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SMD
Magnet Division Procedure

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Title: LHC D2 /D3 /D4 Cold Mass Pressure Leak Check Procedure

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REVISION RECORD

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1 Scope:

This procedure describes the method used to Pressure Leak Check LHC D2 /D3 /D4 Cold Mass Assemblies.

2 Applicable Documents:

RHIC-MAG-Q-1000	Control of Measurement Test Equipment
RHIC-MAG-Q-1004	Discrepancy Reporting Procedure
RHIC-CR-E-4703-0041	Leak Check Specification

3 Requirements:

3.1 Material /Equipment

25-1782.02-5 LHC Cold Mass Lifting Beam

3.2 Safety Requirements

3.2.1 Technicians performing Pressure Testing shall be trained and certified in the procedures prescribed by the BNL ES&H Standard 1.4.0 /1.4.1 /5.1.0 for operating pressurized gas systems and in the use of nonflammable cryogens by the Cognizant Engineer or Technical Supervisor.

3.2.2 Examine all pressure test equipment before pressure is applied to ensure it is tightly connected.

3.2.3 Suitable precautions shall be taken during pressure testing to eliminate hazards to personnel in the proximity of the test in the event of a rupture.

3.2.4 Safety glasses must be worn during potential eye damaging operations.

3.2.5 All lifting and handling operations requiring overhead crane operations shall be performed by holders of valid safety awareness certificates. They shall also be trained and certified in the use of the appropriate lifting device by the cognizant engineer or technical supervisor.

3.2.6 All relief devices and gauges used for pressure tests shall meet the requirements of ES&H standard 1.4.1.

3.3 Pressure Test Procedure

3.3.1 Connect the winch chain from the vacuum tank end to the tow rod and pull the trolley frames into the vacuum vessel. Make any lineup adjustment in the "V" rails.

3.3.2 Connect the winch chain from the rail weldment end to the tow rod.

3.3.3 Disconnect the winch chain from the vacuum vessel end. Pull the trolley frames out of the vacuum vessel and center them on the rail weldment.

NOTE

When preparing the Cold Mass for insertion into the vessel, take care not to damage the Power Lead and Instrumentation Wiring that must be rolled back on itself to fit into the can.

3.3.4 Install wire canisters on the lead stubs of the cold mass at the L.E.

3.3.5 Install wire canisters over exiting quad or dipole bus (as applicable).

3.3.6 Roll up the instrumentation wires and carefully push them into the warm head on the instrumentation feed-thru assembly.

3.3.7 Install a blank flange on the IFS warm head.

3.3.8 Position the warm head at the lead end of the cold mass so that it does not protrude above the top of the cold mass and temporarily secure it in place so that it will not move during the pressure/leak test.

3.3.9 Blank off all remaining stubs.

3.3.10 Connect the pressure hose adapter to the conflat flange on the non lead end of the cold mass.

3.3.11 Using the cold mass lifting beam, part number 25-1782.02-5 lift the cold mass with the overhead crane and place it onto the three trolley frames.

3.3.12 Connect the winch chain from the vacuum tank end to the tow rod. Winch the Cold Mass into the vacuum vessel until the ends of the conduit cap weldments are a few inches away from the bolted and sealed end plate of the vacuum vessel. Disconnect the winch chain from the tow rod and pull the chain completely out of the vacuum tank.

3.3.13 Mount the port hole cover with sealing "O" ring onto the end plate.

3.3.14 Lift the loose end plate, part number 25-1762.29 with the crane up to a position a few inches away from its bolted location on the vacuum vessel.

3.3.15 Reach into the vacuum vessel and extract the non connected end of the hose weldment. Connect this end to the sealing adapter on the end plate.

3.3.16 Mount the end plate with its sealing "O" ring onto the end of the vacuum vessel.

3.3.17 Connect the pressure port swage lock fitting to a helium bottle with a flex hose capable of 500 PSI operating pressure through a regulator and gauge.

CAUTION

Move all operating persons away from the end plates of the vacuum tank end plates and the connection to the helium bottle.

3.3.18 Connect the vacuum pump line to the cover and start the mechanical pump. At 60 microns (60×10^{-3} Torr) start the turbo pump and valve it into the test loop. Close valve to the mechanical pump and turn off.

3.3.19 Calibrate the leak detector.

3.3.20 Allow to pump to approximately 10 microns before leak check is started.

NOTE

Pressure tests need to be witnessed by an ES&H Representative

3.3.21 Pressurize the Cold Mass to 350 psig in the vacuum environment with He and monitor the leak detector for a minimum of 10 minutes.

3.3.22 The maximum acceptable leak rate at 350 psig is 5.0×10^{-9} Std. cc He/Sec. This is equivalent to a leak rate of 2×10^{-10} Std. cc He /Sec. at one Atm. differential.

3.3.23 Bleed the He pressure from the Cold Mass into the He return gas system and vent the vacuum system with nitrogen.

3.3.24 Remove the vacuum vessel cover from the vacuum vessel, disconnect the plumbing & tow the Cold Mass out of the vacuum vessel.

3.3.25 After successful completion of testing, sign and date a "PASSED LEAK CHECK" decal and apply to the Cold Mass.

4 Quality Assurance Provisions:

4.1 The Quality Assurance provisions of this procedure require that the technician shall be responsible for performing all assembly operations in compliance with the procedural instructions contained herein and the recording of the results on the production traveler.

4.2 The technician is responsible for notifying the technical supervisor and/or the cognizant engineer of any discrepancies occurring during the performance of this procedure. All discrepancies shall be identified and reported in accordance with RHIC-MAG-Q-1004

4.3 Measuring and test equipment used for this procedure shall contain a valid calibration label in accordance with RHIC-MAG-Q-1000.

5 Preparation for Delivery:

N/A