

Job Hazard Analysis Form

Job Title: ArgoNeuT Cryostat Filling

Date of Analysis: June 19, 2008

Reviewed By (optional):

Approved By (Supervisor/Task Manager):

Job Location: Proton Assembly Building

Job Description:

The ArgoNeuT cryostat will be filled with liquid argon using a succession of several 150 liter dewars. Dewars will be connected to a TRIGON argon filter, which will be connected to a fill line located on the neck of the cryostat. The internal fill height will be monitored simultaneously by an Arlyn scale located underneath the cryostat, and an argon level-meter located in the neck of the cryostat.

Personal Protective Equipment:

- Face shield
- Cryogenic Apron
- Cryogenic Gloves

Equipment Required for Job:

Work Plan History Information: (List any lessons learned from this job, tips from previous jobs.)

The operators performing the filling should be aware of the hazards listed in the following table, and the necessary procedures to mitigate these hazards.

Hazard Analysis		
STEP	HAZARD	PRECAUTIONS/SAFETY/PROCEDURE
Move Dewar	Dewar Tipping Over	Secure dewar
Attach/Disconnect Dewar to Cryostat Fill Line (MV-55-Ar)	Burns	Wear Cryo gloves/apron/mask
	Spilling Liquid	close dewar liquid valve before attaching/disconnecting
	Contamination	Check valves prior to beginning fill.
Fill	ODH	The ArgoNeuT system is hooked into a vent line that runs outside of PAB. The system is also equipped with 2 ODH monitors. Inform other PAB occupants before filling.
	Overpressure	Monitor pressure gauges during filling.

Filling Procedure

The cryostat filling system will be arranged as depicted in Figure 1. The following steps should be taken to fill the system:

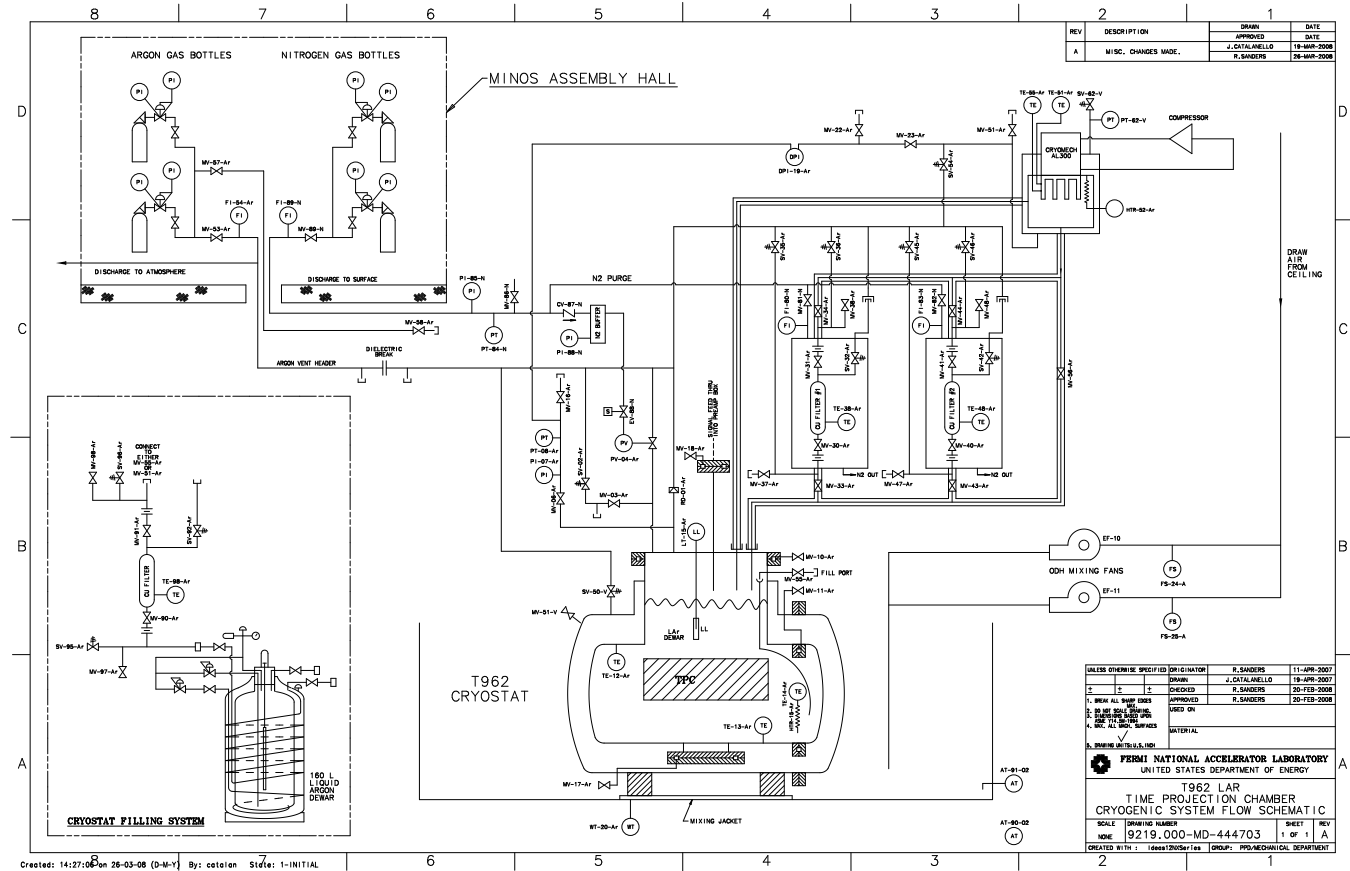


Figure 1: ArgoNeuT Recirculation System

1. Bring 160 L liquid argon dewar into PAB. There should be no more than five 160 L liquid argon dewars (counting the 160 L dewars in use by Flare) containing liquid in PAB at one time.
2. Set up the fill line and 160 dewar as shown by flow schematic 9219.000-MD-444703. Connect the fill line to MV-55-Ar on the cryostat neck. On liquid withdraw port of 160 L dewar, the adapter with a 4 inch long, 1/8 tube must be used to serve as a flow restriction. At this time MV-55-Ar and the liquid withdraw valve on the 160 L dewar need to be closed.

3. Purify the fill line by vacuum pumping and back filling with clean argon gas through valves MV-97-Ar and MV-98-Ar. This process should be repeated 3 times or as needed to remove air from piping. During this process, if the copper filter is already clean keep MV-90-Ar and MV-91-Ar closed. Otherwise open MV-90-Ar and/or MV-91-Ar , during this process, to remove air from the copper filter. When done cleaning the fill line, close MV-97-Ar and MV-98-Ar.
4. Check to see if cryostat pressure is below 5 psig. Do not proceed if cryostat pressure is above 5 psig and the cryocooler is running.
5. Check to see that the dewar liquid withdraw valve is closed. Then open MV-90-Ar and MV-91-Ar. Open MV-55-Ar, on the neck of the cryostat.
6. Slowly open the dewar liquid withdraw valve. Watch cryostat pressure and close down if pressure cryostat pressure goes above 5 psig. As the fill line cools down, the flow rate will increase and adjustments may need to be made on MV-55-Ar.
7. When the 160 L dewar is empty or the filling operation is complete, close MV-90-Ar and the dewar liquid withdraw valve. Open MV-97-Ar to release pressure. Then disconnect the fill line from the 160 L dewar.
8. If the filling operation is complete, close MV-55-Ar. Then open MV-98-Ar to release pressure. After pressure is relieved, close MV-91-Ar to keep from exposing the copper filter to air. Then disconnect the fill line from MV-55-Ar. This procedure is then over.

If the filling process is not complete, replace the empty 160 L dewar with a full 160 L dewar. Purify the section of fill line between the dewar and MV-90-Ar, by vacuum pumping and back filling with clean argon gas through MV-97-Ar. When done purifying the fill line close MV-97-Ar. Repeat steps 4-8.