Fermilab
RD/Cryogenics Department

E706 CRYOSYSTEM DESIGN NOTE

E706EN026

TITLE: LAr Transfer Lines Pressure Test Procedure

AUTHOR: John Urbin

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OBJECTIVE: This note contains a procedure for the safe and efficient pneumatic testing of the LAr transfer lines, for the E706 LAC.

ASSUMPTIONS:

1. All Ar piping is installed per E706 Flow Sheet (2220.1-ME-183293 latest revision).

2. The maximum allowable working pressure (MAWP) of the LAr transfer lines is 150 psi. The lines will be tested to 1.25 X 150 psi = 187.5 psi.

3. This pressure test should be conducted in the initial startup sequence, as it also serves as a leak test. Large leaks can be located using soap solutions. Small leaks can be located using a mass spectrometer.

PROCEDURE:

1. Isolate the piping to be tested from the LAr Storage Dewar, the LAC, and the Rahm Cell with the following valve lineup:

CLOSED	OPEN
MV1000, MV1001, MV1002	MV2001, MV2002, MV2003
MV1005, MV1026, MV1034	MV2006, MV2007, MV2008
MV1035, MV1038, MV2009	MV1028, PV101, PV300
MV2023, MV3001, MV3025	MV73 (LETS UP THE VACUUM ON THE
MV2000a,b,c,d,e,f	LAr FILTER)
MV2024a,b,c	

BLANKED OFF LINES

DISCONNECT LAr PUMP AND BLANK OFF INLET AND OUTLET LINES

6. With the pressure regulator (RV2) set for 0 psi, open: MV1, MV3, and MV4. Gradually pressurize the system, by adjusting RV2, to 94 psi.

7. Close MV4 and hold for 10 minutes, while watching for a loss of pressure. If a leak is detected at any pressure level during the test, the pressure shall be immediately reduced to one-half that pressure level while attempts are made to locate the leak. Depressurize the system before attempting repairs or adjustments.

8. If the pressure remains constant, continue pressurizing the system in approximately 19 psi increments to the maximum test pressure of 187.5 psi. Hold for 10 minutes and check for pressure drops at each level.

9. After the system has held 187.5 psi for 10 minutes, reduce the pressure to the MAWP of 150 psi and hold for 10 minutes or however long it takes to check for leaks. Inspect for any abnormalities in the piping.

10. Upon completion of the test: close MV1, set RV2 for 0 psi, open MV3, open MV4 and gradually vent the system to atmosphere through MV5.

11. Remove the test equipment, remove all pipe plugs and reinstall all relief valves:

SV1008 SV1009 SV1027 SV2005
SV2010 SV2011 SV2012 SV2025 SV3000

12. Reconnect the LAr pump.

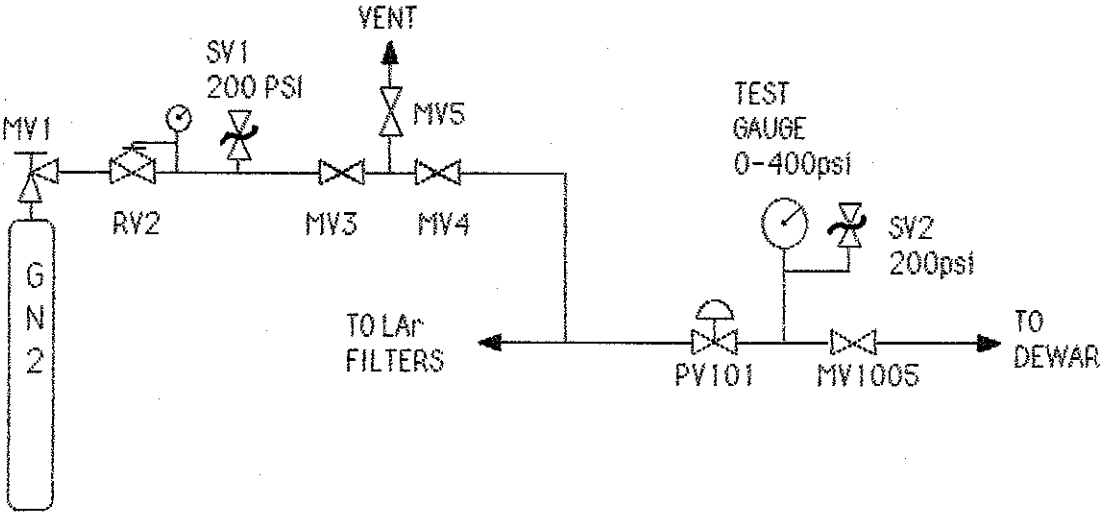
13. Reestablish the vacuum for the LAr filter.

REVIEWED BY: J. ELLERMEIER

PROJECT ENGINEER: K. DIXON

2. Cylinders of GN2 will be used to pressurize the piping. Safely secure the cylinders on the landing inside the southeast door of MW. This location allows monitoring, visually and audibly, of the indoor and outdoor piping. Hook up the test equipment per the test flow schematic (see details of connections to LAr system in step 3). Initially all test valves must be closed.

SCHEMATIC FOR PNEUMATIC PRESSURE TEST OF E706 LAr PIPING



3. Replace the following trapped volume reliefs with pipe plugs :

SV2005 SV2010 SV2011 SV2012 SV2025 SV3000

Remove and plug SV1027.
Replace SV1008 with a 200 psi relief valve and a 400 psi test gauge (relief valve and test gauge must be recently calibrated).
Replace SV1009 with the test pressurization line.

4. Clear the test area of all unnecessary personnel. Rope off the immediate areas and post signs warning of a pressure test in progress.

5. Keep a log of the test. Record times and pressures.