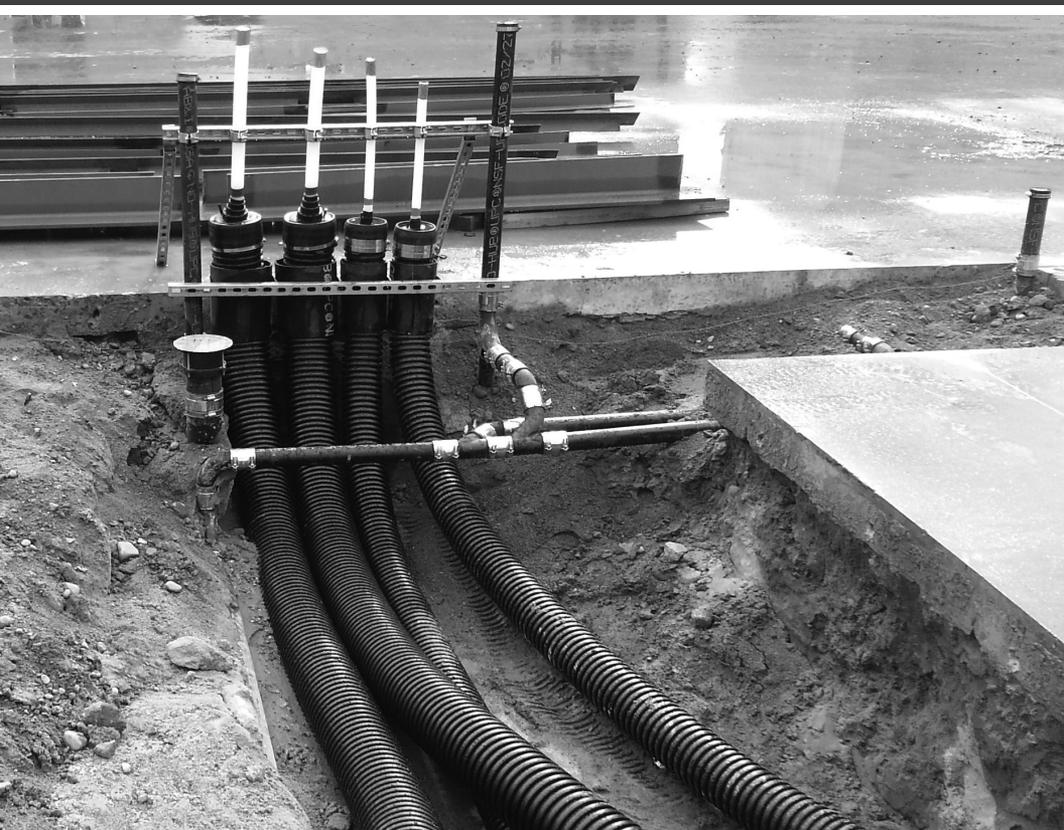


Uponor

Ecoflex[®] potable PEX plus pre-insulated pipe system

Installation guide



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Table of contents

Section 1 — Ecoflex® potable PEX plus pre-insulated pipe	3
Structure.....	3
Cable.....	4
Section 2 — Planning	7
Safety devices installation equipment.....	7
Sizing the supply cable.....	7
Electrical planning.....	7
Circuit length.....	8
Protection.....	8
Ecoflex potable PEX plus accessories.....	8
Section 3 — Installation	9
Heating cable.....	9
General electrical installation instructions.....	9
Installation.....	9
Connections.....	9
Technical drawings.....	10
End cap mounting instructions.....	10
Required tools.....	10
Terminating inside insulation kit.....	11
Heat-trace accessories.....	11
Required tools.....	11
Branch tee installation.....	12
Heat-trace power terminal block installation.....	14
Power terminations.....	15
Heat-trace end seal installation.....	16

Section 1

Ecoflex® potable PEX plus pre-insulated pipe

Ecoflex® potable PEX plus is a versatile, insulated water pipe containing a self-regulating heating cable to prevent freezing. It is suitable for use as a water pipe or pressure sewage system for resort villages, holiday homes, residential areas, industry, ski centers and other locations susceptible to freezing.

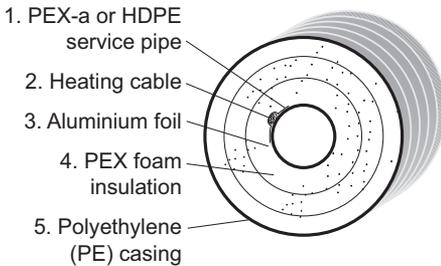


Figure 1-1: Ecoflex potable PEX plus pre-insulated pipe

Ecoflex potable PEX plus pipe comes in a maximum 300-ft. (91m) coil completely ready for installation. The unique features of the self-regulating heating cable allows installers to cut Ecoflex potable PEX plus pipe at the required length, without compromising quality. The service pipe size is 1¼". The maximum pressure for the PEX-a pipe is 160 psi (11 bar) at 73°F (23°C). Connect the service pipe using Uponor ProPEX® fittings for fast and reliable installations and long-term peace of mind.

Part no.	Pipe diameter	Casing O.D.	Insulation thickness	Weight	Bend radius	Max. coil length
54555513	1¼"	5.5" (140mm)	1.65" (42mm)	1.08 lbs/ft (0.49 kg/m)	12" (308mm)	300 ft. (91mm)

Table 1-1: Uponor Ecoflex potable PEX plus pre-insulated pipe specifications

Structure

1. Service pipe — The service pipe, made of crosslinked polyethylene (PEX-a), distributes potable water.

2. Heating cable — The self-regulating heating cable has a nominal output of 17 W/m (watts per meter) or 5 W/ft. (watts per feet) and supply voltage of 240 VAC (see **Figure 1-3** on **page 4**).

3. Aluminium foil — Aluminium foil intensifies heat transmission from the cable to the service pipe.

4. PEX-foam insulation — The closed-cell structure of the PEX-foam insulation prevents water absorption and provides good insulation. The foam is 1.87 lb/ft³ (30kg/m³) and thermal conductivity is 0.25 BTU in/ft²/h/°F (0.036 W/mK).

5. Polyethylene (PE) casing — The PE casings are made of corrugated high-density polyethylene (HDPE). Corrugation makes the casing stiff, but flexible.

Cable

The self-regulating heating cable is designed specifically to prevent pipes from freezing. The heating part of the self-regulating heating cable is a conductive polymer extruded between two copper wires (hot and neutral). In cold sections of the cable, a large current travels from one wire to another, creating heat in the core material. In the warmer cable sections, the material resistance increases, slowing the current and reducing the output. This balances the heat production of the cable and regulates the heating capacity according to ambient conditions separately in each section of the pipe (see **Figure 1-2**). In low temperatures, the Ecoflex potable PEX plus pipe provides adequate power to prevent freezing. As the temperature increases, power reduces. The self-regulating nature of the cable ensures it will not overheat or short circuit.

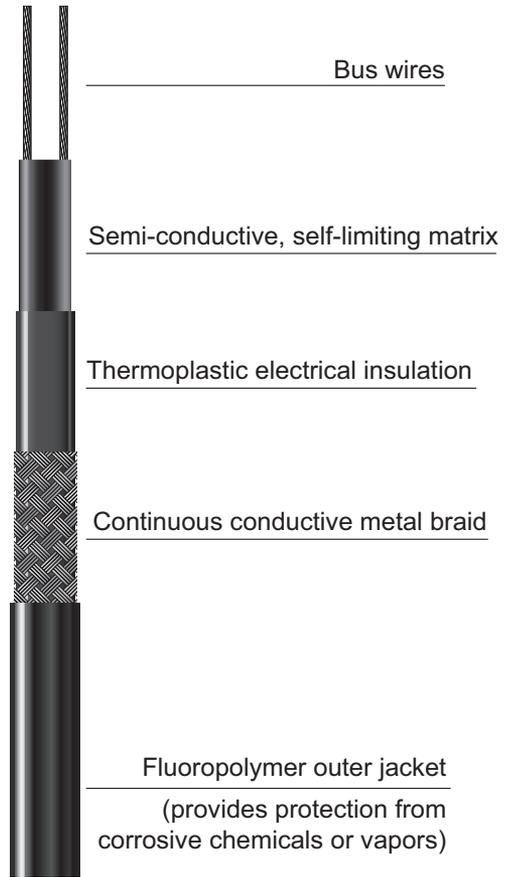


Figure 1-3: Self-regulating heating cable

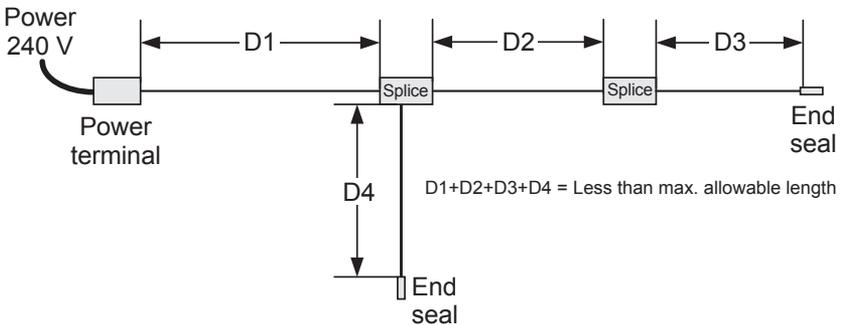


Figure 1-2: Example of cable lengths and splice(s)

Cable part no.	Nominal dimensions	Weight	Bend radius	Gland size
17FSR2 CF	0.5" x 0.23" (12.95mm x 5.95mm)	0.1 lbs/ft (0.13 kg/m)	1.4" (35mm)	M20

Table 1-2: Cable specifications

Cable part no.	Start-up temperature	10A	16A	20A
17FSR2 CF	50°F (10°C)	301 ft. (92m)	485 ft. (148m)	498 ft. (152m)
	32°F (0°C)	275 ft. (92m)	439 ft. (134m)	472 ft. (144m)
	-4°F (20°C)	242 ft. (74m)	387 ft. (118m)	446 ft. (136m)
	-40°F (-40°C)	216 ft. (66m)	347 ft. (106m)	419 ft. (128m)

Table 1-3: Maximum length versus circuit breaker size

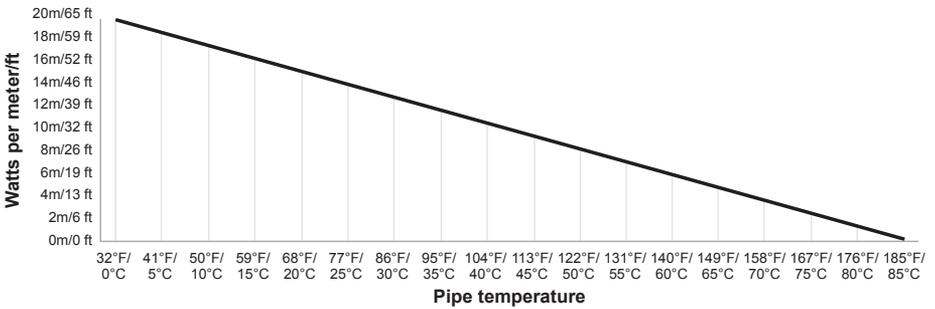


Table 1-4: Cable output at various pipe temperatures

Section 2

Planning

Safety devices installation equipment

- Circuit breaker with ratings of 10A, 16A or 20A
- For use with Type C circuit breakers to IEC 60898¹
- Ground fault interrupter

Protect the final circuit leading to the heating cable with a ground fault interrupter featuring a release current of 30mA.

Sizing the supply cable

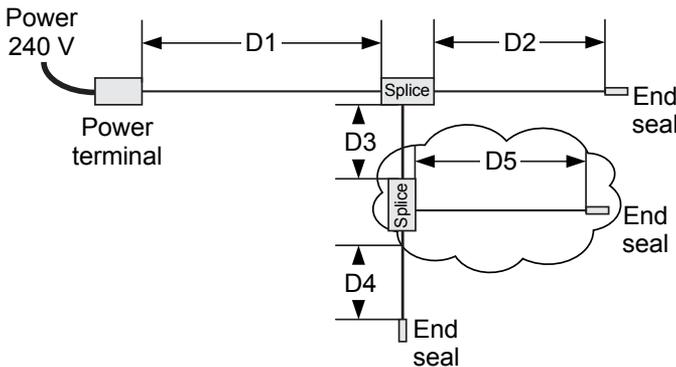
When sizing the supply cables, take into account general regulations, the sizing of the safety devices and possible voltage drops. Select and install the cable size and structure according to the rated value of the safety device as well as local codes and regulations.

Electrical planning

The self-regulating cable features a cCSAus approval. Be sure to install and protect the pipe according to CSA regulations.

Due to the structure of parallel connections, the self-regulating heating cable also functions as a possible feed cable for branches. Therefore, the pipe network can consist of several branches.

Note: The total length of the pipe network supplied from one point must not exceed the longest permitted installation length for the heating cable. The longest permitted installation length is outlined in **Table 1-3 on page 5**.



**Figure 2-1: Tee splice from a parallel circuit
(not an approved installation)**

¹Heat-trace submittal SRDS0102, Aug. 2017

Circuit length

To determine the proper cable length, add 2 ft. (0.5m) for connection and termination and 5 ft. (1.5m) per branch. Also reserve enough cable to wrap around additional sources of thermal loss (valves, feed-throughs, etc.).

Protection

The Uponor Ecoflex potable PEX plus element cable is a parallel-feed heating cable.

The total length of the heating cable determines the number and size of safety devices and the number of independent pipe circuits.

If the power supply cannot be organized from two directions, install a direct-burial supply cable in the trench for the second supply point from a different circuit breaker.

Install the direct-burial supply cable in the trench to supply points B and C. Keep the circuits separate. Do not connect to the same safety device (in this case 3 x 16A). When safety devices are of the same size, connect the feed cables to the different phases of the three-phase fuse box. It must be possible to separate the installation with a switch. Installation must be performed by a qualified installer according to local codes and regulations.



Caution: Do not connect terminal cables. This will cause a short circuit.

Ecoflex potable PEX plus accessories

- 5992000 Heat-trace power terminal block
- 5993000 Heat-trace end seal, SF-E
- 5994000 Heat-trace tee splice, SF-T
- 5855513 End cap 1" and 1¼" PEX pipe with 5.5" jacket (25mm and 32mm)

Section 3

Installation

Heating cable

The heating cable is self-regulating and cannot overheat. When there is no risk of freezing, switch off the power supply to the heating cable.

If the pipeline is used infrequently, use the cable to defrost a frozen pipeline.

Note: The heating cable does not require regular maintenance and must be switched off and protected from mechanical damage during any repairs to the pipeline. After repairs, measure the insulation resistance and record it on the technical drawing.

General electrical installation instructions

Installation

Comply with general safety regulations during installation. Only a qualified electrician should connect the heating cable. Take care to avoid damaging the heating cable during installation.

Connections

Note: Other than the heating cable, no other power consumption is permitted on the final circuit which is protected with a ground fault interrupter. It must be possible to separate the heating cable installation from the network either with a common or circuit-specific switch that can also connect to the control circuit. The switch must include position indicator markings and a label explaining the installation (e.g., non-freeze water pipe).

1. The network connection is provided through the control unit. Do not use the protective ground metal cord on the heating cable as a neutral conductor. Always equip the supply cable with a separate shielded wire in the neutral conductor.
2. Measure the insulation resistance of the heating cable before covering and commissioning the pipes. The measurement is conducted using direct-current voltage 500 VAC 2.5 kV D/C. The insulation resistance should be $R > 20 \text{ M}\Omega$. Make the connection so the insulation resistance of the heating cable can be easily measured later in an accessible location.
3. Use approved termination kits for the extension, tee branching and connection of the heating cable to the supply cable. The cables can touch in the joints because the self-regulating heating cable cannot overheat.



Important: In temperatures below 32°F (0°C), the resistance of the cable is very small. When switching the cable on in low temperatures, the protection (fuse) may switch off. Alter the protection temporarily in order to increase the cable temperature and resistance and to keep the cable switched on.

Technical drawings

Technical drawings reference the location of the cable for future use, replacement or additions. Keep the following drawings at the installation site.

- Type of heating cable
- Number of heating cables
- Placement of heating cables
- Maximum permissible operating temperature for the cable

End cap mounting instructions

Required tools

- Saw for cutting the pipe (if required)
- Sharp knife
- Screwdriver to tighten the clamp on the end cap
- Snipe nose pliers
- Crimping tool
- Nipper pliers
- Lubricant

1. Bring the heat-trace cable out of the end cap. Cut the output for the service pipe (1 1/4") and the cable output on the end cap.

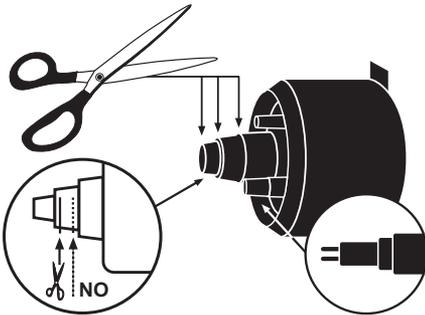


Figure 3-1: Cut the end cap

2. Peel off the casing pipe and remove the insulation, taking into account the length of the end cap. Reserve 2 ft. (0.6m) of cable for the electrician. Cut the service pipe at the required length. Do not damage the cable or the service pipe. Clean thoroughly, including the casing pipe.

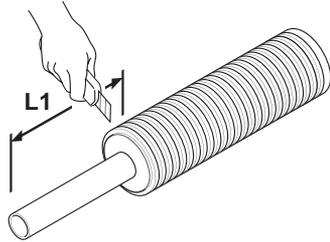


Figure 3-2: Remove casing and insulation

3. Carry out the termination of the heating cable using the supplies in the installation kit.
4. Place the seal in the second groove of the outer jacket.

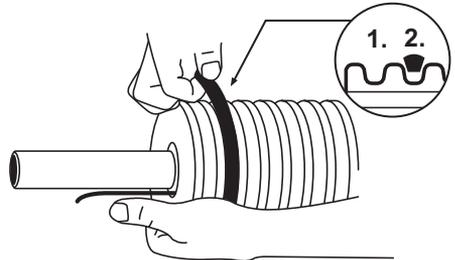


Figure 3-3: Place seal in second groove of jacket

5. Ensure the seal is pressed into the grooves.

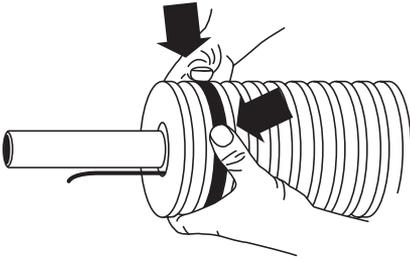


Figure 3-4: Press seal into groove

6. Apply lubricant on the inside of the end cap (lubricant is not sold by Uponor).

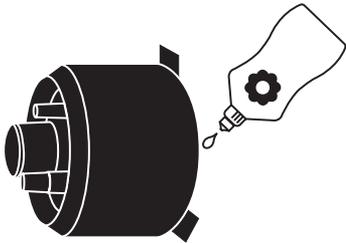


Figure 3-5: Apply lubricant

7. Pull the end cap on top of the pipe element and pull the cable through. Place the clamp on the end cap seal and tighten.

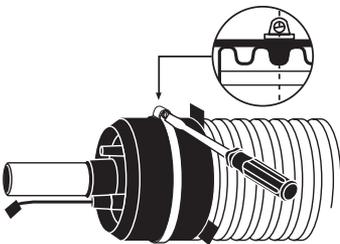


Figure 3-6: Install end cap

Note: If installing the product into an insulation kit, do not use the clamps.

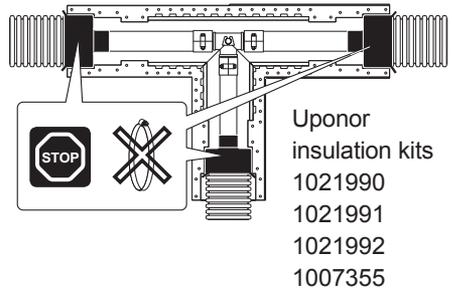


Figure 3-7: Insulation kit

Note: Allow ½" (13mm) spacing between Ecoflex potable PEX plus pipe and all combustible surfaces.

Terminating inside insulation kit Heat-trace accessories

- One heat-trace power termination kit end seal
- One heat-trace power termination kit
- Tee insulation kit

Required tools

- Saw for cutting the pipe (if required)
- Sharp knife
- Screwdriver to tighten the clamp on the end cap
- Snipe nose pliers
- Lubricant
- Hammer
- Screwdriver

1. Peel off the casing pipe and remove the insulation, taking into account the size of the branch tee. Only peel off what is absolutely required in order to connect the service pipe. Reserve approximately 2 ft. (0.6m) of cable for the electrician. Cut the service pipe at the required length.

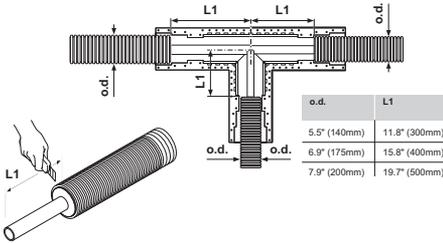


Figure 3-8: Remove casing and insulation

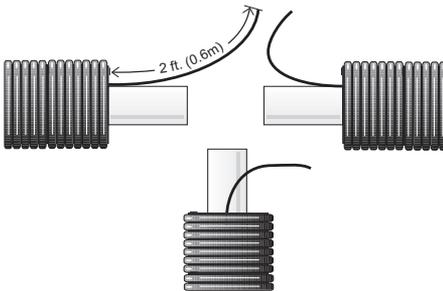


Figure 3-9: Reserve 2 ft. (0.6m) of cable



Important: Do not damage the cable or the service pipe. Cut the service pipes so the total length of uninsulated pipe ends and fasteners is as small as possible. Thoroughly clean the pipe ends of all debris (including the jacket).

2. Refer to the end cap mounting instructions on **page 10** to install the end caps.

3. After installing the end caps, join the service pipes. Be careful not to damage the heating cable. Use the insulation that was peeled off as an additional insulation for the joint.

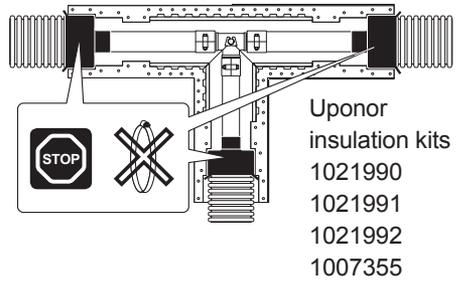


Figure 3-10: Install end caps before joining service pipes

Branch tee installation

1. Join the pipes with the pipe fittings.
2. Pressure test the system.
3. Terminate the ends of the heating cables with the end seal installation kit equipment, and wrap the heating cables on the branch with heat-proof tape. Bring the cable out of the end cap (see **page 10**).

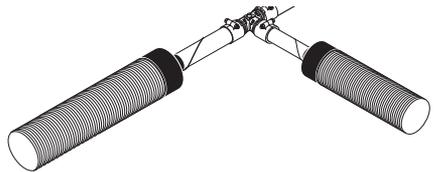


Figure 3-11: Terminate heating cables

4. Apply sealant compound in the bottom of the tee insulation shell

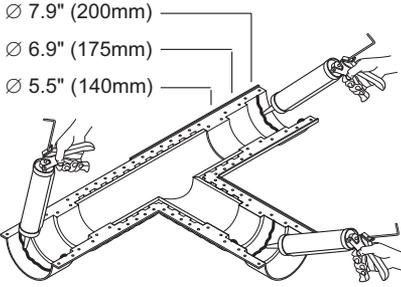


Figure 3-12: Apply sealant

5. Place the pipes in the tee insulation shell.

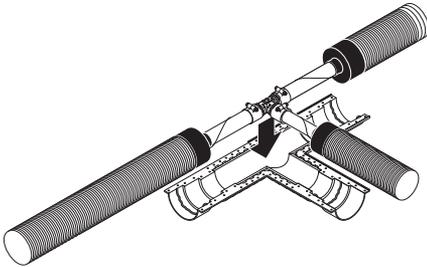


Figure 3-13: Place pipes in shell

6. Apply sealant compound as shown in **Figure 3-14**.

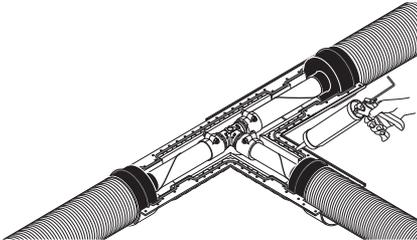


Figure 3-14: Apply sealant

7. Place top part of tee insulation shell in place.

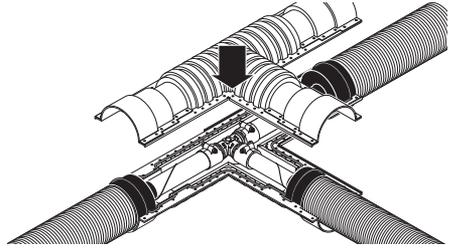


Figure 3-15: Install top of tee shell

8. Tighten all bolts and screws, and hammer in all rivets.

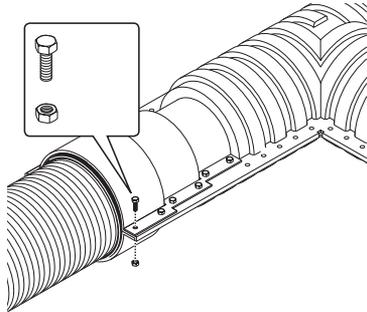


Figure 3-16: Fasten shell

Heat-trace power terminal block installation

Note: The enclosure and terminal block are manufactured from plastic materials that are at risk of breaking down in aggressive soil. To avoid this, make the termination inside an insulation kit, under the end cap or above ground in a non-aggressive environment.

1. Sequentially push the clamping nut, cable stopper and the red seal onto the one end of cable. Ensure the cable end is cut straight. Leave the seal 4.7" (120mm) from the cut end.

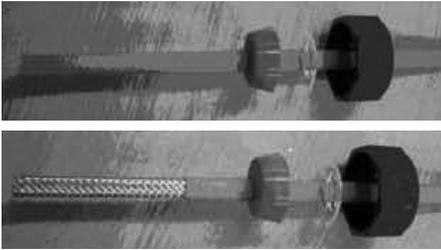


Figure 3-17: Push nut, stopper and seal onto cable end

2. Remove 3.2" (80mm) of outer jacket from the cut end, and push the braiding wires back. To secure the ground connection, wrap aluminum tape around braiding wires in order to make it a minimum 0.25" (6.5mm) long. Position the red seal 3.5" (90mm) from the end of the cable.

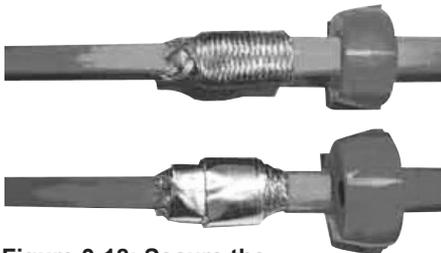


Figure 3-18: Secure the ground connection

3. Insert the stripped cable into the terminal block.



Figure 3-19: Insert cable into block

Note: When the cable passes into the jaws of the cutting blades, the braid wires should be in close contact with the metallic ground frame at the point of entry into the connector (see **Figure 3-20**). Insert the cable straight and deep into the terminal block and ensure the terminal set remains in the enclosure.

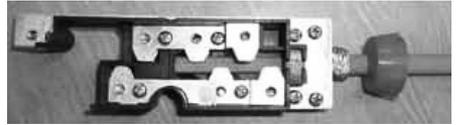


Figure 3-20: Insert the cable straight and deep

4. Fasten the seal and clamping nut onto the terminal block connector (hold the cable in place prior to fastening the screws).



Figure 3-21: Fasten seal and nut



Important! Ensure the far-side terminal blade doesn't touch the near-side bus wire.



Figure 3-22: Ensure blade doesn't touch wire

5. Tighten the terminal screws until the cutting blades touch the wires with a minimum 1.84 lbf•ft (2.5Nm).



Figure 3-23: Tighten screws

6. To check for convection, use a conventional multimeter to verify a circuit is present. After verifying the circuit, close the lid and tighten the screws to securely waterproof.



Figure 3-24: Verify a circuit is present

Power terminations

1. Slide gland and seal over cable, strip back 3.2" (80mm) of jacket and push into the unit.

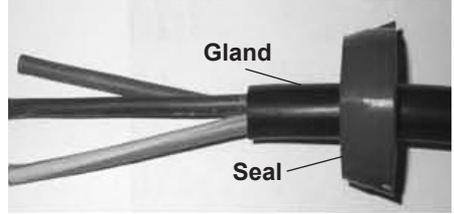


Figure 3-25: Strip jacket and push into unit

2. Complete electrical connection by securing terminals with screws as shown in **Figure 3-26**.

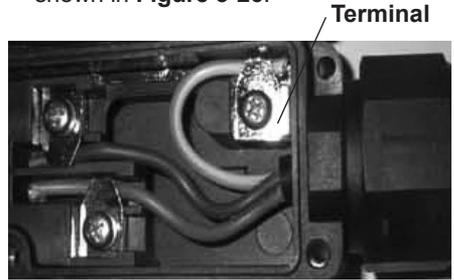


Figure 3-26: Secure terminals with screws



Warning: Select a power cable suitable for the appropriate application temperatures.

Heat-trace end seal installation

Note: The enclosure and terminal block are manufactured from plastic materials that are at risk of breaking down in aggressive soil. To avoid this, make the termination inside an insulation kit, under the end cap or above ground in a non-aggressive environment.

1. Remove the outer jacket 0.8" (20mm) from the end.

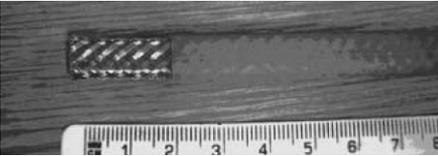


Figure 3-27: Remove outer jacket

2. Trim the braiding wires.

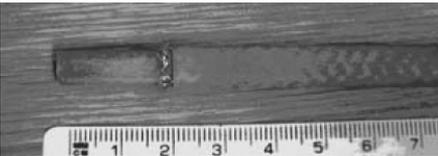


Figure 3-28: Trim braiding wires

3. Cut one of the bus wires back to maintain a minimum 0.2" (5mm) clearance between the bus wires.

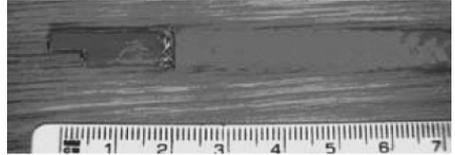


Figure 3-29: Cut the bus wires

4. Push the heat-trace cable into the kit, ensuring the cable contacts the inner wall.

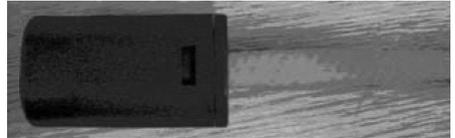
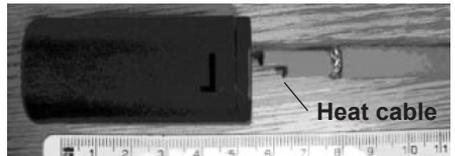


Figure 3-30: Push cable into kit

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