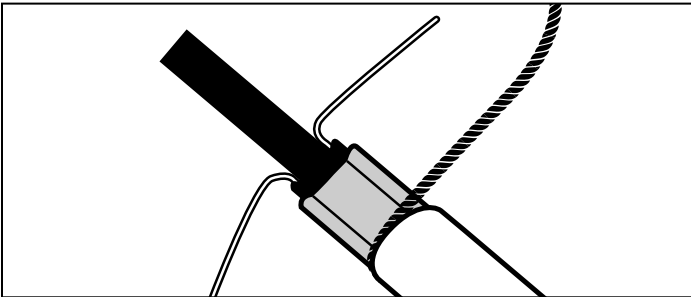
Cut and remove 2" of primary insulation jacket.



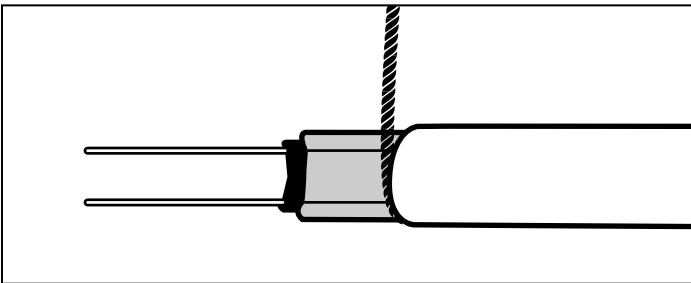
Strip both sides of the conductive matrix to expose each bus wire.



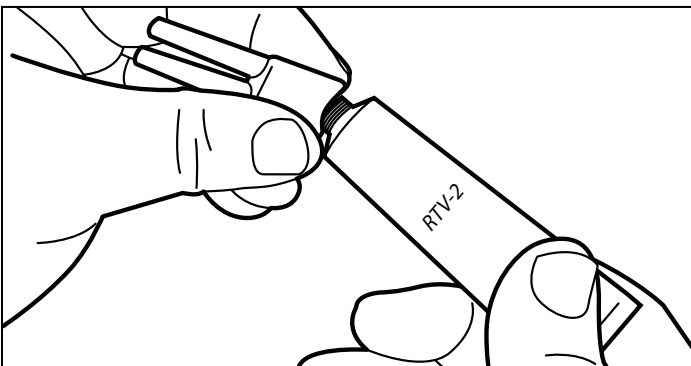
Separate bus wires from conductive matrix.



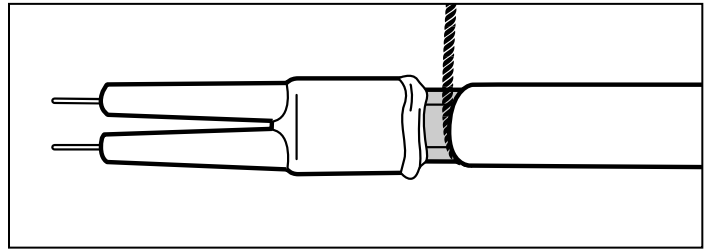
Cut off excess conductive matrix.



Apply a liberal amount of RTV sealant to the insulation boot.

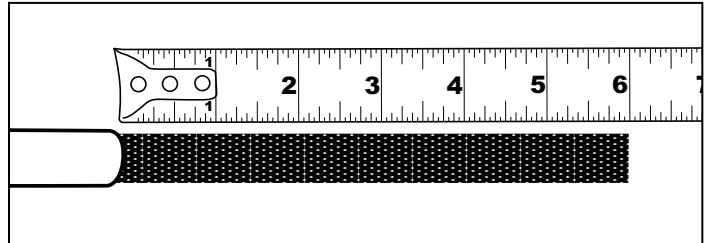


Slide boot onto the end of the cable.

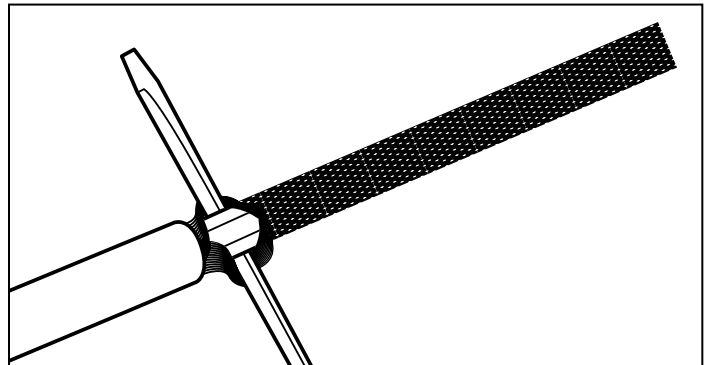


B. SPLICE END B (6" GROUND WIRE)

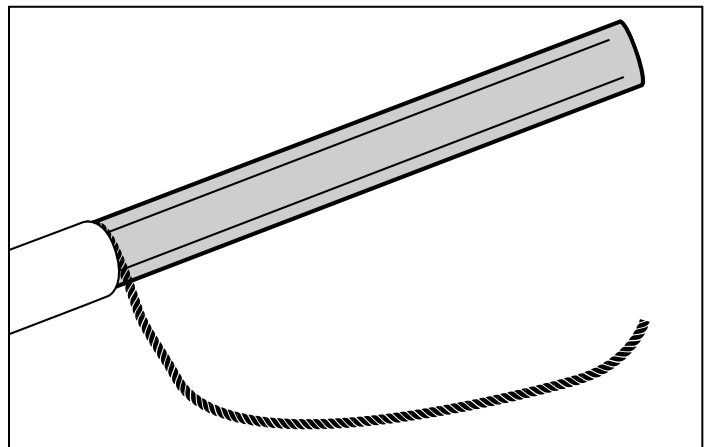
Cut and remove 6" of heating cable overjacket.



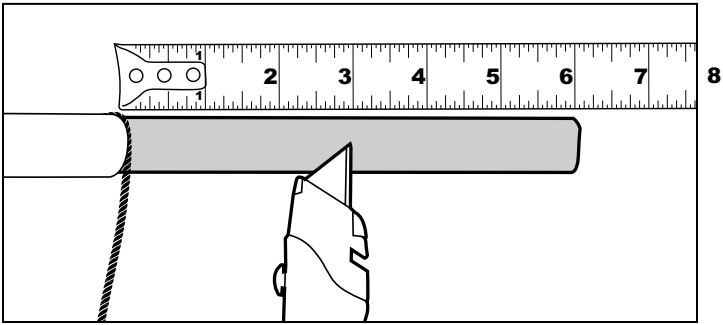
Separate braid strands at edge of overjacket and pull cable through opening in braid.



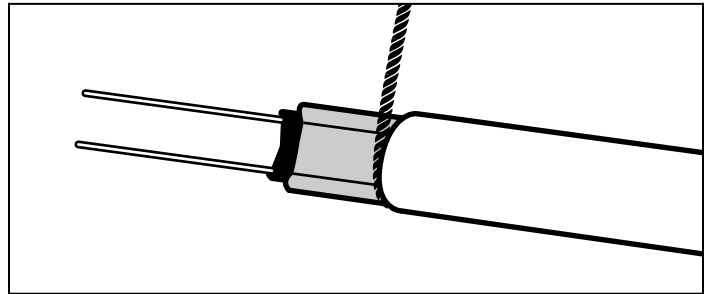
Twist braid into a pigtail. Trim ends of braid.



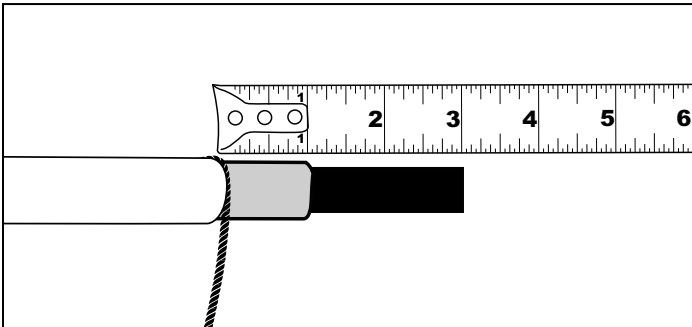
Cut off 3" of cable. Keep 6" ground wire.



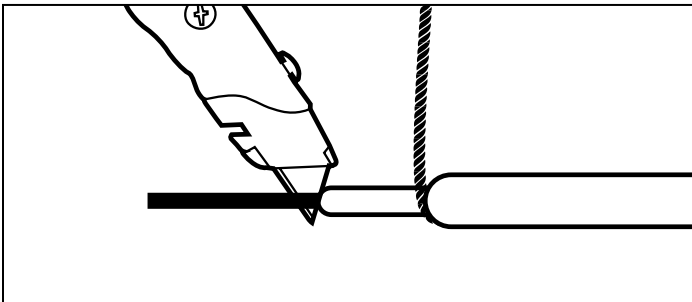
Cut off excess conductive matrix.



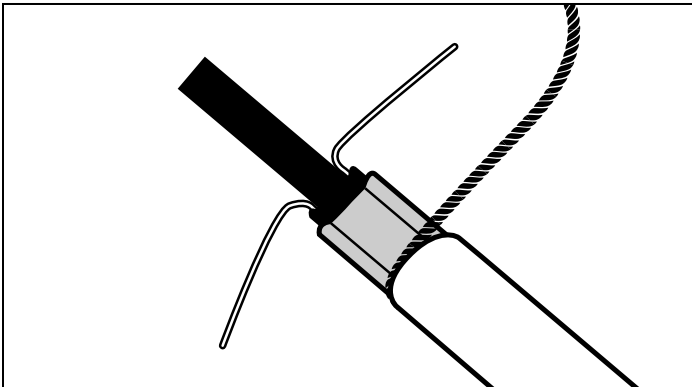
Cut and remove 2" of primary insulation jacket.



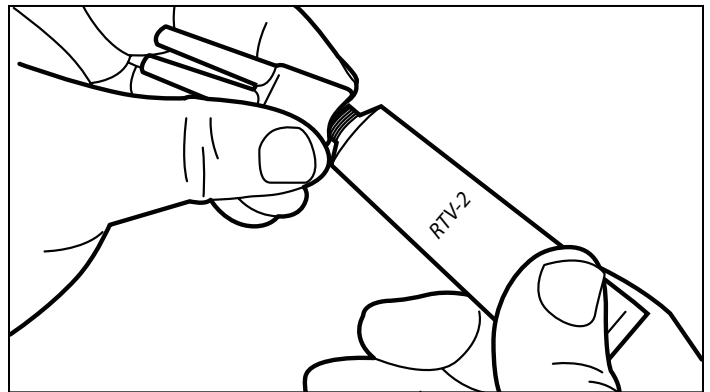
Strip both sides of the conductive matrix to expose each bus wire.



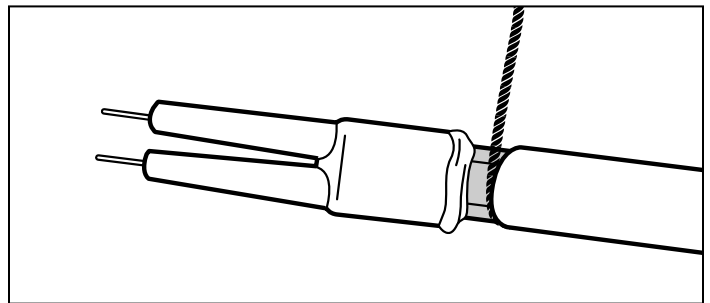
Separate bus wires from conductive matrix.



Apply a liberal amount of RTV sealant to the insulation boot.

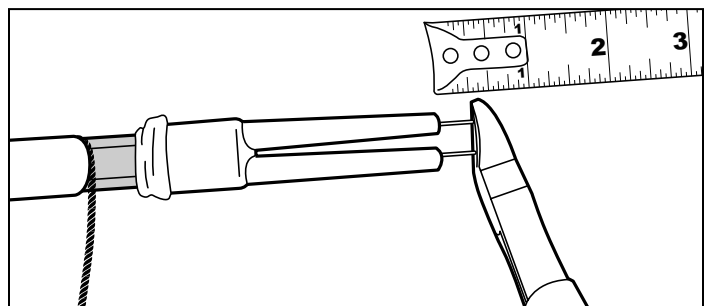


Slide boot onto the end of the cable.

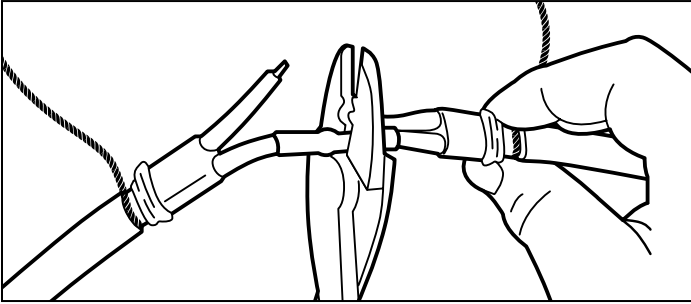


C. CONNECTION

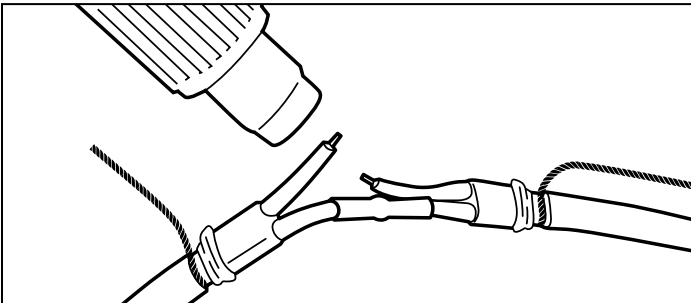
Trim back all bus wires to 1/4" sticking out of both insulation boots.



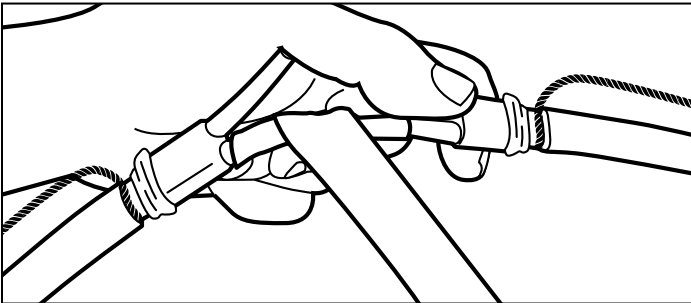
Crimp butt connector to one bus wire on each section of heat trace using the insulated groove in the crimping pliers.



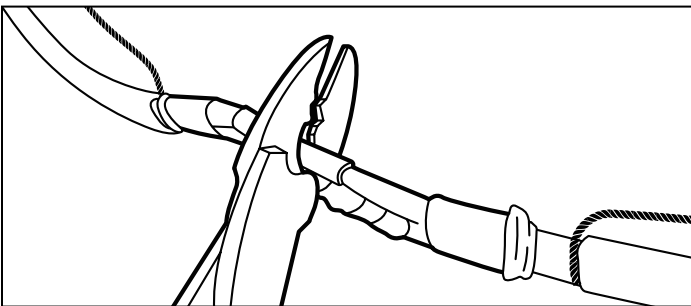
Use heat gun to shrink and seal butt connector.



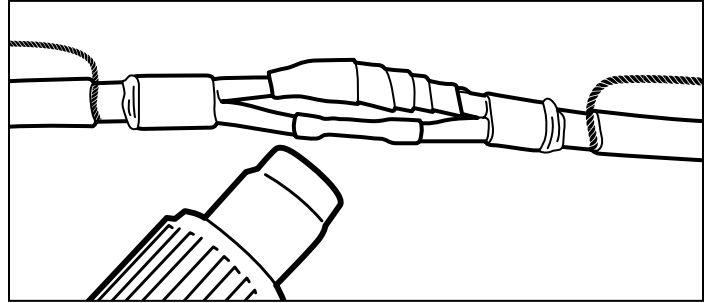
Wrap crimped connection in **Scotch 130C Linerless Rubber Splicing Tape**, stretching the tape and overlapping wraps ½ the width of the tape.



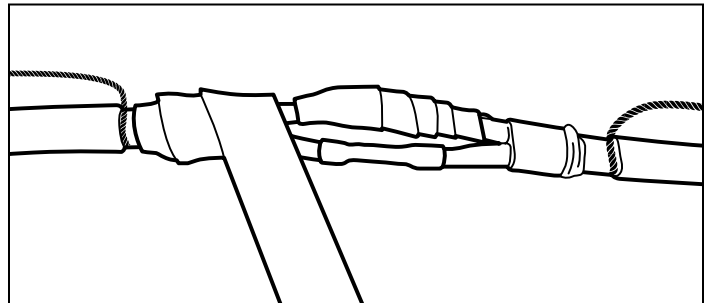
Crimp second pair of bus wires together.



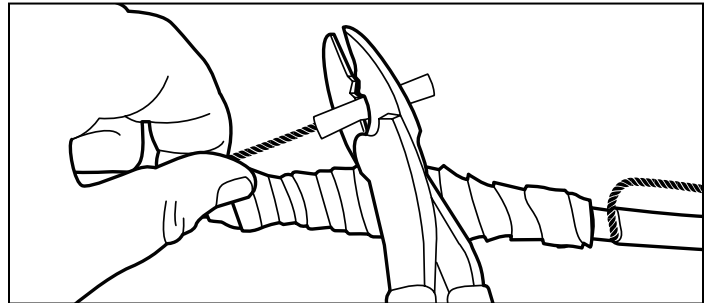
Heat crimped connectors to shrink fit.



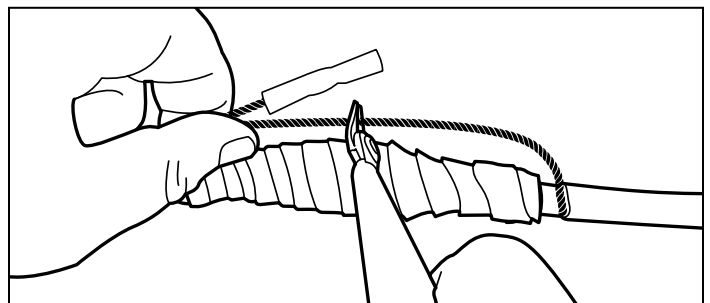
Wrap connected boots with **Scotch 130C Linerless Rubber Splicing Tape**, stretching the tape and overlapping wraps ½ the width of the tape. Keep the ground free.



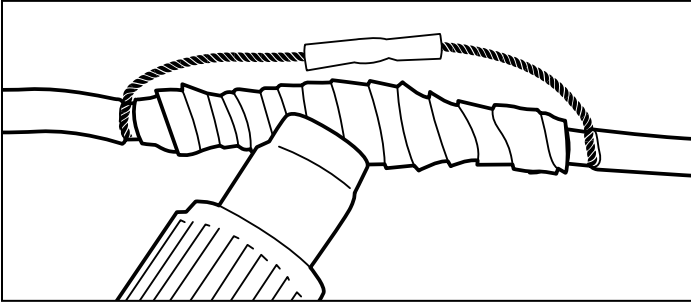
Apply crimp connector to short (3") pigtail.



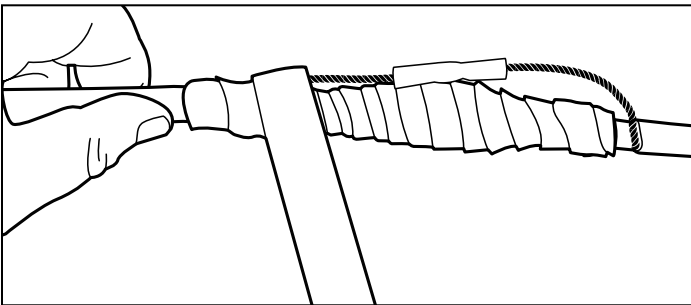
Cut necessary length of the long (6") pigtail to reach butt connector.



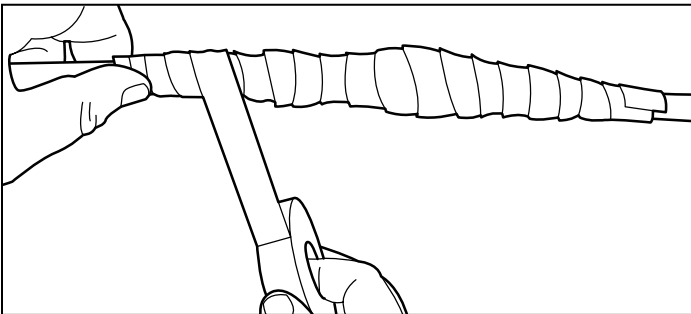
Connect pigtails and apply heat gun for shrink wrap.



Wrap entire splice with **Scotch 130C Linerless Rubber Splicing Tape**, stretching the tape and overlapping wraps ½ the width of the tape.

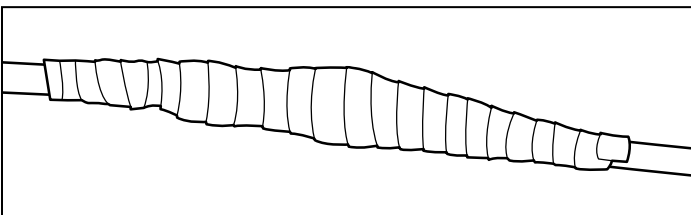


Wrap entire splice location with **Scotch Super 88 Vinyl Electrical Tape**, stretching the tape and overlapping wraps ½ the width of the tape.



D. FINISHED SPLICE

Spliced, Insulated, Grounded and Sealed Heat Trace



18. FINAL INSPECTION

The heating circuit can now be tested for proper operation. This includes measuring and recording the connected voltage, steady-state current draw, length and type of cable, ambient temperature and temperature of the pipe. The complete system (especially the thermal insulation) should now be visually inspected. Additional insulation should be applied snugly around pipe shoes or other heat sinks and sealed from the weather. Expansion joints on high temperature lines should be examined carefully. There may be exposed insulation where sections fit together or around flanges, valves, pipe hangers or connection kits; these locations should be sealed to prevent ingress of moisture. "Electric Heat Tracing" caution labels should be applied to the outer surface of the weather barrier at regular intervals of 10 feet (or as required by code or specification). The location of splices and end terminations should also be marked with splice and end termination caution labels.

19. THERMAL INSULATION

The value of properly installed and well-maintained thermal insulation cannot be overemphasized. Without the insulation, the heat loss is generally too high to be offset by a conventional heat tracing system.

Before the thermal insulation is installed on a heat-traced pipe, the tracing circuit should be tested for dielectric insulation resistance. This will ensure that the cable has not been damaged while exposed on the un-insulated pipe.

In addition to piping and in-line equipment such as pumps and valves, all heat sinks must be properly insulated. This includes pipe shoes, hangers, flanges and, in many cases, valve bonnets.

There are many different pipe insulation materials, each of which has advantages in particular applications. Regardless of the type or thickness of insulation used, a protective barrier should be installed. This protects the insulation from moisture intrusion and physical damage and helps ensure the proper performance of the heat tracing system.

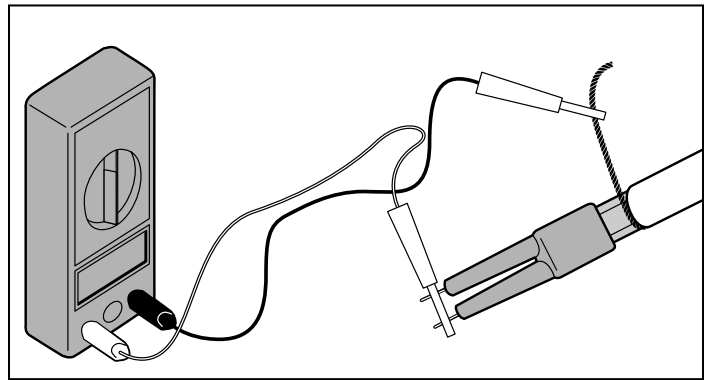
NOTE

When rigid (non-compressible) materials are used, the inside diameter of the insulation is usually oversized to accommodate the heating cable on the pipe.

Insulating materials are very susceptible to water absorption, which dramatically increases the heat loss and should be replaced if the materials get wet.

20. CABLE TESTING

After a heat tracing circuit has been installed and fabricated, the heating cable should be tested to ensure electrical resistance integrity. The cable should be tested with at least a 1000 VDC megohmmeter (megger) between the heating cable bus wires and the heating cable metallic braid. After properly terminating the cable, connect the positive lead of the megger to the bus wires and the negative lead to the metallic braid. The minimum acceptable level for the megger reading for any polymer-insulated heat tracing cable is **20 megohms**. This test should be repeated after the installation is complete but prior to commissioning of the system. If during any test the meter readings vary by +/- 10% from the previous test, stop the installation and investigate. Please check for pinched or crushed cables, test splices, test power connections, test end terminations, and repair accordingly. Check for water in all junction boxes or conduit. Any faults should be repaired by a qualified electrician or factory technician.



21. MAINTENANCE

Once the heat tracing system has been installed, an ongoing preventive maintenance program should be implemented using qualified personnel. Support documentation providing general information and an operating history of the specific circuits in the system should be maintained. The results of the operational testing described above form the testing "base line" or normal range. Subsequent measurements should be recorded periodically and compared to this base-line data to help identify potential malfunctions.

Important Information Follow All Instructions**22. DEF-Trac Piping Inspection Checklist (To be Completed Prior to Commissioning System)**

RETURN TO OMEGAFLEX

FAX 610-524-6484

Site #	Date	Location Address	Reference Drawings
Circuit Information			
Run 1 Circuit Length	Panel No.		Circuit # 120v
Run 2 Circuit Length	Panel No.		Circuit # 120v
Ground Fault Protection Device (Type/MFG)			
Ground Fault Trip Setting (30mA Recommended)			
Site # Date: Location Address: Reference Drawings			
Number of Thermostats		Location	
Thermostat Setting 1		Deg F	
Thermostat Setting 2		Deg F	
Electrical			
Dielectric Insulation Resistance Testing (megger) Refer to IEEE 515-1997 Section 7.9			
Test Voltage	20 Mohms Min - Use 1000 Vdc MEGGER		
Megger Value	20 Mohms Min - Use 1000 Vdc MEGGER		
Heater Supply Voltage			
Value at Power Source Circuit 1			
Value at Field Connection Circuit 1			
Value at Power Source Circuit 2			
Value at Field Connection Circuit 2			
Heater Circuit 1 Current Reading			
Amps Reading at 2-5 min			
Amps Reading at 15 min.			
Ground Fault Current			
Heater Circuit 2 Current Reading			
Amps Reading at 2-5 min			
Amps Reading at 15 min.			
Ground Fault Current			
Comments and Actions			

Important Information Follow All Instructions

RETURN TO OMEGAFLEX

FAX 610-524-6484

Visual Inspection		
DEF Tank Sump	Yes	No
Installation of DP Terminator		
Perform megger test on Heat Trace Circuit		
Proper Installation of Cable terminations (PETK and SCTK)		
RTV Sealant used on terminations (PETK and SCTK)		
Heat Trace is not bent /crimped or cut		
Piping Bundle Rubber Seal installed		
Fitting Nut Rubber Seal installed		
No Exposed Stainless Steel on DEF-Trac Pipe		
DripStop 940 used on NPT pipe fittings		
Fittings Sprayed with Leak Check at Pressure Test		
Dispensers / Transition Sump <i>(Check Each Dispenser/Box for Compliance Below)</i>	Yes	No
Installation of DS/DE or DP Terminator		
Perform megger test on Heat Trace Circuit		
Proper Installation of Cable terminations (PETK and SCTK)		
RTV Sealant used on terminations (PETK and SCTK)		
Heat Trace is not bent /crimped or cut		
Piping Bundle Rubber Seal installed		
Fitting Nut Rubber Seal installed		
No Exposed Stainless Steel on DEF-Trac Pipe		
DripStop 940 used on NPT pipe fittings		
Fittings Sprayed with Leak Check at Pressure Test		
DE-B Beacon Installed		
Tightness Testing of Piping	Yes	No
Pressurized 25psi Test Performed		
Pressurized 75psi Test Performed		
Comments and Actions		
Site Electrician		
General Contractor		
Project Manager		

23. DEF-TRAC WARRANTY

LIMITED WARRANTY

Omega Flex, Inc. (the "Manufacturer") warrants that all OmegaFlex DEF-Trac® (the "Product") will be free from defects in material or workmanship for one (1) years; as measured from the date of shipment from OmegaFlex. If upon examination by the Manufacturer, the Product is shown to have a defect in material or workmanship during the warranty period, the Manufacturer will repair or replace, at its option, that part of the Product which is shown to be defective.

This limited warranty does not apply:

- If the Product has been subjected to misuse or neglect, has been accidentally or intentionally damaged, or has been altered or modified in any way.
- If the Product has been repaired by anyone who is not an OmegaFlex authorized service representative.
- If the Product has not been installed in accordance with the DEF-Trac installation guidelines.
- If the Product has been installed with unauthorized third party components, except those components that are recommended for use with DEF-Trac in the DEF-Trac installation guide.
- To any costs or expenses incurred during investigation, removal or reinstallation of the defective Product, including without limitation any costs or expenses for clean-up, downtime, or lost profits.
- To any damage or impairment of the Product caused by any casualty, including without limitation fires, storms, floods, earthquakes, or acts of God.
- To any workmanship of the installer of the Product.

DISCLAIMER

This limited warranty is conditional upon:

- Receipt of a written warranty claim during the applicable warranty period.
- Installment of the Product by an individual who has received factory authorized training on the installation and proper use of DEF-Trac.
- All site and warranty registration forms are completed and received by DEF-Trac within 30 days of installation.
- OmegaFlex receives notice of warranty claim within 24 hours of any known or suspected failure of the Product.

Repair or replacement of any part under this Limited Warranty shall not extend the duration of the warranty with respect to such repaired or replaced part beyond the stated warranty period.

THIS LIMITED WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ALL SUCH OTHER WARRANTIES, INCLUDING WITHOUT LIMITATION IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY DISCLAIMED AND EXCLUDED FROM THIS LIMITED WARRANTY.

IN NO EVENT SHALL THE MANUFACTURER BE LIABLE IN ANY WAY FOR ANY CONSEQUENTIAL, SPECIAL, OR INCIDENTAL DAMAGES OF ANY NATURE WHATSOEVER, OR FOR ANY AMOUNTS IN EXCESS OF THE SELLING PRICE OF THE PRODUCT OR ANY PARTS THEREOF FOUND TO BE DEFECTIVE. THIS LIMITED WARRANTY GIVES THE ORIGINAL OWNER OF THE PRODUCT SPECIFIC LEGAL RIGHTS. YOU MAY ALSO HAVE OTHER RIGHTS WHICH MAY VARY BY EACH JURISDICTION.

The products illustrated reflect the design characteristics at time of printing. Please contact the factory for certified prints with exact dimensions when required.

The technical data contained herein is a guide to the user of DEF-Trac products. The data contained herein is based upon tests and information believed to be reliable, but users should not rely upon it absolutely for specific applications. It is given and accepted at user's risk and confirmation of its validity and suitability in particular cases should be obtained independently.

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OmegaFlex policy is one of continuous improvement and development. OmegaFlex reserves the right to change specifications and introduce improved designs without notice.



For more information please visit our new website at
www.doubletrac.net or call 1-800-355-1039.

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