FT4947 Heater N90680 no longer available for purchase NYCT

Technical writer name
Devanand

Manual section **14**

First Level Parts (100% of 92 vehicles)		
Material	**Part Number**	**QTY**
SCREW M8X25 H YZ TRIV 96H 8.8	N32102	3
SCREW M6X20 H YZ TRIV 96H 8.8	N40492	1
NUT LOCKNYL M6 YZ TRIV 96H C8	N44887	1
NUT LOCKNYL M8 YZ TRIV 96H 8.8	N44888	3
TIE TEFZEL CABLE TIES	N56339	2
SLEEVE HEAT RESISTANT HOSE 5"	N56614-03	1
CLAMP WORM-DRIVE 30-45MM	N80668	2
CLAMP WORM-DRIVE 40-60MM	992087	2
P-CLAMP ID 1.500"THK 0.030"M8	N84090-11	3
P-CLAMP ID 2.250"THK 0.060"M8	N84090-14	1
PIPE HEATING	N93549	1
SUPPORT HEATING PIPE	N93550	1
HOSE SLC 4PLY 1.25"ID X 4.5"LG	N95060-108	1
HOSE SILI-ARAM 4PLY 1 1/2"X 3"	N95827-25	1
CONNECTOR WPK	561781	1
Note: **N81079 ss to 992087** **12010717 ss to 561781**		

Shop Supply (100% of 92 vehicles)		
Material	**Part Number**	**QTY**
HEAT SHRINK TUBING RED	N27548-06	3 inch
Note: **N27548-06 (HEAT SHRINK TUBING RED)** **1 ea = 1 FT** **Required 3 inches/bus** **276 inches for 92 buses** **23 FT Tube for the entire campaign**		

Nb hours Level 1 5 hr

MQR 7621-1795

Disposal of parts		
Removed parts are:		When the retained check box is check, the parts must be retained and returned in accordance with the usual warranty procedure to be reimbursed,
Discarded	Retained	
x	-	

Client	Order	Road numbers		VIN		QTY	Lang.	Customer	Target market	Plant	Config moteur	Model	NR	R1
New York City Transit - New York	L958	5439	5442	S92J9G9775533	S92J9G9775631	4	E	NYCT	US	PLB	TD	60	x	
New York City Transit - New York	L959	5443	5443	S92J0H9776118	S92J0H9776118	1	E	NYCT	US	PLB	TD	60	x	
New York City Transit - New York	LB59	5444	5484	S92J7H9776195	S92J6H9776379	41	E	NYCT	US	PLB	TD	60	x	
New York City Transit - New York	LA23	5485	5530	S92J5J9776380	S92J6J9776517	46	E	NYCT	US	PLB	TD	60	x	

Jean-Nicolas Fournier

Digitally signed by Jean-Nicolas Fournier
DN: cn=Jean-Nicolas Fournier, o=Nova Bus, email=jean-nicolas.fournier@volvo.com, c=CA
Date: 2021.02.09 15:04:33 -05'00'

REFERENCE	Manuels Nova Bus
SECTION	14 : Heating, Ventilation, Window Protection
RS No	MQR 7621-1795
EFFECTIVE IN PROD	

SUBJECT :	Auxiliary Heater
JUSTIFICATION :	Watlow Auxiliary Heater is Discontinued

LEVEL	DESCRIPTION	COSTS		TIME
		Workforce	MATERIAL	
1	Remove Watlow auxiliary heaters	Nova Bus	Nova Bus	5 hours
2	-	-	-	-

MATERIAL

QTY	PART N°	REV.	DESCRIPTION	REPLACES PART N°
LEVEL 1				
3	N32102	B	SCREW M8X25 H YZ TRIV 96H 8.8	-
1	N40492	B	SCREW M6X20 H YZ TRIV 96H 8.8	-
1	N44887	B	NUT LOCKNYL M6 YZ TRIV 96H C8	-
3	N44888	B	NUT LOCKNYL M8 YZ TRIV 96H 8.8	-
2	N56339	A	TEFZEL CABLE TIES	-
1	N56614-03	F	SLEEVE HEAT RESIST HOSE 5'' LG	-
2	N80668	A	WORM CLAMP 30-45MM CAILLAU	-
2	N81079		WORM CLAMP 40-60 MM CAILLAU	-
3	N84090-11		P-CLAMP ID 1.500'' THK 0.030'' M8	-
1	N84090-14	A	P-CLAMP ID 2.250'' THK 0.060 M8	-
1	N93549	A	PIPE HEATING	-
1	N93550		SUPPORT HEATING PIPE	-
1	N95060-108		HOSE COOLANT 1.25'' ID X 4.5'' lg	-
1	N95827-25		HOSE SILI-ARAM 4PLY 1 ½''X3''	-
1	12010717		Delphi Weather Pack female inline , connector, 3 cavities	-
	N27548-06	H	Red Heat Shrink Tubing	-
LEVEL 2				
-	-	-	-	-

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	-	

CLIENT	LOT	VEHICULE #		NIV		QTY
		FROM	TO	FROM	TO	
New York City Transit - New York	L958	5439	5442	S92J9G9775533	S92J9G9775631	4
New York City Transit - New York	L959	5443	5443	S92J0H9776118	S92J0H9776118	1
New York City Transit - New York	LA23	5485	5530	S92J5J9776380	S92J6J9776517	46
New York City Transit - New York	LB59	5444	5484	S92J7H9776195	S92J6H9776379	41

WARNING

Follow your internal safety procedures.

PROCEDURE

1.1. Park the vehicle on an even surface with transmission in neutral (N).

1.2. Turn the ignition switch to OFF position and engage the parking brake.

1.3. Set the Master control switch in the STOP position (see Figure 1).

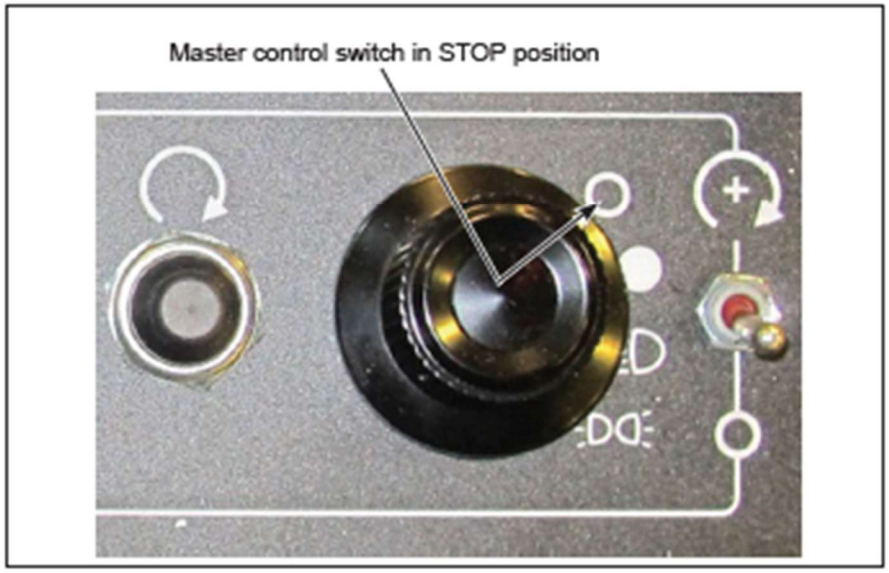


Figure 1 - Master Control Switch in STOP Position

1.4. Set the battery disconnect switch in the battery compartment to the OFF position (see Figure 2).

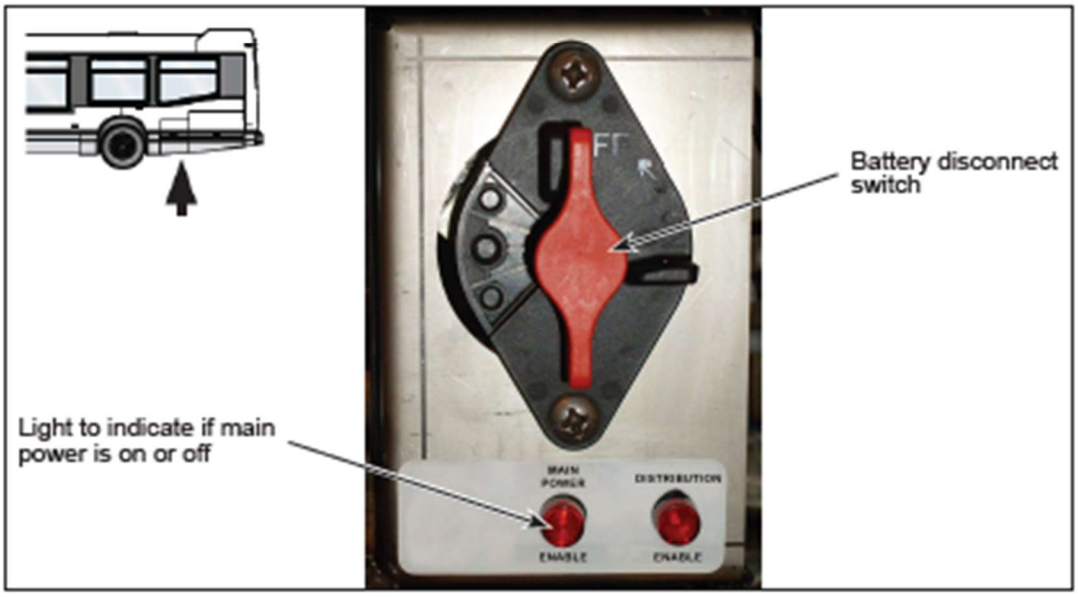
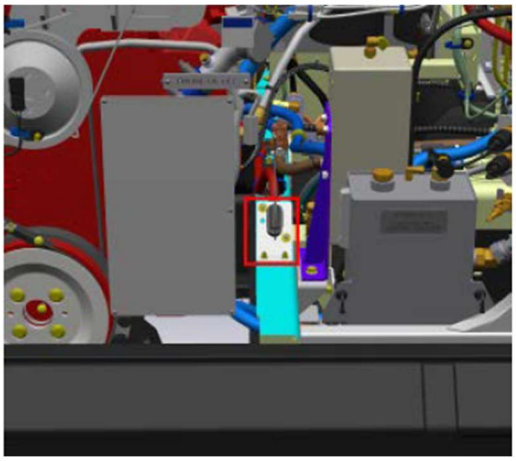
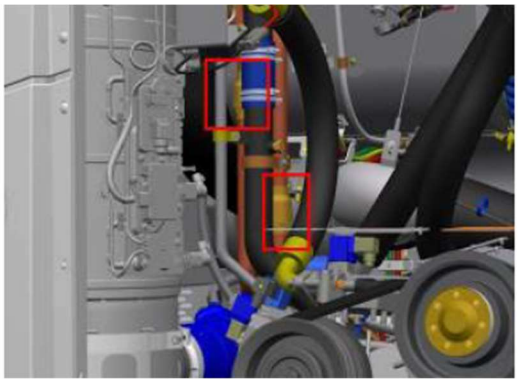
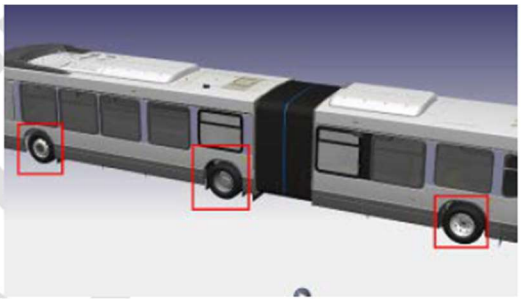
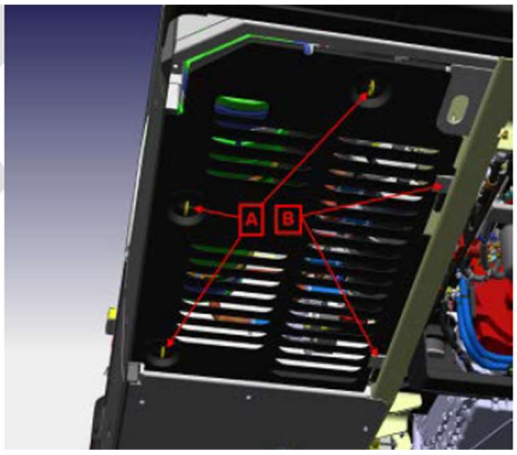


Figure 2 - Typical Battery Disconnect Switch

1. Lockout the bus by closing the main cut-off switch in the OFF position Tool : Padlock	1	 
2. Validate there is no cable plugged on the jump start cable [redacted]	1	

3. Close the engine main coolant valves located over the DPF	1	
4. Lift the bus and place jack stands under Tools: Lift Jack stands	5	
5. Remove the dust pan. Open the 3x hooks (A) and remove the 2x latches from the structure (B). Set the dust pan aside. Tool : Dust pan hook	2	

Clean

6. Drain the cabin side coolant from under the bus into a collection barrel. Once the coolant is drained, reinstall the drain plug

Tools:
11/16" open end wrench
Coolant barrel recuperation

Part :
N37086 thread sealant
Yellow anti-tamper seal

Torque info :
Apply N37086 thread sealant
Hand tight
1 ½ to 2 ½ turn with the wrench
Apply yellow anti-tamper seal

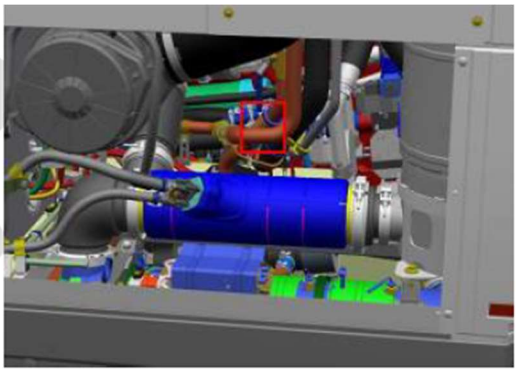
Note:
Reference AVT0032 rev J section 2.1

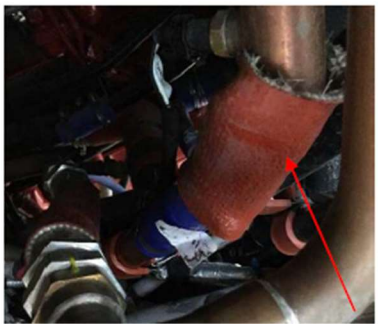
10

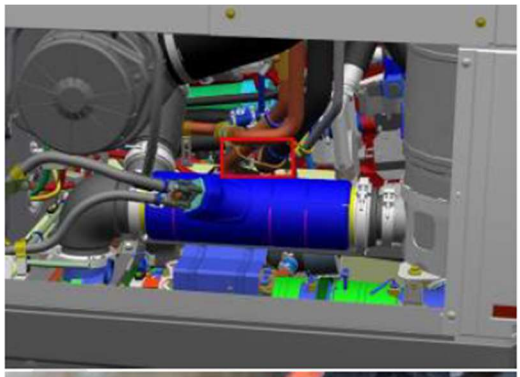
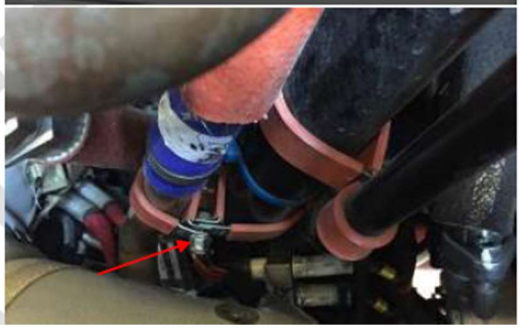
7. Remove the heat shield protection and zip ties using a cutter. Use a ladder or temporarily lower the bus to gain access.

Tools:
Zip tie cutter
Ladder

1



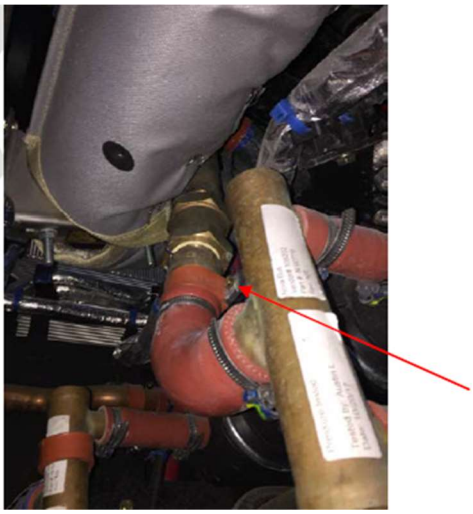


8. Loosen the p-clamps hardware. Use a ladder or temporarily lower the bus to gain access to the p-clamp Tools: 10mm open end wrench 10mm socket with 3/8” drive 3/8” drive ratchet Ladder	2	 

9. Remove the p-clamp hardware to the mounting bracket on outlet pipe

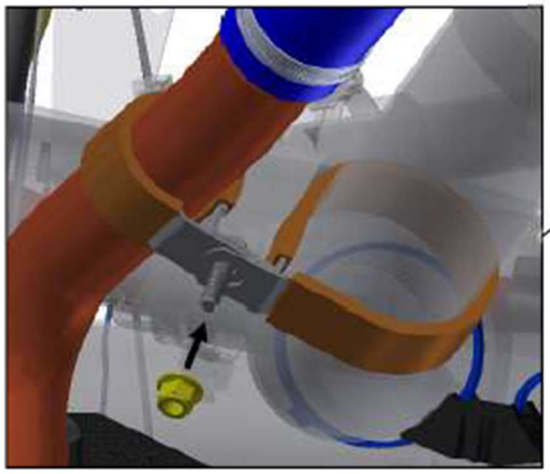
Tools:
10mm open end wrench
10mm socket with 3/8" drive
3/8" drive ratchet

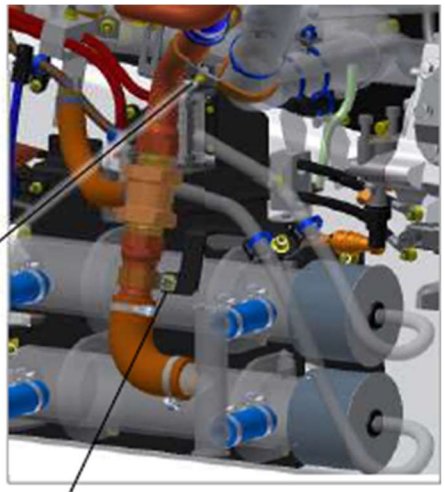
2

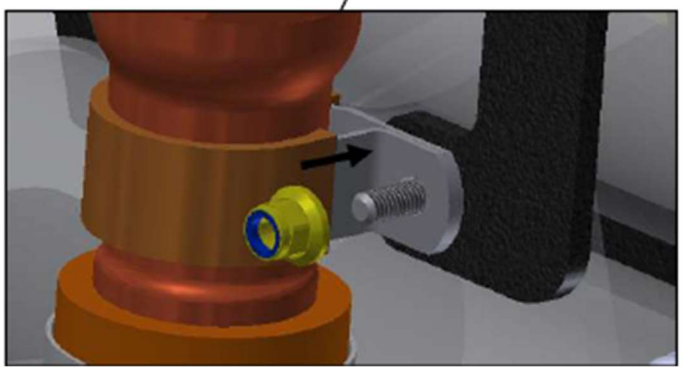


Outlet pipe

[redacted]





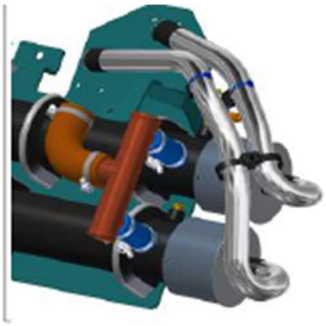


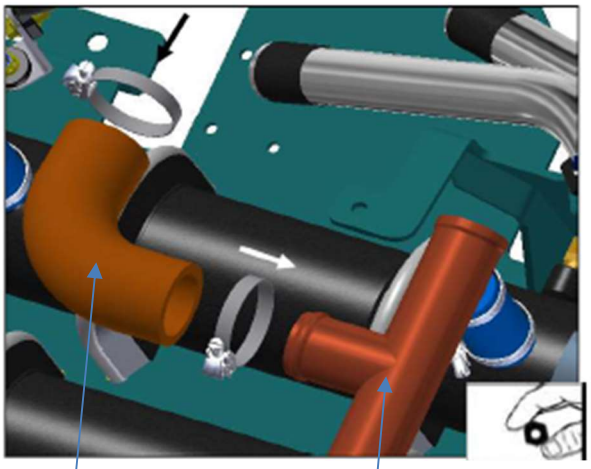
10. Loosen the clamps on the hose attached to the pipe and remove the hose from the pipe

Tools:
7mm socket with 3/8" drive
3/8" drive ratchet

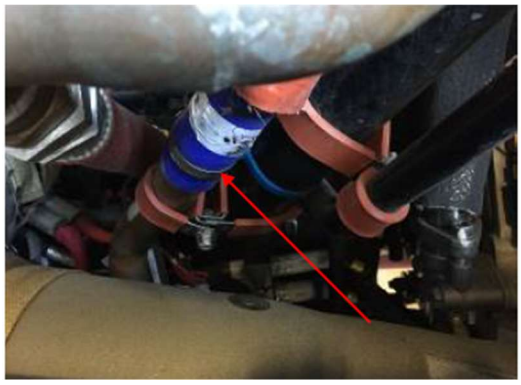
5

EP 26



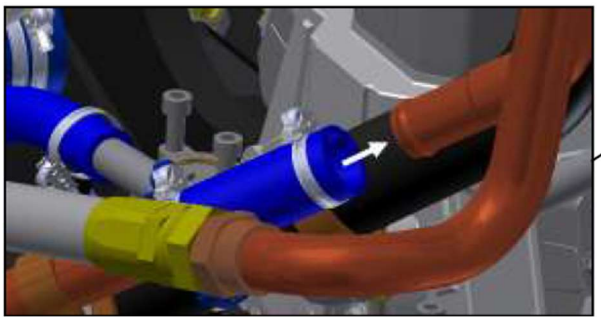


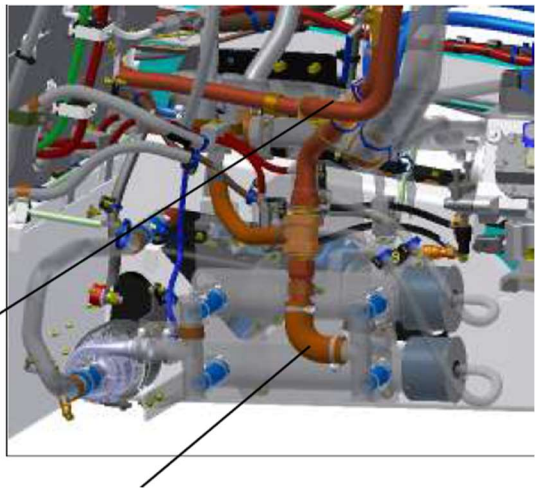
On outlet side

12. Loosen up the coolant clamp. Use a ladder or temporarily lower the bus to gain access to the clamp Tools: 7mm socket with 3/8" drive 3/8" drive ratchet Ladder	1	

Outlet side of heater

[redacted]



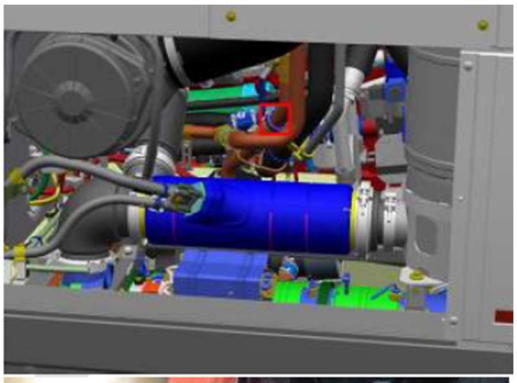


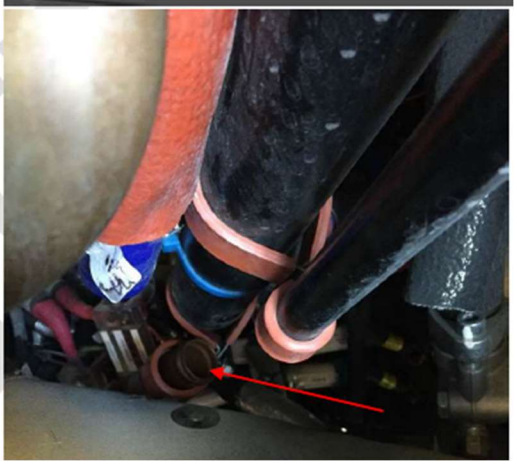
outlet

13. Remove the coolant pipe from the coolant hose on the heater side. Use a ladder or temporarily lower the bus to gain access to the coolant line

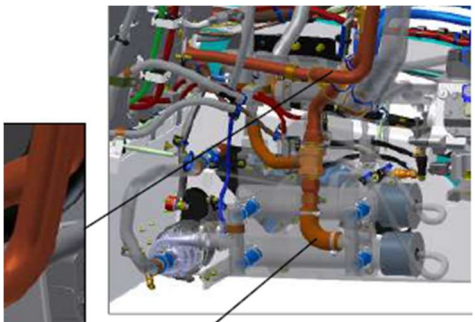
Tool :
Ladder

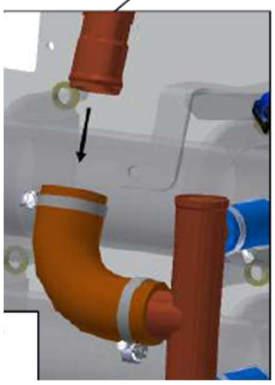
2





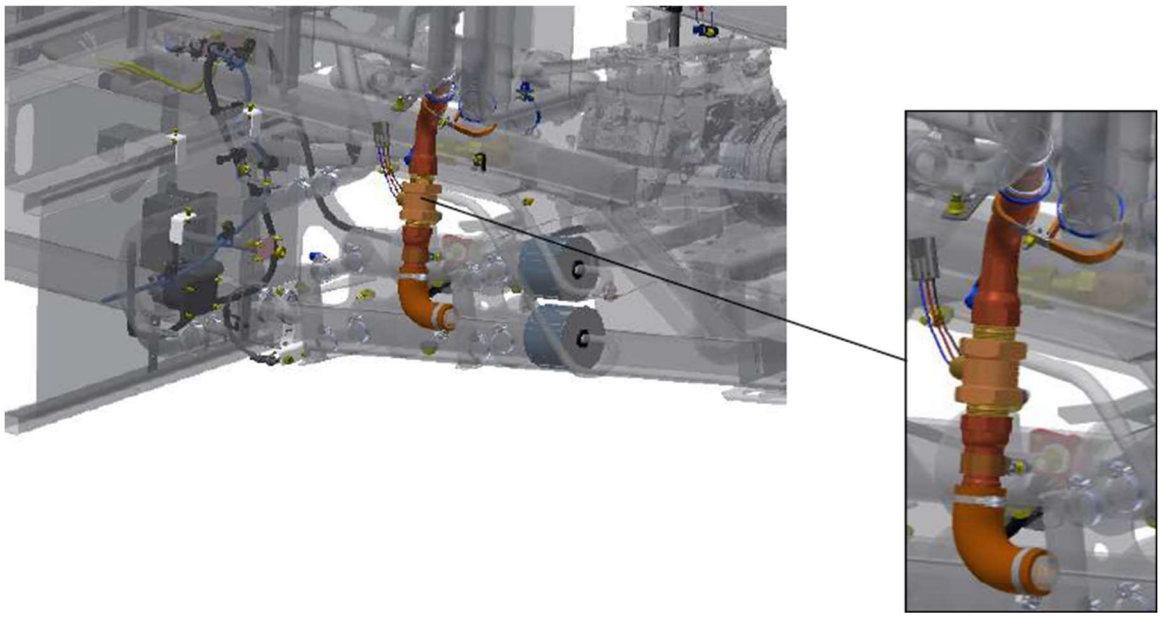
Outlet side of heater

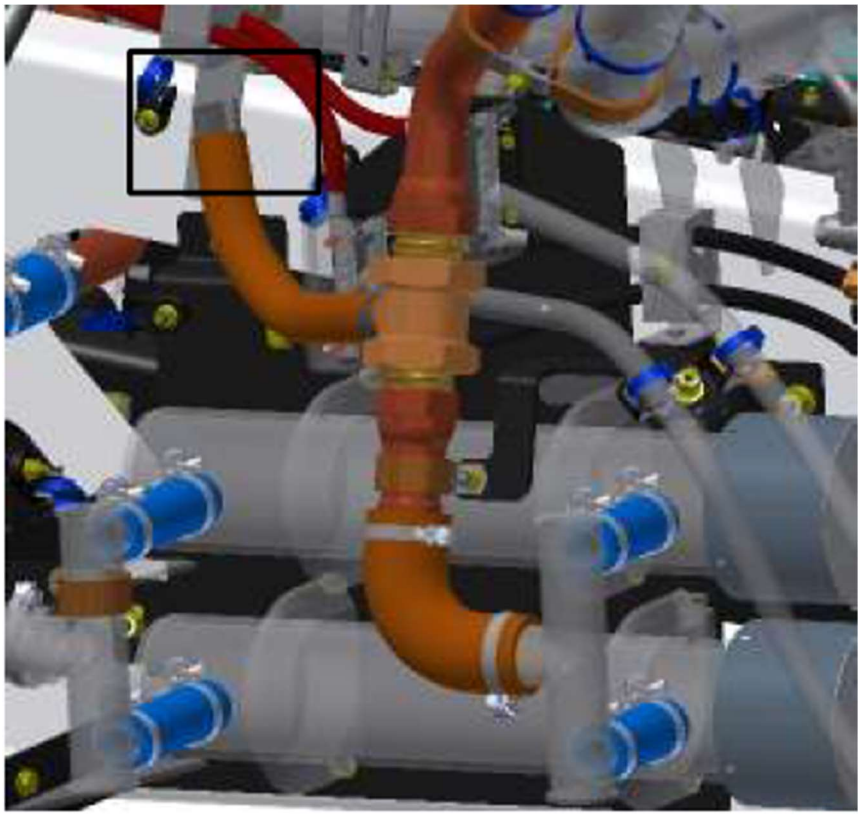




14. Disconnect the electrical connector and

Outlet side of heater



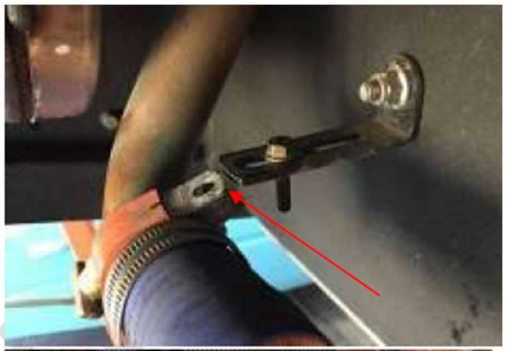


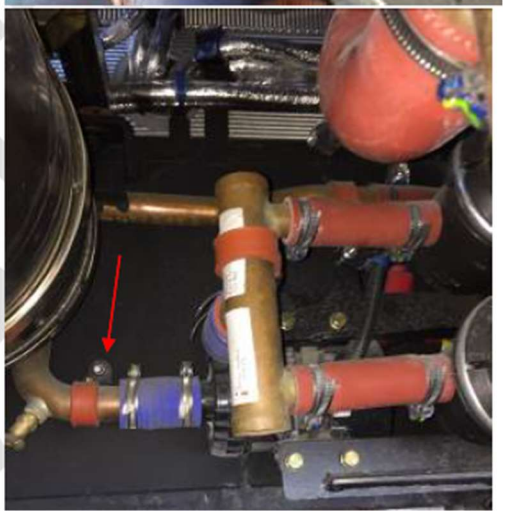
Then capp off bus connector with weather pack 12010717. Install red heat shrink N27548-06 on connector to prevent water intrusion.

15. Remove the p-clamp hardware that attaches to the mounting bracket

Tools:
10mm socket with 3/8” drive
3/8” drive ratchet

1



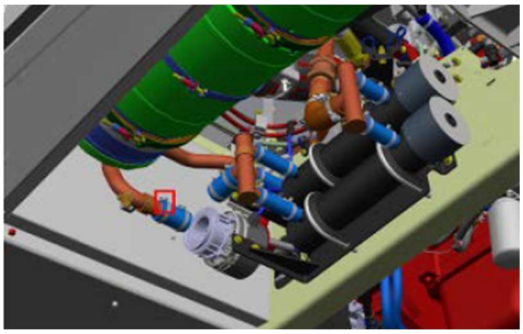


Remove blue hose from pump

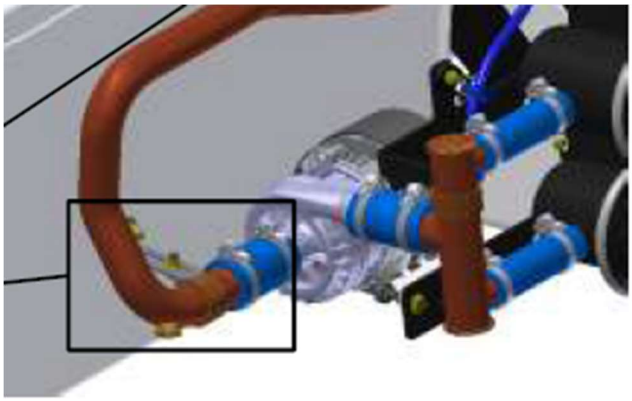
16. Unplug coolant line on the pump side by loosening up the clamp

Tool :
7mm socket with 3/8” drive
3/8” drive ratchet

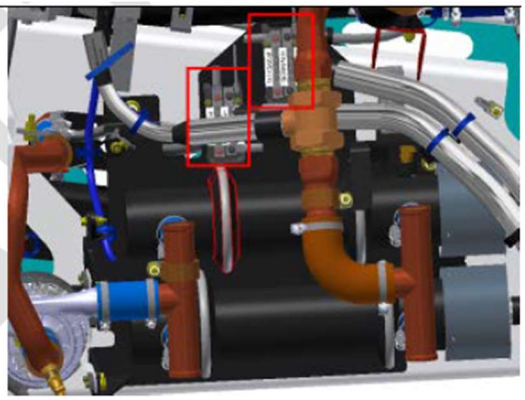
2



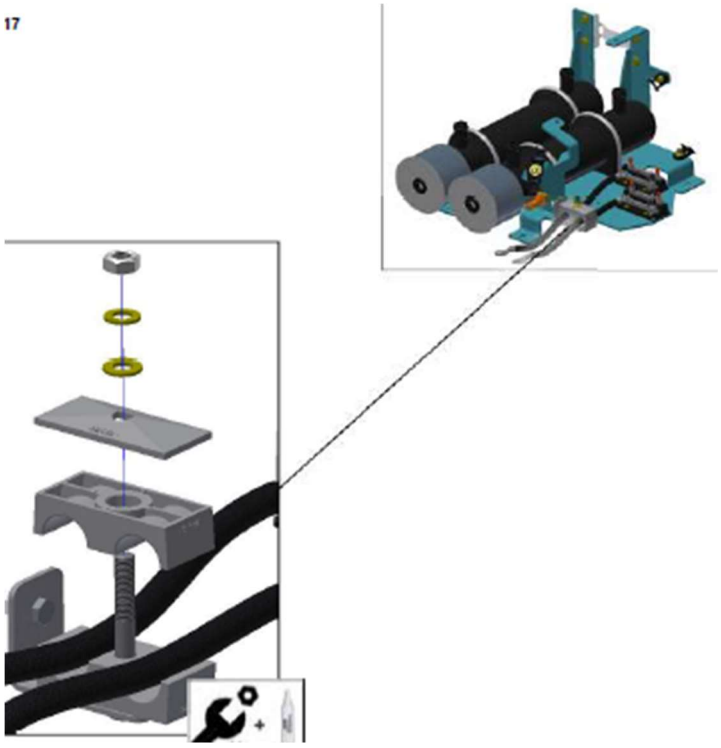
See red square in the picture



Coolant line that was connected to the circulating pump

17. Remove the 2x busbar caps	1	

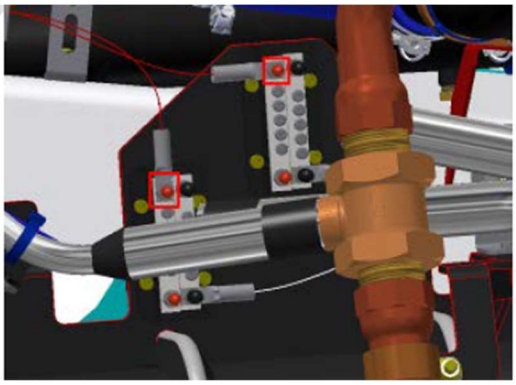
17



18. Unscrew the 2x nuts on the positive cables. Remove the 2x nuts and 2x lock washers. Remove the 2x power cables. Reinstall the 2x lock washers and nuts back onto the stud ~~hand-tight~~.

Tool :
10mm socket with 3/8" drive
3/8" drive ratchet

5



And torque to 1.5Nm

19. Cut zip ties from standoffs

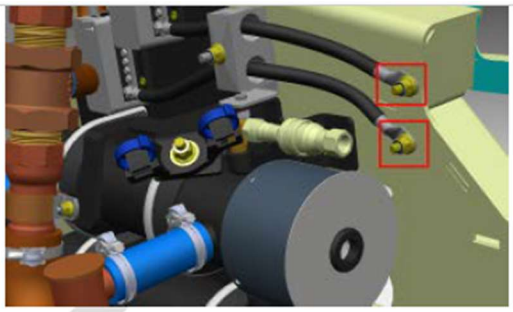
Tools:
Zip tie cutter

1

20. Unscrew the 2x ground cables from the structure. Temporarily reinstall the 2x lock washers and nuts back onto the stud ~~hand-tight~~

Tool:
13mm socket with 3/8” drive
3/8” drive ratchet

5



And torque to 6Nm

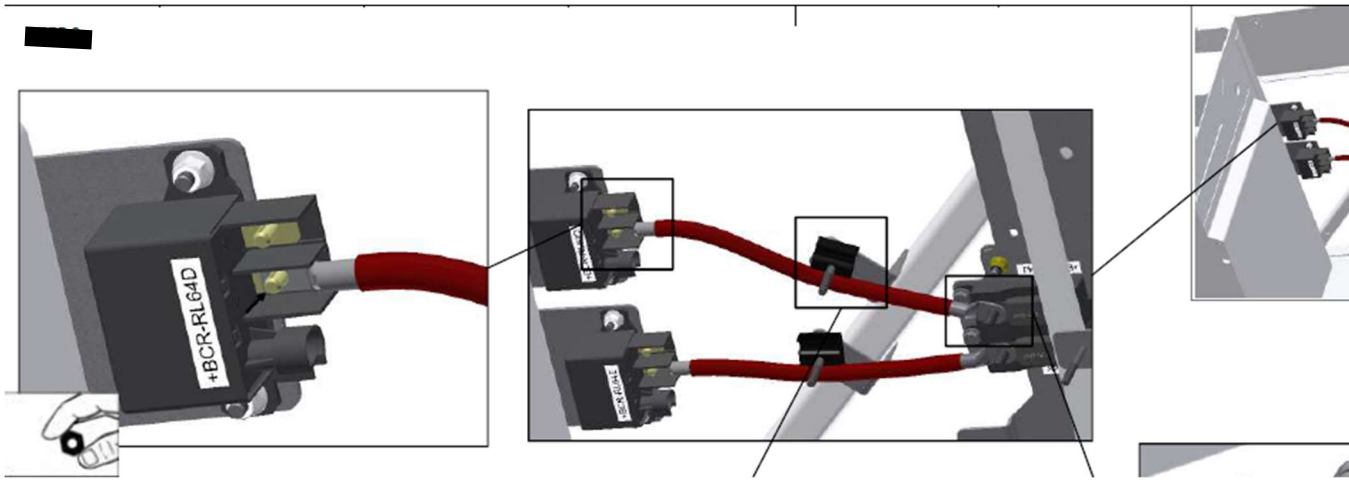
21. Unscrew the 2 big red wires (C1009 & C1011) from relay BCR-RL64D in battery compartment.

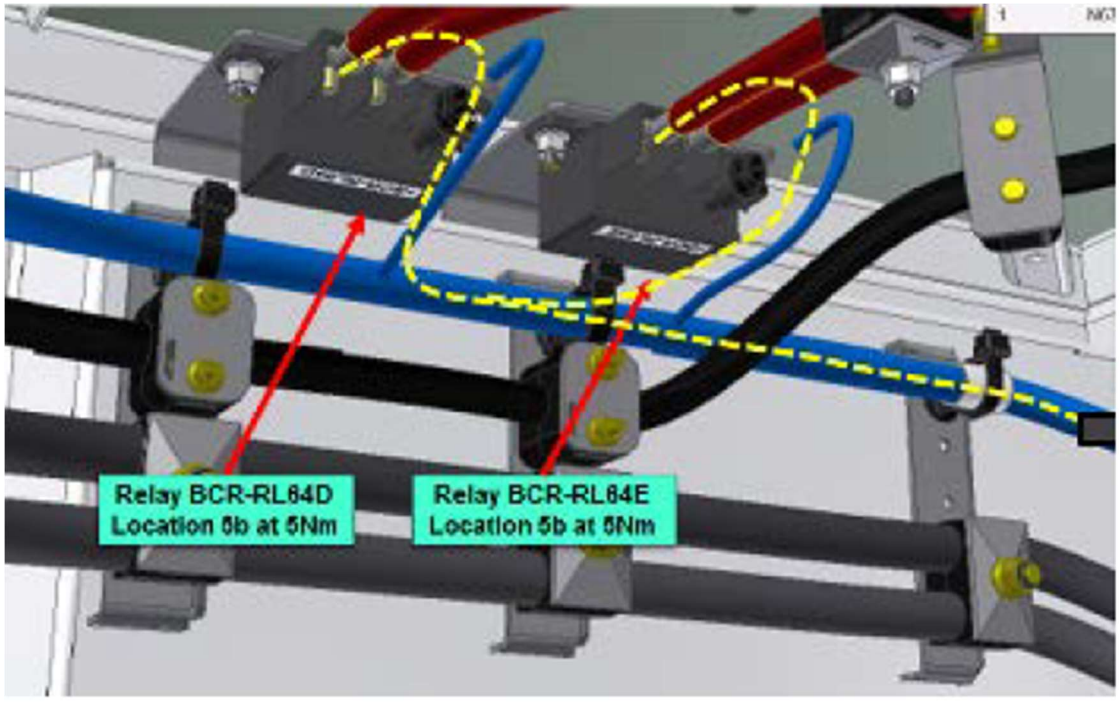
Tool:

M6 socket with 3/8’’ drive

3/8’’ drive ratchet

[redacted]


+BCR-RL64D


Relay BCR-RL64D
Location 5b at 5Nm
Relay BCR-RL64E
Location 5b at 5Nm

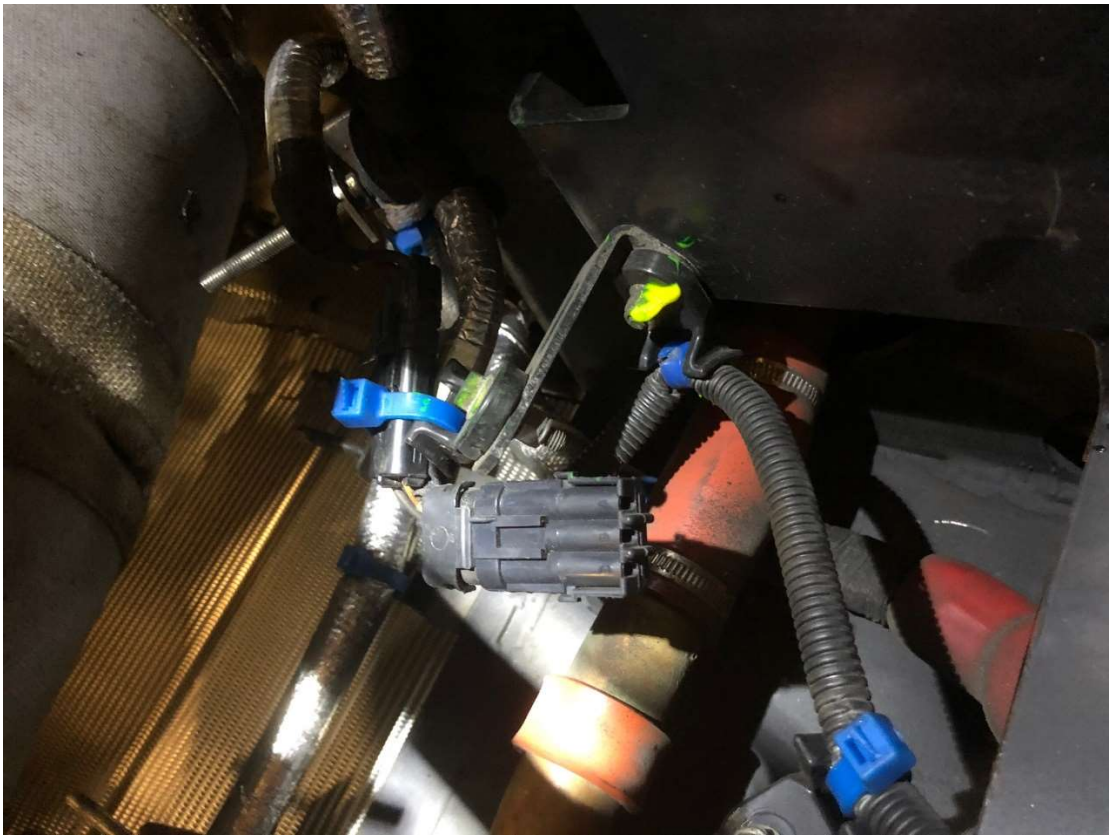
22. Unscrew the 2 big red wires (C1010 & C1012) from relay BCR-RL64E in battery compartment.

Follow instructions of step 21

23. Remove the AMP connector from relays BCR-RL64D and BCR-RL64E

AMP connector AMP connector

24. Install a cover on both connectors



25. Remove relays BCR-RL64D and BCR-RL64E

Tool:

M6 socket with 3/8’’ drive

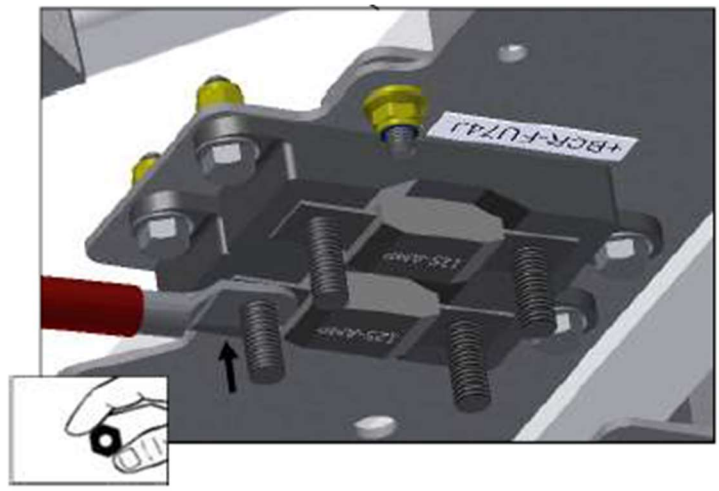
3/8’’ drive ratchet

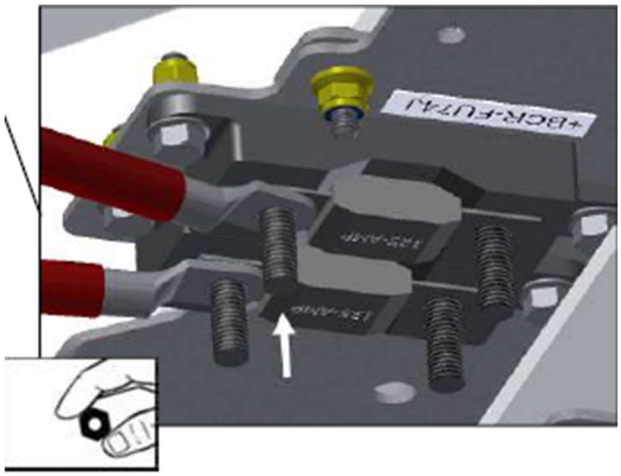
26. Unscrew the other end of the 2 big red wires C1009 & C1010 from the 125A fuse in battery compartment rear.

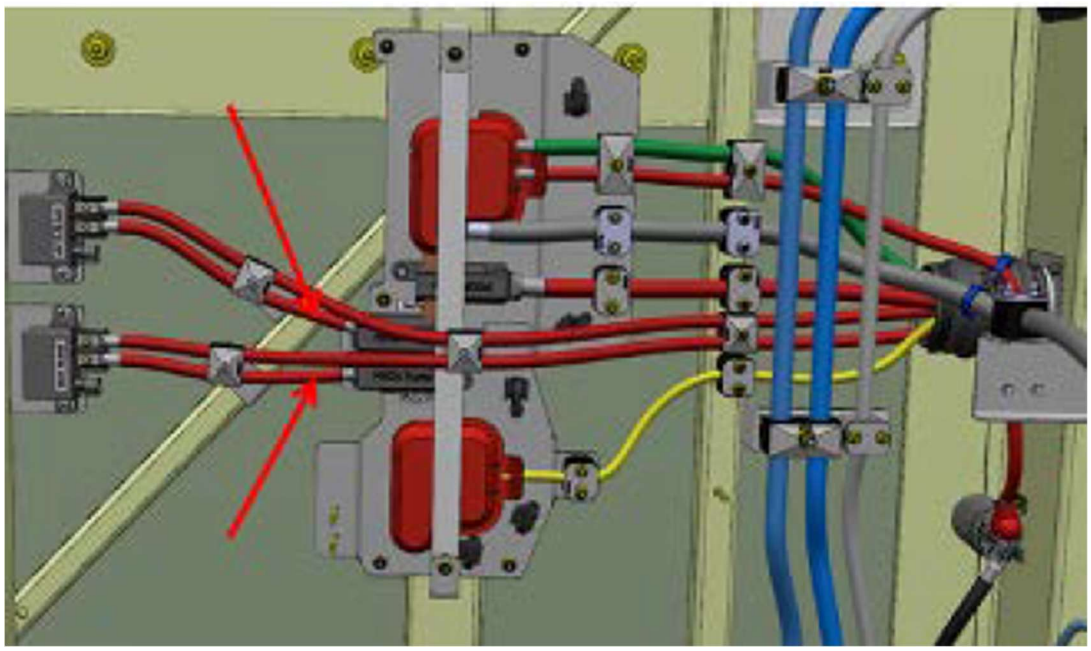
Tool:

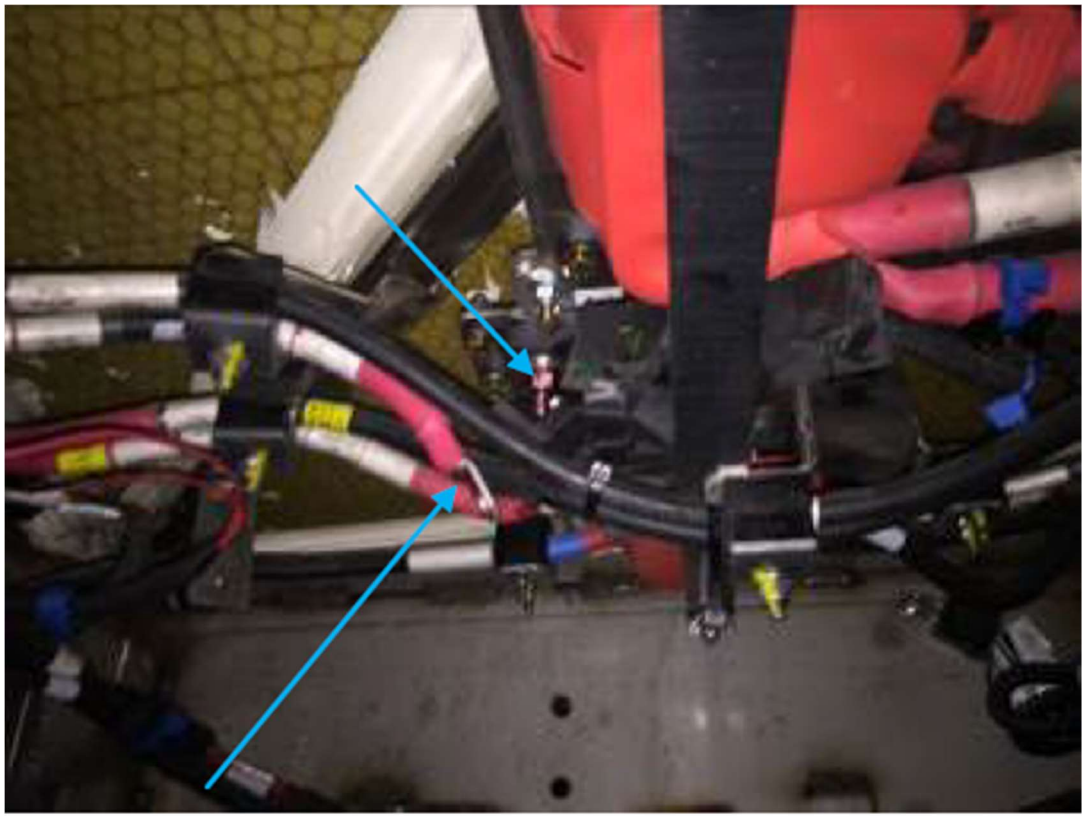
M6 socket with 3/8’’ drive

3/8’’ drive ratchet


+BCR-FU741
125-AMP

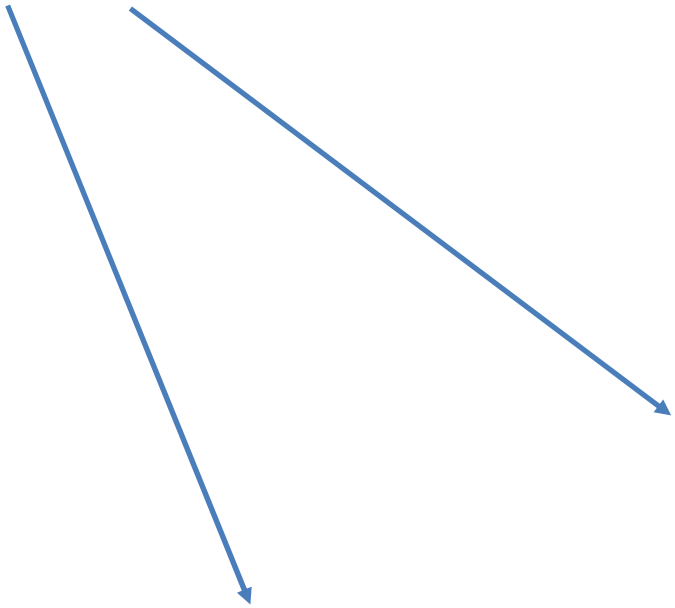

+BCR-FU741
125-AMP



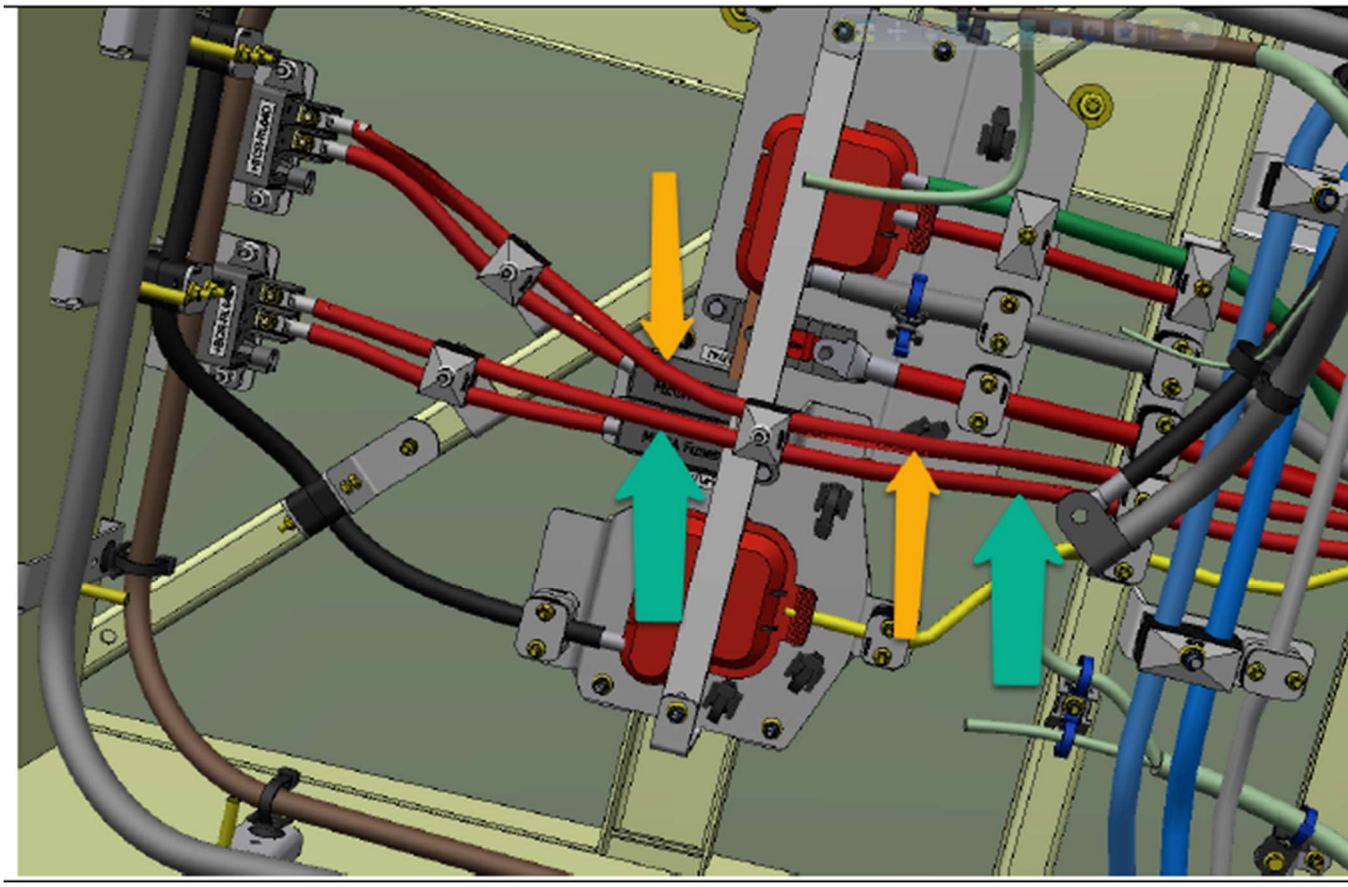


27. Remove the 2 x 125A fuses in the battery compartment.

28. Apply heatshrink at the end of both cables to cover terminals.



29. Remove wires C1011 & C1012 from heaters in the engine compartment

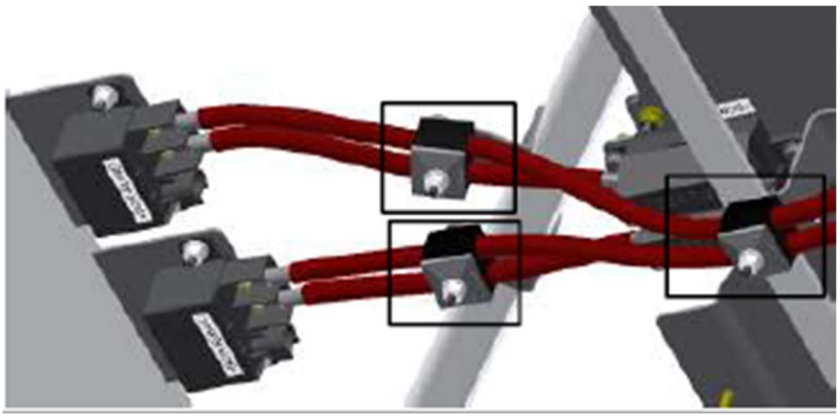


30. Remove cables C1009, C1010, C1011 & C1012 by unscrewing 3 double clamps

Tool:

M6 socket with 3/8'' drive

3/8'' drive ratchet



31. Bring a table near the rear of the bus to hold the auxiliary heaters.

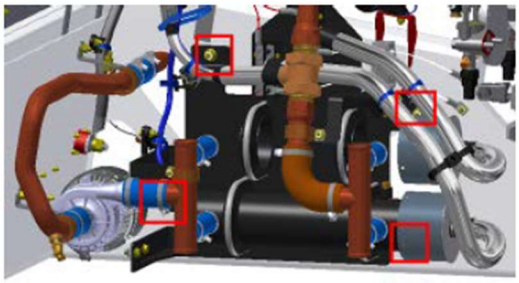
Residual coolant from when the hoses were removed

[redacted]. Loosen the 4x mounting bolts and drop the cradle on the table. Drain any excess coolant from the auxiliary heater assembly into the coolant collection barrel

Tool :
15mm open end wrench
15mm socket with 3/8" drive
3/8" drive ratchet
Scissors lift table / jack stand
Coolant barrel recuperation

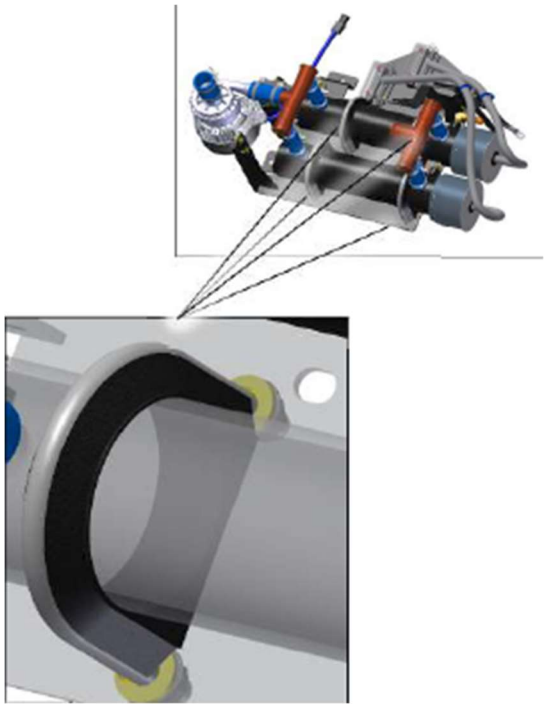
Note:
Two (2) people required :
- 1 mechanic holding the cradle
- 1 mechanic unscrewing the mounting bolts

15



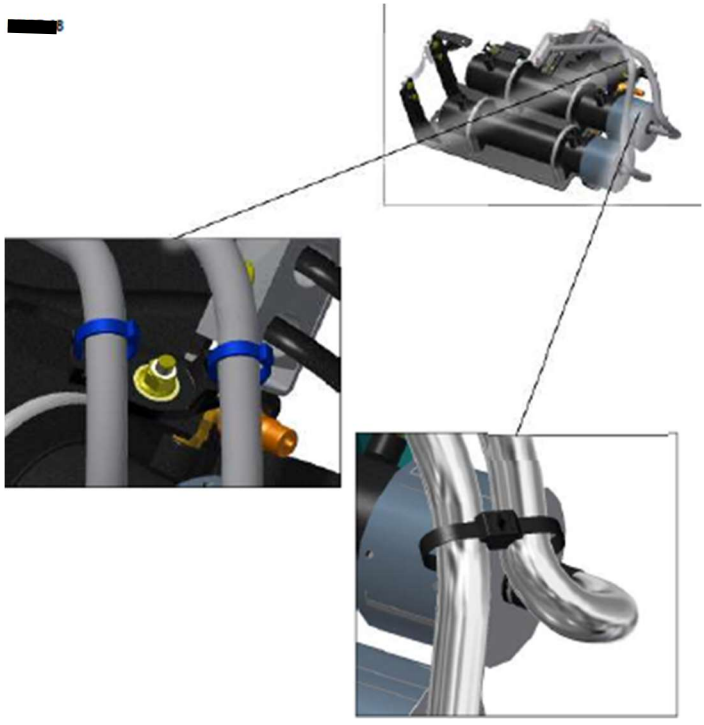
Discard hardware.

32. REMOVE U-BOLT (4). Discard U-bolts and related hardware.



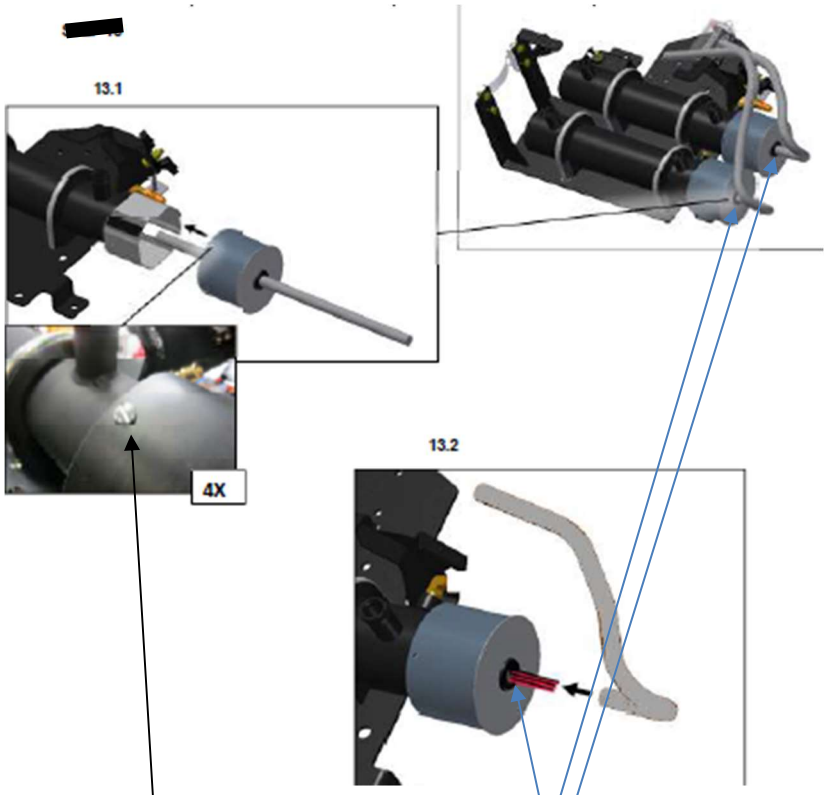
33. REMOVE HEATER CABLES

Cut zip ties. Tool: Zip tie cutter



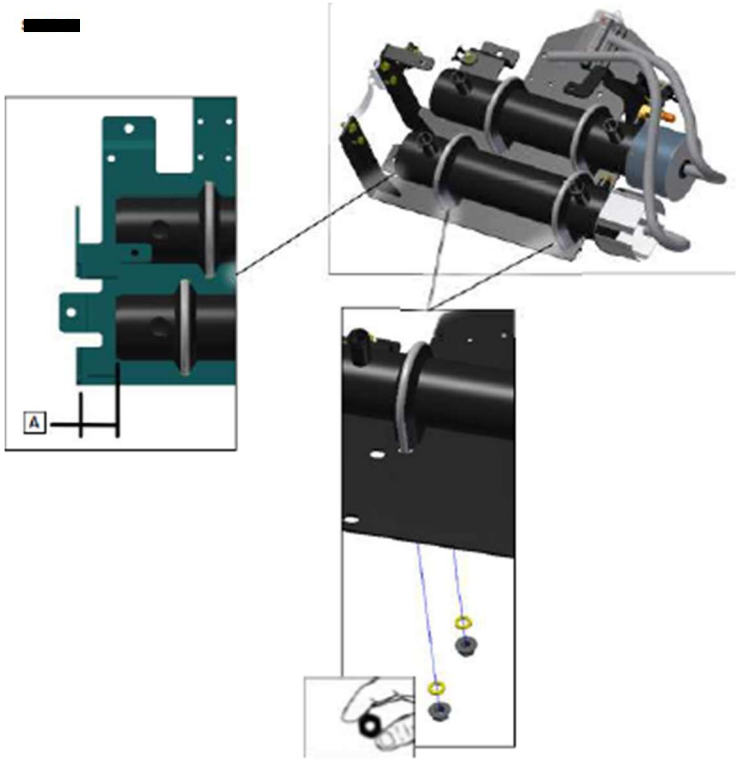
Pump and remaining coolant hoses/pipes are not shown in this picture even if they are still there

34. REMOVE CABLE FROM COVER FROM THE 2 HEATERS

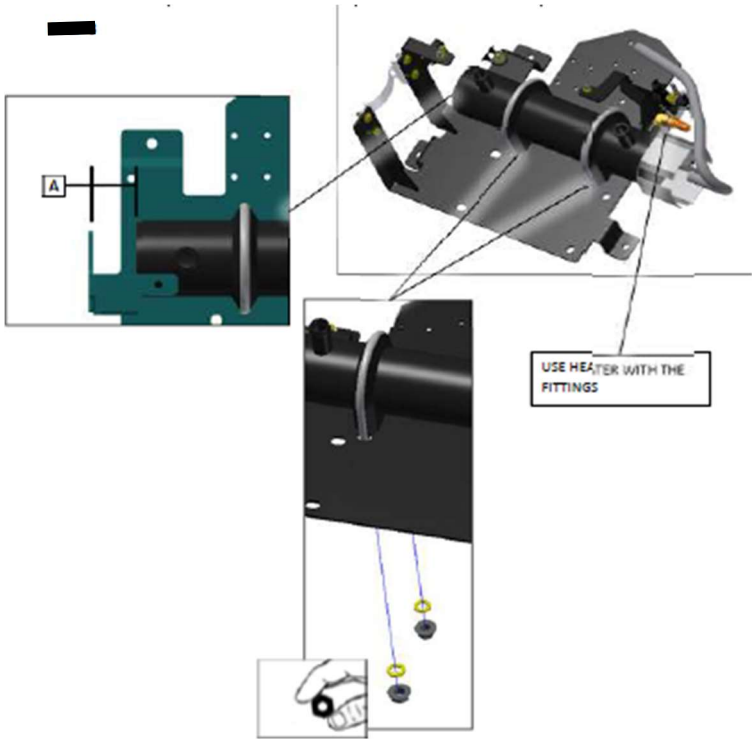


Unscrew screws on heater, remove electrical tape and remove cable. Discard hardware.

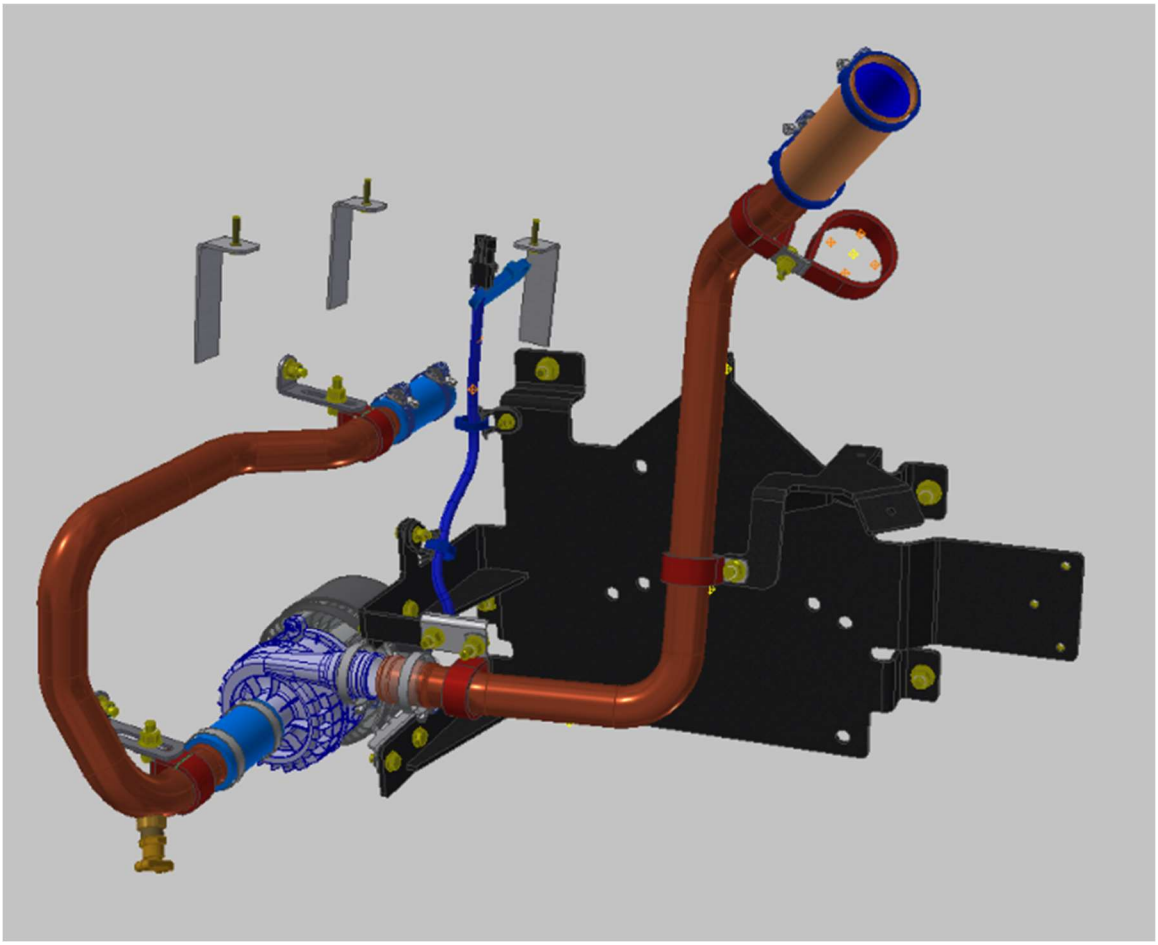
35. REMOVE SECOND HEATER FROM BRACKET



36. REMOVE FIRST HEATER FROM BRACKET



Closing the coolant loop

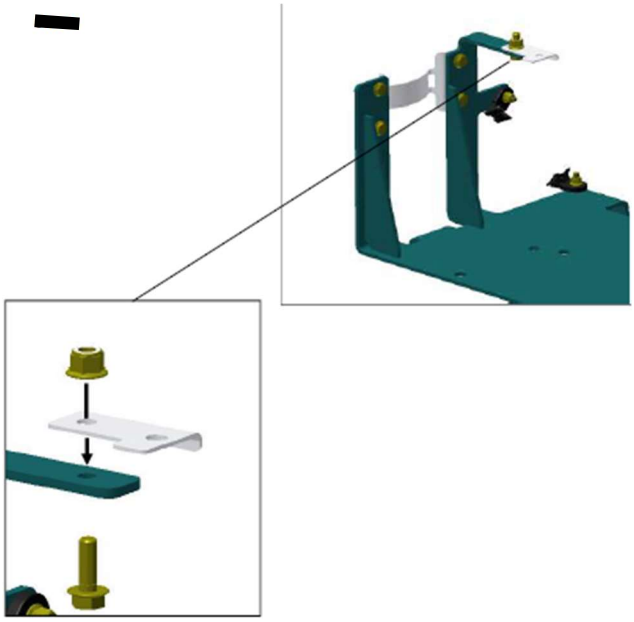


BOM		
Part Number	Description	Quantity
N32102	SCREW M8X25 H YZ TRIV 96H 8.8	3
N40492	SCREW M6X20 H YZ TRIV 96H 8.8	1
N44887	NUT LOCKNYL M6 YZ TRIV 96H C8	1
N44888	NUT LOCKNYL M8 YZ TRIV 96H 8.8	3
N56339	TEFZEL CABLE TIES	2
N56614-03	SLEEVE HEAT RESIST HOSE 5'' LG	1
N80668	WORM CLAMP 30-45MM CAILLAU	2
N81079	WORM CLAMP 40-60 MM CAILLAU	2
N84090-11	P-CLAMP ID 1.500'' THK 0.030'' M8	3
N84090-14	P-CLAMP ID 2.250'' THK 0.060 M8	1
N93549	PIPE HEATING	1
N93550	SUPPORT HEATING PIPE	1
N95060-108	HOSE COOLANT 1.25'' ID X 4.5'' lg	1
N95827-25	HOSE SILI-ARAM 4PLY 1 ½''X3''	1

37. INSTALL PIPE SUPPORT

Part Number	Description	Qty
N32102	SCREW M8X25 H YZ TRIV 96H 8.8	1
N44888	NUT LOCKNYL M8 YZ TRIV 96H 8.8	1
N93550	SUPPORT HEATING PIPE	1

Tools: 8mm socket with 3/8'' drive + 3/8'' drive ratchet

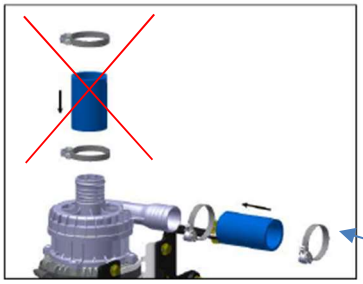


Torque to 9.9 Nm and apply torque strip

38. INSTALL HOSE

Part Number	Description	Qty
N81079	CLAMP WORM-DRIVE 40-60MM	2
N95827-25	HOSE SILI-ARAM 4PLY 1 ½''X3''	1

Tools: 10mm open end wrench + 10mm socket with 3/8'' drive + 3/8'' drive ratchet



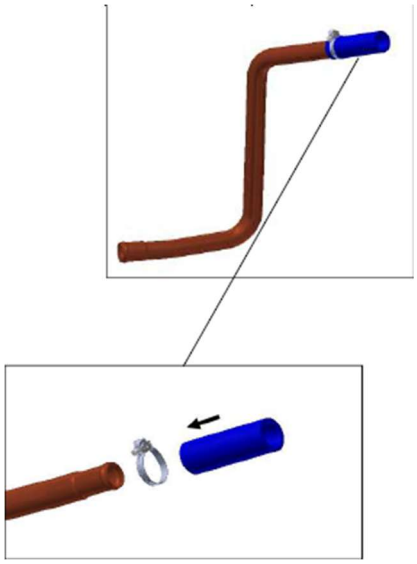
Install this hose

Note: The pump was not removed from plate. It is already installed and secured on plate.

39. INSTALL HOSE ON PIPE

Part Number	Description	Qty
N80668	CLAMP WORM-DRIVE 30-45MM	1
N93549	PIPE HEATING	1
N95060-108	HOSE SLC 4PLY 1.25''ID X 4.5''LG	1

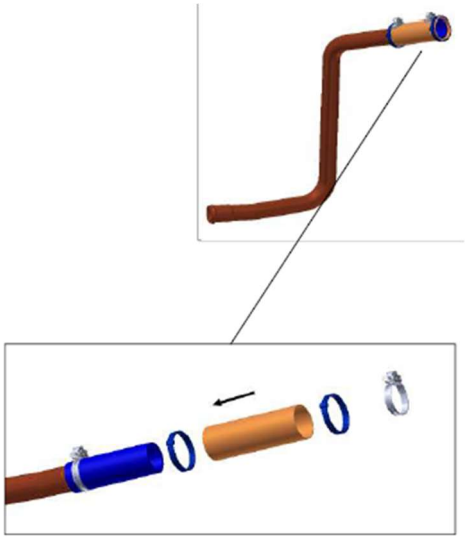
Tools: 10mm open end wrench + 10mm socket with 3/8'' drive + 3/8'' drive ratchet



40. INSTALL HEAT SHIELD

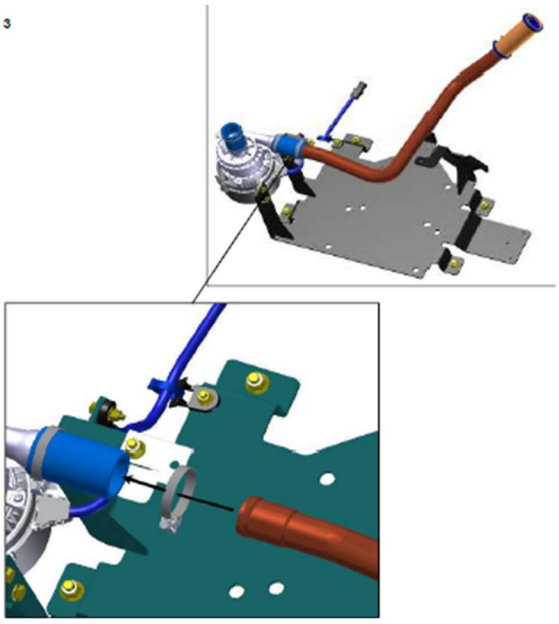
Part Number	Description	Qty
N56339-02	TEFZEL CABLE TIES	2
N56614-03	SLEEVE HEAT RESISTANT HOSE 5''	1
N80668	CLAMP WORM-DRIVE 30-45MM	1

Tools: 10mm open end wrench + 10mm socket with 3/8'' drive + 3/8'' drive ratchet



41. INSTALL PIPE ON PUMP

Tools: 10mm open end wrench + 10mm socket with 3/8'' drive + 3/8'' drive ratchet

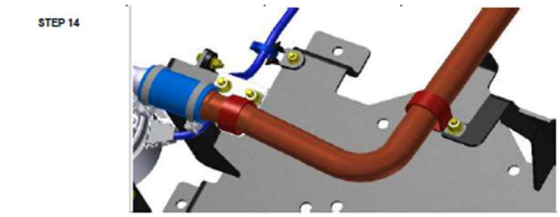


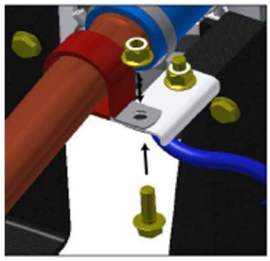
Torque to 3.5 ± 0.25 Nm the hose clamp and apply torque strip.

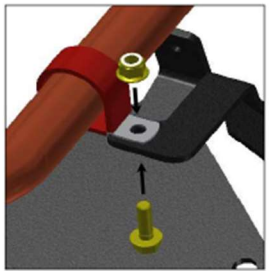
42. HOLD PIPE

Part Number	Description	Qty
N32102	SCREW M8X25 H YZ TRIV 96H 8.8	2
N44888	NUT LOCKNYL M8 YZ TRIV 96H 8.8	2
N84090-11	P-CLAMP ID 1.500''THK 0.030'' M8	2

Tools: 8mm socket with 3/8'' drive + 3/8'' drive ratchet







Torque to 9.9 Nm and apply torque strip

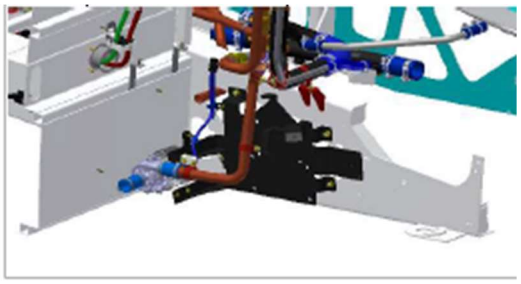
43. INSTALL PLATE

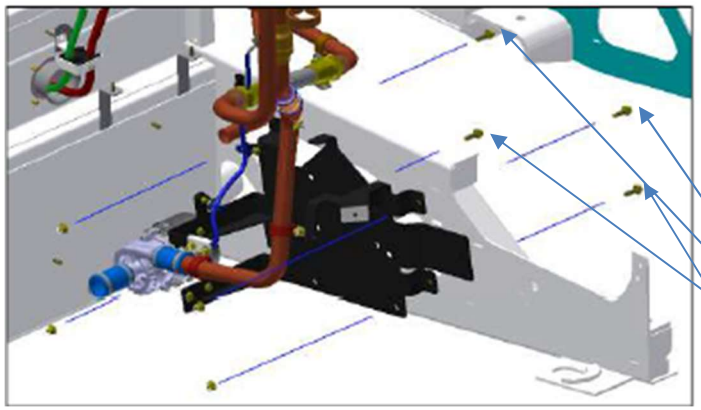
Part Number	Description	Qty
N33228	SCREW M10X30 H YZ TRIV 96H 8.8	4
N44889	NUT LOCKNYL M10 YZ TRIV 96H C8	4
SUBE323SB	S/A SPUMP COOL LOOP WO WEBASTO	1

Tools: 10mm socket with 3/8'' drive + 3/8'' drive ratchet

TORQUE = 55 ± 4 Nm and apply torque strip

EP 8

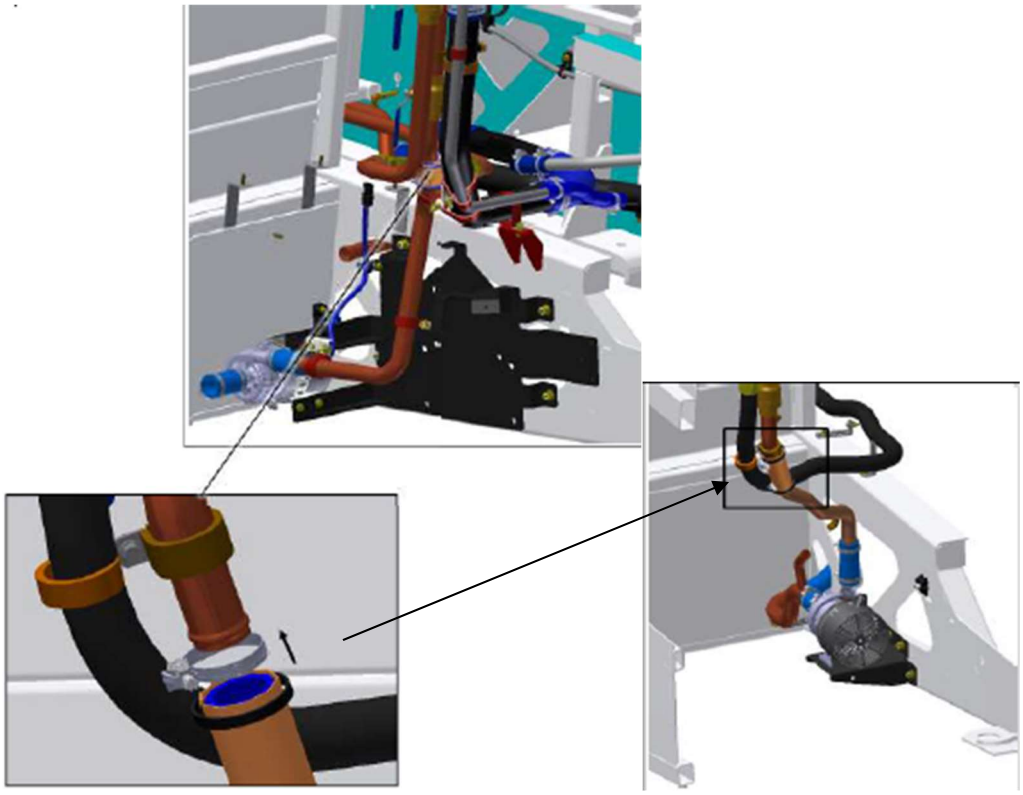




Torque = 55 ± 4 Nm

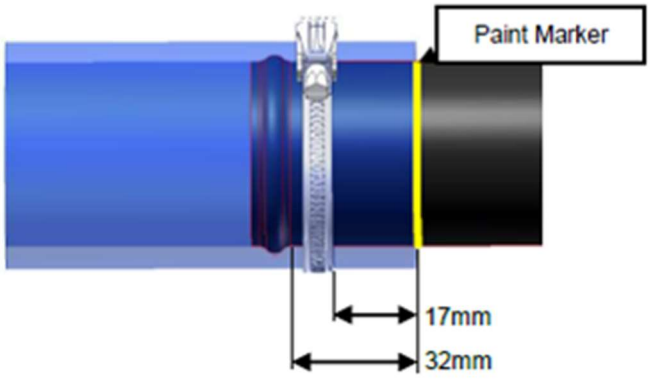
44. CONNECT HOSE

Tools: 10mm open end wrench + 10mm socket with 3/8'' drive + 3/8'' drive ratchet

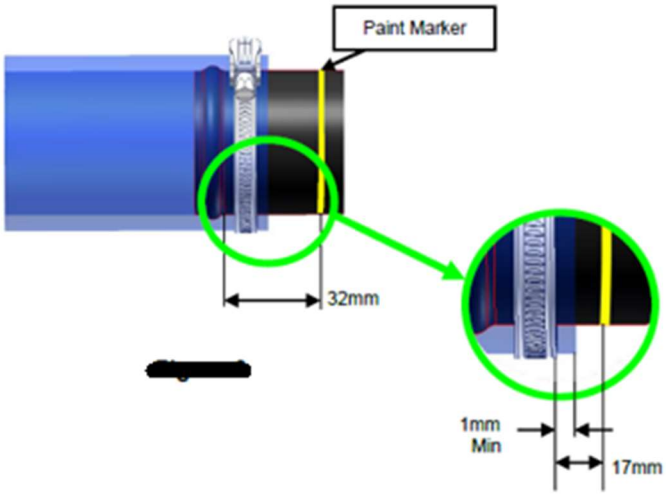


Recommended Clamp Installation

- Mark Tubing at distance of 32mm (1 17/64'') and draw a line with a paint marker before installing the silicone hose and clamp
- Silicone hose must be aligned directly on the edge of the painted line at 32mm



- If silicone hose is short from the 17mm (43/64 ‘’) clamp position marker ensures to respect the 1mm minimum excess of silicone hose when clamp is tightened

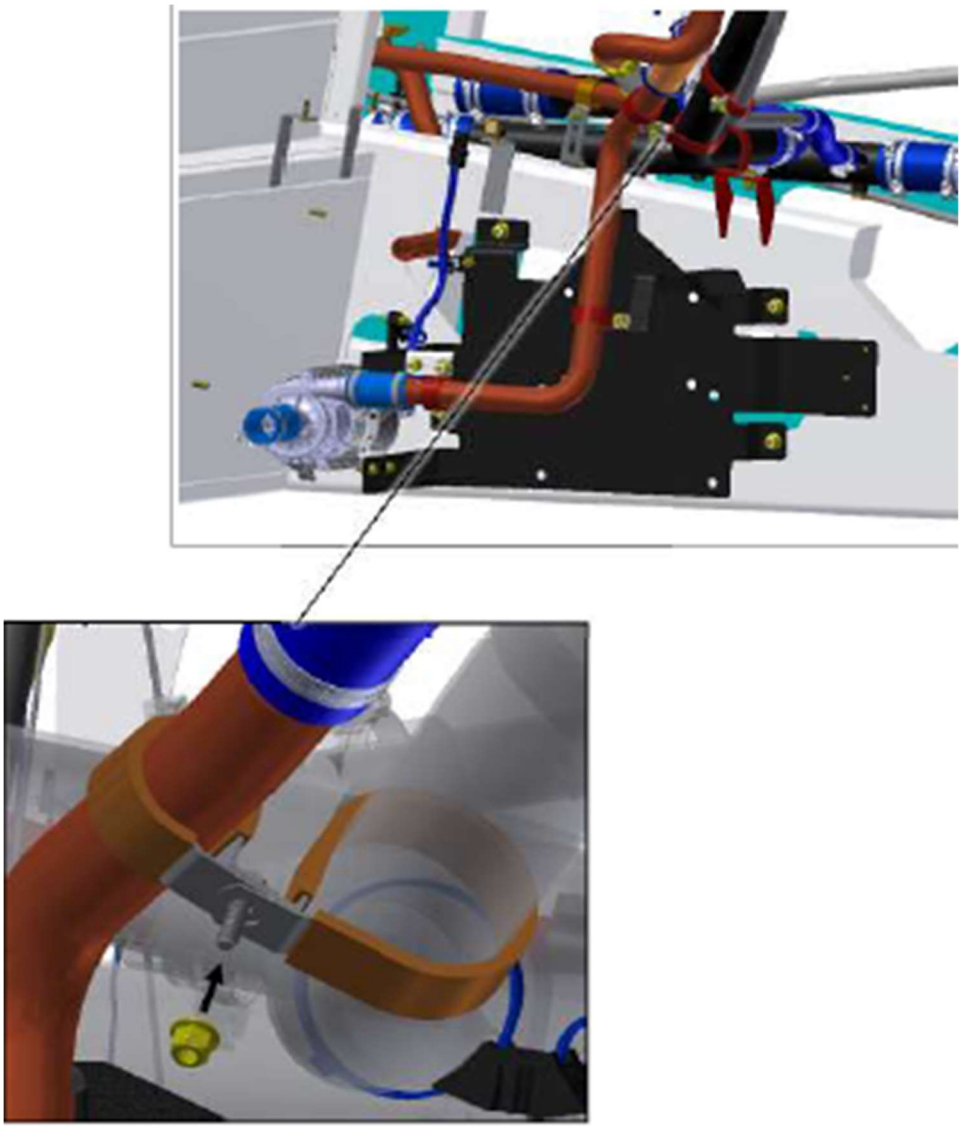


Torque to 3.5 ± 0.25 Nm and apply torque strip. Recommended screwing speed: 500 RPM

45. HOLD THE PIPE

Part Number	Description	Qty
N40492	SCREW M6X20 H YZ TRIV 96H 8.8	1
N44887	NUT LOCKNYL M6 YZ TRIV 96H C8	1
N84090-11	P-CLAMP ID 1.500’’ THK 0.030’’ M8	1
N84090-14	P-CLAMP ID 2.250’’ THK 0.060’’ M8	1

Tools: 6mm socket with 3/8’’ drive + 8mm socket with 3/8’’ drive + 3/8’’ drive ratchet

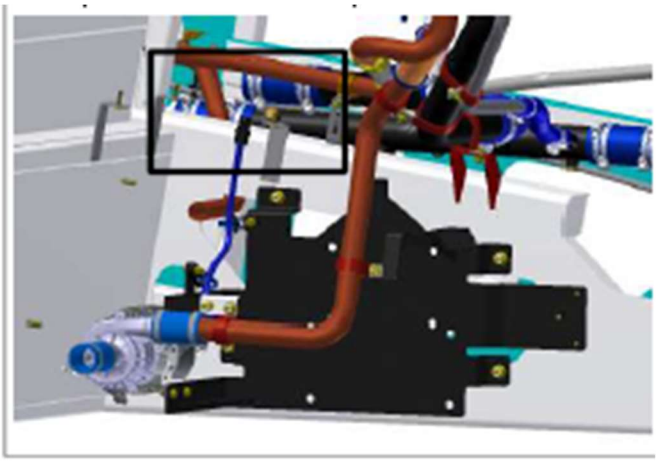


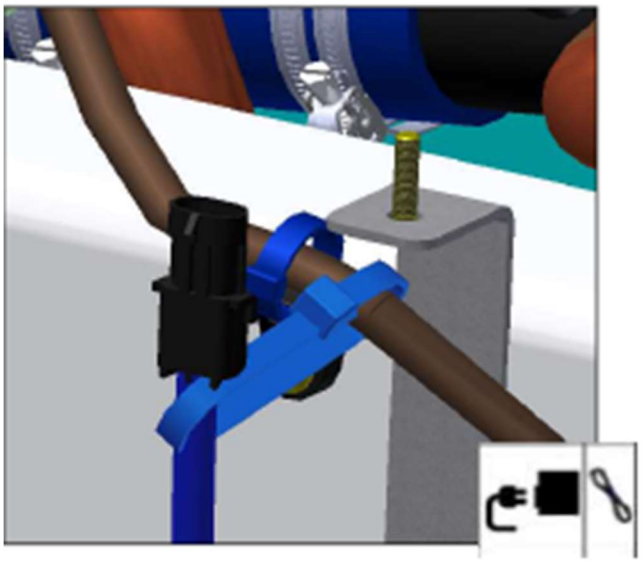
Torque to 9.9 Nm and apply torque strip

46. CONNECT AND ROUTE PUMP ELECTRICAL CABLE

Part Number	Description	Qty
N56339	TIE TEFZEL CABLE TIES	1

Connect the pump electrical connector



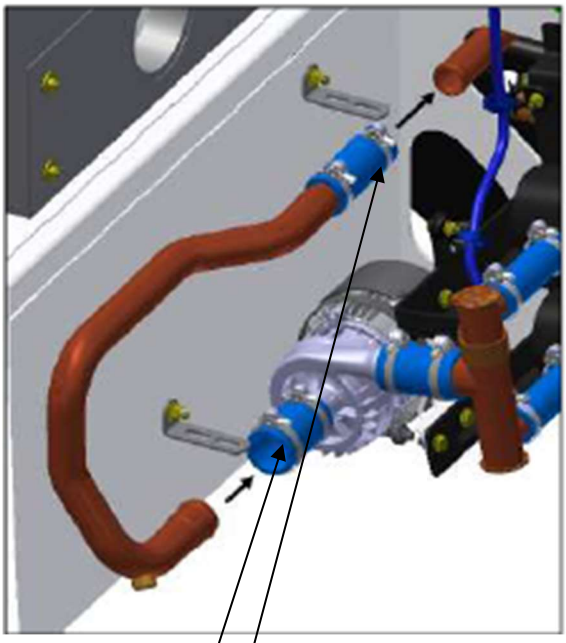


Route and attach the pump electrical cable

47. INSTALL PUMP INLET PIPE

Part Number	Description	Qty
N44888	NUT LOCKNYL M8 YZ TRIV 96H 8.8	2
SUBE314SC	S/A PIPE DRAIN ELEC AUX HEAT	1

Tools: 8mm socket with 3/8'' drive + 3/8'' drive ratchet



Torque both clamps to 3.5 ± 0.25 Nm and apply torque strip. Recommended screwing speed: 500 RPM

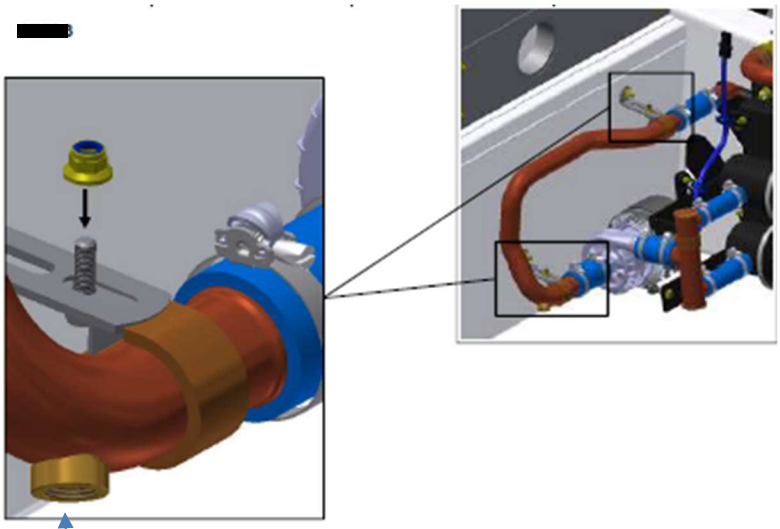
See Annex A for Caillau Clamps Installation Procedure

48. HOLD PIPE

Part Number	Description	Qty
N84090-11	P-CLAMP ID 1.500'' THK 0.030'' M8	2

Tools: 8mm socket with 3/8'' drive + 3/8'' drive ratchet

Torque to 9.9 Nm and apply torque strip



The drain plug is not shown on this picture but is already installed

49. At the right of the engine compartment refill with the coolant drained at the beginning of the procedure.

50. Reinstall the dust pan

51. Remove jack stands under the bus and lower the bus down on the ground

52. Remove the lock from the main cut-off switch

53. Place the main cut-off switch at ON position.

54. Open the engine main coolant valves located over the DPF

55. Bleed the coolant system

56. Verify for leaks

57. Program the V-BEA system using the program and revision indicated in the client listing or the one recommended by your customer support manager. See section 16: V-BEA (VOLVO BUS ELECTRONIC ARCHITECTURE) of the Nova LFS maintenance manual for programming procedure.

Annex A Caillau Clamps Installation Procedure

1.0 OBJECTIVE

Establish specifications for Caillau clamps installation and tightening.

2.0 GENERAL

2.1 To ensure the proper clamp installation and reduce the risk of subsequent leakage, it is important to position and mount the clamp perpendicular to the pipe axis.

2.2 Make sure all components are cleaned with isopropylic alcohol.

2.2.1 Caillau Clamp
2.2.2 Silicone Hose Inside/Outside Diametre
2.2.3 Coolant Pipe/Tube Outside Diameter

3.0 TOOLS NEEDED

- Atlas Copco tightening tool **LUM22 HR12** (see Figure 1)
- Tightening tools for less accessible area on the vehicle e.g. torque wrench and torque screwdrivers.

Figure 1

4.0 INSTALLATION STANDARD

4.1 To allow easier access in service, once the vehicle is completed make sure the clamping nut is positioned to be accessible with tooling.

4.2 When installing a flexible hose on a barbed or a beaded fitting push on fitting until hose bottoms against stop ring or hex.

4.3 Tubing / Piping alignment. (see figure 2)

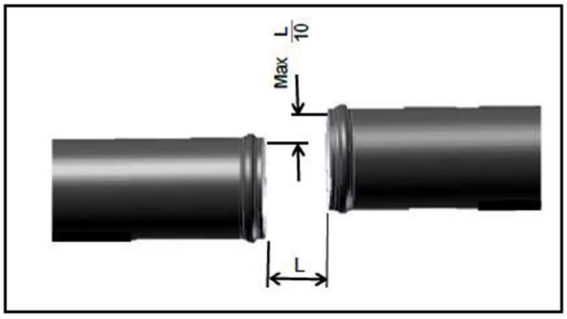


Figure 2

4.4 Maximum clamp misalignment 0.07 x Dia. (see Figure 3)

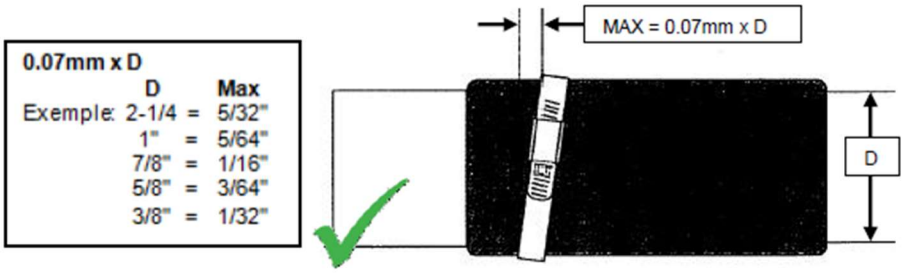


Figure 3

4.5 Minimum Excess of Flexible . (see Figure 4)

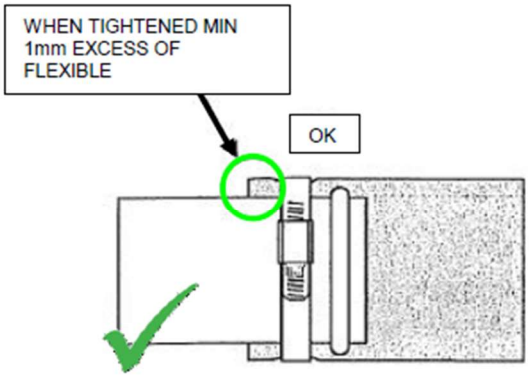


Figure 4

4.6 Do not install the clamp too close to the bead or on the bead it will cause leakage. (see Figure 5)

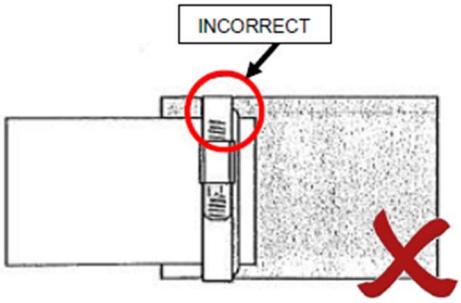


Figure 5

4.7 Recommended Clamp installation.

4.7.1 Mark Tubing at distance of 32mm and draw a line with a paint marker before installing the silicone hoses and clamps.

4.7.2 Silicone hose must be aligned directly on the edge of the painted line at 32mm.

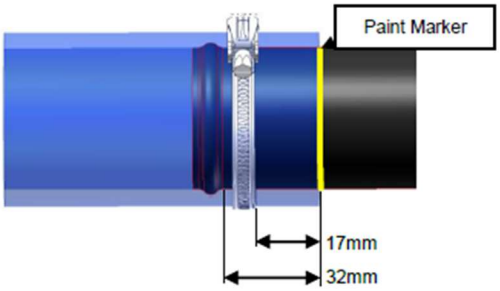


Figure 6 (Single clamp)

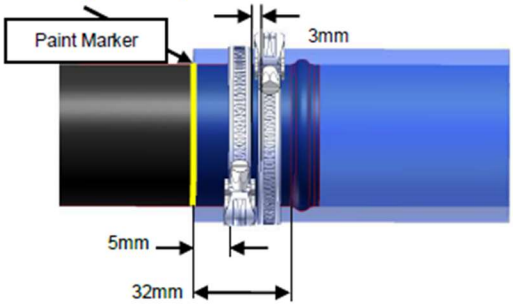


Figure 7 (Dual Clamp)

4.7.3 Single clamp Installation: If silicone Hose is short from the 17mm clamp position marker ensures to respect the 1mm minimum excess of silicone hose when clamp is tightened. (Figure 8)

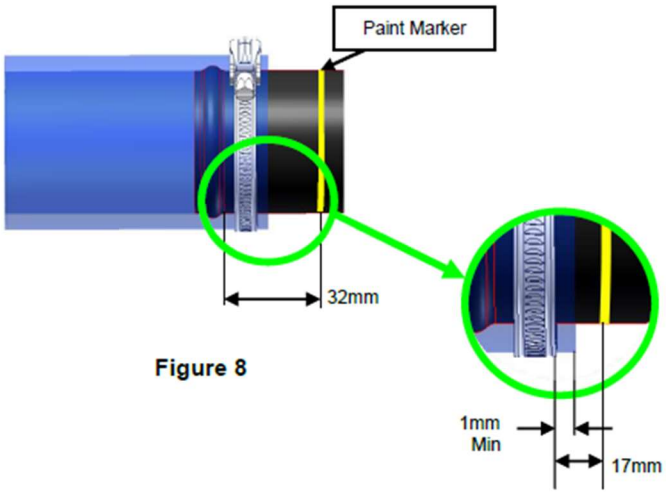


Figure 8

4.7.4 Dual clamp Installation: If silicone Hose is short from the 5mm clamp position marker ensures to respect the 1mm minimum excess of silicone hose when clamp is tightened. (Figure 9)

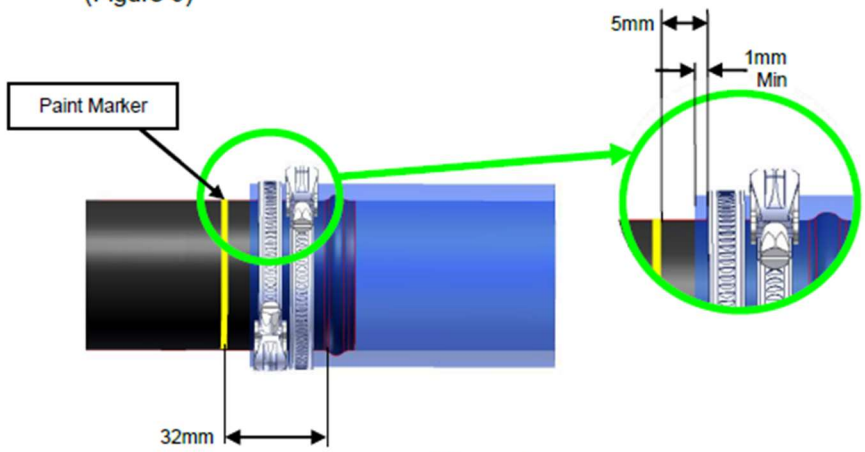


Figure 9

4.7.5 If the silicone hose is longer and exceed the measurement position 32mm make a new reference mark further. Example Single Clamp: 40mm mark (depending on the excess hose) and reposition the clamp at 57mm. (Figure10)

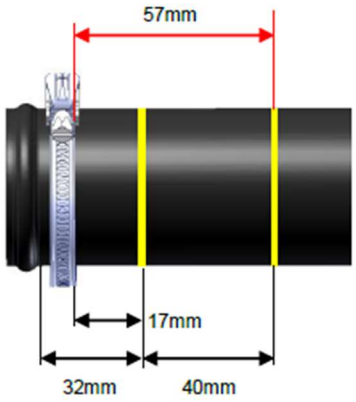


Figure 10

4.8 When the clamp is double, the more rigid part of the clamps, the tightening screw should be rotated by a minimum of 90 degrees apart to prevent any overlap. In most cases, both screw heads will look in the same direction, where the tool will be coming from. (see figure 11 & 12)

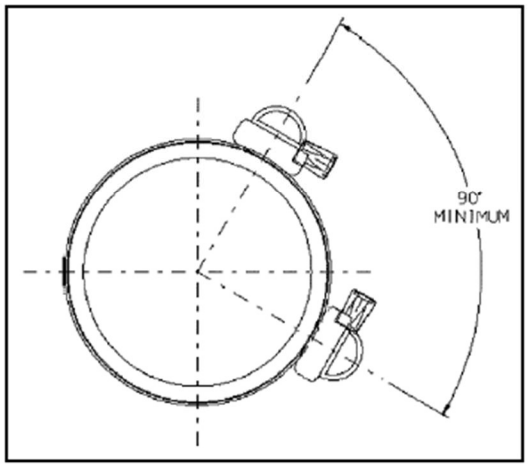


Figure 11

Note 1 :We can install 2 clamps side by side at a distance of 3mm as long as they are not located on a pipe bead and that we can see the hose ends. In places where we can not meet these two criteria, we will only use one clamp. (see figure 9)

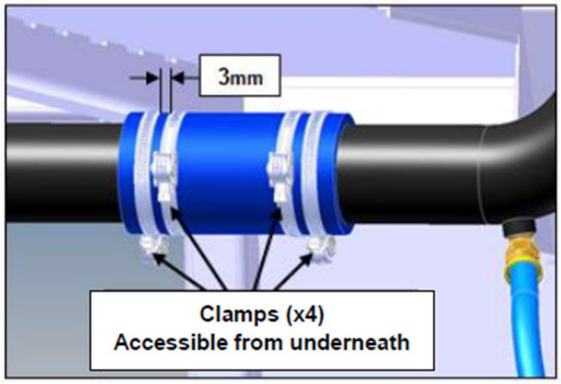


Figure 12

4.9 If a lubricant is required to insert the hose over the connector, use temporary-type lubricant P80. (see Figure 13)

Figure 13

CAUTION: No petroleum- or silicone-based products are accepted (e.g. Vaseline.)

5.0 Maximal torque and speed

5.1 Recommended tightening torque: 3.5 ±0.25 Nm

5.2 Recommended screwing Speed : 500 RPM