

Fermilab

RD/Cryogenics Department

E706 CRYOSYSTEM DESIGN NOTE

E706EN025

TITLE: LN2 Transfer Lines Pressure Test Procedure

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OBJECTIVE: This note contains a procedure for the safe and efficient pneumatic testing of the LN2 transfer lines, for the E706 LAC.

ASSUMPTIONS:

1. All LN2 piping is installed per E706 Flow Sheet (2220.1-ME-183293 latest revision).
2. The maximum allowable working pressure (MAWP) of the LN2 transfer lines is 140 psi. The lines will be tested to $1.25 \times 140 \text{ psi} = 175 \text{ psi}$.
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:

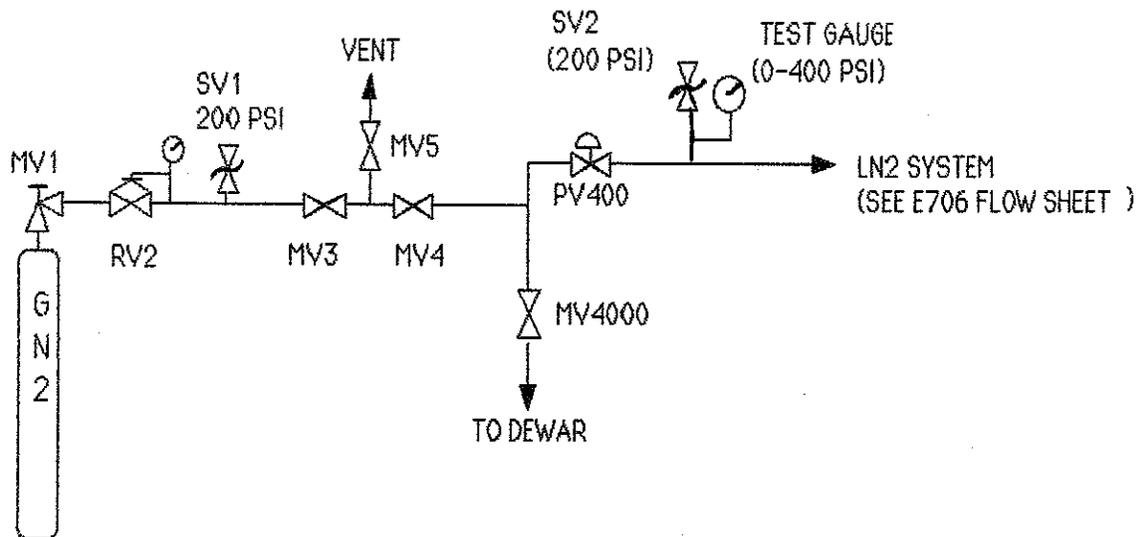
1. Isolate the piping to be tested from the LN2 Storage Dewar, the LAC Recondenser Vessels and the Rahm Cell with the following valve lineup:

<u>CLOSED</u>	<u>OPEN</u>
MV4000 PV103	MV1013 PV104
PV301 PV304	PV400 MV2017
mv1016a,b,c,d,e,f	MV2004 MV2014
mv1033a,b	PV302 PV303
	EV501 MV2015
<u>BLANKED OFF LINES</u>	
LN9294 LN9590	

E706 N2 PIPING PRESSURE TEST (cont.)

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 LN2 system in step 3). Initially all test valves must be closed.

SCHEMATIC FOR PNEUMATIC PRESSURE TEST OF E706 LN2 PIPING



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

SV1014 SV2018 SV2021 SV2016 SV2022 SV2015

Replace and plug SV1015.

Replace SV4001 with a 200 psi relief valve and a 400 psi test gauge (relief valve and test gauge must be recently calibrated).

Replace SV4002 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.

E706 N2 PIPING PRESSURE TEST (cont.)

6. With the pressure regulator (RV2) set for 0 psi, open: MV1, MV3, and MV4. Gradually pressurize the system, by adjusting RV2, to 88 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 about 18 psi increments to the maximum test pressure of 175 psi. Hold for 10 minutes and check for pressure drops at each level.
9. After the system has held 175 psi for 10 minutes, reduce the pressure to the MAWP of 140 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:
SV1014 SV1015 SV2015 SV2016 SV2018
SV2021 SV2022 SV4001 SV4002


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