

AMPHENOL® OVAL CONTACT SYSTEM (OCS 13-53) FOR 24 GAUGE CABLES

The following procedures are based on Gore's best practices for terminating GORE® Aerospace Ethernet Cables with the Amphenol® Oval Contact System (OCS) for both plug and receptacle versions. These procedures should be used as a guide in conjunction with current connector manufacturing instructions.

Preparing the Cable and Parts

1. Gather the tools and materials required for assembly and termination (Figures 1–8). **Note:** This assembly requires SN63 leaded solder.
2. Be sure to evaluate the tools and procedures in these termination instructions for potential hazards; collect the proper personal protective equipment you will need.
3. Verify that you have the correct parts for your assembly by checking the part numbers for the connectors and the GORE® Aerospace Ethernet Cables listed on drawing DDA0238.
4. Cut two 1.5-inch pieces of 0.75-inch thin-walled adhesive-lined tubing (TAT).
5. Cut the cable to the desired assembly length minus 4.5 centimeters (cm) to allow for length of the connectors (i.e., 2.2 cm for the plug connector and 2.3 cm for the receptacle connector).
6. Print any labels required by the end-user, and slide the center label onto the cable.
7. To identify the end for the plug connector, place a piece of tape on the end in which the pairs rotate clockwise in order of green → orange → blue → brown (Figure 9).



Figure 9: Pairs configuration at plug end



Figure 1: Needle nose pliers, scalpel, tweezer scissors, and hand strippers



Figure 2: Cutters



Figure 3: Soldering iron



Figure 4: Solder wick



Figure 5: Clamp tool (Tie-Dex® II)

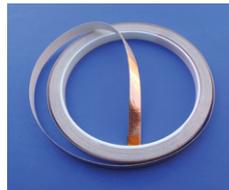


Figure 6: Copper foil tape¹ (3M-3313)



Figure 7: Braid brush



Figure 8: Probe/pick

1. Gore recommends using copper foil tape instead of polyimide tape during termination procedures because copper tape is easier to use and improves signal integrity.

Terminating the Plug Connector (Termination A)

1. Slide one piece of the TAT onto the cable.
2. Slide the backshell onto the cable with the smallest end facing the cable (Figure 10).



Figure 10: Inserting backshell on the cable

3. Measure and mark the cable 0.5 inch from the plug end of the cable (Figure 11).



Figure 11: Marking the cable

4. Using a scalpel or scissors, slit the cable's jacket from its edge to the mark (Figure 12).

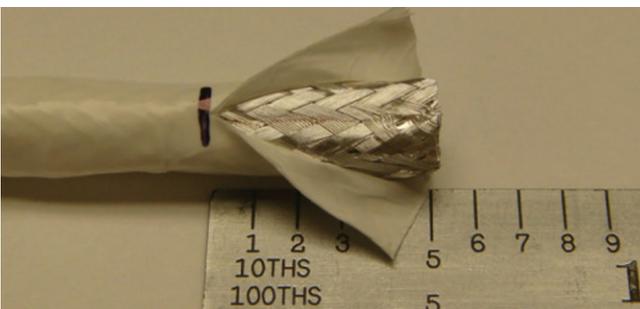


Figure 12: Slitting the cable jacket

5. Using needle-nose pliers, gently pull the outer jacket down the cable until you have exposed approximately 3.5 inches of braid (Figure 13).

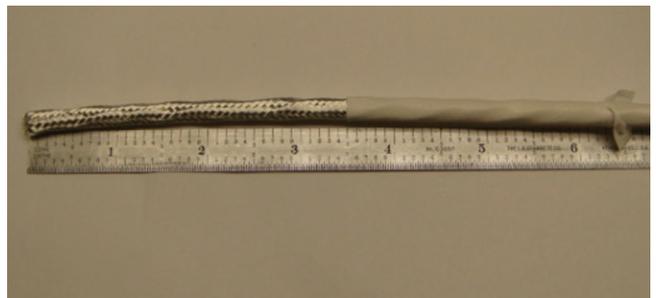


Figure 13: Exposing the braid

6. With your fingers, push the braid back over the cable to expose approximately 3.5 inches of the foil (Figure 14).



Figure 14: Exposing the foil

7. Remove the white filler as far down as possible.
8. Cut a piece of 0.25-inch polyimide tape, and tape the foil at the end of each pair (Figure 15).



Figure 15: Taping each pair

9. Insert each pair into the connector grommet based on the following table. Printing on the connector grommets shows orientation for both plug and receptacle pairs, so be sure to insert the pairs in a counter-clockwise orientation (Figure 16). Gently pull the foil on each pair toward the connector grommet if it was pushed down while you were inserting the pair (Figure 17).

Grommet Location	Pair
A	Green/green white
B	Brown/brown white
C	Blue/blue white
D	Orange/ orange white



Figure 16: Inserting each pair into connector



Figure 17: Pairs inserted in connector grommet

10. Slide the connector grommet toward the braid as close as possible (Figure 18).



Figure 18: Positioning the grommet near the braid

11. Wrap a 0.5-inch piece of copper tape around each pair directly next to the piece wrapped in step 8 (Figure 19).

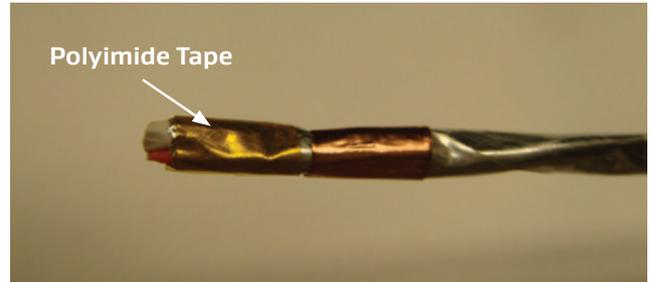


Figure 19: Adding tape to each pair

12. Using cutters, remove the polyimide tape and the foil until you reach the copper tape placed in step 11 (Figure 20).

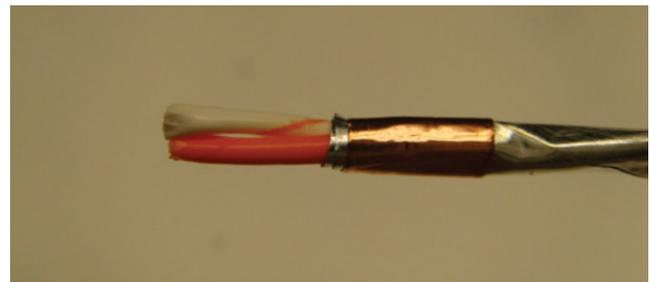


Figure 20: Removing polyimide tape and foil

13. Using a soldering iron, tin the ends of each wire to prevent bird-caging during stripping.

14. Mark each primary at 0.07 inch from the end (Figure 21).

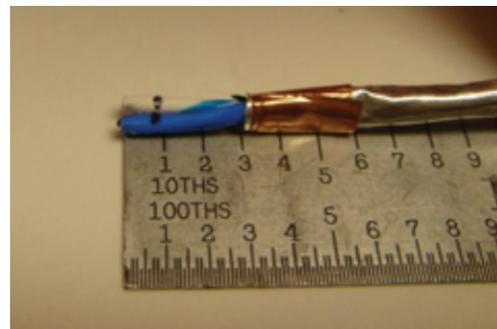


Figure 21: Marking a primary

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Termination Instructions

15. Using 24-gauge hand strippers, strip each primary (Figure 22). If necessary, re-tin the primary ends.

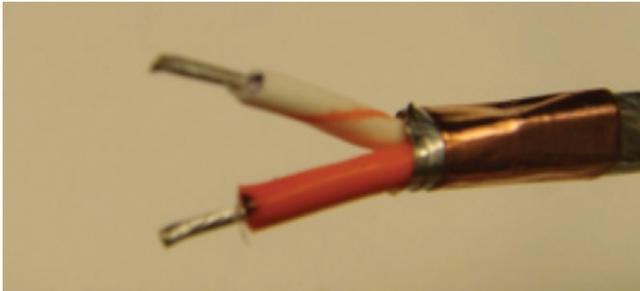


Figure 22: Stripping primary

16. Degold all contacts by applying flux and then solder. Using solder wick, remove all excess solder from the solder cups (Figures 23–24).

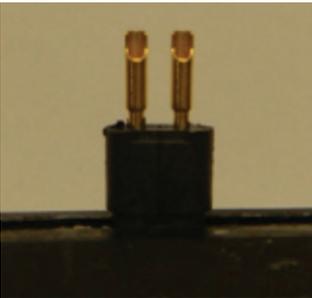


Figure 23: Before Degolding contacts

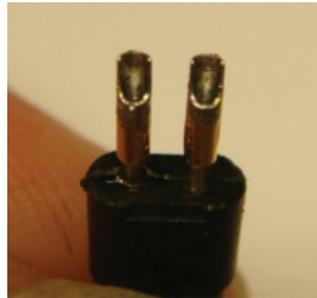


Figure 24: After degolding contacts

17. Slide an oval ferrule on each shielded pair (Figure 25).

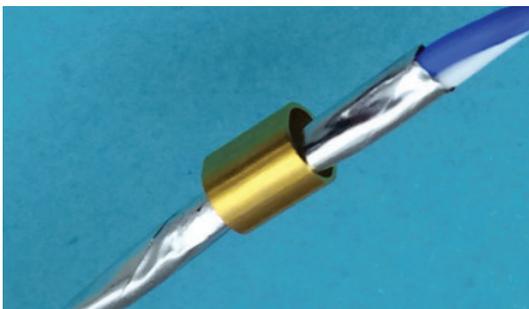


Figure 25: Adding ferrule on pair

18. Solder each twisted pair into a set of contacts. With the solder cup's opening facing you, solder the solid primary into the left contact and the striped primary into the right contact (Figure 26). After soldering all four twisted pairs, clean the solder joints using isopropyl alcohol or an equivalent flux cleaner.



Figure 26: Soldering the twisted pair

19. To prepare the outer bodies for each pair, tin the ears of each outer body, keeping the solder smooth (Figure 27).



Figure 27: Tinning ears of outer body

20. One pair at a time, place the black rear insulator on the back of the contact (Figure 28).

21. Insert the beige rear insulator on the top of the contact on the same pair (Figure 29).

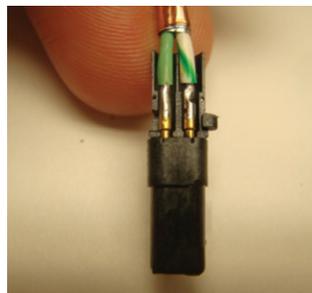


Figure 28: Attaching black rear insulator

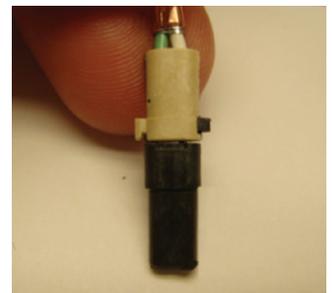


Figure 29: Attaching beige rear insulator

22. Slide the outer body pieces onto the rear insulators at the end of the cable, while locking them together (Figure 30). **Note:** Unlike the single-piece outer body for the receptacle, the plug's outer body is two pieces that must be locked together.



Figure 30: Locking outer body onto rear insulators

23. Wrap copper tape around the ears of the outer body so that it touches the tape around the foil shield of the twisted pair (Figure 31).

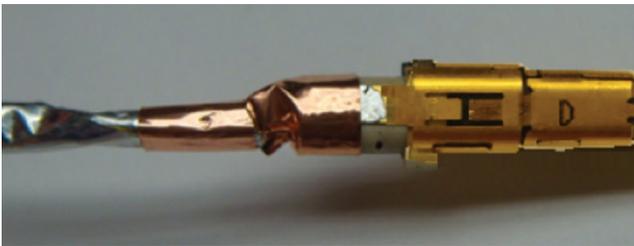


Figure 31: Taping the outer body ears

24. Slide the oval ferrule down the cable, over the ears until it fits snugly to the outer body (Figure 32).



Figure 32: Positioning the ferrule

25. Wrap 0.015-inch solder around the inside of the ferrule (Figure 33); flow the solder (Figure 34). Clean all solder joints using isopropyl alcohol or equivalent flux cleaner.



Figure 33: Wrapping solder



Figure 34: Flowing solder

26. Carefully insert each contact by hand as follows:

- a. On the front side of the connector identify the connector main key keyway (Figure 35).
- b. Align the green/green-white pair's orientation keyway (i.e., the beige key), and insert it in position A, being careful not to insert it at an angle (Figure 36).
- c. Push until the contact snaps into position.
- d. Verify the proper retention by tugging gently on the end of the contact.
- e. Repeat steps a through d for:

Keyway Position	Pair
B	Brown/Brown-white
C	Blue/Blue-white
D	Orange/Orange-white

Connector Main Keyway

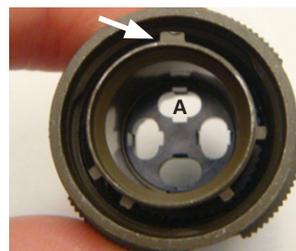


Figure 35: Front view with connector keyway

Orientation for Beige Key

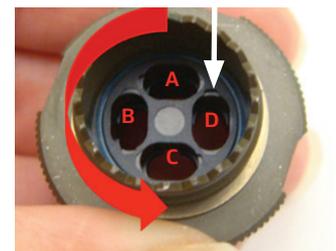


Figure 36: Rear view with insertion orientation

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Termination Instructions

27. Slide the connector grommet to the plug, and torque it to 40 inch-pounds using the appropriate torque fixtures (Figure 37).



Figure 37: Connecting the grommet to the plug

28. Slide the backshell to the connector grommet, and torque it to 40 inch-pounds using the appropriate torque fixtures.

29. Slide the braid toward the connector, and use a braid brush or pick to brush it over the backshell (Figure 38).



Figure 38: Returning braid to connector

30. Using the Tie-Dex® II clamp tool, attach a Band-It clamp over the knurled section of the backshell, being careful not to cut yourself on the sharp edges of the clamp (Figure 39). Trim any extra braid.



Figure 39: Attached Band-It® clamp

31. Wrap a piece of polyimide tape two or three times around the Band-It® clamp (Figure 40).



Figure 40: Wrapping Band-It® clamp

32. With your fingers or needle-nose pliers, push the outer jacket as close as possible to the connector. Trim any excess outer jacket.

33. Position the tubing so that it completely covers the braid, Band-It® clamp, and the first lip of the backshell. Using a heat-gun, shrink the tubing over the backshell (Figure 41).



Figure 41: Shrinking tubing to backshell

Terminating the Plug Connector (Termination B)

1. Slide one piece of the TAT onto the cable.
2. Slide the backshell onto the cable with the smallest end facing the cable (Figure 42).



Figure 42: Inserting backshell on the cable

3. Measure and mark the cable 0.5 inch from the receptacle end of the cable (Figure 43).



Figure 43: Marking the cable

4. Using a scalpel or scissors, slit the cable's jacket from its edge to the mark (Figure 44).



Figure 44: Slitting the cable jacket

5. Using needle-nose pliers, gently pull the outer jacket down the cable until you have exposed approximately 3.5 inches of braid (Figure 45).

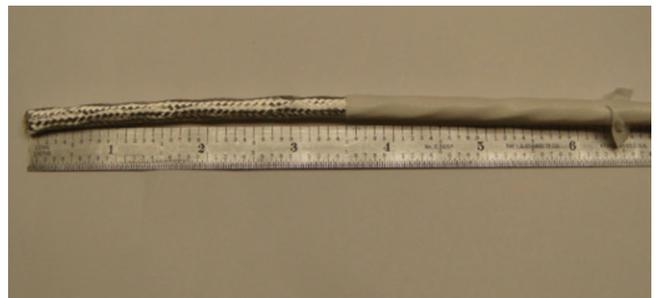


Figure 45: Exposing the braid

6. With your fingers, push the braid back over the cable to expose approximately 3.5 inches of the foil (Figure 46).



Figure 46: Exposing the foil

7. Remove the white filler as far down as possible.

8. Cut a piece of 0.25-inch polyimide tape, and tape the foil at the end of each pair (Figure 47).



Figure 47: Taping each pair

GORE® Aerospace Ethernet Cables

Termination Instructions

9. Insert each pair into the connector grommet based on the following table. Printing on the connector grommets shows orientation for both plug and receptacle pairs, so be sure to insert the pairs in a clockwise orientation (Figure 48). Gently pull the foil on each pair toward the connector grommet if it was pushed down while you were inserting the pair (Figure 49).

Grommet Location	Pair
A	Green/green white
B	Brown/brown white
C	Blue/blue white
D	Orange/ orange white

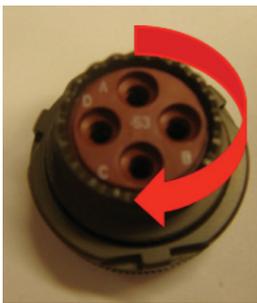


Figure 48: Inserting each pair into connector grommet



Figure 49: Pairs inserted in connector grommet

10. Slide the connector grommet toward the braid as close as possible (Figure 50).



Figure 50: Positioning the grommet near the braid

11. Wrap a 0.5-inch piece of copper tape around each pair directly next to the piece wrapped in step 8 (Figure 51).

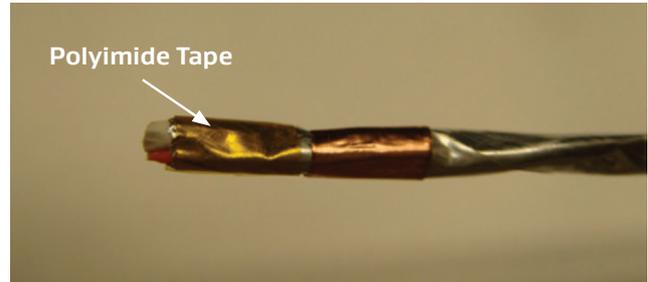


Figure 51: Adding tape to each pair

12. Using cutters, remove the polyimide tape and the foil until you reach the copper tape placed in step 11 (Figure 52).

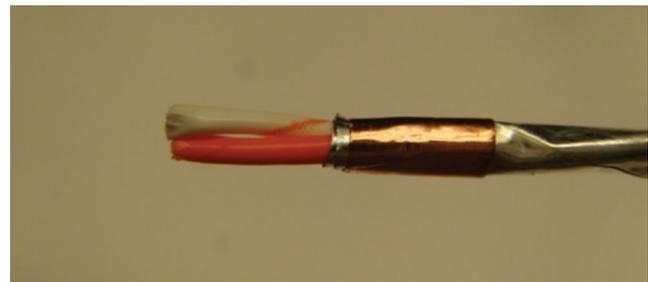


Figure 52: Removing polyimide tape and foil

13. Using a soldering iron, tin the ends of each wire to prevent bird-caging during stripping.

14. Mark each primary at 0.07 inch from the end (Figure 53).

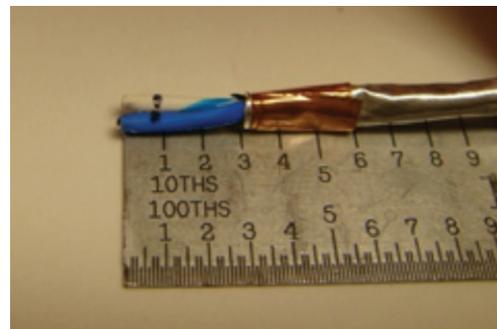


Figure 53: Marking a primary

15. Using 24-gauge hand strippers, strip each primary (Figure 54). If necessary re-tin the primary ends.

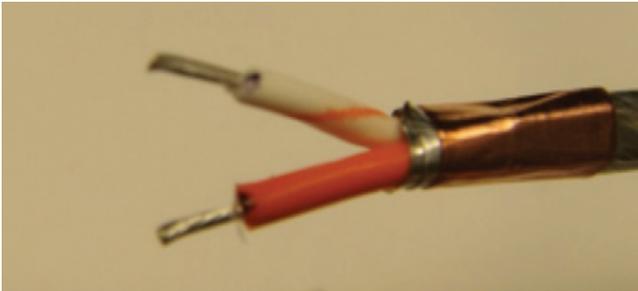


Figure 54: Stripping primary

16. Degold all contacts by applying flux and then solder. Using solder wick, remove all excess solder from the solder cups (Figures 55–56).

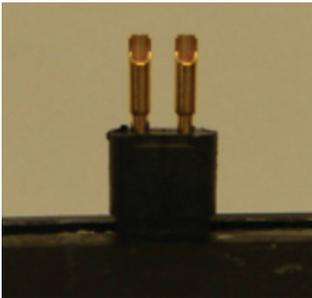


Figure 55: Before degolding contacts

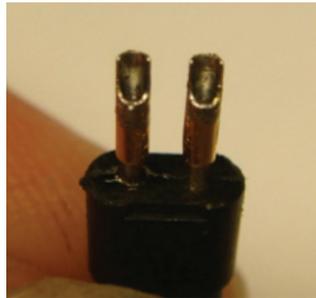


Figure 56: After degolding contacts

17. Slide an oval ferrule onto each shielded pair (Figure 57).

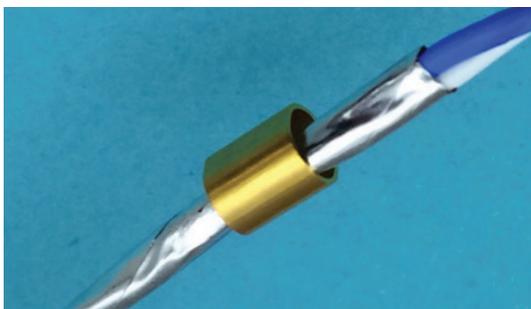


Figure 57: Adding ferrule on pair

18. Solder each twisted pair into a set of contacts. With the solder cup's opening facing you, solder the solid primary in the left contact and the striped primary in the right contact (Figure 58). After soldering all four twisted pairs, clean the solder joints using isopropyl alcohol or equivalent flux cleaner.

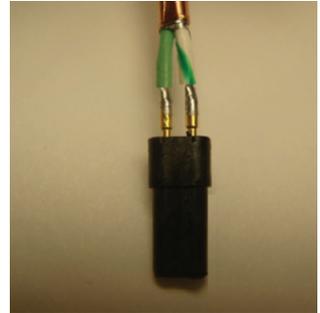


Figure 58: Soldering the twisted pair

19. To prepare the outer bodies for each pair, tin the ears of each outer body, keeping the solder smooth (Figure 59).



Figure 59: Tinning ears of outer body

20. One pair at a time, place the black rear insulator on the back of the contacts (Figure 60).

21. Insert the beige rear insulator on the top of the contacts (Figure 61).

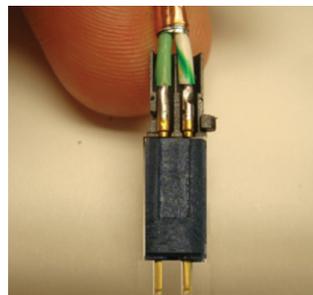


Figure 60: Attaching rear insulator

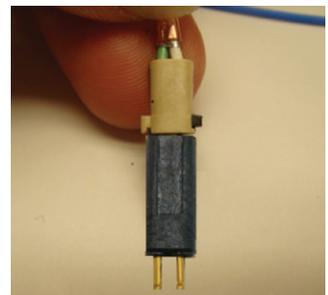


Figure 61: Attaching beige rear insulator

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Termination Instructions

22. Slide the outer body onto the rear insulators at the end of the cable (Figure 62). **Note:** Unlike the two-piece outer body for the plug, the receptacle's outer body is only one piece.



Figure 62: Locking outer body onto insulators

23. Wrap copper tape around the ears of the outer body so that it touches the tape around the foil shield of the twisted pair (Figure 63).

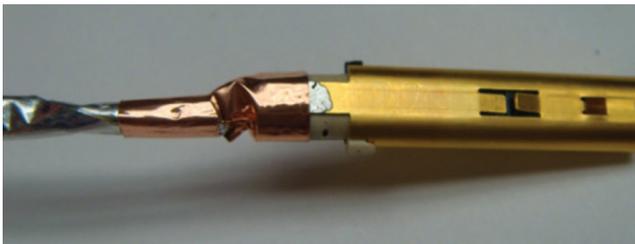


Figure 63: Taping the ears

24. Slide the oval ferrule down the cable, over the ears until it fits snugly to the outer body (Figure 64).



Figure 64: Positioning the ferrule

25. Wrap 0.015-inch solder around the inside of the ferrule (Figure 65); flow the solder (Figure 66). Clean all solder joints using isopropyl alcohol or equivalent flux cleaner.



Figure 65: Wrapping solder



Figure 66: Flowing solder

26. Carefully insert each contact by hand as follows:

- a. On the front side of the connector identify the connector main key keyway (Figure 67).
- b. Align the green/green-white pair's orientation keyway (i.e., the beige key), and insert it in position A, being careful not to insert it at an angle (Figure 68).
- c. Push until the contact snaps into position.
- d. Verify the proper retention by tugging gently on the end of the contact.
- e. Repeat steps a through d for:

Keyway Position	Pair
B	Brown/Brown-white
C	Blue/Blue-white
D	Orange/Orange-white

Connector Main Keyway

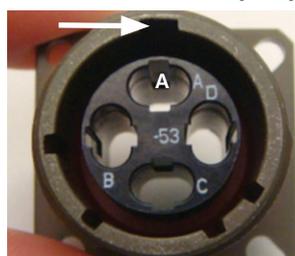


Figure 67: Front view with connector keyway

Orientation for Beige Key

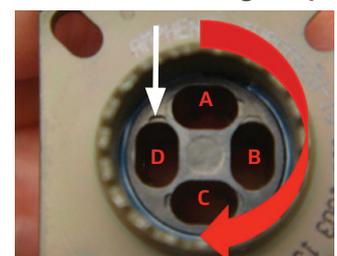


Figure 68: Rear view with insertion orientation

27. Slide the connector grommet to the receptacle, and torque it to 40 inch-pounds using the appropriate torque fixtures (Figure 69).



Figure 69: Connecting the grommet to the receptacle

28. Slide the backshell to the connector grommet, and torque it to 40 inch-pounds using the appropriate torque fixtures.

29. Slide the braid toward the connector, and use a braid brush or pick to brush it over the backshell (Figure 70).



Figure 70: Returning braid to connector

30. Using the Tie-Dex® II clamp tool, attach a Band-It® clamp over the knurled section of the backshell, being careful not to cut yourself on the sharp edges of the clamp (Figure 71). Trim any extra braid.



Figure 71: Attached Band-It® clamp

31. Wrap a piece of polyimide tape two or three times around the Band-It® clamp (Figure 72).



Figure 72: Wrapping Band-It® clamp

32. With your fingers or needle-nose pliers, push the outer jacket as close as possible to the connector. Trim any excess outer jacket.

33. Position the tubing so that it completely covers the braid, Band-It® clamp, and the first lip of the backshell. Using a heat-gun, shrink the tubing over the backshell (Figure 73).



Figure 73: Shrinking tubing over backshell

Closing the Connectors

1. Perform all required testing. At a minimum, verify proper wiring and continuity, and check for shorts. Local authorities and end-users may require additional testing.
2. Verify that the assembly length is accurate.
3. Using a heat-gun, shrink the center label, if appropriate.

NOTICE — USE RESTRICTIONS APPLY. Not for use in food, drug, cosmetic or medical device manufacturing, processing, or packaging operations.

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