



Procedure for Re-evacuation of Cryogenic Equipment

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Introduction

If a cryogenic vessel or vacuum insulated transfer line develops condensation on the jacket, or is cold to the touch during use, the insulating vacuum level is inadequate and must be restored. In order to determine if this vacuum degradation is due to a vacuum leak or normal outgassing, a vacuum leak test should be performed if a helium mass spectrometer leak detector is available. If no leak is detected, then the proper operating vacuum must be reestablished using the procedures below. If a leak is discovered, repairs must be made, and then the vacuum must be restored according to the procedure below, before the equipment is put into service again.

In order to gain access to the vacuum space for leak testing or for re-evacuation, an appropriate pump-out operator must be used. On equipment manufactured by Cryofab, Inc. the pump-out will more than likely be either one of our standard sizes, 1/2 inch or 1 inch. The pump-out operators for these sizes are slightly different, and operating instructions for them are given below.

1/2" Operator

To attach, remove plastic cap on pump-out and extract snap ring, if present. Push the operator down over the pump-out body, then push the stem down until it touches the sealing plug. Turn the stem clockwise to engage the threads all the way. Tighten the hex nut on the bottom to complete the seal. Attach a vacuum hose to the side branch of the operator.

After evacuation is complete, reseal the pump-out by pushing the stem all the way down. Disengage the stem by turning counterclockwise until free. Close the isolation valve on the vacuum pumping system or turn the pump off. Loosen the hex nut and pull the operator off the pump-out. Replace the snap ring and plastic cap.

1" Operator

To attach, remove the plastic cap on the pump-out, and push the operator down over the pump-out until it bottoms. Push the stem down until it touches the sealing plug. Turn the stem clockwise to engage the threads completely. Tighten the coupling nut on the top to complete the seal. Attach a vacuum hose to the side branch of the operator.

After evacuation is complete, reseal the pump-out by pushing the stem all the way down. Disengage the stem by turning counterclockwise until free. Close the isolation valve on the vacuum pumping system or turn the pump off. Loosen the coupling nut and pull the operator off the pump-out. Replace the plastic cap.

Re-Evacuation

The other end of the vacuum hose should be connected to the vacuum pumping system. The vacuum pumping system must be capable of at least 1 millitorr ultimate pressure, and have an appropriate gauge for monitoring the vacuum level.

Pump the vacuum hose down first, and then open the pump-out operator by holding the operator body with one hand while pulling up on the stem with the other. Pump on the vacuum jacket for at least 4 hours, but preferably longer. Heating either the inner wall or vacuum jacket by any suitable means will enhance the quality of the vacuum obtained. The method of heating must be carefully controlled, however, so that none of the surfaces reach temperatures in excess of 250°F. In time, depending upon the size of the vacuum space and the condition of the insulation, the vacuum level should reach a stable value of less than 20 millitorr. If it does not, check the assembly for leaks, and repair. Allow the equipment to remain on the vacuum pumping system for a number of hours after the minimum vacuum level has been reached.

After evacuation is complete, reseal the pump-out as described above, and disconnect the vacuum hose. If a high vacuum pumping system is available (10⁻³ millitorr), transfer the equipment to it, and pump for an additional 8 hours. Reseal the pump-out and return the equipment to service.

1.800.426.2186

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Cryofab | sales(at)cryofab.com
phone: 800.426.2186 | 908.686.3636
fax: 908.686.9538
540 North Michigan Avenue,
PO Box 485
Kenilworth, NJ, USA 07033