

ITEM

Final Test of Complete magnet Assembly per MD-124720.

TEST EQUIPMENT:

Room temperature thermometer accurate to within 1°F. Electrical instruments per electrical portion of Q.C. Traveler. M.S.L.D. calibrated to A.V.S. Std. 2.1. Calibration shall be done once each month, with the aim of establishing the minimum Detectable Signal. M.S.L.D. shall have been "warmed up" per manufacturer's instruction. The M.S.L.D. shall have a Minimum Detectable Leak Rate of 2×10^{-9} Atm. cc/sec. of helium, and shall be equipped with a strip chart recorder per A.V.S. Std. 2.1. A Calibrated Leak. Helium gas, high purity grade or better. Leak Test Vacuum System with provisions for attaching a calibrated leak item at the furthest point from the M.S.L.D. Sealing caps and plugs, non-silicone vacuum grease as required. M.S.L.D. combined with it's roughing pump. Roots blower, LN₂ cold trap combined with it's roughing pump.

TEST OBJECTIVE:

Final physical, electrical and leak test of magnet assembly.

TEST PROCEDURE:

1. Visually inspect magnet assembly for damage and defects and workmanship.
2. Physically inspect magnet assembly for conformance to dimensional and rotational positions specified in Drawing No. MD-124720.
3. Perform Vacuum Leak Test as follows:
 - a. Set-up fixtures to isolate internal cryogen channels 1 phase 2 phase and N₂ to atmosphere for later pressurization. Allow beam tube to remain open both ends to cryostat shell. Evacuate shell.
 - b. Attach M.S.L.D. zero M.S.L.D. output. Open M.S.L.D. and check for low background (<85% on x 1 scale) with roughing pump on leak detector cart valved off.
 - c. If necessary, leak check all fittings.
 - d. If necessary close M.S.L.D. and establish purging flow of dry nitrogen gas at a rate such that thermocouple gage next to LN₂ trap reads ~1000 micron--and reduce M.S.L.D. background reading. Periodically (~2 hours) check M.S.L.D. background readings.

REV.	DESCRIPTION	DRAWN	DATE
		APPD.	DATE
A	Change to eliminate Beam tube from pressure and check under vacuum.	JGM	9-11-80
B	Change to eliminate Beam tube from individual leak check to leak check in combination with cryostat shell.	JGM	10-15-80

UNLESS OTHERWISE SPECIFIED			ORIGINATOR	
FRACTIONS	DECIMALS	ANGLES	DRAWN	J. McBride 12-21-79
1/64	.001	1/2	CHECKED	
1. BREAK ALL SHARP EDGES 1/64 MAX.			APPROVED	
2. DO NOT SCALE DWG.			USED ON	
3. DIMENSIONING IN ACCORD WITH ANSI Y14.5 STD'S.			MATERIAL-	
<input checked="" type="checkbox"/> MAX. ALL MACHINED SURFACES				
 FERMI NATIONAL ACCELERATOR LABORATORY U.S. DEPARTMENT OF ENERGY				
Energy Doubler				
335 Dipole Complete Magnet				
Final Acceptance Test Spec.				
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- e. When M.S.L.D. background reading <85 on x 1 scale, turn on chart recorder. Run for 2 minutes.
 - f. Bag both ends of vacuum system (including welds on both ends). Flood each bag with helium for 2 minutes.
 - g. Record background reading in traveler, then close M.S.L.D. open calibrated leak at the furthest end of the system from the M.S.L.D. Open M.S.L.D. and hold at steady state until output stabilizes. Record leak response in traveler, close calibrated leak and hold at steady state for 2 minutes.
 - h. Flood the 1 phase cryogen channel to 30 PSIG with helium gas. Hold at pressure for two minutes. Release pressure. Wait 2 minutes.
 - i. Flood the 2 phase cryogen channel to 30 PSIG with helium gas. Hold at pressure for two minutes. Release pressure. Wait 2 minutes.
 - j. Flood the N₂ cryogen channel to 30 PSIG with helium gas. Hold at pressure for two minutes. Release pressure. Wait 2 minutes. Turn off chart recorder.
4. Perform the tests per the electrical portion of the Q.C. Traveler.

TEST REPORT:

- 1. Note any visual damage or evidence of poor workmanship on Q.C. Traveler Form.
- 2. Note any deviation in dimensions or position on Q.C. Traveler Form.
- 3. Record the following data in the Q.C. Traveler:
 - a. Part number.
 - b. Date and time.
 - c. Operator's last name.
 - d. Scale units before helium probing.
 - e. Scale units while enclosure is helium flooded.
 - f. The minimum Detectable Signal (M:D.S.) obtained from the latest calibration (Scale Units)
 - g. The background before Test Procedure, Item 3 above. (Scale Units)
 - h. The steady state gauge reading response to the Calibrated Leak. (Scale Units)
 - i. The temperature corrected value of the Calibrated Leak (Std. cc/sec. helium).

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±	±	±	CHECKED		
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3. DIMENSIONING IN ACCORD WITH ANSI Y14.5 STD'S. ✓ MAX. ALL MACHINED SURFACES					
			MATERIAL-		
 FERMI NATIONAL ACCELERATOR LABORATORY U.S. DEPARTMENT OF ENERGY					
Energy Doubler 335 Dipole Complete Magnet Final Acceptance Test Spec.					
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4. Calculate the Minimum Detectable Leak (M.D.L.) using data recorded above and enter in Q.C. Traveler.
5. Attach chart recorder output during test to appropriate sheet in Q.C. Traveler. Add explanatory notes where necessary.

TEST RESULTS:

1. Any evidence of physical damage or poor workmanship will be cause for rejection.
2. Any deviation from print requirements will be cause for rejection.
3. A leak, as evidenced by an increase in the scale reading during test, procedure 3 above, shall be cause for rejection.
4. A calculated minimum Detectable Leak greater than 5×10^{-9} Atm. cc/sec. of helium is unacceptable. Consult with Supervisor if this is the case. Change to another leak detector if necessary.
5. Record the results of the Electrical Tests on the Q.C. Traveler.
6. Any deviation from previous electrical tests results must be cleared in writing by the cognizant Fermilab Q.C. personnel before the magnet can be accepted for use.

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		APPD.	DATE

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FRACTIONS	DECIMALS	ANGLES	DRAWN	J. McBride 12-21-79
±	±	±	CHECKED	
1. BREAK ALL SHARP EDGES 1/64 MAX. 2. DO NOT SCALE DWG. 3. DIMENSIONING IN ACCORD WITH ANSI Y14.5 STD. <input checked="" type="checkbox"/> MAX. ALL MACHINED SURFACES			APPROVED	
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