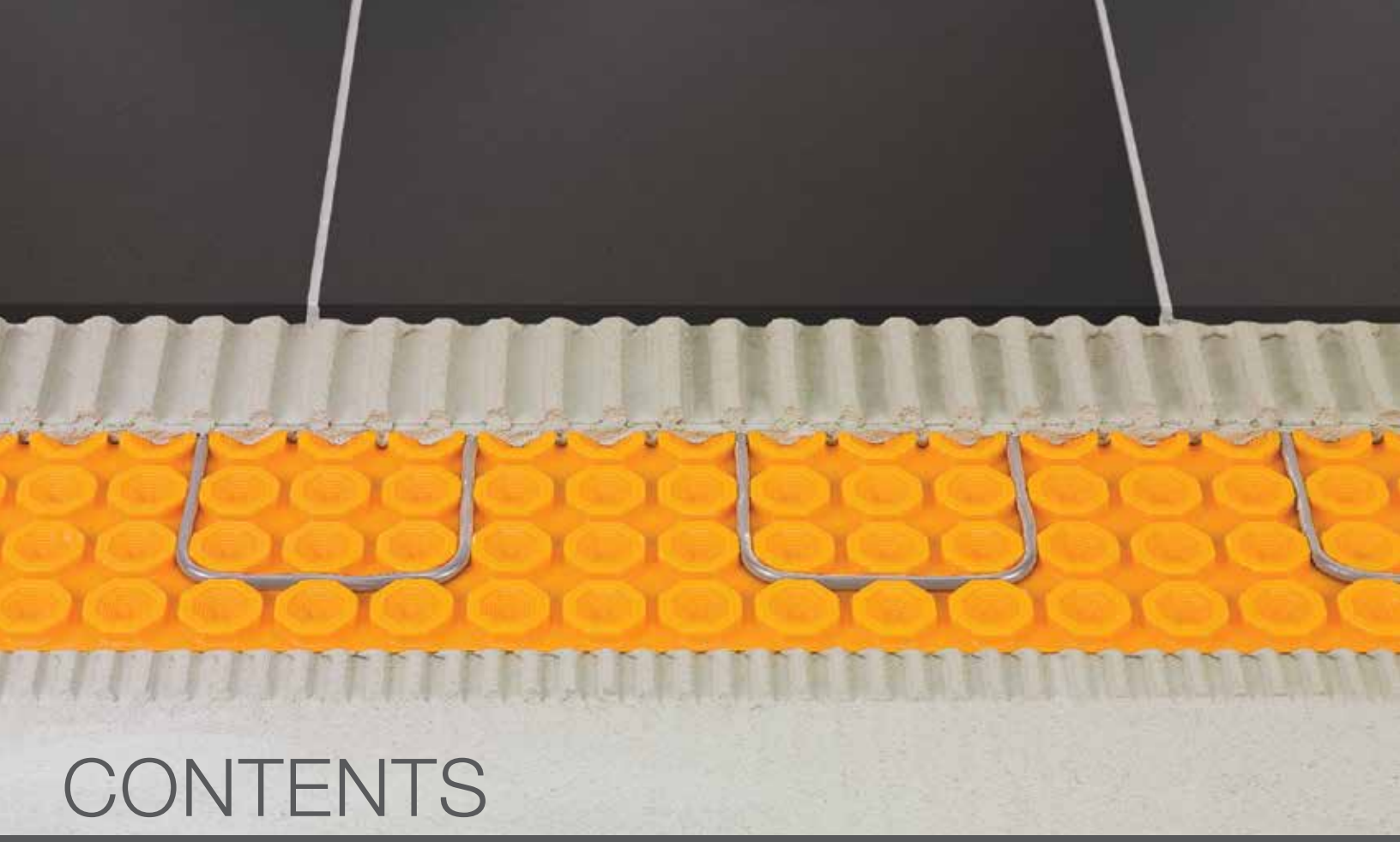




Schluter®-DITRA-HEAT

Repair procedure for the DHE-HK Heating Cable



- 3 List of tools required and contents of the repair kit
- 4 Freeing the cable at the location of the break

Types of repairs covered in this guide

- 4 Heating portion of the cable
- 7 Transition splice (between the gray cable and black power lead)
- 10 End splice (end of gray cable)

Appendix:

- 12 A-1: Repair technician data table
(Indicate the cable product no., as well as its conductor size (AWG) required to be stripped from its insulation sheathing)
- 13 A-2: Conductor size (AWG) table according to the heating section of the cable product no.










Heating cables must be installed by a qualified person in accordance with this handbook and with the National Electric Code (USA) or Canadian Electric Code Part I (CAN) as applicable. All electrical connections must be made by a qualified electrician, according to the electrical and building codes effective in your region.

DITRA-HEAT-E-HK Heating Cable Repair Kit

1) TOOLS REQUIRED

- Heat gun for shrink tubes
- Hot glue gun and hot glue
- Wire stripper 10 AWG to 20 AWG
- Wire stripper 20 AWG to 30 AWG
- Wire cutter
- Hammer and chisel
- Safety glasses
- Utility knife
- Piece of cloth
- Ohmmeter or multimeter
- Megohmmeter (range set to 1000 volts)
- Measuring tape or ruler
- Felt pen or marker

KIT CONTENTS

Item	Description	
A	Heat shrink solder sleeve (small)	
B	Heat shrink solder sleeve (big) (D>d) ¹ (only available in repair kit DHE-HK-SK)	
C	Copper foil	
D	Heat shrink with sealant Ø 1/4"	
E	Heat shrink with sealant Ø 1/2"	
F	Insulated wire (heating wire) ²	
G	Braided gray cable ²	

1 Diameter D is larger than diameter d

2 Use 10 AWG wire stripper to strip outer grey jacket, and 20 AWG to strip the insulated wires

WARNINGS

- Heating cable repairs must be conducted by a qualified technician in accordance with this heating cable repair procedure, the National Electric Code (USA) or Canadian Electric Code Part I (CAN) as applicable and the Schluter®-DITRA-HEAT Installation Handbook. All electrical connections must be made by a qualified electrician, according to the electrical and building codes effective in your region.
- Do not use this repair kit to splice different heating cables together. The kit is only intended for making repairs within a cable.
- The heating cable cannot be shortened or altered to fit.
- Very important: Never CUT the heating cable. This could change the cable resistance and could lead to cable overheating and damage.
- **WARRANTY DISCLAIMER:** Damage to the DITRA-HEAT-E-HK heating cables voids the Schluter®-DITRA-HEAT 10-Year Limited Warranty and warranty coverage is not reinstated upon repair of the heating cable. SCHLUTER SYSTEMS FURTHER DISCLAIMS ANY AND ALL WARRANTIES EXPRESSED OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE AND ANY AND ALL LIABILITY ARISING FROM THE ELECTRICIAN SERVICES.

REPAIR PROCEDURE

Before starting the repair procedure, ensure the circuit is turned OFF!

Note: The repair cannot alter the resistance greater than 3% of the nominal resistance of the heating cable.

2) FREE THE CABLE WHERE THE BREAK IS LOCATED

Wear safety glasses.

Cover the tile with a piece of cloth and break it with a hammer. Remove the broken pieces of tile to locate the break in the heating cable.

Note: At this stage, determine the cause of the cable failure.

- Using a chisel, free the heating cable from the mortar. Remove the mortar around the cable and within the perimeter of the tile that was broken. Clean this perimeter well.
- Take note of the heating cable product number (see silver identification label in junction box) and using the table provided in Appendix A-2, find the gauge of the conductor (red heating wire) and fill this information in the data table provided in Appendix A-1.

3) TYPES OF REPAIRS COVERED IN THIS GUIDE

- Repairing the heating portion of the heating cable (gray cable): **see section 3.1.**



- Repairing the transition splice (between the gray cable and black lead): **see section 3.2.**



- Repairing the end splice (end of gray cable): **see section 3.3.**



3.1) REPAIRING THE HEATING PORTION (GRAY CABLE)

A) Preparing the heating cable

Cut and remove the faulty section of the cable to obtain two intact segments.

- Free the cable to a length at least 9-1/2" (241 mm) longer than the length removed (LR) on one side, and 3-1/2" (89 mm) on the other side. (See Fig. 3.1)

For example: if the length removed (LR) = 2-1/2" (63.5 mm), the cable must be uncovered LR + 9-1/2" = 12" (305 mm) on one side and 3-1/2" (89 mm) on the other. Make a cavity in the floor to house the repaired joint.

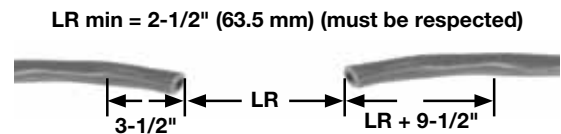


Fig. 3.1

- Make sure that the joint does not exceed the membrane height so as not to interfere with the installation of replacement tiles.
- Cut the heat shrink tube $\text{Ø } 1/2''$ (item E) to a length at least 4" (101.6 mm) longer than the length removed (LR). For example, if a section of 2-1/2" (64 mm) was removed from the heating cable, a heat shrink tube of at least 6-1/2" (165 mm) long will be required. (See Fig. 3.2).
- Slide the heat shrink over the longest segment of intact cable and protect it with a damp cloth. (See Fig. 3.3).

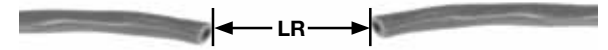


Fig. 3.2



Fig. 3.3

B) Preparing heating cable ends

- Strip the gray sheath (outer jacket) of each section of the heating cable 1-1/2" (38 mm), using a 10 AWG wire stripper, exposing the ground braid. (See Fig. 3.4 and 3.5)



Fig. 3.4

⚠ Be careful not to damage the tinned copper braid during this step.

- Push back the ground braid over the gray sheath of the heating cable to expose the heating wire. (See Fig. 3.5 and 3.6)



Fig. 3.5

- **Using a wire stripper***, strip the heating wire 1/4" (6 mm) to expose the heating element (conductor). (See Fig. 3.6)

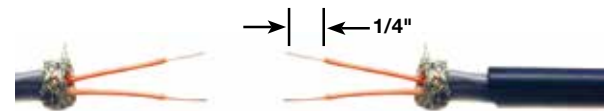


Fig. 3.6

Note: Undo the thermostat connections to the heating cable in the junction box, in order to verify the repair.

- In order to assure that there are no additional faults in the heating cable, perform an insulation resistance test using a megohmmeter (range set to 1000 volts) between the ground braid and each conductor on both sides of the exposed cable. A successful test will provide a measurement equal to or greater than 1 Gigaohms (1 Gigaohms = 1 G ohms = 1000 Mega ohms = 1000 M ohms).



Fig. 3.7

*** Refer to appendix A-2 at the end of this document to determine the conductor size (AWG) to use with the wire stripper, based on the product no. of the heating cable to repair.**



Fig. 3.8

C) Replacing missing section of heating cable

Situation 1:

- If the length removed (LR) of the cable is less than 6" (152.4 mm), use the heating wire (item F) from the kit. (See Fig. 3.1 and 3.7)

Prepare the cable ends as described in the previous section (Section 3.1, Point B)

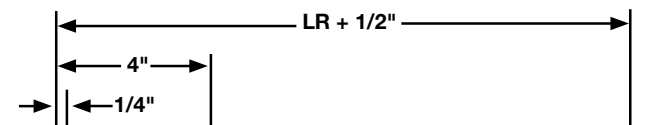


Fig. 3.8A

Situation 2:

- If the length removed (LR) of the cable is more than 6" (152.4 mm), use the braided gray cable (item G) from the kit (See Fig. 3.1, 3.8 and 3.8A)



Fig. 3.9

- Item G (See Fig. 3.8A) must be prepared as follows: total length of cable = $LR + 1/2"$. Using a wire stripper, remove 4" (102 mm) of the gray insulating jacket from each end of the cable segment. Next, roll back the ground braid as shown in Fig. 3.8A and strip 1/4" (6 mm) from each of the conductors.

D) Measuring, cutting and stripping the wire (item F) or the braided cable (item G, already prepared)

- Measure and cut the wire (item F) or the braided cable (item G, already prepared) in such a way that the ends are long enough to be in contact with the ends of the insulated wires previously stripped in step B. (See Fig. 3.9)
- Using a wire stripper*, strip the ends of wire (F) or cable (item G) 1/4" (6 mm). (See Fig. 3.9)

*** Refer to appendix A-2 at the end of this document to determine the conductor size (AWG) to use with the wire stripper, based on the product no. of the heating cable to repair.**

E) Connections (steps to perform for all the joints in the repair process)

Before sliding on the small heat shrink tube (item A), try as much as possible to align the 2 conductors so they are perfectly parallel.

- Slide a heat shrink tube with integrated solder ring (item A) on one of the conductors and then insert the replacement conductor. (See Fig. 3.9 and 3.10) Place the conductors on each side of the heat shrink tube in such a way that the bare portions overlap within the integrated solder ring. (See Fig. 3.10)
- Using a heat gun, adequately heat the shrink tube with integrated solder ring. The solder ring will melt and bond the two conductors together and the heat shrink will shrink completely.
- Cut 2" sections of heat shrink (item D) (qty 4). Slide one of these sections over item A making sure it is centered over the connection and heat to shrink. (See Fig. 3.10A and 3.10B)
- Slide another 2" section over the heat shrink installed in the previous step and protect it with a damp cloth. (See Fig. 3.10C)
- Next, slide another heat shrink with integrated solder ring (item A) over the end of the wire make sure that the bare portions of the conductors overlap within the integrated solder ring. Then, heat item A. (See Fig. 3.10D and 3.10E)
- Slide and center the 2" heat shrink that was protected by the damp cloth over the new connection and heat to shrink. Repeat this sequence of steps for the other conductor. (See Fig. 3.10E and 3.11)



Fig. 3.10

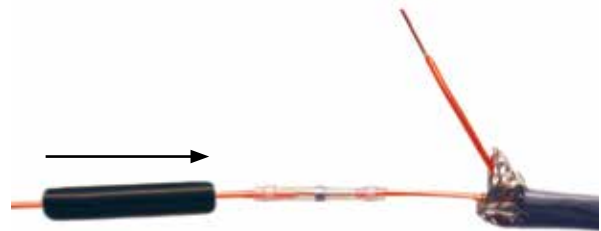


Fig. 3.10A



Fig. 3.10B



Fig. 3.10C



Fig. 3.10D



Fig. 3.10E



Fig. 3.11

F) Re-establishing the continuity of the ground braid

- Pull the tinned copper braided ground wire, covering the conductors on each end of the heating cable, towards the center. (See Fig. 3.12).
- Align the end of the copper foil (Item C) with the gray sheath on both ends and cut. (See Fig. 3.13)
- Remove the paper back protective layer, if any, from the copper foil, and slide it under the repaired joint, with adhesive on top (if any), and fold it tightly around and over it. (See Fig. 3.15)
- The copper foil must have good contact with the ground braid at both ends and must not touch the gray sheath. (See Fig. 3.14 and 3.15)

Before continuing, verify the repair with the following tests:

Note: Undo the thermostat connections to the heating cable in the junction box, in order to verify the repair.

- Perform a resistance test, using an ohmmeter or multimeter, between the two conductors. A successful test will provide a nominal cable resistance close to the one found on the cable label on the cold lead.

Note: The repair cannot alter the resistance greater than 3% of the nominal resistance of the heating cable.

- Perform an insulation resistance test using a megohmmeter (range set to 1000 volts) between the ground braid and each conductor. A successful test will provide a measurement equal to or greater than 1 Gigaohms (1 Gigaohms = 1 G ohms = 1000 Mega ohms = 1000 M ohms).

G) Placing the heat shrink (Item E)

- Using a felt pen or marker, mark a distance of 1" (25.4 mm) on the gray sheath from the beginning of the repaired joint. (See Fig. 3.16)
- Slide the black heat shrink (Item E) to the marked point in order to properly seal the repaired joint. (See Fig. 3.17)
- Using a heat gun, heat the heat shrink until it completely seals the gray sheath on each side of the heating cable. (See Fig. 3.18)
- Repeat the resistance test and the insulation resistance test as outlined at step F.
- Once the repair is complete and the tests pass, embed the repaired joint in the cavity using hot glue.

Note: Undo the thermostat connections to the heating cable in the junction box, in order to verify the repair.



Fig. 3.12



Fig. 3.13



Fig. 3.14



Fig. 3.15



Fig. 3.16



Fig. 3.17



Fig. 3.18

3.2) REPAIRING THE TRANSITION SPLICE (BETWEEN GRAY CABLE AND BLACK COLD LEAD)

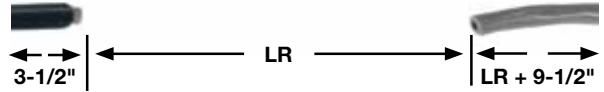


Fig. 3.21

A) Preparing the heating cable and the cold lead

Cut and remove the faulty section of the cable to obtain two intact segments.

- Free the cable to a length at least 9-1/2". (241 mm) longer than the length removed (LR) on one side, and 3-1/2" (89 mm) on the other side. (See Fig 3.21)

For example, if the length removed (LR) = 5" (127 mm), the cable must be uncovered $LR + 9\text{-}1/2 = 14.5$ " (368 mm) on one side and 3-1/2" (89 mm) on the other.

Re-use the cavity in the floor that housed the transition splice. Make sure that the repaired joint does not exceed the membrane height so as not to interfere with the installation of replacement tiles.

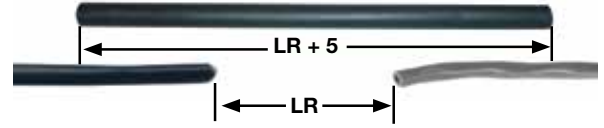


Fig. 3.22



Fig. 3.23



Fig. 3.24

- Cut the heat shrink tube $\text{Ø } 1/2$ " (12.7 mm) (item E) to a length at least 4" (101.6 mm) longer than the length removed (LR). For example, if a section of 5" (127 mm) was removed from the heating cable, a heat shrink tube of at least 9" (229 mm) long will be required. (See Fig. 3.22)



Fig. 3.25

- Slide the heat shrink over the longest segment of intact cable. (See Fig. 3.23)

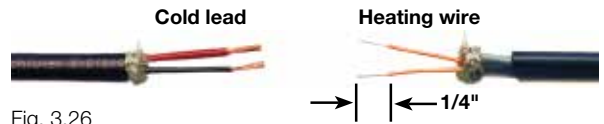


Fig. 3.26

B) Preparing each cable end

- Strip the black sheathing of the cold lead end and the gray sheath of the heating cable end each by 1-1/2" (38 mm) using a utility knife, exposing the ground braid. (See Fig. 3.24 and 3.25)

⚠ In both cases, be careful not to damage the tinned copper braid.

- Push back the ground braid over the sheathed portion of each cable section to expose the insulated conductors. (See Fig 3.25 and 3.26)
- Using a wire stripper*, strip the cold lead wires and the heating wires 1/4" (6 mm) exposing the insulated conductors. (See Fig 3.26)

*** Refer to Appendix A-2 at the end of this document to determine the conductor size (AWG) to use with the wire stripper, based on the product no. of heating cable to repair.**

Note: Undo the thermostat connections to the heating cable in the junction box, in order to verify the repair.

- In order to assure that there are no additional faults in the heating cable, perform an insulation resistance test using a megohmmeter (range set to 1000 volts) between the ground braid and each conductor on both sides of the exposed cable. A successful test will provide a measurement equal to or greater than 1 Gigaohms (1 Gigaohms = 1 G ohms = 1000 Mega ohms = 1000 M ohms).

C) Replacing missing section of the heating cable

Situation 1:

- If the length removed (LR) of the cable is less than 6" (152 mm), use the heating wire (item F) from the kit. (See Fig. 3.21 and 3.27)

Prepare the cable ends as described in the previous section (B).

Situation 2:

- If the length removed (LR) of the cable is more than 6" (152 mm), use the braided gray cable (item G) from the kit (See Fig. 3.21 and 3.28)

Prepare the cable as shown in Fig 3.28A.

Note: 4" (101.6 mm) of the gray sheath from item G must be removed for the side facing the gray heating cable, and 1-1/2" must be removed from it for the side facing the black cold lead.

D) Measuring, cutting, and stripping the insulated wire (item F) or the braided gray cable (item G)

- Measure and cut the insulated wire (F) or the braided gray cable (G) in such a way that the ends are long enough to be in contact with the ends of the insulated wires previously stripped. (See Fig 3.29)
- Using a 20 AWG wire stripper, strip the ends of wire (F) or cable (G) 1/4" (6 mm). (See Fig 3.29)

E) Connections

- Cut heat shrink tubing item D to a length of 2" (50.8 mm). Two pieces are required to cover heat shrink solder sleeve item A for each wire at a later stage.
- Slide a heat shrink with integrated solder ring (item B) on one of the cold lead conductors (14 AWG), and then insert one of the replacement heating wire conductor. (See Fig. 3.29A and 3.30A)

Place the conductors on each side of the shrink tube in such a way that the bare portions overlap within the integrated solder ring. The cold lead conductor and heating wire conductor must be adjacent to one another. (See Fig. 3.30)

Caution: insert the larger diameter D on the 14 AWG



Fig. 3.27 (Item F)



Fig. 3.28 (Item G)



Fig. 3.29

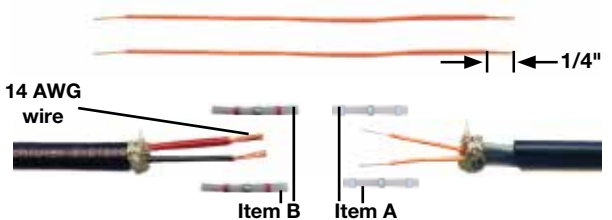


Fig. 3.29A



Fig. 3.30



Fig. 3.30A: The diameter of D is larger than d (ØD > Ød)

wire. (See Fig. 3.29A and 3.30A)

- Using a heat gun, adequately heat the shrink tube with integrated solder ring. The solder ring will melt and bond the two conductors together and the heat shrink will shrink completely. (See Fig. 3.30B)
- Slide a 2" heat shrink with sealant (item D) over the heat shrink installed in the previous step and protect it with a damp cloth.
- Next, slide a heat shrink with integrated solder ring (item A) over the end of the replacement conductor and insert one of the heating wire conductor so that so that the stripped portions overlap within the integrated solder ring.
- Using a heat gun, heat the shrink tube until the integrated solder ring has completely melted. (See Fig. 3.29A and 3.30C)
- Slide and center the 2" (50.8 mm) heat shrink that was protected by the damp cloth over the new connection and heat to shrink. (See Fig. 3.30D)
- Repeat this sequence of steps for the other conductor. (See Fig. 3.31)

F) Re-establishing the continuity of the ground braid

- Pull the tinned copper braided ground wire, covering the conductors on each end of the heating cable, towards the center. (See Fig. 3.32)
- Align the end of the copper foil (Item C) with the gray sheath on one end and the black sheath on the other end and cut. (See Fig. 3.33)
- Remove the paper back protective layer, if any, from the copper foil, and slide it under the repaired joint with adhesive on top, if any, (See Fig. 3.34) and fold it tightly around and over it. (See Fig. 3.35)
- The copper foil must have good contact with the ground braid at both ends and must not touch either the gray sheath or the black sheath at each end. (See Fig. 3.34 and 3.35)
- Before continuing; verify the repair:

Note: Undo the thermostat connections to the heating cable in the junction box, in order to verify the repair.

Perform a resistance test, using an ohmmeter or multimeter, between the two conductors. A successful test will provide a nominal cable resistance close to the one found on the cable label on the cold lead.

Note: The repair cannot alter the resistance greater than 3% of the nominal resistance of the heating cable.

- †0 Perform an insulation resistance test using a megohmmeter

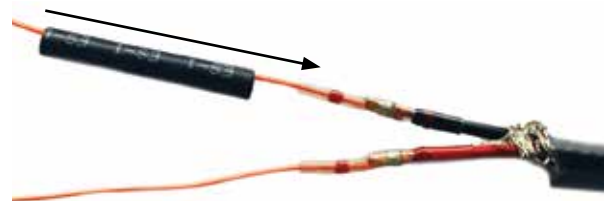


Fig. 3.30B: Protect item D with a damp cloth



Fig. 3.30C: Protect item D with a damp cloth



Fig. 3.30D



Fig. 3.31: Push the heat-shrink tubing further back and cover with damp cloth before soldering tubes.



Fig. 3.32



Fig. 3.33



Fig. 3.34



Fig. 3.35

(range set to 1000 volts) between the ground braid and each conductor. A successful test will provide a measurement equal to or greater than 1 Gigaohms (1 Gigaohms = 1 G ohms = 1000 Mega ohms = 1000 M ohms).

- Placing the heat shrink. (item E):

Using a felt pen or marker, mark a distance of 1/2" (13 mm) on the gray sheath of the heating cable from the beginning of the repaired joint. (See Fig. 3.36)

Slide the black heat shrink (Item E) to the marked point in order to properly seal the repaired joint. (See Fig. 3.37 and 3.37A)

Using a heat gun, heat the heat shrink until it completely seals the gray sheath on each side of the heating cable. (See Fig. 3.38 and 3.38A)

- Repeat the resistance test and the insulation resistance test as outlined in step F.
- Once the repair is complete and the tests pass, embed the repaired joint in the cavity using hot glue.



Fig. 3.36



Fig. 3.37



Fig. 3.37A: Align the heat-shrink tube with the line.



Fig. 3.38



Fig. 3.38A

3.3) REPAIRING THE END SPLICE (END OF GRAY HEATING CABLE)

A) Stripping procedure to expose the ground braid

- Cut the defective end splice completely (complete portion having black heat shrink) and remove it.
- Free the heating cable from the mortar and make sure to have a minimum of 3" (76.2 mm) available for the repair.
- Strip the gray sheath (outer jacket) 1-1/4" (31.8 mm). (See Fig. 3.40)

 **Be careful not to damage the tinned copper braid during this step.**

B) Unbraiding and preparing for soldering

- Pull the ground braid back over the non-stripped portion of the cable to expose the insulated conductors. (See Fig. 3.41)
- Use wire strippers to strip 5/8" (16 mm) of the insulation from both conductors. (See Fig. 3.42)

*** Refer to appendix A-2 at the end of this document to determine the conductor size (AWG) to use with the wire stripper, based on the product no. of heating cable to repair.**

- Twist the copper strands together. (See Fig. 3.43)

C) Soldering

- Slide the heat shrink with integrated solder ring (item B) over the conductors making sure that the integrated solder ring is centered over the twisted bare conductors. (See Fig. 3.44)



Fig. 3.40



Fig. 3.41



Fig. 3.42



Fig. 3.43



Fig. 3.44

- Using a heat gun, adequately heat the heat shrink and integrated solder ring making sure the solder melts and the shrink provides a good seal.
- Pull the tinned copper braid ground wires over the the heat shrink solder sleeve which was previously heated and shrunk. (See Fig. 3.45)



Fig. 3.45



Fig. 3.46



Fig. 3.47



Fig. 3.48

D) Verify the repair

- Before continuing, verify the repair.

Note: Undo the thermostat connections to the heating cable in the junction box, in order to verify the repair.

Perform a resistance test, using a ohmmeter or multimeter between the two conductors. A successful test will provide a nominal cable resistance close to the one found on the cable label on the cold lead.

Note: The repair cannot alter the resistance greater than 3% of the nominal resistance of the heating cable.

Perform an insulation resistance test using a megohmmeter (range set to 1000 volts) between the ground braid and each conductor. A successful test will provide a measurement equal to or greater than 1 Gigaohms (1 Gigaohms = 1 G ohms = 1000 Megaohms = 1000 M ohms).

E) Heat shrink tube (item D)



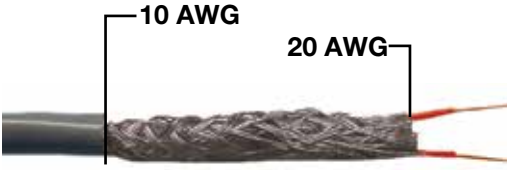
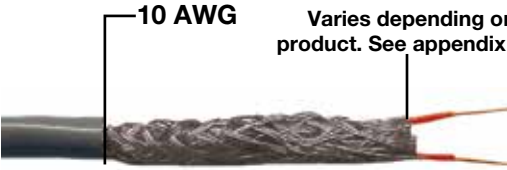
- Make a mark, using a felt pen or marker, at a distance of 1/2" (12 mm) on the gray sheath. (See Fig. 3.46)
- Cut a 3" section of heat shrink (item D)
- Slide the black heat shrink (Item D) to the marked point in order to properly seal the repaired joint. Using a heat gun, heat the heat shrink until it completely seals the gray sheath on the heating cable. (See Fig. 3.47 and 3.48)
- Pinch the heat shrink at the end of the cable using pliers to properly seal the termination point. (See Fig. 3.48)

F) Anchor the cable to the floor

- Make a groove in the floor to accommodate the repair. Anchor the repaired cable using hot glue. Make sure the repaired joint does not interfere with the laying of the replacement tile or tiles.
- Repeat the resistance test and the insulation resistance test as outlined in step D.

Appendix A-1: Repair Technician Data Table

SUMMARY OF WIRE SIZES (AWG)

Supplied with the repair kit	Cable being repaired
<p>Item F</p>  <p>20 AWG</p>	<p>Cold lead (black)</p>  <p>14 AWG</p> <p>Utility knife</p> <p>Be careful not to damage the braid</p>
<p>Item G</p>  <p>10 AWG</p> <p>20 AWG</p> <p>Be careful not to damage the braid</p>	<p>Heating cable (grey)</p>  <p>10 AWG</p> <p>Varies depending on product. See appendix A-2</p> <p>Be careful not to damage the braid</p>

DATA TABLE (AWG)

Repair	Product number	AWG (appendix A-2)
A		
B		
C		
D		
E		

CABLE PRODUCT NO. AND THEIR HEATING CONDUCTOR SIZES (AWG)

Product number (120 V)	Heating conductor size (AWG)*
DHEHK12011	27
DHEHK12016	27
DHEHK12021	25
DHEHK12027	26
DHEHK12032	24
DHEHK12038	26
DHEHK12043	25
DHEHK12051	23
DHEHK12064	26
DHEHK12073	25
DHEHK12083	24
DHEHK12092	23
DHEHK120102	22
DHEHK120113	21
DHEHK120134	20
Product number (240 V)	Heating conductor size (AWG)*
DHEHK24011	28
DHEHK24016	26
DHEHK24021	27
DHEHK24027	25
DHEHK24032	27
DHEHK24038	27
DHEHK24043	25
DHEHK24053	26
DHEHK24064	24
DHEHK24075	26
DHEHK24085	25
DHEHK240103	23
DHEHK240129	26
DHEHK240145	25
DHEHK240167	24
DHEHK240183	23
DHEHK240204	22
DHEHK240225	21
DHEHK240269	20

* Recommended wire stripper size to remove insulation from conductor.