# 3.3 Glycol Add/Remove Procedure

This procedure covers opening the hydraulic system to a glycol reservoir whenever a complete fill/drain is not required. This procedure is to be followed in conjunction with Procedure 3, Glycol Handling Procedure.

In addition to the hazards of propylene glycol stated in Procedure 3, there is a risk of blowing the pressure vessel pressure relief valve with this procedure. To proceed:

1. Review Procedure 3 "Glycol Handling Procedure" and have it available.

2. Ensure the NESLAB is controlling the glycol temperature above 20°C. If the NESLAB fails, we want the glycol to contract, not expand.

3. Run the Cart Commissioning Tool. Start data logging every 60 seconds. The pressure will have to be monitored for this run.

4. Assemble a vacuum pump, vacuum lines, and a fluid trap. Connect to the vacuum port MV-12. Do not activate the pump.

5. Ensure that all valves on the hydraulic system except MV-10 and MV-11 are closed. Use the Commissioning Tool to set the hydraulic system pressure to 150psig in the expanded state.

6. Compress the cart, then bleed off the pneumatic system pressure to 15psig.

7. Close MV-11 to isolate the pressure vessel.

8. Follow the "Before Glycol Handling" section of Procedure 3. Set up the work area and don PPE.

9. Assemble a glycol reservoir (5 gallon bucket or 55 gallon drum) and a draw hose with a long handled tip valve. Connect the draw hose to MV-15 using a 7/8" wrench. Open the draw hose tip valve and dip it into the glycol reservoir.

10. Double check that the cart's pneumatic system is at 15psig and expanded with the pneumatic cylinder at it's top travel. Slowly open MV-15 to force glycol out through the draw hose. Monitor the pneumatic cylinder position and bubbles coming out of the hose. When all the air is forced out or the pneumatic ram reaches full stroke, close MV-15. In the latter case, use the hydraulic ram to refill the pneumatic cylinder and repeat this step.

11. Add or remove glycol.
    a) To remove glycol, open MV-15, let the pneumatic cylinder reach full stroke, then use the hydraulic ram to force out the required amount of glycol.

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b) To add glycol, raise the hydraulic ram until the pneumatic cylinder is at full stroke. Open MV-15 and continue to raise the hydraulic ram until the desired amount of glycol has been sucked in.

12. Close MV-15.

13. Lower the hydraulic ram to force the pneumatic cylinder up to it's top stop. Pressurize the cart to using the hydraulic ram to match the pressure inside the pressure vessel.

14. Slowly reopen MV-11 to connect the pressure vessel and hydraulic cart.

15. Close the pneumatic valve positioned after the regulator. Set the regulator to pressurize the pneumatic system to 50psi. Slowly reopen the pneumatic valve.

16. Close the draw hose valve. With paper absorber ready, disconnect the draw hose from KF-25 at MV-15 and raise the hose end high. Reopen the draw hose valve and drain glycol from the hose.

17. Clean up any glycol spillage and glycol residue from off the draw hose. Bag the draw hose for storage.

18. Complete the "After Glycol Handling" section of Procedure 3.

19. Reopen MV-4 to AC-2.

20. Use the Commissioning Tool to set the expanded pressure to the desired value.

21. You may close the Commissioning Tool and restart data acquisition.