

Warm Tiles®

DFTRK Cable Repair Kit Instructions

DESCRIPTION

Before attempting any cable repair, determine if there actually is a fault and its location. A Fault Detector Kit is available through EasyHeat technical help line. Thermal imaging devices may also be used in the detection of faults. Having to repair your EasyHeat cable is an extremely rare occurrence. Damage is almost always a function of field conditions, such as impacts with tools or damage from use of staples.

The DFTRK Repair Kit can be used to make repairs to damaged floor heating cables and is suitable for use on most types of heating

cables/mats with either single or dual conductor heating elements: EasyHeat Single Conductor Cables/Mats: FT, WTE, FWC, etc.; EasyHeat Dual Conductor Cables/Mats: DFT, SAM, DFM, XD, etc.

This kit contains all the materials needed to replace (1) short—up to 25.4 mm (1 in) — section of damaged heating cable, or repair/replace (1) heating cable-to-cold lead splices, or repair/replace (2) cable end splices. This kit may require up to 610 mm (24 in) of exposed cable.

KIT CONTENTS

8 Parallel crimp connector (small)
4 Parallel crimp connector (large)
4 Shrink tubes (short)
1 Shrink tube (large – ES-3)

1 Shrink tube (medium – ES-2)
1 Shrink tube (small – ES-1)
2 Jumper wires
1 Bare copper wire

TOOLS REQUIRED

Sidecutters
Crimping pliers
Coaxial cable strippers or utility knife

Heat gun
Ohmmeter
Insulation resistance tester (megohmmeter)

WARNINGS!



- Shortening of the heater cable will result in the cable running hotter. Excessive shortening may result in a risk of personal injury and/or fire. **DO NOT** install more than two DFTRK kits on any cable. Contact EasyHeat for additional information.
- Turn breaker off at the panel and tag the panel to ensure that no one turns the breaker on. Disconnect the heater wires from the thermostat as an added safety step and to conduct testing during and after repairs.
- Determine location of fault before beginning any repair work.
- **DO NOT** use this kit to repair the sensor wire.

CAUTIONS

- Heat guns, if not handled carefully, can result in burns. Heat shrink tubing and the sealant retain heat. Be careful in handling them before they have cooled completely.
- Excessive heat can damage shrink tubing and cable materials. Use care not to overheat materials. Damage from heat may not be visible.
- No wires should protrude past the ends of the connectors. Carefully trim wires flush as needed. Sharp wires and loose wire strands can pierce through the heat shrink and may result in shorting.
- Allow the inner heat shrink to cool before applying the outer heat shrink. Failure to do this may leave the inner tube too soft and result in damage as the outer tube is shrunk.

NOTE

Since the repaired area of cable will likely be larger than the original splice, it may be necessary to chisel out extra space in the floor below the splice to ensure the repaired area does not interfere with the finished floor.

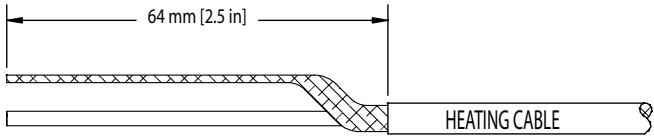
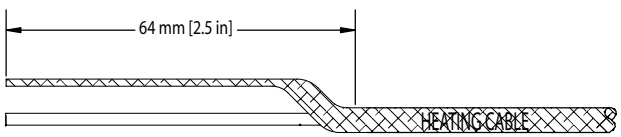
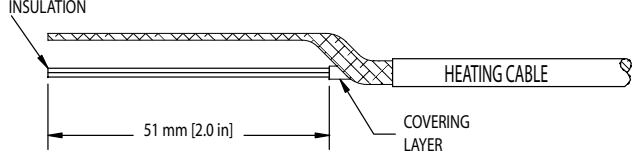
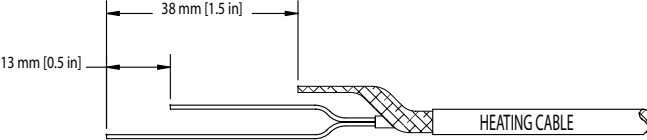
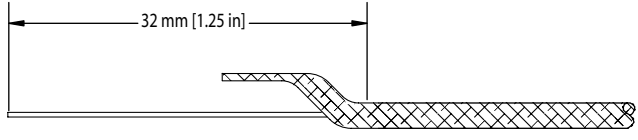
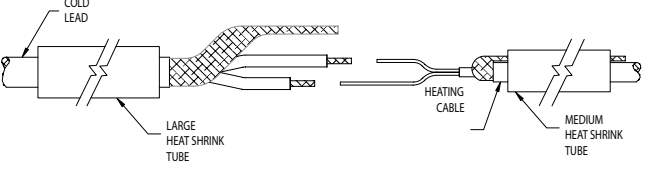
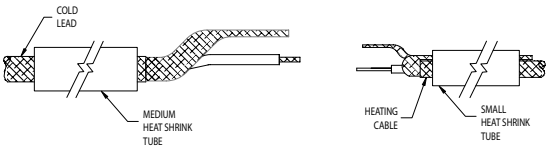
For cold lead to heating cable splices, it is assumed that at least 50.8 mm (2 in) of slack in the cold lead can be obtained to facilitate proper connections.

For heating cable to heating cable splices, it is assumed that it is not possible to obtain any slack in the heating cable. For this reason, jumper wires (for the heating cable) and a bare wire (for the ground braid) are provided in the kit to facilitate proper connections.

If there is no slack in the cold lead, it may become necessary to replace the old cold lead with a new cold lead. Contact EasyHeat to obtain a new cold lead.

NOTICE: REPAIRING A DAMAGED CABLE WILL VOID THE ORIGINAL HEATING CABLE WARRANTY.

DIRECTIONS - COLD LEAD TO HEATING CABLE SPLICE

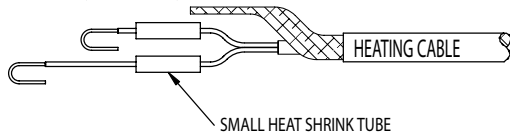
Dual Heating Cable For use with large crimp connectors	Single Heating Cable For use with small crimp connectors for the conductor connection and large crimp connectors for the ground connection
1. Carefully expose the original factory splice by removing any mortar in which the splice is embedded. Remove the splice by cutting it off with sidecutters. 2. Carefully expose about 305 mm (12 in) of heating cable by removing any mortar covering it. 3. Pull excess cold lead from wall cavity such that the cold lead overlaps heating cable by 50.8 mm (2 in).	
4. Remove 63.5 mm (2.5 in) of outer jacket from heating cable (clear nylon) and cold lead (black PVC). Be careful not to damage ground braid beneath the jacket.	N/A
5. For both heating cable and cold lead, unbraid the ground braid back to the outer jacket and twist it to one side to form a pigtail on each cable. 	
6. Carefully trim 50.8 mm (2 in) of the covering layer on the heating cable; ensure that the insulation beneath is not damaged during this step. 	N/A
7. If the insulation on the two conductors is bonded together, using a very sharp, finely bladed knife (such as a utility knife or box cutter), split the insulation of the two heating conductors back to the covering layer.	N/A
8. Trim one of the paired conductors 12.7 mm (0.5 in) back, and the braid 38 mm (1.5 in) back. Repeat this pattern on the other cable. This allows the ground braid connection to be offset from the primary conductor connections which minimizes both the size of the repaired area and the potential for the ground connection to penetrate the primary connections. 	8. Trim the braid 31.8 mm (1.25 in) back. Repeat this pattern on the other cable. This allows the ground braid connection to be offset from the primary conductor connection, which minimizes both the size of the repaired area and the potential for the ground connection to penetrate the primary connection. 
9. Slide the medium shrink tube over the heating cable, and the large shrink tube over the cold lead. The large and medium shrink tubes may be shortened to fit. If shortened, the large shrink tube must still provide at least 25.4 mm (1 in) of overlap on each side of the splice. 	9. Slide the medium shrink tube over the cold lead and the small heat shrink tube over the heating cable. The medium and small shrink tubes may be shortened to fit. If shortened, the medium shrink tube must still provide at least 25.4 mm (1 in) of overlap on each side of the splice. 

DIRECTIONS - COLD LEAD TO HEATING CABLE SPlice

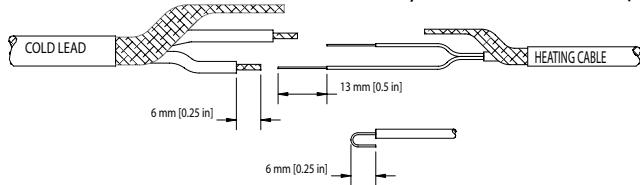
Dual Heating Cable

For use with large crimp connectors

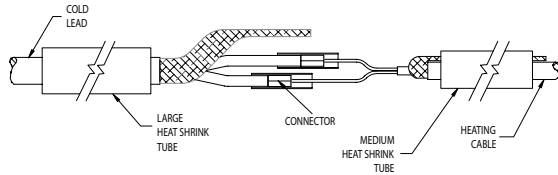
- Strip 6.4 mm (0.25 in) of insulation from the ends of each cold conductor (two total), strip 15.2 mm (0.6 in) of insulation from the ends of each of the paired heating element conductors and fold these conductors back into a hook shape 6.4 mm (0.25 in) long (two total).
- Slide one short shrink tube over each of the heating cable conductors (two total).



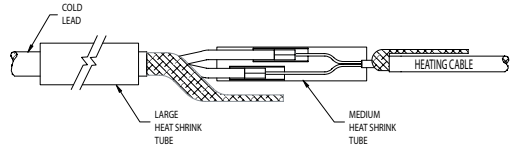
- Match up the heating element conductors to the cold lead conductors. Insert each conductor into the connector and crimp securely. After crimping, pull slightly on each conductor to ensure that the conductors are securely held within the crimp.



- Center the short shrink tubes over the crimp connectors, ensuring that all bare conductor connector parts are under the shrink tube. Starting at the center of the shrink tube, heat with heat gun until completely shrunk.

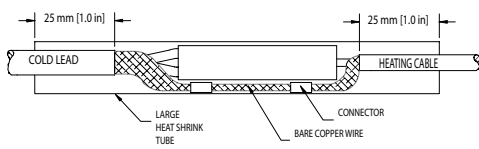


- Slide the medium shrink tube over both of the heater crimp connections, ensuring that the shrink tube provides at least 6.4 mm (0.25 in) of overlap on the covering layer of the heating cable and over the cold lead conductors. Starting at the center of the shrink tube, heat with heat gun until completely shrunk.



- Connect braid pigtails using bare copper wire to extend ground braid and crimp securely. After crimping, pull slightly on the ground braid to ensure it is firmly held by the crimp.

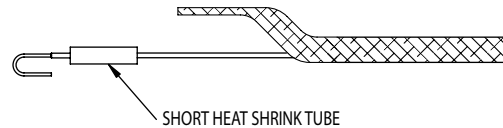
- Position the large shrink tube over the entire splice area and shrink with heat gun. The shrink tubes must overlap by splice area by 25.4 mm (1 in).



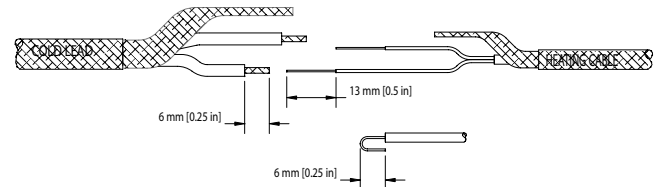
Single Heating Cable

For use with small crimp connectors for the conductor connection and large crimp connectors for the ground connection

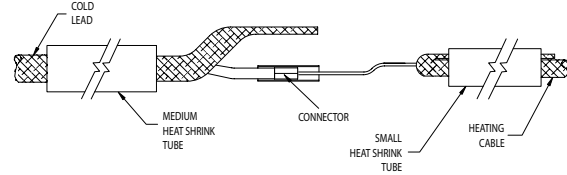
- Strip 6.4 mm (0.25 in) of insulation from the end of the cold lead conductor, strip 15.2 mm (0.6 in) of the insulation from the end of the heating element conductor and fold this conductor back into a hook shape 6.4 mm (0.25 in) inch long.
- Slide one short shrink tube over the heating cable conductor.



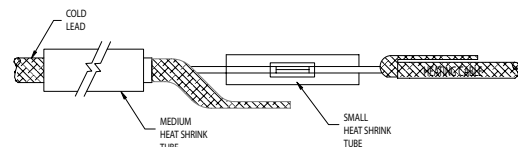
- Match up the heating element conductor to the cold lead conductor. Insert the conductor into the connector and crimp securely. After crimping, pull slightly on conductor to ensure that the conductors are securely held within the crimp.



- Center the short shrink tube over the crimp connector, ensuring that all bare conductor connector parts are under the shrink tube. Starting at the center of the shrink tube, heat with heat gun until completely shrunk.



- Slide the small shrink tube over the heater crimp connection, ensuring that the shrink tube provides at least 6.4 mm (0.25 in) of overlap over the short heat shrink. Starting at the center of the shrink tube, heat with heat gun until completely shrunk.



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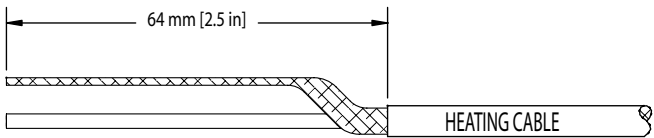
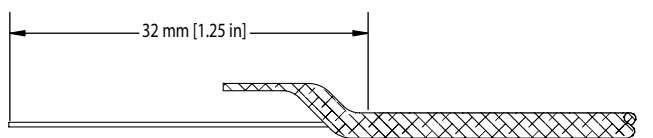
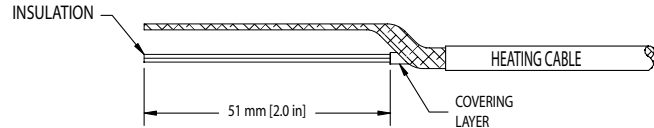
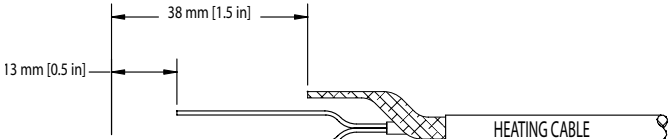
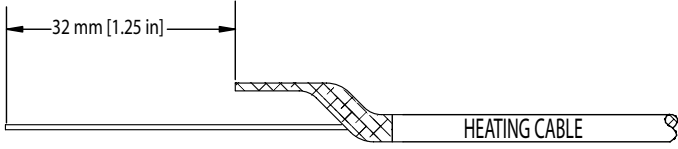
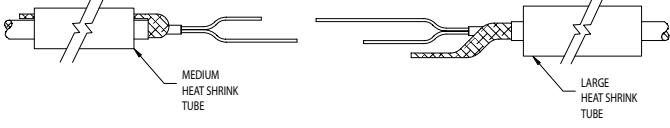
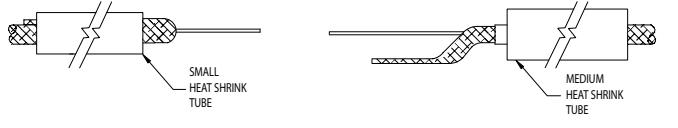
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DIRECTIONS - HEATING CABLE TO HEATING CABLE SPLICE

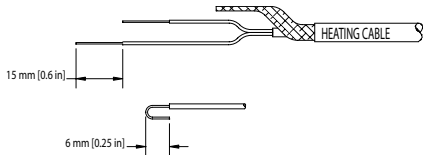
Dual Heating Cable For use with small crimp connectors for the conductor connections and large crimp connectors for the ground connections	Single Heating Cable For use with small crimp connectors for the conductor connections and large crimp connectors for the ground connections
1. Carefully expose the damaged heating cable by removing any mortar in which the heating cable is embedded. Remove any damaged heating cable by cutting it off with sidecutters. This repair kit is designed to accommodate situations where up to 25.4 mm (1 in) of damaged cable needs to be removed. 2. Carefully expose about 305 mm (12 in) of heating cable on either side of the damaged area by removing any mortar/tile cover the cable in this area.	
3. Remove 63.5 mm (2.5 in) of outer jacket from each side of the heating cable (clear nylon). Be careful not to damage the ground braid beneath the jacket.	N/A
4. Unbraid the ground braid back to the outer jacket and twist it to one side to form a pigtail on each cable. 	
5. Carefully trim 50.8 mm (2 in) of the covering layer of each cable. Ensure the insulation beneath is not damaged during this step. 	N/A
6. If the insulation on the two conductors is bonded together, using a very sharp, finely bladed knife (such as a utility knife or box cutter), split the insulation of the two heating conductors back to the cover layer.	N/A
7. Trim one of the paired conductors 12.7 mm (0.5 in) back, and the braid 38 mm (1.5 in) back. Repeat this pattern on the other cable. This allows the ground braid connection to be offset from the primary conductor connections, which minimizes both the size of the repaired area and the potential for the ground connections to penetrate the primary connection. 	7. Trim the braid 31.8 mm (1.25 in) back. Repeat this pattern on the other cable. This allows the ground braid connection to be offset from the primary conductor connection, which minimizes both the size of the repaired area and the potential for the ground connection to penetrate the primary connection. 
8. Slide the medium shrink tube over one of the cables and the large shrink tube over the other cable. 9. The large and medium shrink tubes may be shortened to fit. If shortened, the large tube must still provide at least 25.4 mm (1 in) of overlap on each side of the splice. 	8. Slide the medium shrink tube over one of the cables, and the small heat shrink tube over the other cable. 9. The shrink tubes may be shortened to fit. If shortened, the medium shrink tubes must still provide at least 25.4 mm (1 in) of overlap on each side of the splice. 

DIRECTIONS - HEATING CABLE TO HEATING CABLE SPLICE

Dual Heating Cable

For use with small crimp connectors for the conductor connections and large crimp connectors for the ground connections

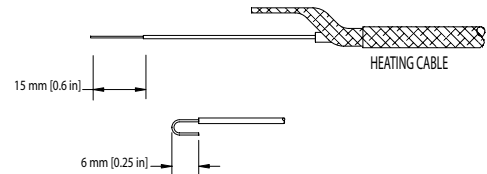
10. Cut the jumper wires to the required length and strip 6.4 mm (0.25 in) of insulation from the ends (four strips of 0.25 inch in total). Strip 15.2 mm (0.6 in) of insulation from the ends of each heating cable primary conductor and fold these conductors back into a hook shape 0.25 long (four strips of 0.6 inch total).



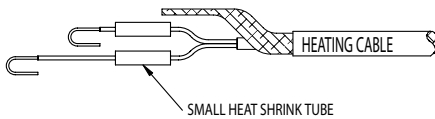
Single Heating Cable

For use with small crimp connectors for the conductor connections and large crimp connectors for the ground connections

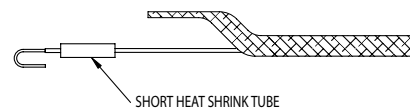
10. Cut a jumper wire to the required length and strip 6.4 mm (0.25 in) of insulation from the ends (two strips of 0.25 in total). Strip 15.2 mm (0.6 in) of insulation from the ends of the heating cable primary conductor and fold this conductor back into a hook shape 0.25 long (two strips of 0.6 inch total).



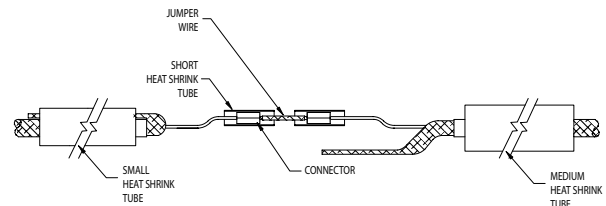
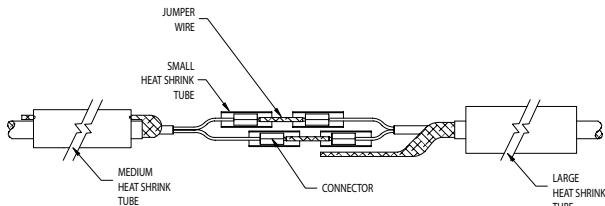
11. Slide one short shrink tube over each of the heating cable conductor ends (four tubes in total).



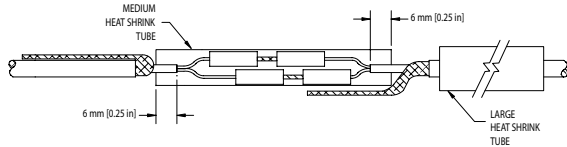
11. Slide one short shrink tube over each of the heating cable conductor ends (two tubes in total).



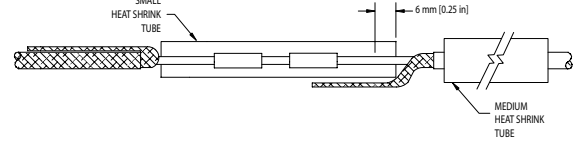
12. Insert the hooked conductor of each cable into a crimp connector and crimp securely to the jumper wire. After crimping, pull slightly on each conductor to ensure that the conductors are securely held within the crimp. Trim any overlaps.
13. Center the short shrink tube over the crimp connector, ensuring that all bare conductor connector parts are under the shrink tube. Starting at the center of the shrink tube, heat with heat gun until completely shrunk.



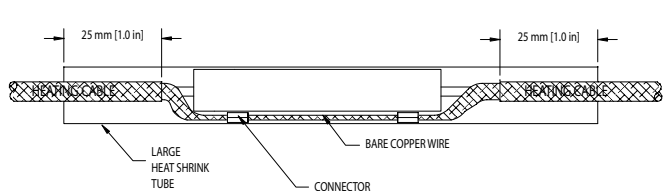
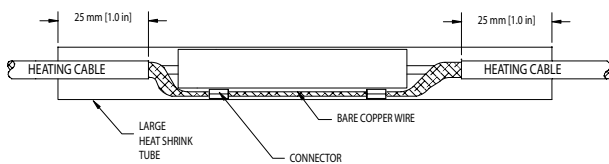
14. Slide the medium shrink tube over all four of the heater crimp connections, ensuring that the shrink tube provides at least 6.4 mm (0.25 in) of overlap on the covering layer. Starting at the center of the shrink tube, heat with heat gun until completely shrunk.



14. Slide the small shrink tube over the heater crimp connection, ensuring that the shrink tube provides at least 6.4 mm (0.25 in) of overlap over the short heat shrink. Starting at the center of the shrink tube, heat with heat gun until completely shrunk.



15. Connect braid pigtails using bare copper wire to extend ground braid and crimp securely. Use large crimp connectors. After crimping, pull slightly on the ground braid to ensure that it is firmly held by the crimp.
16. Position large shrink tube over entire splice area and shrink with heat gun. The shrink tube must overlap each splice area by 25.4 mm (1 in).



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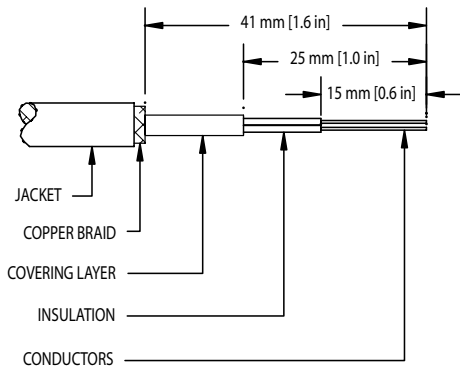
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HEATING CABLE TAIL SPLICE

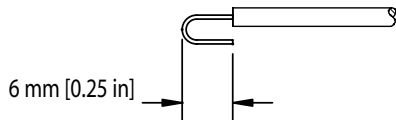
Dual Heating Cable Only

For use with small crimp connectors

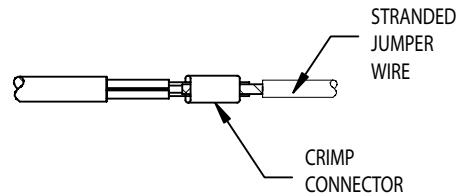
- Carefully expose the original factory splice by removing any mortar in which the splice is embedded. Remove the damaged tail splice by cutting it off with side-cutters.
- Carefully expose about 305 mm (12 in) of heating cable by removing any mortar covering it.
- Remove 40.6 mm (1.6 in) of outer jacket from heating cable (clear nylon) and ground braid beneath the jacket.
- Carefully trim 25.4 mm (1 in) of the covering layer on the heating cable; ensure that the insulation beneath is not damaged during this step.



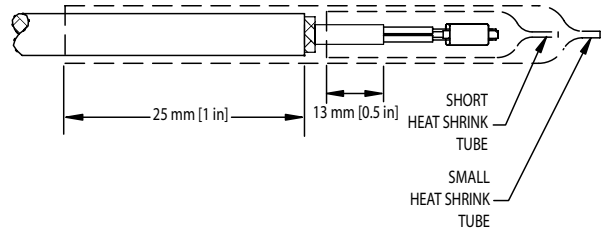
- If the insulation on the two conductors is bonded together, using a very sharp, finely bladed knife (such as a utility knife or box cutter), split the insulation of the two heating conductors back to the covering layer.
- Strip 15.2 mm (0.6 in) of insulation from the ends of the paired heating element conductors and fold these conductors back into a hook shape 6.4 mm (0.25 in) long.



- Insert the folded conductors into the crimp connector (use only one connector). On the opposite end, insert a stripped section of a jumper wire to act as a filler. Crimp securely. Cut off excess jumper wire. Next, pull slightly on the crimp to ensure that the conductors are securely held.



- Slide one short shrink tube over the crimped heating cable conductors, ensuring that the shrink tube provides at least 12.7 mm (0.5 in) of overlap on the covering layer. Starting at the center of the shrink tube, heat with heat gun until completely shrunk. Before the shrink tube becomes completely shrunk, use a pair of pliers to pinch the end closed.
- Position the small shrink tube over the entire splice area. The heat shrink can be shortened, but must overlap the splice area by 25.4 mm (1 in). Starting at the center of the shrink tube, heat with heat gun until completely shrunk. Before the shrink tube becomes completely shrunk, use a pair of pliers to pinch the end closed.



TESTING

1. Test the resistance between the primary conductors of the cold lead with an ohmmeter. Record the resistance in the Repair and Test Record.
2. Test the insulation resistance of the cable between the primary conductor and the ground braid with a 500 VDC megger. The resistance should be greater than 20 Megohms. Record the resistance in the Repair and Test Record.

Dual Heating Cable

Insulation Resistance Test: Connect a megohmmeter between the copper grounding braid and the two conductors connected together. Set the megohmmeter at 500 V (minimum) and measure the resistance.

Resistance Test: Connect an ohmmeter between the two conductors of the cable. Measure the resistance.

Single Heating Cable

Insulation Resistance Test: Connect a megohmmeter between the copper grounding braint and the inner conductor on one lead of a mat. Ensure the other lead is isolated and the heating element is not in contact with the ground braid. Set the megohmmeter at 500 V (minimum) and measure the resistance.

Resistance Test: Connect an ohmmeter between the inner conductors of the two leads of the mat. Measure the resistance. Be certain that the resistance test is appropriate for the marked wattage and voltage.

REPAIR AND TEST RECORD

Repair Address _____ Repair Date _____

Repair Location (bathroom) _____ (kitchen) _____ (foyer) _____ (others) _____

Cause of Damage _____ Repair Completed by _____

Original Cable Length _____

Heater Resistance (Ω) _____ Ground Continuity (Yes) Insulation Resistance (M Ω) _____

NOTICE: REPAIRING A DAMAGED CABLE WILL VOID THE ORIGINAL HEATING CABLE WARRANTY.

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