



2500 gallon liquid nitrogen dewar outside PAB. Provides LN2 to condense argon boil off vapor which allows argon cryostats to remain closed systems. LN2 boiling point is 77 Kelvin while LAr boiling point is 87 Kelvin. Vessel maximum allowable working pressure is 75 psig

Electronic differential pressure transmitter which indicates liquid level in LN2 dewar which computer records.

Electronic transmitter to record LN2 dewar pressure.

Vaporizer for nitrogen gas use inside PAB

Small dewar liquid fill outside PAB

LN2 transfer line isolation valve for future expansion to 5 meter cryostat.

Liquid nitrogen dewar fill line with over fill shut off valve. Over fill shut off valve dead heads tanker truck pump when LN2 dewar pressure exceeds 87 psig. Tanker trucks can deliver 400 psig.

Vacuum insulated LN2 transfer line from LN2 dewar to test cryostat condensers.

Vent valve and temperature sensor for LN2 line cool down.

High purity pneumatic isolation valve on sample line to O2 analyzer. 5 micro inch surface finish with fully swept flow passages.

Cryostat liquid drain line with high purity isolation valve and connection to vaporizer. Liquid will be pushed out by vapor pressure in cryostat generated by heater. Cryostat relief will be at 35 psig, so 25 psig is easily available to drain liquid argon.

Vacuum transmitter and isolation valves for cryostat double seal integrity monitoring.

120 VAC solenoid valve for maintaining LN2 level in condenser

High purity absolute pressure transmitter and gauge. Cryostat pressure is controlled based on this value.

Condenser with level and pressure instrumentation. Estimated capacity is 1300 Watts at an argon pressure of 15 psig. This will condense 20.7 liters of Argon per hour. Currently control scheme is on/off. If this is not satisfactory, a constant flow control valve will be added. Condenser can drive argon cryostat sub-atmospheric.

New Varian ConvecTorr and UHV Bayard-Alpert vacuum instrumentation with metal seal connections for full range vacuum readout.

High purity level probe with +/- 0.75% of span error

Insulating vacuum transmitter and positive pressure relief

Regeneration isolation valves.

High purity vacuum insulated manual valve for cryostat isolation.

24 VDC solenoid valve to actuate pneumatic valve with nitrogen gas.

Check valve to prevent backflow into cryostat if argon space is under vacuum.

Three stockroom argon dewars for filling cryostats. Provision will be made to analyze deuterium gas for O2 level before filling takes place.

Temperature sensors and heater for liquid movement. 100 W heater can move 1 liter of liquid every 20 seconds by replacing it with 1 liter of cold vapor (120 liters in 40 minutes)

120 liter liquid argon cryostat

Filter with 1.72 liter volume filled with Trigon. Two heaters with RTD temperature sensors for filter regeneration. A gas sampling line may be added downstream of the filter

Insulating vacuum transmitter to ensure inner vessel is not damaged by external pressure when evacuated.

Dry roughing pump with isolation valve and vacuum transmitter for pumping down transfer line insulating vacuum and cryostat insulating vacuums if needed.

Dry turbo cart for pumping on argon circuit with isolation valve and full range pressure instrumentation.

Small dry vacuum pump for seal monitoring with isolation valve and vacuum transmitter.

ASME Code pressure relief valve. Should be only oring in high purity system. Back side of o-ring will be purged with Argon gas to prevent permeation.

REV	DESCRIPTION	APPROVED	DATE
1	ISSUED FOR CONSTRUCTION		12-07-2005

SCALE	DRAWING NUMBER	SHEET	REV
AS SHOWN	3942-510-ME-435365	1 OF 1	

DESIGNED BY	CHECKED BY	DATE

FERMI NATIONAL ACCELERATOR LABORATORY UNITED STATES DEPARTMENT OF ENERGY	
FLARE-PP42 GAS SYSTEM	
ARGON PURIFICATION SYSTEM	