

1.5 Hydraulic Cart Fluid add/remove (live)

Written Procedure

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This procedure covers the addition or removal of hydraulic fluid from the hydraulic cart while it is hooked to a live bubble chamber. The need for this procedure would arise when an analysis of the fluid volume change of a pending operation such as a temperature increase or decrease had determined the actual volume in reserve to be wanting or in excess. The initiation of such an operation in the circumstance of insufficient or excessive hydraulic fluid volume would result in the inability of the cart to regulate pressure thereby leading to the unfortunate result of the explosion or implosion of the bubble chamber inner vessel or bellows. The necessity for the avoidance of such an unfortunate occurrence is the appropriate cause for the elevation of this document to the status of “written procedure.”

- 1) Prepare the appropriate external plumbing. For draining, a small line from the drain valve to a fluid receptacle. For adding, a line equipped with a draw-pipe as per procedure 1.2 should be prepared, inserted into the glycol reservoir, and evacuated in advance.
- 2) Ensure that the temperature regulation of the bubble chamber is working correctly, and that the temperature of the bubble chamber is stable.
- 3) Ensure that the bubble chamber is *compressed*.
- 4) Isolate the bubble chamber from the cart. Remember that in doing so, one has deprived the chamber of the ability to react gracefully to any subsequent change in temperature. It is therefore imperative that all subsequent steps be executed with deliberate speed, consistently, of course, with their safe execution.
- 5) Disconnect the compressed air from the hydraulic cart and wait for the pressure to bleed down.
- 6) To remove fluid, *slowly*¹ open the drain valve a crack, and *slowly*² drive the main hydraulic cylinder down to the appropriate position.
- 7) To add fluid, open the draw-pipe valve to fill the pipe and lines with fluid. Then open the drain valve to the hydraulic cart. Slowly raise the piston to the appropriate height, drawing in new fluid.
- 8) Close off the drain valve and remove the external plumbing.
- 9) Restore the compressed air, and recompress the cart. Open the isolation valve to the bubble chamber.

¹ Remember, there is still pressure. You don't want to spray this stuff all over yourself...

² Ditto. You're potentially generating excessive pressure if you move the cylinder too fast...