| | VT-0045 | 001 | 05/29 | BP/BK |
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| CHART® | R110 LH Tanks EFV and Liquid Tube Install | | | |

## Purpose

This document will outline the steps necessary to upgrade the plumbing on certain LNG vehicle tanks designed and manufactured by Chart under R110 standards.

## Overview

Certain R110 coded LNG vehicle tanks can have the tanks plumbing supply lines upgraded. The upgrade only affects a small number of tanks. The owner of tanks requiring this upgrade procedure will be contacted directly by Chart LNG personnel to schedule the repairs. Scope of repair items includes installation of a secondary flow restriction device, installation of new fuel supply line between the tank liquid shut off valve and heat exchanger inlet. Installation of new fuel supply lines between the heat exchanger outlet and shut off solenoid inlet, as well as new fuel supply line between the shut off solenoid outlet and tank internal bulkhead connector. The optional fuel inlet check valve and bulkhead connector will also be removed and the hole plugged off.

## Parts Needed

| Qty. | Part Number | Description |
|---|---|---|
| 1 | 20732476 | Plastic Plug for Bulkhead Connector Hole |
| 1 | 20910172 | LH Liquid Tube Assembly |
| 1 | 11751555 | 3/8” Flaretite Seal |
| 3 | 11751571 | 3/4” Flaretite Seal |
| 1 | 11377778 | 3/8” NPT X 3/8” flare 90D |
| 1 | 20910445 | 3/8” Flare X 3/8” adapter |
| 1 | 20909776 | Excess flow valve |

## Tools Needed

- 1/2” Combination Wrench or Hex Socket Adapted to Drill or Ratchet
- 9/16” Combination Wrench
- 11/16” Combination Wrench
- 3/4” Combination Wrench
- 7/8” Combination Wrench
- 1-1/8” Combination Wrench
- 1-1/4” Combination Wrench
- 1-3/8” Combination Wrench
- Internal wire brush

**This procedure is intended for use by trained technicians with experience on systems using LNG. Review all applicable safety documents before beginning this procedure.**

## Other Supplies

- Nickel Impregnated Thread Sealant Tape (PN: 11811511)
- Anti-Seize Lubricant for Stainless Steel

## Safety

Ensure the servicing technician has read this procedure in its entirety prior to beginning. They will follow the procedure in a step by step process. Ensure all appropriate personal protective equipment is worn as required. Any special safety considerations will be highlighted in red and should be paid special attention.

## Upgrade Steps

1. Remove the 4 shroud plumbing protective cover attaching bolts. Use a ½" hex socket or ½" combination wrench. Retain the cover and bolts to reinstall.
2. Turn off Fuel Shutoff Valve (Red Hand wheel shown in photo below) by rotating it clockwise until it is fully closed.


3. Turn on the ignition switch and start the engine to depressurize fuel line downstream of the Fuel Shutoff Valve.
4. Once the engine stops, turn the ignition off, remove and secure the key.

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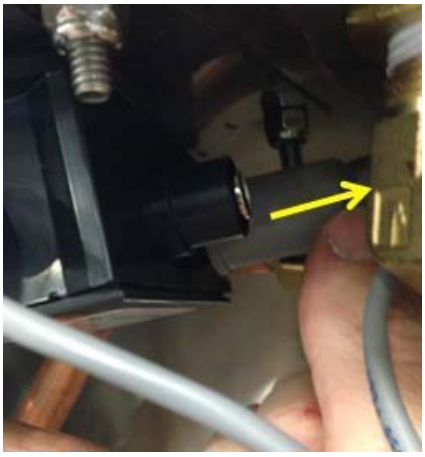
5. Slide the rubber boots down and remove the BNC Connectors of coaxial cables going into the fuel gauge sender. See photo below.



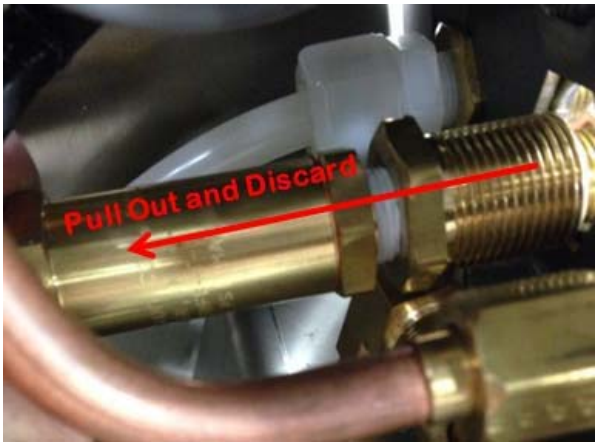
6. Using an 11/16" combination wrench, loosen the flare nuts of 3/8" tube in between the tee and heat exchanger. Loosen the nuts two full turns and wiggle the tube by hand to loosen it in its mating fitting, this will also allow any residual pressure to safely escape. (See photo below).

7. Once residual pressure has escaped it is safe to completely loosen and remove the two flare nuts from their connecting fittings and remove the tube.

8. Using an 11/16” combination wrench, loosen the flare nuts of the 3/8” tube in between the tee and elbow fitting going into check valve. See photo below.


9. Remove the Flaretite seals from the male flare fittings and discard.
10. Using a 1-1/4” combination wrench, remove the jam nut from the bulkhead connector of ‘AUX LIQUID IN’ port.

11. Remove the check valve, bulkhead connector, and 90° elbow fittings. See photo below.




12. Insert plastic plug into 'AUX LIQUID IN' hole.

13. Using 1-1/4" combination wrench, slowly loosen the flare nuts of 'AUX FILL' line. Only loosen them 1 to 2 full turns maximum to allow pressure to escape from the lines. See photo below.

**Use Caution when performing Step 13. The line to be loosened will have natural gas under pressure inside it, but will begin to bleed out when the flare nuts are loosened. The tube should bleed to 0 bar within one minute, if it continues to leak pressure after 2 minutes the fill check valve may need to be replaced as a separate repair procedure.**

14. Once all pressure has escaped it is safe to fully loosen the flare nuts and remove the tube. Keep the tube to reinstall in a later step.
15. Loosen the flare nut on the tee's side going to the fill receptacle and slide it onto tube away from tee.
16. Remove the Flaretite seals from both flared fittings and discard.

17. Remove the stainless steel flare tee from Fuel Shutoff Valve body using a 3/4" combination wrench. See photo below.


18. Remove any remaining thread sealant tape from the shut off valve female pipe threads using a wire tube brush. Slowly open the valve for a few seconds to use tank pressure to purge out any remaining debris then close it.

19. Apply thread sealant tape to the male threads of 3/8” NPT x 3/8” Flare 90° elbow and install in Fuel Shutoff Valve. Refer to Chart procedure VT-0030 for thread tape installation requirements. Insert 3/8” Flaretite seal and tighten the tee with a 3/4” combination wrench as oriented in the photo below.


20. Install 3/8” flare to 3/8” NPT adapter and tighten with 11/16” combination wrench.

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21. Loosen the 'AUX FILL' bulkhead connector's jam nut with 1-3/8" combination wrench to allow alignment between the tubes and fittings for the next steps.
22. Reinstall 'AUX FILL' line using three new ¾" Flaretite seals (one for the 90° fitting going into the street 45° coming out of the fill check valve and two for the tee going into the 'AUX FILL' bulkhead connector. Tighten the flare nuts with 1-1/4" combination wrench. Tighten the bottom flare nut first, the flare nut going into the bottom of the tee second, the flare nut coming out the side of the tee third, then the bulkhead connector's nut last (with 1-3/8" combination wrench). See photos below.


23. Reconnect BNC Connectors to Fuel Gauge Sender and slide rubber boots up over the connections.
24. Apply thread sealant tape to male threads of the excess flow valve and install it into the female pipe threads of the 3/8" flare to 3/8" NPT adapter. Tighten the excess flow valve with 1-1/8" combination wrench on the flats closes to the pipe thread end while holding the adapter fitting with 7/8" combination wrench.

25. Insert the non-flared end of the LH Liquid Tube Assembly (PN: 20910172) into the outlet of the EFV. The excess flow valve should have a nut and ferrules already installed.
26. Install a new 3/8" Flaretite seal onto the heat exchanger fuel inlet elbow, male flare fitting.
27. Using 11/16" combination wrench, tighten the flare nut on the heat exchanger end.

28. Using 11/16" combination wrench, tighten the nut of compression nut while holding the EFV body with a 1-1/8" combination wrench.

29. Apply anti-seize lubricant to the four screws that mount the shroud cover to the shroud and install shroud cover then tighten screws with ½" combination wrench or hex socket.
30. Fully open the Fuel Shutoff Valve by turning the handle counter-clockwise.
31. Turn on ignition switch to power (open) the fuel shut off solenoid.
32. Leak test all fittings and connections.