Procedure on Filling Oxford Magnet with LHe

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Abstract

The routine liquid helium filling procedure of the Oxford Superconducting Solenoid must be carried out approximately every six weeks. This document describes the steps needed to accomplish the helium fill.

1 Check Initial LHe Levels

a) Turn ON LHe Level Meter, wait 30 sec and then press MANUAL button once to take a level reading. Leave level meter unit ON for the fill. Record LHe level in logbook.

b) Orient the 250L LHe Supply Dewar far enough away from the magnet's fringe field so that electronics do not get adversely affected and metal tools do not get sucked into magnet.

c) Place the portable yellow plastic steps next to helium dewar so that operator can conveniently reach all valves on top.

d) Put on a pair of gloves and use Cryomagnetics Level Dipstick to determine LHe Level in 250L Supply Dewar:

1) remove red cover on vent valve
2) open vent valve to relieve pressure
3) open top valve
4) slowly lower in dipstick until it hits bottom
5) take level reading
6) quickly remove dipstick
7) close both top and vent valves.

2 Prepare Transfer Line and Top Hat

a) Move transfer line closer to magnet area (ie. lean against loading dock *Overhead Door*).

b) Open Helium Gas Cylinder and set a gradual flow from output line (you can sense flow with your lips).

c) Attach He-gas line to output (short stick) end of transfer line. Verify that there is a flow of helium gas from other end. This ensures there will be no air inside the line that could freeze when the transfer line is inserted into the LHe supply dewar.

d) Go up onto magnet platform and carefully remove vent check valve from magnet LHe reservior helium service on the "top hat". Remove black plug, quick connect nut and o-ring from LHe input port. Replace black plug only into LHe input port. Place cap & o-ring in easy accessible location when needed for transfer line.

3 Start LHe Fill

a) With one person holding the long supply dewar end and another person holding the short magnet end, carry the transfer line into position for the fill.

b) Insert the long end of transfer line into supply dewar's top valve. Do this while all valves are closed. Person with this long end should use the yellow steps to reach top of dewar while the second person climbs up onto the magnet platform and helps hold long end up for easy insertion. Insert line until it hits the closed valve (about 2-inches) and then make sure all quick connects are sealed (ie. turn clockwise, right hand rule).

c) Once both persons are ready, open top valve and slowly lower transfer line into supply dewar. This is now a good time to:

   1) close the 1/2-psi pressure pop-off valve on the supply dewar
   2) remove the He-gas line from the short end
   3) reposition the line so that it goes between top and bottom rails of the platform so that it may more easily reach the LHe input port
   4) attach the black quick connect nut and o-ring onto botton 1-inch of short end of transfer line.

d) The second person that holds the short end must pay attention to the flow of He-gas coming out of the transfer line. As the line gets closer to the LHe in the dewar, the more He will boil off and create more pressure & flow thru transfer line. Use the vent valve to ease off pressure when needed.

e) Once there is a cold plume of He coming out of the short end of transfer line, relieve pressure by opening vent valve on supply dewar and then closing it. Now insert the short end of the transfer line into the LHe fill port. Screw on quick connect nut. Push transfer line in all the way.

f) Verify that:

   1) short end of transfer line is in all the way and the input port nut is screwed on tight
   2) long end of transfer line is now pushed in all the way

g) Plug in 250L LHe supply dewar heater. Switch ON to 4-psi mode. Watch the heater and pressure on dewar to make sure auto pressure is working properly. If heater does not shut ON/OFF properly to maintain 4-psi, switch heater ON/OFF manually or use He-gas cylinder to pressurize dewar via vent port.

h) Record start time of fill and then LHe Level reading every 10 minutes.

4 Stop LHe Fill

a) When one hears a *whistling* sound thru the transfer line, it is time to stop the fill. Wait a minute then record the time of the *whistle* and LHe level in logbook.

b) Shut heater power. Clean off frost from around LHe fill port on magnet top hat. Loosen fill port black nut partially (1 or 2 turns, not all the way). Nut must remain on.

c) The two operators must now position themselves at each end of the transfer line. When ready, relieve pressure from the supply dewar by opening up the vent valve. Leave it open or now. Loosen quick connect a little, then pull long end of transfer line out about half way and then just hold it there temporarily. Now pull out short end of transfer line from LHe fill port on magnet, immediately close fill port with black plug and tighten.

d) Pull transfer line out completely from supply dewar end. Close all valves on supply dewar, but open 1/2-psi pressure pop-off valve. Carry transfer line to safe location.

e) Do the following in this order:

   1) replace 1/2-psi check valve onto LHe reservoir vent
   2) unplug heater from supply dewar
   3) check that all valves on supply dewar are closed and only the 1/2-psi pressure pop-off is open
   4) place red protective plastic cap back onto supply dewar vent
   5) replace all appropriate quick connects to the supply dewar top valve
   6) verify the LHe fill port plug and 1/2-psi check valve on the vent port are both properly attached and tight
   7) verify stop time and last LHe level reading are recorded in the logbook
   8) turn OFF the LHe Level meter