sPhenix Solenoid Incoming Inspection & Acceptance

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Approved: 04/06/2015

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Serial No	Part No	Part	P/L	ECN	Rev	P/L	ECN	Rev	P/L

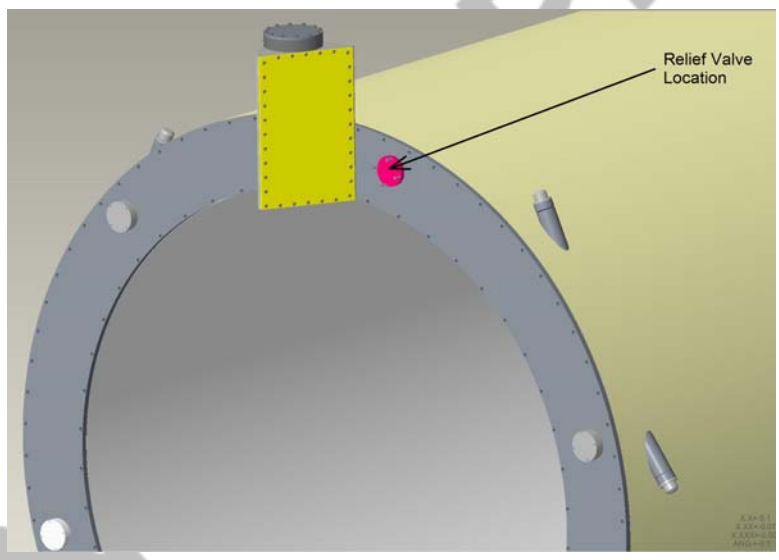
Work Order #: _____ **Deviation & Waiver:** _____

OP	Description	Name/Life #	Date	DR
5	Reference Documents: 25-2043020 Revision A			
10	This traveler covers only the work described herein. Moving, lifting, or reorienting the magnet is not a part of the work described here.			
20	The technicians shall be instructed by their cognizant technical supervisor in the operation of the required electrical test equipment and the electrical testing procedures.			
30	Hipot ("Hypot") and impulse testing pose an electrical hazard. At least two properly trained technicians must be present to perform this testing. When testing, a trained technician shall be stationed at any point where the item under test is accessible to unauthorized people, and barriers shall be set up. Signs shall be posted reading "DANGER HIGH VOLTAGE" and warning lights shall be turned on.			
40	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 SMD-MAG-1003. Measuring and test equipment used for this procedure shall contain a valid calibration label in accordance with the SBMS Subject Area 'Calibration', where applicable.			

OP	Description	Name/Life #	Date	DR
50	Technicians performing Pressure Testing shall be instructed in the procedures prescribed by the SBMS Subject Areas by the Cognizant Engineer or Technical Supervisor: * Compressed Gas Cylinders and Related Systems * Pressure Safety * Cryogenics Safety All relief devices and gauges used for pressure tests shall meet the requirements of the SBMS Subject Area. Examine all pressure test equipment before pressure is applied to ensure it is tightly connected. 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. The area shall be roped off.			
60	All work performed herein shall be done in a manner compliant with the document "Work Plan for S-Phenix Magnet". All work which has not been categorized as 'worker planned work' shall require an approved work permit.			
110	Inspect, tag, and inventory all voltage tap, strain gauge and other instrumentation wires. Record lead ID's on Table 2.			
120	Remove and inspect heat shield shipping restraints. There are 3 restraints at each end of the magnet. Photograph and record damage, if any, on a discrepancy report. Tag and store the shipping restraints for future use.			
130	Perform visual inspection of the magnet. Photograph and record damage, if any, on a discrepancy report.			
140	Set power supply to 25 VDC maximum and apply 1 amp to coil. Measure and record voltage drops and record in Table 1			

OP	Description	Name/Life #	Date	DR
150	Measure overall resistance, coil inductance and quality factor. Perform tests at three frequencies, 20Hz, 60Hz and 1KHz. Record data below: Temp: _____ R: _____ / _____ / _____ L: _____ / _____ / _____ Q:_____ / _____ / _____			
160	Prepare coil for hypot & impulse testing: 1. Verify (3) blank-off flanges at LE & (3) blank-off flanges at NLE are installed ____ 2. Locate magnet lead feedthrough assembly along with O-Ring to the chimney. Attach single magnet lead to feedthrough ____ 3. Dress all other leads and taps /instrumentation into the chimney in preparation for bolting of the feedthrough ____ 4. Bolt the feedthrough in place ____ 5. Install lead box covers _____ 6. Connect mechanical vacuum pump to the feedthrough ____ 7. Start pump. Continue pumping down until an absolute pressure of <50 millitorr is reached in the vacuum space ____			

OP	Description	Name/Life #	Date	DR
170	Perform hypot test of coil - leakage shall be <50uA : CAUTION: BE SURE THE "HYPOT" IS GROUNDED AND GROUND LEADS ARE ATTACHED DURING TESTING. FAILURE TO OBSERVE THIS CONDITION MAY RESULT IN ELECTROCUTION. CAUTION: VACUUM SPACE MUST BE UNDER VACUUM (<50 millitorr ABS) DURING THIS TEST. Perform hypot. Slowly increase voltage to 520V. Record leakage current (<50uA): _____			
180	Perform impulse test of coil at 400V. Record waveform data file. CAUTION: VACUUM SPACE MUST BE UNDER VACUUM (<50 millitorr ABS) DURING THIS TEST.			
190	Cognizant Electrical Engineer to sign-off results "OK to proceed". Cognizant Electrical Engineer: _____			
195	Release vacuum			

OP	Description	Name/Life #	Date	DR
200	Pressure Leak Check: CAUTION: Move all personnel away from the magnet and the connections to the helium bottle. NOTE 1: The magnet has a nitrogen circuit, a helium circuit, and a single vacuum jacket. NOTE 2: Vacuum leak testing shall be performed using a helium mass spectrometer leak detector with a sensitivity> 1x10-9 std. cc. he./sec. NOTE 3: Pressure tests need to be witnessed by an ES&H Representative			
205	Installation of Cryostat Relief Valve: 1) At lead end of cryostat, remove blank-off flange as shown in illustration below and discard hardware. 2) Install Cryostat Relief Valve IAW SMD Drawing 25-2043020  			
210	Connect the nitrogen circuit to a helium bottle with a flex hose capable of 81PSIG through a regulator and gauge.			

OP	Description	Name/Life #	Date	DR
220	Connect the vacuum pump line to the magnet vacuum space and start the mechanical pump. At 60 microns (60 x 10-3 Torr) start the turbo pump and valve it into the test loop. Close valve to the mechanical pump and turn off.			
230	Calibrate the leak detector.			
240	Allow to pump down to approximately 10 microns before leak check is started.			
250	Pressurize the nitrogen circuit with helium gas to 81PSIG as read at the helium bottle regulator. This equates to a 6.6 bar differential between the circuit under test and the vacuum space. This pressure is the equivalent of 1.1 times the operating pressure.			
260	Monitor the leak detector for a minimum of 10 minutes. The maximum acceptable leak rate at test pressure is 1x10-8 std. cc. he./sec. NOTE: The maximum helium leak rate for any part of the solenoid system not enclosed within the vacuum vessel, e.g. instrumentation feed-throughs, shall not exceed 1x10-6 std. cc. he./sec Leak Rate Nitrogen Circuit: _____ Witness - ES&H Rep: _____			
270	Shut down the helium supply. Bleed the helium pressure from the nitrogen circuit using a method compliant with Building 912 requirements.			
280	Move the helium flex line with gauge and regulator to the helium circuit.			

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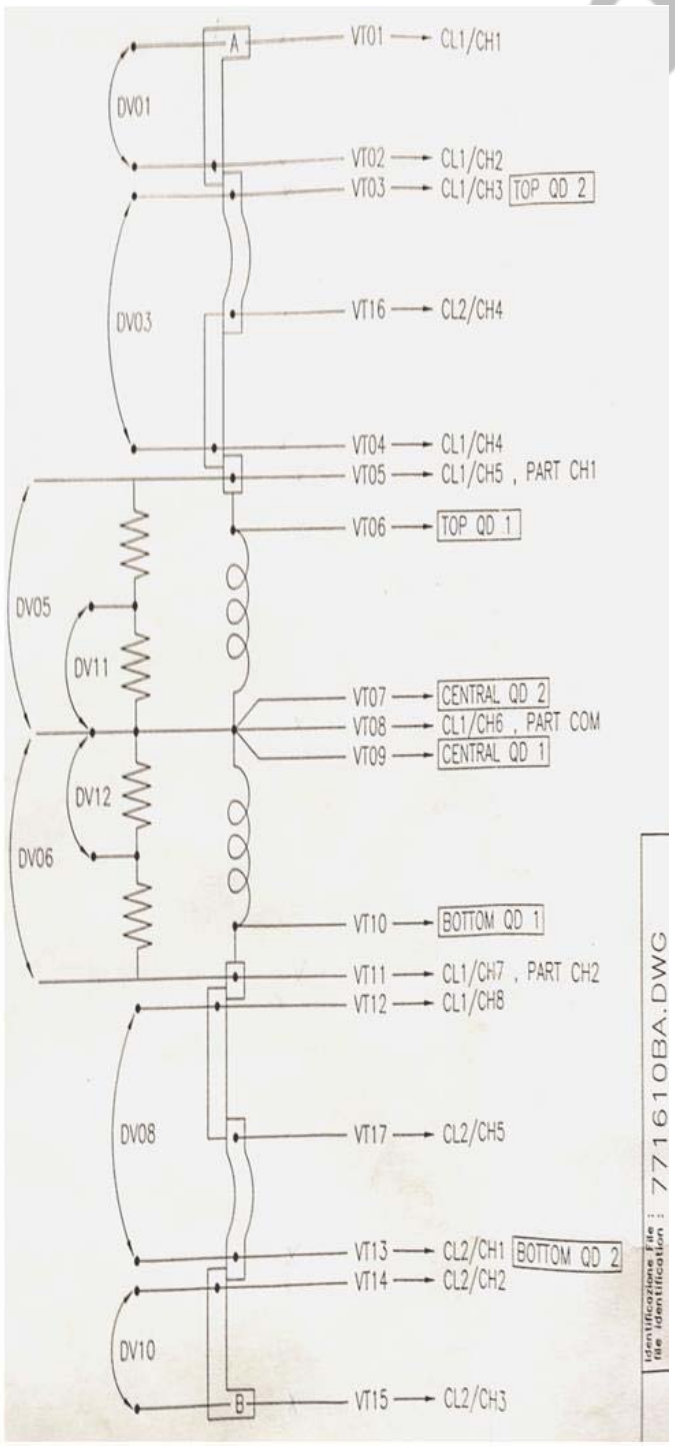
300	Monitor the leak detector for a minimum of 10 minutes. The maximum acceptable leak rate at test pressure is 1x10-8 std. cc. he./sec. NOTE: The maximum helium leak rate for any part of the solenoid system not enclosed within the vacuum vessel, e.g. instrumentation feed-throughs, shall not exceed 1x10-6 std. cc. he./sec Leak Rate Helium Circuit: _____ Witness - ES&H Rep: _____.			
310	Shut down the helium supply. Bleed the helium pressure from the helium circuit using a method compliant with Building 912 requirements.			
310	Verify All Traveler Operations Complete			
991	Revision History: Rev. A: Initial Release 4/3/15			

OP	Description	Name/Life #	Date	DR
1000				

Babar Voltage Drops @ 1amp
Table 1

Tap	Description	Value
VT01		
VT02		
VT03	Top QD 2	
VT16		
VT04		
VT05		
VT06	Top QD 1	
VT07	Central QD 2	
VT08		
VT09	Central QD 1	
VT10	Bottom QD 1	
VT11		
VT12		
VT17		
VT13	Bottom QD 2	
VT14		
VT15		
DV	**Description**	**Value**
DV01		
DV03		
DV05		
DV06		
DV08		
DV10		
DV11		
DV12		



OP	Description	Name/Life #	Date	DR
1010				

Babar Magnet – Instrumentation Lead Inventory - Table 2

Lead ID As rec'd(V)	Description
VT01	
VT02	
VT03	
VT04	
VT05	
VT06	
VT07	
VT08	
VT09	
VT10	
VT11	
VT12	
VT13	
VT14	
VT15	
VT16	
VT17	
Add ID's ↓	
	Continued on next page

See Wiring Diagram for Description of V-Taps

OP	Description	Name/Life #	Date	DR
1020				

Lead ID As rec'd(√)	Description
Add ID's ↓	