NOVA BUS

RECALL CAMPAIGN CR4602E

REFERENCE:	Nova Bus Manuals
SECTION:	09: Engine and Cooling
RS Nº:	MQR 7621-1695
EFFECTIVE IN PROD.:	LC32 (2019MR)
NHTSA RECALL Nº.:	19V274

APPLICATION DEADLINE: N/A
CLAIM REFERENCE NUMBER: SR-4602

SUBJECT:	Engine Door Fan Connector Replacement.
JUSTIFICATION:	Connectors, terminals and wiring damaged due to excessive heat.

LEVEL	DESCRIPTION	DIRECT CHARGES		TIME
		LABOUR	MATERIAL	
1	Replacement of the connectors and terminals on the fan and bus wiring sides.	Nova Bus	Nova Bus	1.25 hrs

MATERIAL

QTY	NOVA PN	REV.	PREVOST PN	DESCRIPTION	REPLACES PART Nº
LEVEL 1					
1	N77235	-	N8910118	HDSCS Connector Plug - Power - Series 6.3	-
2	N97874-01	-	N8908509	HDSCS Terminal Socket	-
1	N77185	-	N8910119	HDSCS Connector Receptacle - Power - Series 6.3	-
2	N97874-02	-	N8908508	HDSCS Terminal Pin	-
2	N77238	-	993747	HDSCS Seal Green for 10 AWG	-
2	N77237	-	993749	HDSCS Seal Blue for 12 AWG	-
1	N82710	-	N82710	DT Connector Male 2 Pos. w/ Boot	-
1	N25892-01	-	N25892-01	DT Lock Secondary (Wedge Lock) 2 Pos. Male Side	-
1	N82711	-	N82711	DT Connector Female 2Pos. w/ Boot	-
1	N26398	-	562487	DT Secondary Lock (Wedge Lock) 2 Pos. Female Side	-
1	N57040	B	N57040	Tie Cable Mount HI-HEAT	-
1	N38350	A	N38350	Anchor Heavy Duty Mount	-
2	N67755	-	N67755	TEFZEL Blue Cable Ties	-
1	N56339	A	N56339	TEFZEL Blue Cable Ties	-
2	G5900714	-	N8910153	Terminal Female (Socket) Deutsch Size 16 Solid	-
2	G5900719	-	562286	Terminal Male (Pin) Deutsch Size 16 Solid	-
10.5 in	N82227-04	-	N82227-04	Tubing Heat Shrink Dual Wall	-
6 in	N82227-13	-	N82227-13	Tubing Heat Shrink Dual Wall	-
40 in	N74787	A	N74787	Electrical Cloth Tape	-
LEVEL 2					
35%	N11690-30	-	N11690-30	Circuit Breaker 30A	-
5%	N91996	-	N91996	Fan Axial BLDC	-
SPECIAL TOOLING					
1	-	-	N8910120	HDSCS 6.3 Crimping Hand Tool	-
1	-	-	N8910121	HDSCS 6.3 Die Set	-
-	-	-	-	Deutsch DT Crimping Hand Tool (not included)	-

APPROVED BY: Daniel Theriault

Digitally signed by Daniel Theriault
DN: cn=Daniel Theriault, o=Nova Bus, ou, email=daniel.theriault@volvo.com, c=CA
Date: 2019.07.05 13:10:40 -04'00'

DISPOSAL OF PARTS

REMOVED PARTS ARE:	DISCARDED *	RETAINED	* Dispose of the unused parts and the defective parts in accordance with local environmental standards in effect.
	Yes	–	

REVISION HISTORY

REV.	DATE	CHANGE DESCRIPTION	WRITTEN BY
NR	2019-07-04	Initial release	Yuvaraj

CLIENT	ORDER	ROAD NUMBER		VIN (2NVY/4RKY...)		QTY
		FROM	TO	FROM	TO	
New York City Transit - New York	LB59	5444	5484	S92J7H9776195	S92J6H9776379	41
New York City Transit - New York	LA23	5485	5530	S92J5J9776380	S92J6J9776517	46

WARNING

Follow your internal safety procedures.

PROCEDURE

VEHICLE PREPARATION

1.1. Park the vehicle on an even surface with transmission on neutral (N) and apply the parking brake.

1.2. Before starting any work on the vehicle, make sure that the vehicle is completely and securely stationary.

ENGINE FAN TEST

1.3. Open the interior back panel (see figure 1) and locate the circuit breaker of the engine fan. Refer to the table below to locate the circuit breaker position.

Order Number	Circuit Breaker Location
LB59	+IB-CB99AT2
LA23	+IB-CB99AT2

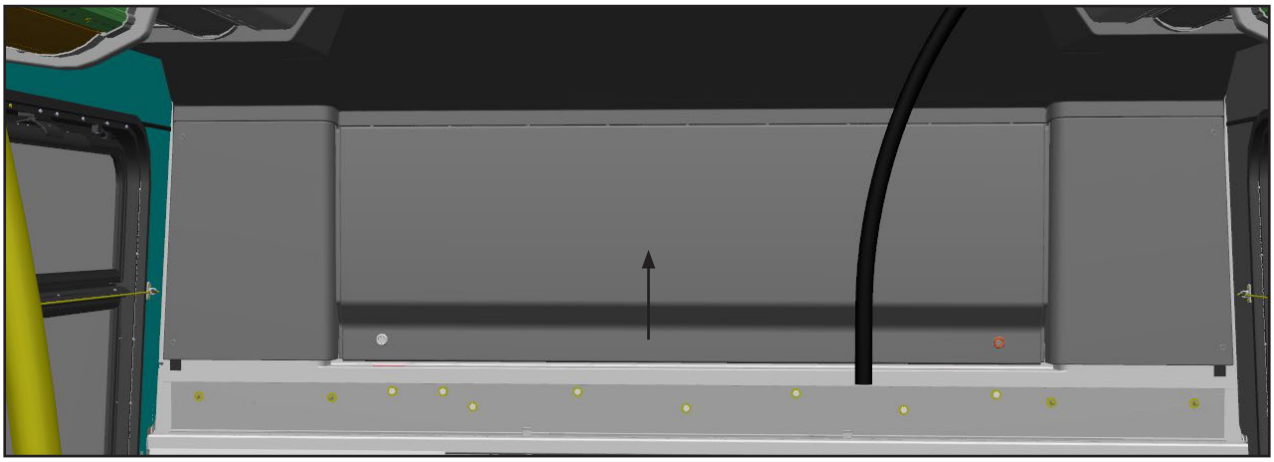


Figure 1 - Bus Interior Back Panel Location

1.4. Insert the circuit breaker PN N11690-30 into the engine fan circuit breaker socket.

1.5. Start the vehicle and confirm that the engine fan is working.

1.6. If the engine fan connector and/or terminals are too damaged to test the engine fan, replace the damaged fan with a spare known working fan PN N91996.

ENGINE FAN CONNECTORS REPLACEMENT

1.7. Set the Master Control Switch in the STOP position (see figure 2).

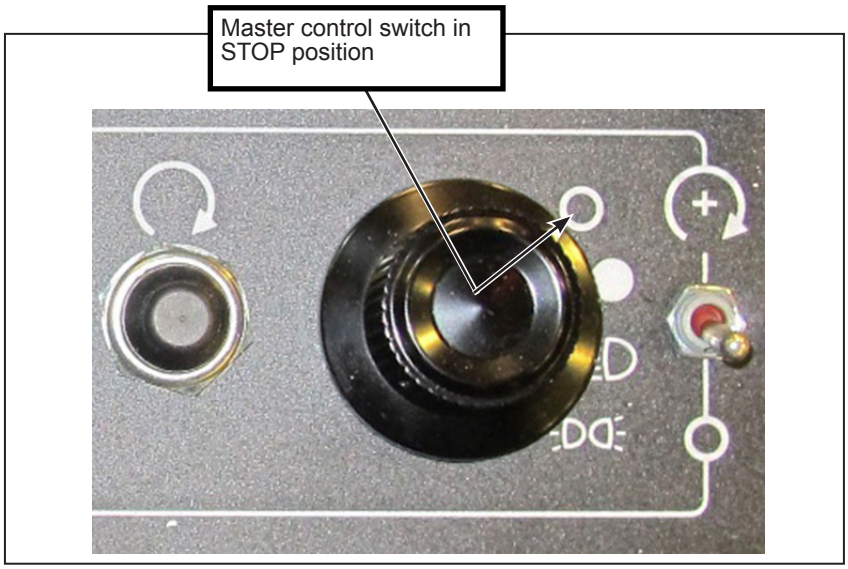


Figure 2 - Master Control Switch in STOP Position

1.8. Disconnect the starting circuit on the control box at the rear of the vehicle and place the battery disconnect switch in the OFF position.

WARNING

Follow your internal safety procedures.

Removal of Deutsch DTP and DT Connectors

1.9. Open the engine compartment door and locate the engine fan Deutsch DTP and DT connectors (see figure 3).

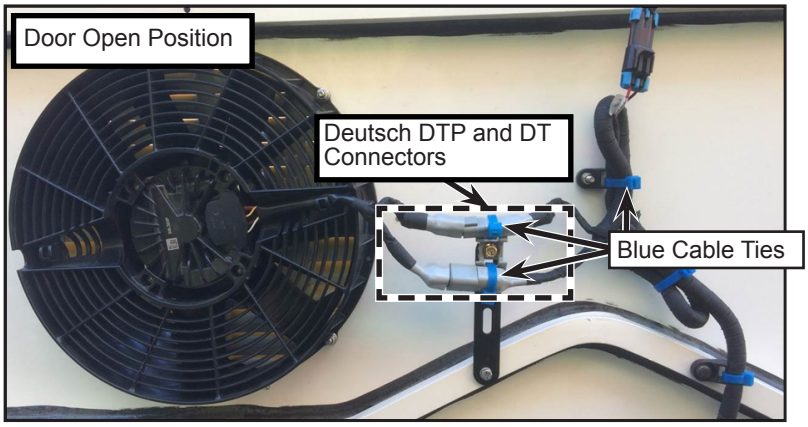


Figure 3 - Typical Engine Door Fan Deutsch DTP and DT Connectors Installation

1.10. Cut the two blue cable ties on the dual tie mount securing the Deutsch DTP and DT connectors and one blue cable tie on the door at harness side (see figure 3).

1.11. Remove the Coroplast tape and grey rubber boots from the Deutsch DTP and DT connectors (see figure 4) and then disconnect both connector pairs.

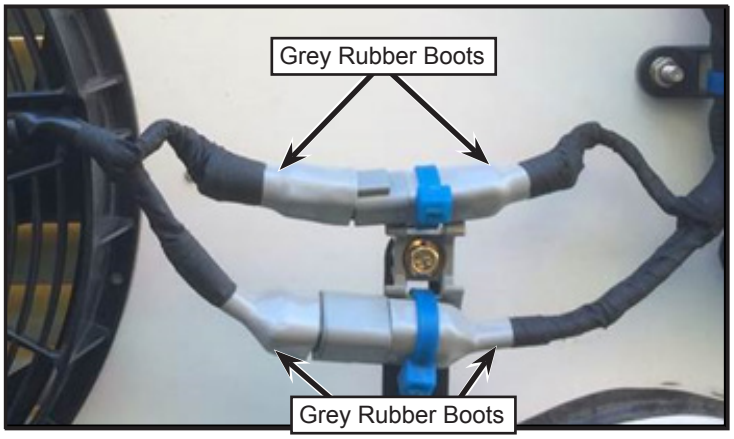


Figure 4 - Removal of Coroplast Tape and Grey Rubber Boots from Both Connector Pairs

1.12. On the fan side, extract the wire terminals inside the DTP and DT connectors using a Deutsch extraction tool or a small flat blade screwdriver. Then cut the terminals keeping the maximum wire length (see figure 5). Clean the wires with contact cleaner, if glue or dirt is present.

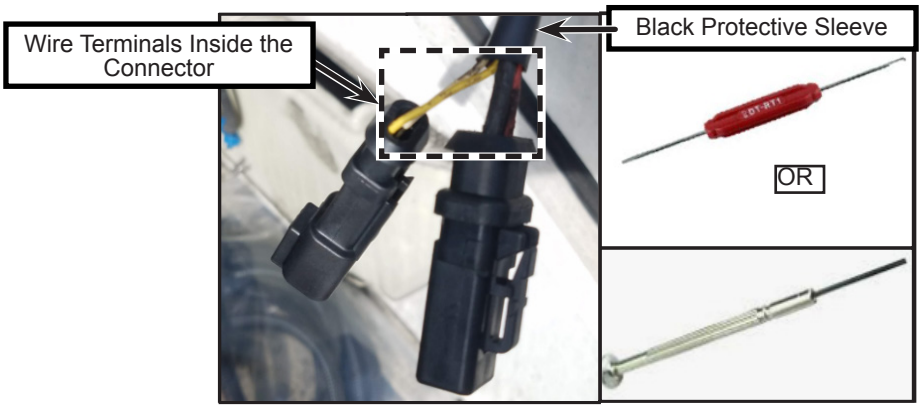


Figure 5 - Fan Side Connectors Removal and Tool Options for Terminals Extraction from the Connector Housing

1.13. On the harness side, cut both the DTP and DT connectors with the terminals directly at the back end of the connector housing (see figure 6) and clean the wires with contact cleaner, if glue or dirt is present.

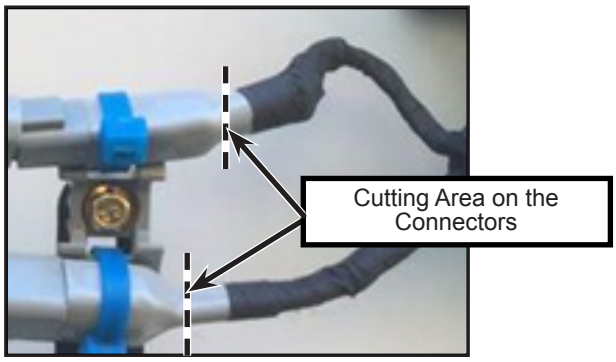


Figure 6 - Harness Side Connectors Removal

Installation of HDSCS Connector at Fan Side

1.14. Using the HDSCS crimping tool (see figure 7), crimp the socket terminal PN N97874-01 with the blue seal PN N77237 on both RED and BLACK power wires (see figure 8). Refer to the figure below showing a typical HDSCS terminal crimp example and to Annex 1 for more information about the HDSCS connectors terminal crimping quality guidelines.

Figure 7 - TE Connectivity HDSCS Crimping Hand Tool

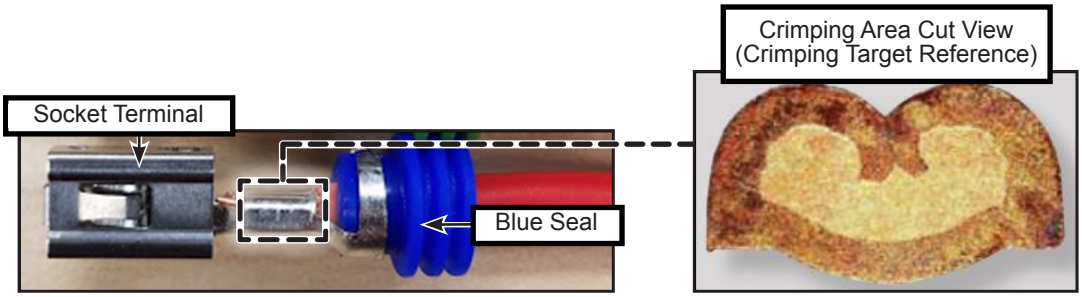


Figure 8 - TE Connectivity HDSCS Socket Terminal and Blue Seal

1.15. Insert 1.75 in (total of 3.5 in) of heat shrink tubing PN N82227-04 over both RED and BLACK power wires. Then, using a heat gun, apply the small heat shrink tubing PN N82227-04 over the power wires while leaving a 1/8 in gap with respect to each seal in order to avoid any interference with the terminal wire seals.

1.16. Insert 1.5 in of large heat shrink tubing PN N82227-13 over the power wires bundle but do not shrink immediately.

1.17. Insert the RED wire terminal into position 1 and the BLACK wire terminal into position 2 of the HDSCS plug connector PN N77235 (see figure 9). Make sure that the yellow secondary lock of the plug connector is completely pressed (to move it from the unlocked to the locked position) after inserting both terminals. Refer to Annex 2 for detailed instructions about terminals insertion and secondary lock.

1.18. Using a heat gun, apply the large heat shrink tubing PN N82227-13 starting from the boot adapter of HDSCS plug connector finishing directly over the smaller heat shrink tubes previously installed on the power wires (see figure 9). Make sure to fill any gap between the two power wires with the inner adhesive liner glue (do not apply heat shrink tubing over tape or loom).

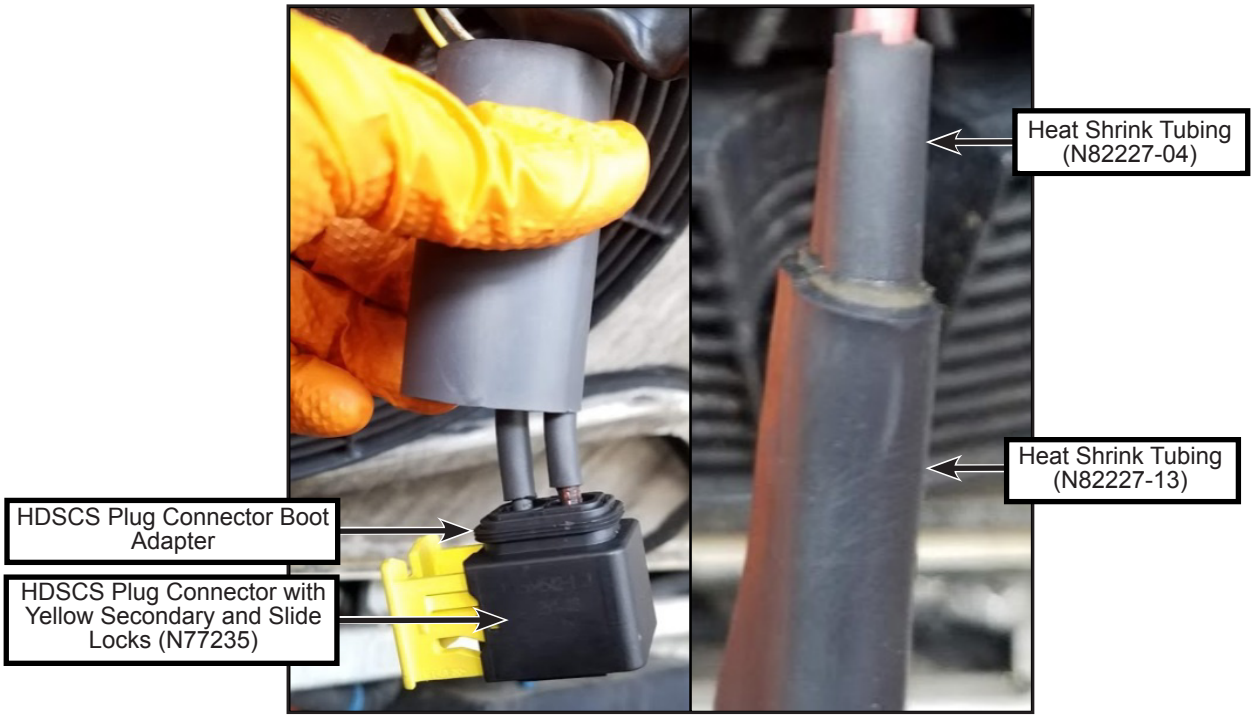


Figure 9 - Heat Shrink Tubing Installation on HDSCS Plug Connector Wiring at Fan Side

Installation of DT Connector at Fan Side

1.19. Using the Deutsch DT crimping tool (see figure 10), crimp the socket terminal PN G5900714 on both WHITE and YELLOW control wires (see figure 11). Refer to the figure below showing a typical Deutsch DT solid socket terminal crimp example and to Annex 3 for more information about the TE Connectivity`s Deutsch DT solid terminals crimping quality guidelines.

Figure 10 - Deutsch DT Crimping Hand Tool

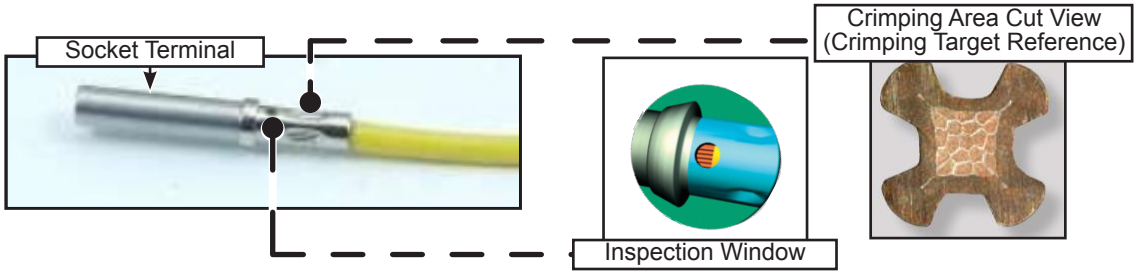


Figure 11 - Deutsch DT Socket Terminal

1.20. Insert a single 1.75 in length of heat shrink tubing PN N82227-04 over the **paired** WHITE and YELLOW control wires. Then, using a heat gun, apply the small heat shrink tubing PN N82227-04 over the paired control wires while leaving a 1/4 in gap with respect to the terminals in order to avoid any interference or stress on the DT connector back end wire seal.

1.21. Insert 1.5 in of large heat shrink tubing PN N82227-13 over the control wires bundle but do not apply immediately.

1.22. Insert the WHITE wire terminal into position 1 and the YELLOW wire terminal into position 2 of the DT plug connector PN N82710. Insert the wedge lock PN N25892-01 into the DT plug connector (see figure 12).

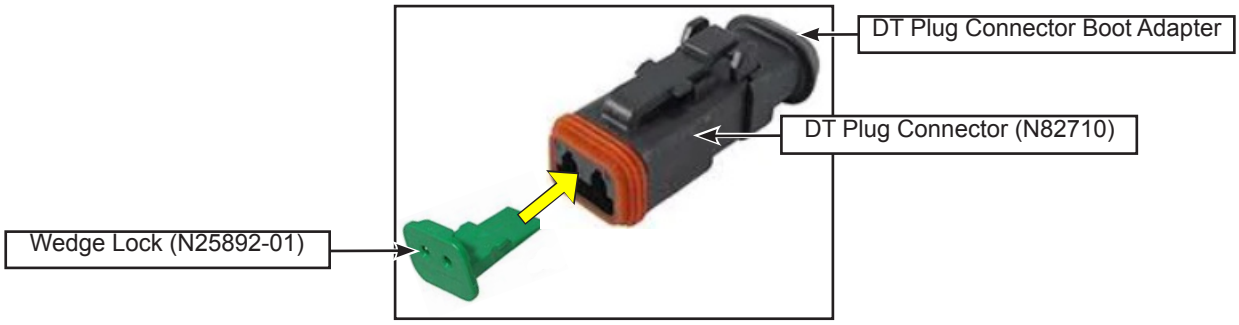


Figure 12 - Wedge Lock Insertion into Deutsch DT Plug Connector

1.23. Using a heat gun, apply the large heat shrink tubing PN N82227-13 starting from the boot adapter of DT plug connector finishing directly over the smaller heat shrink tube previously installed on the paired control wires (see figure 13). Make sure to fill any gap with the inner adhesive liner glue (do not apply heat shrink tubing over tape or loom).

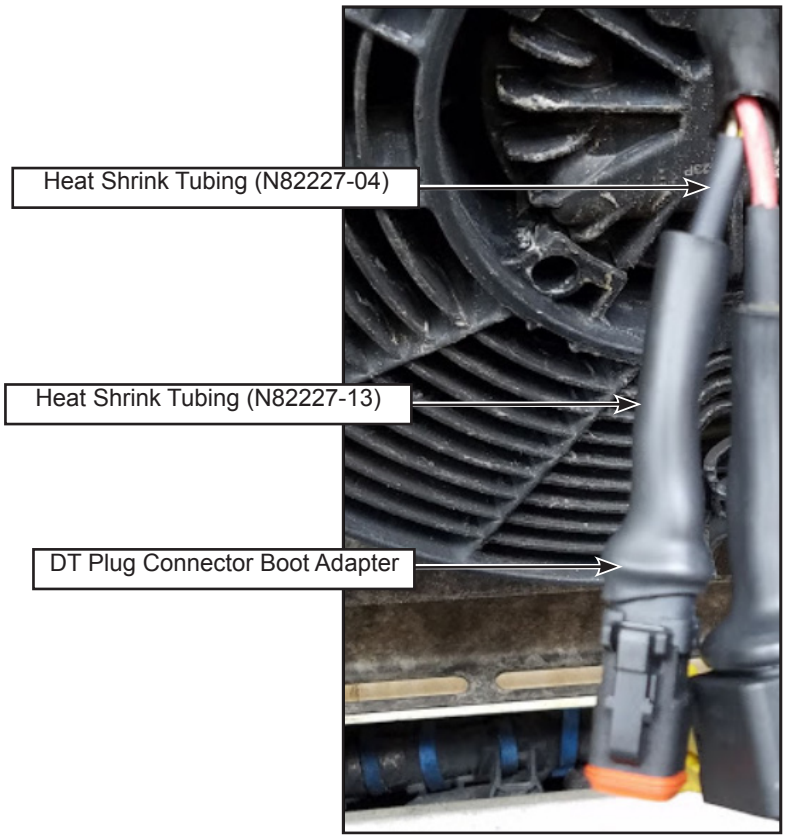


Figure 13 - Heat Shrink Tubing Installation on DT Plug Connector Wiring at Fan Side

1.24. Apply Coroplast tape PN N74787 over the exposed wiring / heat shrink tubing on the fan side HDSCS and DT plug connectors.

Installation of HDSCS Connector at Harness Side

1.25. Using the HDSCS crimping tool (see figure 7), crimp the pin terminal PN N97874-02 with the green seal PN N77238 on both RED and BLACK power wires (see figure 14). Refer to the figure below showing a typical HDSCS terminal crimp example and to Annex 1 for more information about the HDSCS connectors terminal crimping quality guidelines.

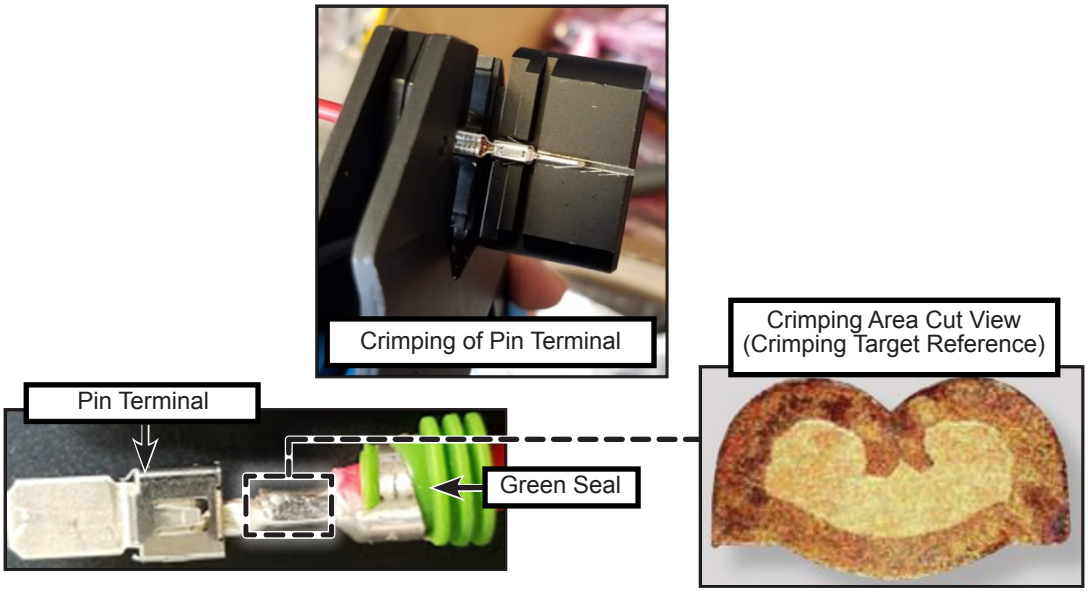


Figure 14 - TE Connectivity HDSCS Pin Terminal and Green Seal

1.26. Insert 1.75 in (total of 3.5 in) of heat shrink tubing PN N82227-04 over **both** RED and BLACK power wires. Then, using a heat gun, apply the small heat shrink tubing PN N82227-04 over the power wires while leaving a 1/8 in gap with respect to each seal in order to avoid any interference with the terminal wire seals.

1.27. Insert 1.5 in of large heat shrink tubing PN N82227-13 over the power wires bundle but do not shrink immediately.

1.28. Insert the RED wire into position 1 and the BLACK wire into position 2 of the HDSCS receptacle connector PN N77185. Make sure that the yellow secondary lock of the receptacle connector is completely pressed (to move it from the unlocked to the locked position) after inserting both terminals (see Figure 15). Refer to Annex 2 for detailed instructions about terminals insertion and secondary lock.

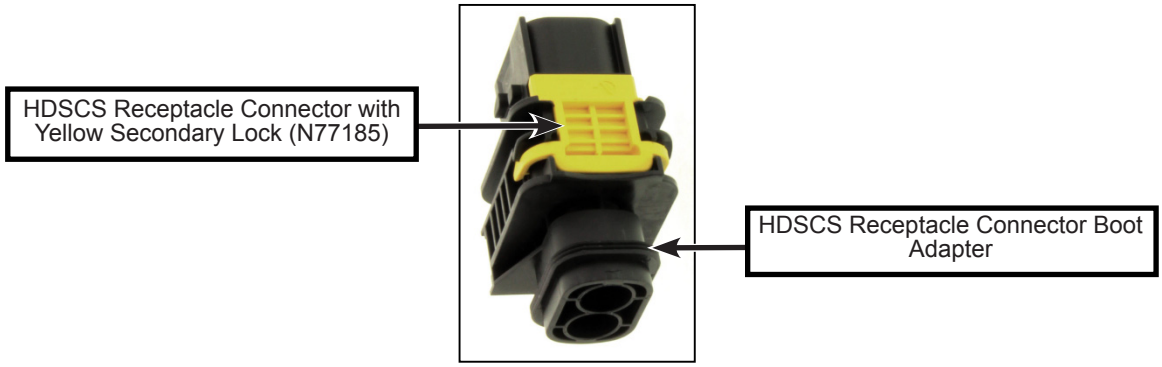


Figure 15 - TE Connectivity HDSCS Receptacle Connector

1.29. Using a heat gun, apply the large heat shrink tubing PN N82227-13 starting from the boot adapter of HDSCS receptacle connector finishing directly over the smaller heat shrink tubes previously installed on the power wires (see figure 9). Make sure to fill any gap between the two power wires with the inner adhesive liner glue (do not apply heat shrink tubing over tape or loom).

Installation of DT Connector at Harness Side

1.30. Using the Deutsch DT crimping tool (see figure 10), crimp the pin terminal PN G5900719 on both WHITE and RED control wires (see figure 16). Refer to the figure below showing a typical Deutsch DT solid socket terminal crimp example and to Annex 3 for more information about the TE Connectivity`s Deutsch DT solid terminals crimping quality guidelines.

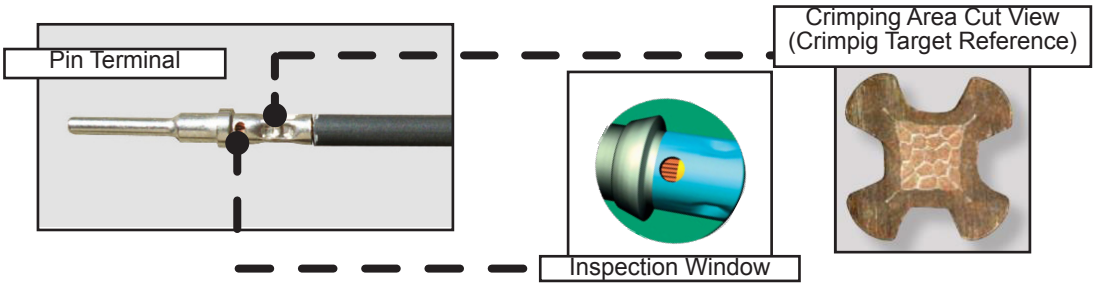


Figure 16 - Deutsch DT Pin Terminal

1.31. Insert a single 1.75 in length of heat shrink tubing PN N82227-04 over the **paired** WHITE and RED control wires. Then, using a heat gun, apply the small heat shrink tubing PN N82227-04 over the paired control wires while leaving a 1/4 in gap with respect to the terminals in order to avoid any interference or stress on the DT connector back end wire seal.

1.32. Insert 1.5 in of large heat shrink tubing PN N82227-13 over the control wires bundle but do not apply immediately.

1.33. Insert the WHITE wire terminal into position 1 and the RED wire terminal into position 2 of the DT receptacle connector PN N82711. Insert the wedge lock PN N26398 into the DT receptacle connector (see figure 17).

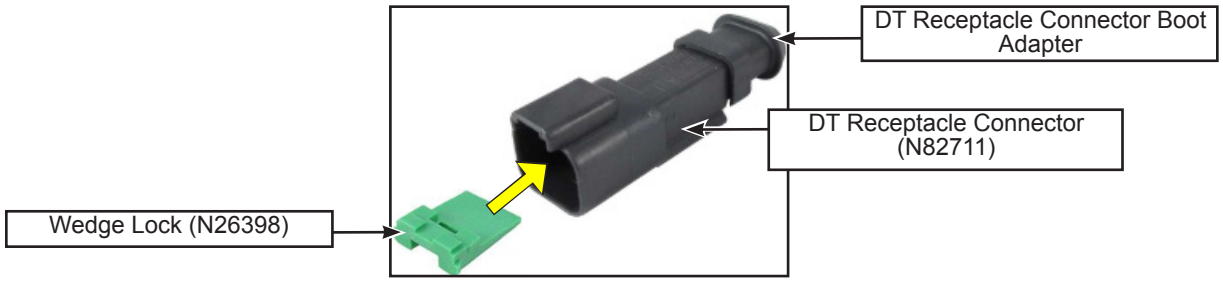


Figure 17 - Wedge Lock Insertion into Deutsch DT Receptacle Connector

1.34. Using a heat gun, apply the large heat shrink tubing PN N82227-13 starting from the boot adapter of DT receptacle connector finishing directly over the smaller heat shrink tube previously installed on the paired control wires (see figure 18). Make sure to fill any gap with the inner adhesive liner glue (do not apply heat shrink tubing over tape or loom).

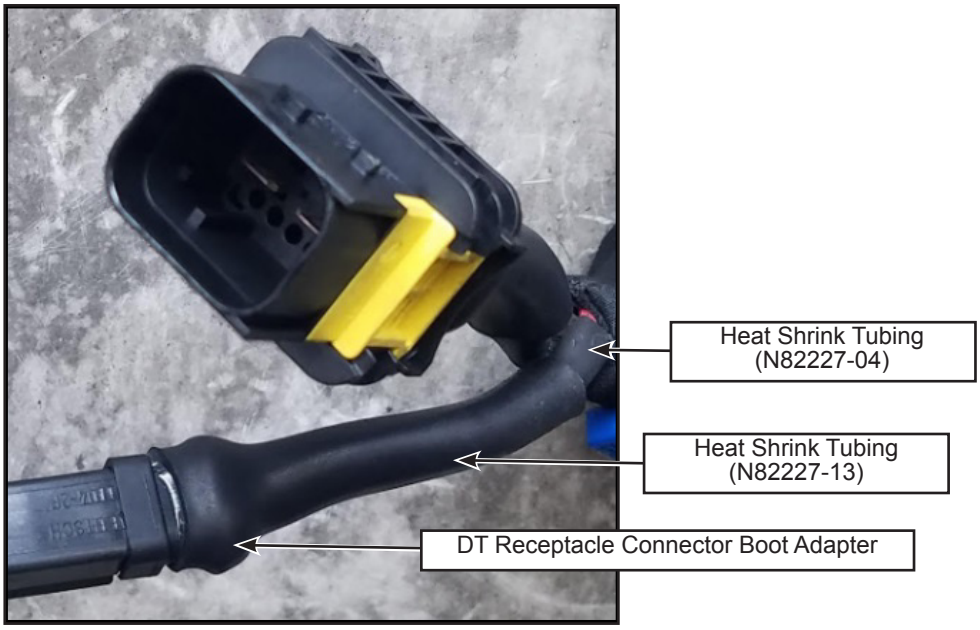


Figure 18 - Heat Shrink Tubing Installation on DT Receptacle Connector Wiring at Harness Side

1.35. Add Coroplast tape PN N74787 over the exposed wiring / heat shrink tubing on the harness side HDSCS and DT receptacle connectors.

Final Preparation

1.36. Remove and discard the dual tie-mount installed on the straight bracket and retain the mounting hardware (bolt and nut).

1.37. Install the two tie-mounts PN N57040 (1x) and PN N38350 (1x) on the straight bracket using the same mounting hardware (see figure 19).

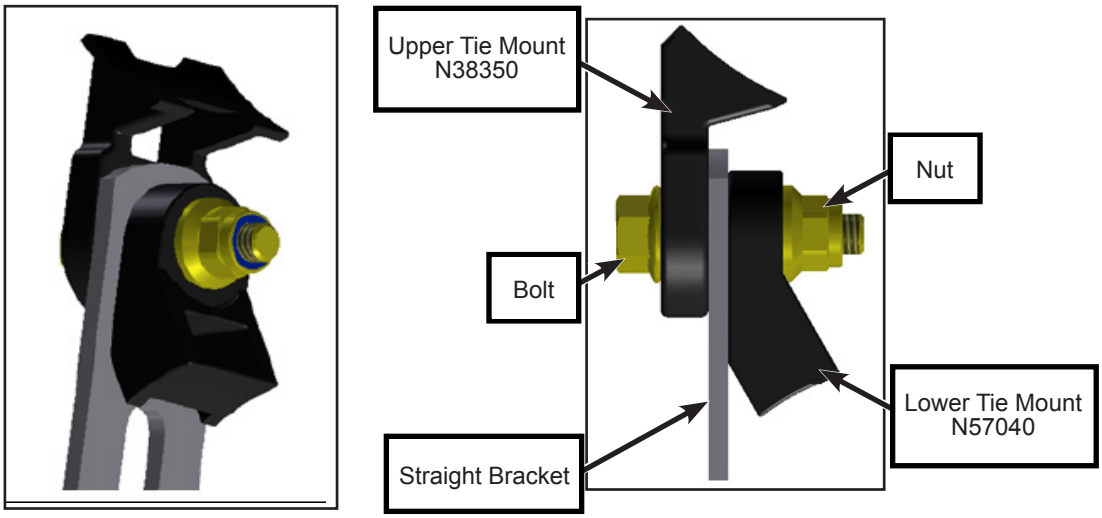


Figure 19 - Tie Mounts Installation

1.38. Secure the HDSCS receptacle connector on the harness side with the upper tie-mount (door open) using a blue cable tie PN N67755 (1x) (see figure 20 and 21) and then connect it to the HDSCS plug connector on the fan side. While mating both connectors, press the yellow slide lock of the plug connector to latch and lock both connectors together.

1.39. Secure the DT receptacle connector with the lower tie-mount (door open) using a blue cable tie PN N67755 (1x) (see figure 20 and 21) and then connect it to the DT lug connector on the fan side.

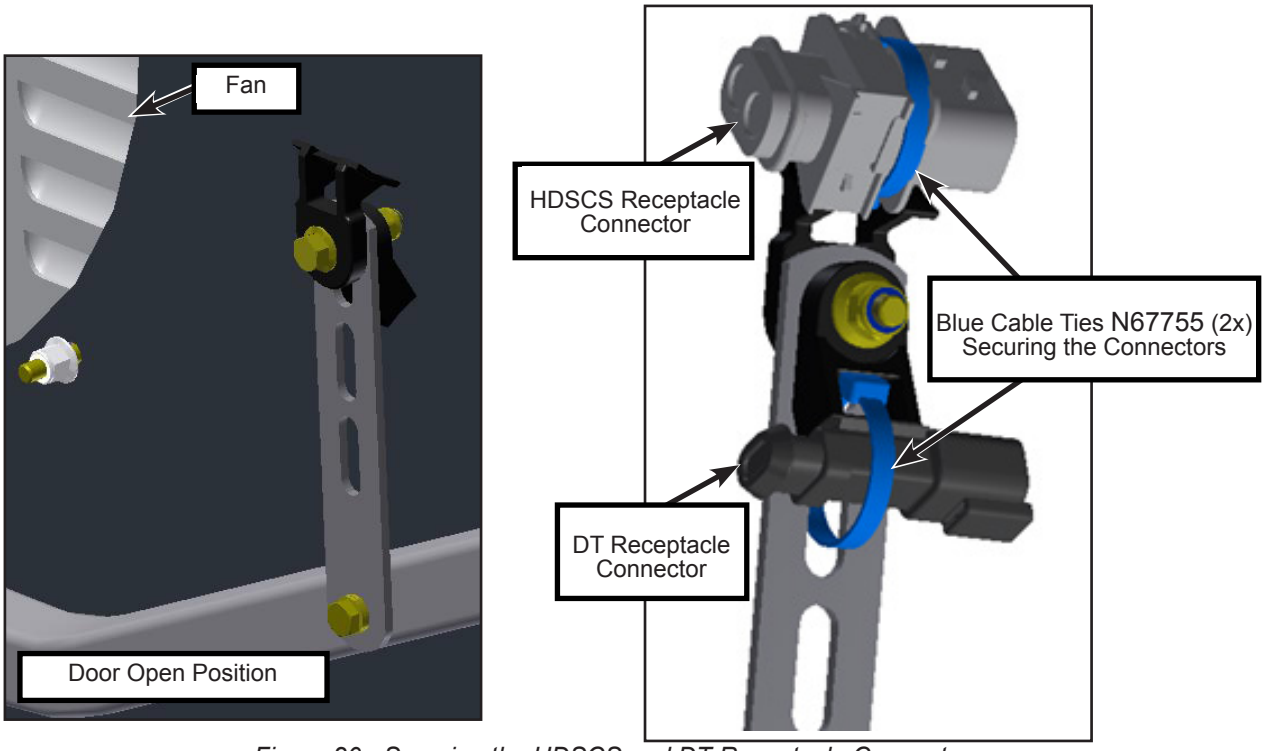


Figure 20 - Securing the HDSCS and DT Receptacle Connectors of the Harness Side

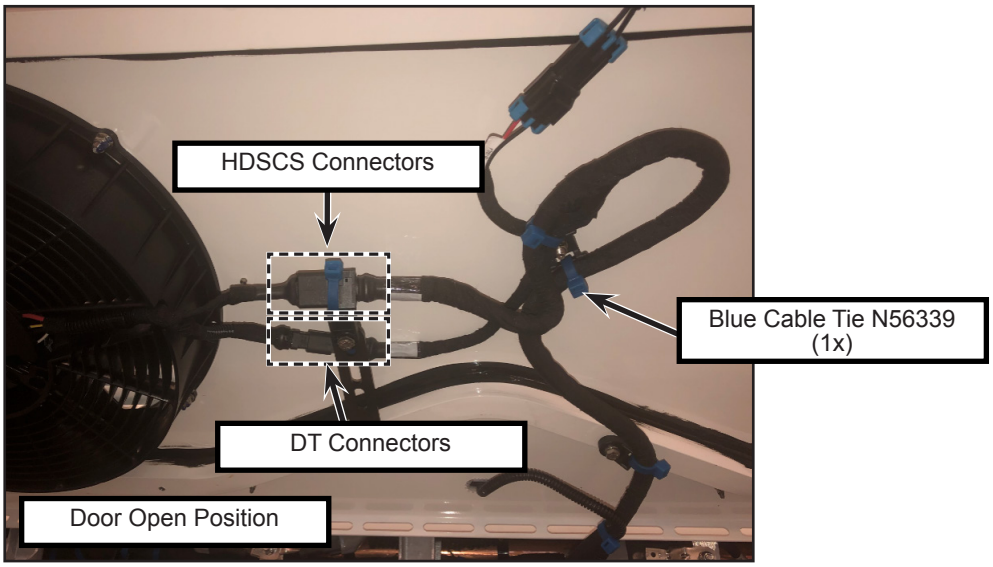


Figure 21 - Final Installation Showing the Black HDSCS and DT Connectors Replacing the Original Grey DTP and DT Connectors

1.40. Secure the wiring on the door at harness side with a blue cable tie PN N56339 (1x) (see figure 21).

NOTE

The HDSCS and DT connectors should be both installed towards the door to avoid any interference with the belt guard.

1.41. Test the fan with the final configuration.

1.41.1. Set the Master Control Switch in the START position.

1.41.2. Reconnect the starting circuit on the control box at the rear of the vehicle and place the battery disconnect switch in the ON position.

1.41.3. Start the vehicle and confirm that the engine fan is working.

1.42. If no issues are found, bus is ready for service.

Annex 1 - HDSCS Connectors Terminal Crimping Quality Guidelines

NOTE

The following procedure is provided by (TE Connectivity). Nova Bus cannot be held responsible for its content.

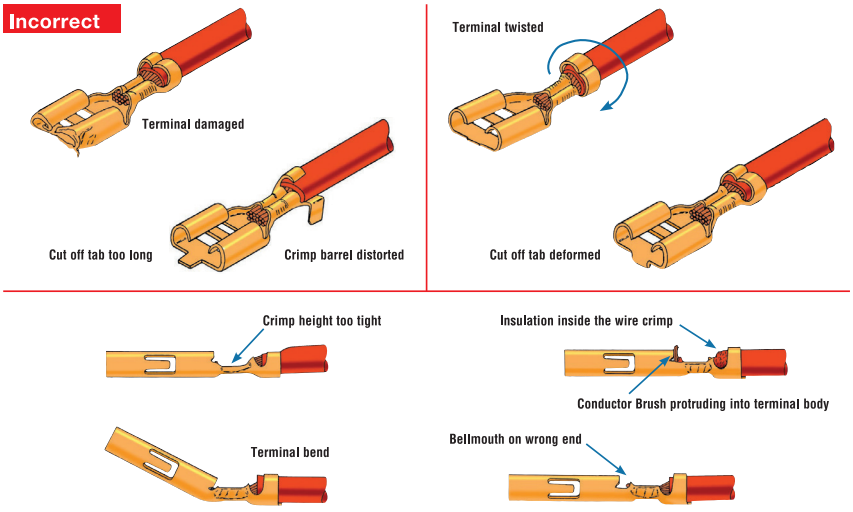
TE connectivity
INDUSTRIAL & COMMERCIAL TRANSPORTATION

Heavy Duty Sealed Connector Series (HDSCS)

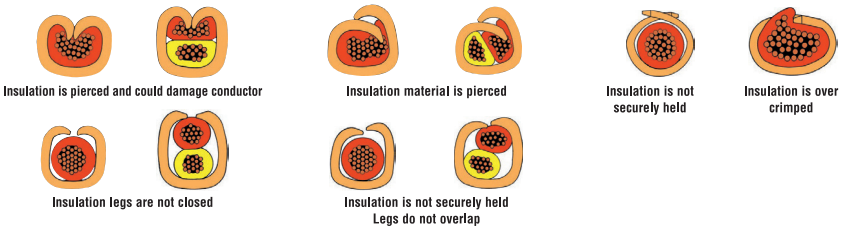
Catalog 1654326-1
Issued 11-2013

Quality Guidelines

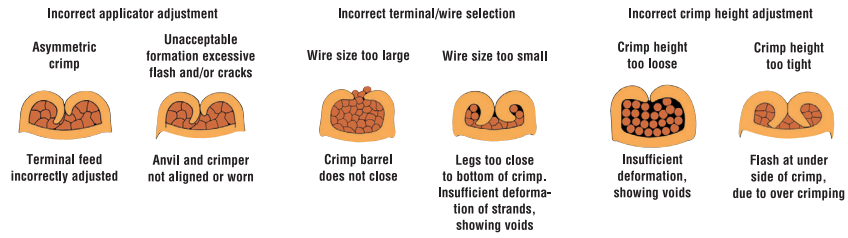
Incorrect



INSULATION CRIMP



WIRE CRIMP



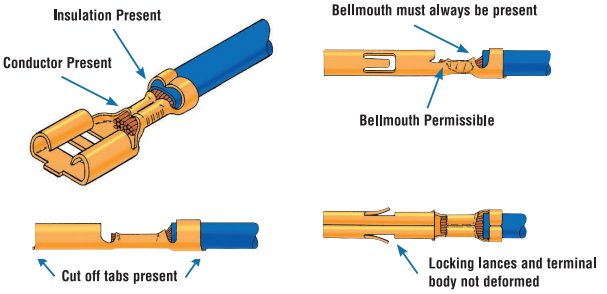
VI

All specifications subject to change. Consult TE Connectivity for latest specifications.

Quality Guidelines

Correct

WIRE CRIMP



Correct selection of wire, terminal and applicator

Crimp barrel is closed, legs support each other

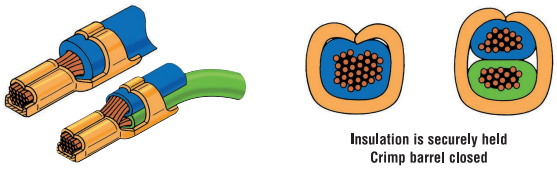
Sufficient gap between legs and bottom of crimp

All strands are equally distributed and deformed

INSULATION CRIMP

Correct Insulation Diameter, Applicator and Terminal

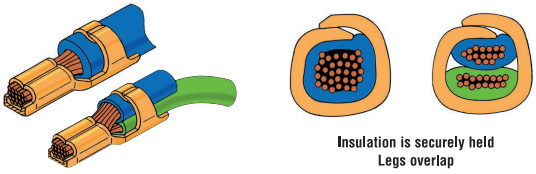
F-CRIMP



Insulation is securely held
Crimp barrel closed

For double wire applications with different size wires always place wire with smallest outer diameter in the bottom

OVERLAP CRIMP



Insulation is securely held
Legs overlap

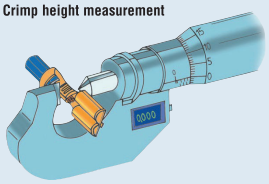
WRAP OVER CRIMP

Insulation securely held
Legs must pass each other

Test

WIRE CRIMP

Crimp height measurement



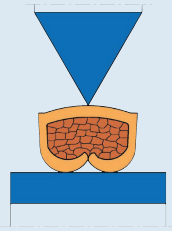
Crimp heights and tolerances

For crimp height tolerances for any given contact, please refer to the relevant application specification.

Examples:

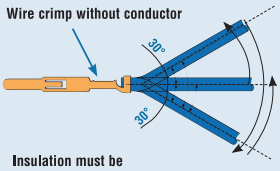
Contact	Part No.	Wire Range (mm^2)	Tolerance (mm)	Application Spec.
MQS	962885 962886	0.2–0.5	±0.03	114-18025
JPT	927775	0.5–1.0	±0.05	114-18050
JPT	927773	1.5–2.5	±0.05	114-18050

Digital Crimp Height Micrometer (0.001 mm increments) acc. to DIN ISO 9001 Part No. 547203-1



INSULATION CRIMP

Wire crimp without conductor



Insulation must be securely held after bend test

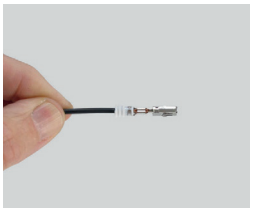
Annex 2 - HDSCS Connectors How-To Instructions

HDSCS CONNECTORS

HOW-TO INSTRUCTIONS

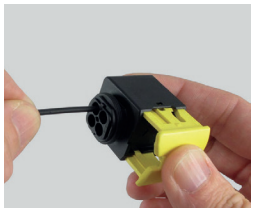
HDSCS CONNECTORS

CONTACT INSERTION

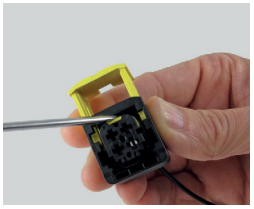


STEP 1:
Grasp crimped contact approximately one inch behind the contact barrel.

STEP 2:
Make sure the contact is in the correct orientation. Verify the integrated secondary lock is in the unlocked position.

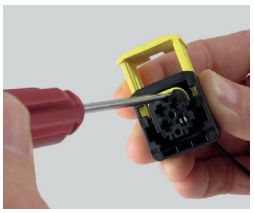


STEP 3:
Push contact straight into connector grommet until a click is felt. A slight tug will confirm that it is properly locked in place.

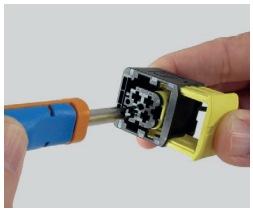


STEP 4:
Push the integrated secondary lock into the locked position with a DT-RT1 or a screwdriver.

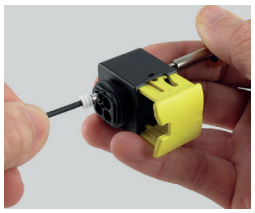
CONTACT REMOVAL



STEP 1:
Using a DT-RT1 or a screwdriver, unlock the integrated secondary lock.



STEP 2:
Using the appropriate extraction tool, insert the blades into the contact cavity until they stop.



STEP 3:
Pull contact wire assembly out of connector.

Annex 3 - Deutsch DT Solid Terminal Crimping Quality Guidelines

DEUTSCH Common Contacts

Crimping

Crimping is defined as the act of joining a conductor to a pin or socket contact using a mechanical tool to compress and displace metal. In a good crimp joint, there is mutual flow of metal, causing a symmetrical distortion of wire strands.

CRIMPING CONFIGURATIONS

Stamped & formed contacts use a folded type of crimp (Fig. 1) while solid contacts use a 1, 2, or 4 indent crimp (Fig. 2). In both styles of crimps, the wire strands and the contact material are formed together in a solid mass creating a reduction of the wire strand area. The reduced wire strand area creates a minimum of voids allowing for excellent conductivity. Crimping may be accomplished with hand tools or power tools.

Stamped & Formed Style

Cross-Section Across Axis

Figure 1

BENEFITS OF CRIMPED CONTACTS

Mechanically crimping contacts is the leading wire termination method for some very good reasons:

- With smaller wire, the crimp is as strong as the wire itself.
- The joint can be visually inspected. Viewing the wire through an inspection hole in the contact makes inspection quick and easy, both by the operator and the inspector.
- Plating thickness is not restricted, as in solder joints, so better corrosion resistance and contact reliability are achieved.
- Crimping can be done anywhere, without special preparation. Terminations are replaced or modified in the field exactly the same as in the shop, using the same tools and the same techniques, and with the same ease of operation and certainty of results.
- Total installed and maintenance costs are lower.

Solid Style

Indenter Crimp
Cross-Section Across Axis

Figure 2

helpful hint

Solder should not be added to DEUTSCH terminals.

Note

The use of dielectric grease is not recommended.

DEUTSCH Common Contacts

CRIMP INSPECTION

Crimping tools provide lower total installation and maintenance costs. However, controls are required to help confirm that the proper crimp tools designed for the type and size contact are used, the pin or socket is properly inserted into the tool, the wire insulation is stripped properly, and the wire fully inserts into the contact.

When a crimp is completed, correct termination can be visually inspected. The inspector should check for:

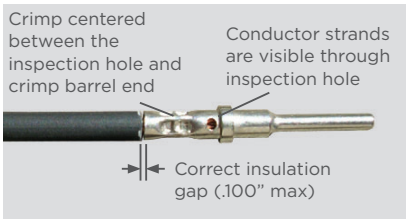
- The removed insulation should expose a conductor length that will pass beyond the inspection hole in the contact and still reveal the appropriate length of conductor between the contact and the insulation on the wire.
- Wire strands intact.
- All wire strands enter the contact barrel.
- Wire inserted to the proper depth in the contact.

When the correct crimp tool and process are used, a good termination results.

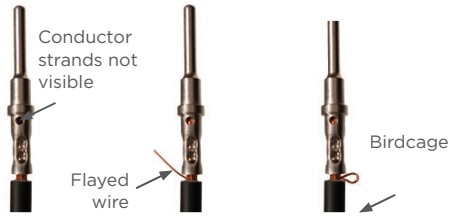
Note

For more detailed crimp dimensions please request a drawing.

SOLID CONTACT CRIMP

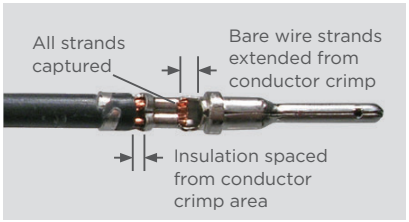


Acceptable Crimp

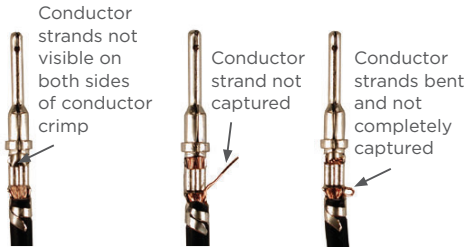


Unacceptable Crimps

STAMPED & FORMED CONTACT CRIMP



Acceptable Crimp



Unacceptable Crimps