Cold Shrink - Silicone Rubber
QTII(X)4S-32H Series Cable Termination

Instructions

Class I Indoor Termination
Voltage Designation: 12/20(24) kV

Kit Contents:

<table>
<thead>
<tr>
<th>Size Selection (X)</th>
<th>Termination Assembly Body Size</th>
<th>Cable Insulation O. D. Range mm ( Inch )</th>
</tr>
</thead>
<tbody>
<tr>
<td>( )</td>
<td>J</td>
<td>16 – 28 ( 0.64 – 1.12 )</td>
</tr>
<tr>
<td>( )</td>
<td>K</td>
<td>21 – 35 ( 0.84 – 1.38 )</td>
</tr>
<tr>
<td>( )</td>
<td>L</td>
<td>27 – 46 ( 1.08 – 1.80 )</td>
</tr>
<tr>
<td>( )</td>
<td>M</td>
<td>33 – 53 ( 1.31 – 2.10 )</td>
</tr>
</tbody>
</table>

Final Determining Factor = Cable Insulation Diameter

Table 1

CAUTION:

Working around energized high voltage systems may cause serious injury or death. Installation should be performed by personnel familiar with good safety practice in handling high voltage electrical equipment. De-energize and ground all electrical systems before installing this product.

3M™ QTII
Silicone Rubber Termination
3/C Copper Tape Shield – Armored Cable

78-8126-0460-7A
A. Prepare Cable

1. Determine cable jacket removal length required for correct core (phase) spacing and bolted terminal lug connections ([A] + [B], Figure 1), based on the longest phase to be connected. Allow for dimension [C] as needed.

   **Note:** Individual core length and separation dimensions vary according to specific installation and equipment design requirements. They must, therefore, be determined by the installer and must conform to accepted engineering practices. Supplied materials allow for a maximum [A] + [B] dimension of 1.5 M. See your local 3M Representative for information regarding longer core length requirements.

2. Remove cable jacket, armor, bedding (inner sheath) and core fillers according to Figure 1 dimensions and equipment requirements. Secure copper tape shield ends with a temporary band of vinyl tape (Figure 1).

3. Using light tension, apply one mastic seal strip around cable jacket 25 mm (1.0”) below the cut edge (Figure 1).
B. Attach Metallic Shield Grounding Braids

1. Cut supplied tinned copper grounding braid into three equal 750 mm (30.0") lengths. Expand each braid end for a distance of 300 mm (12.0") (Figure 2).

2. Position one expanded ground braid end over each cable core shield as shown in Figure 3. Using vinyl tape bands, secure upper braid end to copper tape shielding 200 mm (8.0") beyond armor edge (jacket edge for non-armored cable) (Figure 3). Secure to cable jacket 15 mm (0.60") below mastic seal strip (Figure 3).

3. Connect ground braid ends to cable core metallic shields using small constant force springs (Figure 3).

   **Armored cables:** Connect three ground braids to cable armoring using one large constant force spring (Figure 3). Following application, cinch (twist with hand) each spring to tighten.

4. Apply a second mastic seal strip over ground braids and previously-applied mastic strip (Figure 3).

5. Apply two highly stretched half-lapped layers vinyl tape over mastic seal strips and constant force springs (Figure 3).
C. Install Heat Shrink Breakout Boot

1. Inspect breakout boot interior. Remove any contaminants that may be present.

2. Apply a single band of mastic around vinyl tape at position shown ( Figure 4 ).
   
   **Note:** Disregard this step if using a breakout boot supplied with adhesive sealant.
   
3. Slide boot over cable as far as it will go ( Figure 4 ). Using an appropriate torch, shrink breakout boot into final position.
D. Install Heat Shrink Core Insulating Sleeves

1. From the chart below, determine the correct [A] dimension for the QT-II Termination being installed.

<table>
<thead>
<tr>
<th>(X)</th>
<th>QTII Termination Assembly</th>
<th>Dimension [A]</th>
</tr>
</thead>
<tbody>
<tr>
<td>J4S</td>
<td>195 mm (7.7”)</td>
<td></td>
</tr>
<tr>
<td>K4S</td>
<td>195 mm (7.7”)</td>
<td></td>
</tr>
<tr>
<td>L4S</td>
<td>205 mm (8.1”)</td>
<td></td>
</tr>
<tr>
<td>M4S</td>
<td>205 mm (8.1”)</td>
<td></td>
</tr>
</tbody>
</table>

2. Place a vinyl tape marker on each cable core shield at dimension [X] (Figure 5).

   **Note:** [X] = [A] + [B] (Lug depth) as in Figure 5.

3. Determine distance [S] in Figure 5. Be sure to include breakout boot finger length in measurement (Figure 5).

4. If [S] is 450 mm (17.7”) or less, continue with the installation at Step 5. For longer [S] dimensions, go to Step 11.

5. Cut three phase re-jacketing sleeves to dimension [S].

   **Caution:** Heat shrink sleeve end cuts must be straight and smooth (No rough or jagged edges).

6. Wrap a mastic sealing band around the end of one breakout boot finger (Figure 6).
7. Position one heat shrink re-jacketing sleeve over one shielded cable core and breakout boot finger (Figure 7).

   Note: Working on one core at a time will prevent unwanted adhesion between mastic sealing bands.

8. Repeat Steps 6. and 7. for the remaining two cable cores (Figure 8).

9. Align each re-jacketing sleeve end with a termination marker tape (Figure 9) and shrink into position.

   Note: Maintain sleeve-to-marker tape edge alignment while shrinking. Shrink sleeves by progressing down from the marker tape edges to the breakout boot fingers. Never shrink both ends before moving to the center region of the heat shrink sleeve.

10. Allow heat shrink re-jacketing sleeves to cool before proceeding. Go to Section E., Page 8.
11. For [S] dimensions longer than 450 mm (17.7") (As measured in Figure 10 below), add 100 mm (4.0") to [S].

12. Cut three heat shrink re-jacketing sleeves to dimension [S + 100 mm (4.0")].

Caution: Heat shrink sleeve end cuts must be straight and smooth (No rough or jagged edges).

13. Wrap a single mastic band around the end of one breakout boot finger (Figure 10).

14. Position one heat shrink re-jacketing sleeve over one breakout boot finger and shielded cable core.

Note: Working on one core at a time will prevent unwanted adhesion between mastic sealing bands.

15. Repeat Steps 13. and 14. on remaining two cable cores (Figure 11).

Note: Position three phase re-jacketing sleeves completely over breakout boot fingers. Extended length re-jacketing sleeves will cover previously applied termination marker tapes.

16. Starting at the breakout boot fingers, shrink re-jacketing sleeves into final position.

Note: Shrink from the lower end (over breakout boot fingers) to the upper end. Never shrink both ends before moving to the center region of the heat shrink sleeve.

17. Allow heat shrink sleeves to cool before proceeding.
18. Mark three installed re-jacketing sleeves at dimension [X].
   
   Note: \([X] = [A] + [B] (\text{Lug Depth})\) as in Step D.1. and Figure 12.

   Remove excess sleeve length to dimension [X].
   
   Caution: Do not cut into cable metallic shielding while removing excess re-jacketing sleeve material.

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**Figure 12**

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**E. Install QT-II Cold Shrink Termination Assemblies**

1. Prepare cable phase ends according to dimensions shown (Figure 13). Allow for crimp growth when using aluminum connectors or lugs.

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**Figure 13**

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<table>
<thead>
<tr>
<th></th>
<th>J-4S</th>
<th>K-4S</th>
<th>L-4S</th>
<th>J-4S</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>195 mm</td>
<td>195 mm</td>
<td>205 mm</td>
<td>205 mm</td>
</tr>
<tr>
<td>B</td>
<td>Lug Depth</td>
<td>Lug Depth</td>
<td>Lug Depth</td>
<td>Lug Depth</td>
</tr>
<tr>
<td>C</td>
<td>60 mm</td>
<td>60 mm</td>
<td>60 mm</td>
<td>60 mm</td>
</tr>
<tr>
<td>D</td>
<td>40 mm</td>
<td>40 mm</td>
<td>40 mm</td>
<td>40 mm</td>
</tr>
</tbody>
</table>
2. Secure each metallic shield end with a single band of vinyl tape (Figure 14). Center tape band on metallic shield edge. **Note: Do not extend vinyl tape wrap beyond width of tape roll.**

3. From the free end of each installed shield grounding braid, cut a single, 150 mm (6.0") long, piece. **Note: In some kits, these shorter braid lengths may be supplied pre-cut.**

4. Fully expand the diameter of each short braid. Slide one braid over each cable phase metallic shield (Figure 14).

5. Secure ground braids to metallic shields using supplied constant force springs (Figure 15). **Note: Make sure braid and springs are applied over cable metallic shields (Not over vinyl tape).**

6. Wrap a mastic seal strip band over applied ground braid 5mm (0.20") from re-jacketing sleeve edge (Figure 15).
7. Apply two highly stretched half-lapped layers vinyl tape over springs and mastic bands (Figure 16).

Note: Do not extend vinyl tape wrapping more than 5 mm (0.20") beyond mastic band and ground braid leading edge (⊙ and ◐ Figure 16).

8. Place a termination installation marker tape over each re-jacketing sleeve 100 mm from semi-con screen edge (Figure 17).

9. Position heat shrink binding sleeves over ends of applied ground braids (⊙ Figure 18). Shrink sleeves into position.
10. **Special Applications – For terminal lug pads that will not pass through the interior of the termination assembly support core.** Slide the termination assemblies over the cable phase legs before installing the lugs. Position each termination assembly with its loose core ribbon directed toward the open, lug end, of the cable (Reference ①, Figure 21 as needed). Continue with lug installations.

**Normal Applications – Install Terminal Lugs:**

For Aluminum Conductors - Thoroughly wire brush conductor strands to remove aluminum oxide layer. Immediately insert conductor into terminal lug barrel as far as it will go.

Ensure that each lug face is parallel to its intended connection interface (① Figure 19).

11. Crimp terminal lugs according to manufacturer recommendations. Start at the upper end as shown (② Figure 19). Remove all traces of oxide inhibitor that may have come out of the lug barrels during crimping.

Thoroughly clean primary insulation and lug barrel area using solvent wipes from supplied cable preparation kit.

**Note:** Avoid wetting cable semi-conductive layer with solvent.

12. Fill step at cable semi-con cut edge with silicone grease (① Figure 20).
13. Install QT-II Termination Assemblies.

(a.) Position each termination assembly with it’s loose core ribbon end directed toward the terminal lug (Figure 21).
(b.) Align base of termination (not the plastic support core) with installation marker tape as shown (Figure 21).
(c.) Grasp the loose core ribbon and pull while unwinding it counter clock-wise around the cable end (Figure 21).

Note: Once the silicone rubber termination body has made adequate contact (Approx. 25 mm or 1.0”), release the assembly and continue unwinding the core. Do not pull or push on the assembly while unwinding.
(e.) Remove the installation marker tape.

14. Seal termination body to terminal lug barrel by applying at least two half-lapped layers Scotch™ No. 70 Silicone Tape as shown (Figure 22). Start, and finish, tape wrapping at the upper end of the terminal lug barrel.

15. Collect shield-grounding braids together and connect to system ground (earth) according to normal practice.
Important Notice

Before using this product, you must evaluate it and determine if it is suitable for your intended application. You assume all risks and liability associated with such use.

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