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1. Scope:

This MAP describes the procedure used to produce DESY GO Cryostat Assemblies.

2. Applicable Documents:

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

3. Requirements:

All welding must be performed by welders qualified I.A.W. with ASME Section IX.

3.1 Material/Equipment

3.2 Safety Precautions

3.2.1 Operators shall wear safety glasses with side shields, or goggles.

3.2.2 Operators shall be trained by their cognizant technical supervisor and qualified in the operation of the required welding equipment.

3.2.3 No welding shall take place unless all welding screens are in place around the welding station, and all personnel not directly involved with the welding process are outside the screens. Any personnel inside the screens shall wear protective gear to prevent eye injury, and shall be clothed to prevent burns caused by intense ultra-violet light.

3.2.4 All lifting and handling operation requiring overhead crane operations shall be performed by holders of valid Safety Awareness Certificates and trained in the use of the lifting device by the Cognizant Engineer or Technical Supervisor.

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

3.3 Procedure

3.3.1 Cryostat Preparation

3.3.1.1 Starting with 15010008 cryostat machined assembly, disassemble and thoroughly clean cryostat vessel and helium containment vessel.

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- 3.3.1.2 Wrap helium containment vessel with (3) superinsulation blankets 15010285. Tie down blankets with lacing cord on each side of the key blocks. Cut out insulation over key slots (10) places.
- 3.3.1.3 Starting with the lead end of the helium containment vessel, slide it into the non-lead end of the Cryostat Vessel. Use reference marks to ensure proper orientation.
- 3.3.1.4 Hold tubes in place with same fixturing used in machining process.
- 3.3.1.5 Position (6) 15010178 and (4) 15010180 Retaining Keys in their respective positions. Temporarily hold in place with a hose clamp.

**Note**

**Keys may require some minor filing in order to fit tightly into their seats**

- 3.3.2 Coil Installation
  - 3.3.2.1 Insert the non-lead end of the Coil Assembly into the lead end of the Helium Containment Assembly. Install until flange of Coil Assembly is against the Helium Containment Tube.
  - 3.3.2.2 Install Cold Mass & Cryostat Alignment tool on lead end of assembly. Be sure that dowel pins are in their proper holes in both the coil support tube flange and the end flange of the cryostat. This now aligns the cryostat and cold mass circumferentially.
  - 3.3.2.3 Through the four access windows in the alignment tool, tack weld coil end flange to the Helium Containment Vessel.
  - 3.3.2.4 Remove alignment tool.
  - 3.3.2.5 Weld coil assembly to helium containment tube and weld retaining keys in place.
  - 3.3.2.6 Perform leak check on the He containment. Max leak rate  $2 \times 10^{-10}$  Std cc Helium /Sec per CR-E-4703-0041.
- 3.3.3 Beam Tube Installation

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- 3.3.3.1 From the non-lead end of the cold mass assembly, install the beam tube assembly and the 4K supply line through the bore of the cold mass assembly.
- 3.3.3.2 Weld extension tubes with rotatable flange inserts onto the ends of the beam tube cooling pipes and the 4K inlet pipe.
- 3.3.3.3 Weld the 4K supply pipe to the end flange manifold.
- 3.3.3.4 Perform leak check on this weld. Perform leak check on the above welds. Max leak rate  $2 \times 10^{-10}$  Std cc Helium /Sec per CR-E-4703-0041.
- 3.3.4 RF Shield Sub-Assembly Preparation
  - 3.3.4.1 Referring to Cryostat Assembly Drawing 15010005 weld the RF Shield 15010051 to the bellows flange 15010026.
- 3.3.5 Bellows Installation
  - 3.3.5.1 Slide lead end bellows and bellows extension ring onto end of beam tube.
- 3.3.6 End Flange Sub-Assembly
  - 3.3.6.1 Weld bellows sleeve 15010106 to inner flange 15010049.
  - 3.3.6.2 Insert travel limiter screws 15010082 (thread end first) into the large end of travel limiter bearing 15010083
- 3.3.7 Final Assembly
  - 3.3.7.1 Weld the RF shield sub-assembly to the lead end of the beam tube.
  - 3.3.7.2 Tack weld travel limiter bearing/screw assemblies to RF shield sub-assembly.
  - 3.3.7.3 Using V-blocks for fixturing, carefully slide the RF shield fingers into their slot in the end flange sub-assembly.
  - 3.3.7.4 Screw travel limiter screws into end flange.
  - 3.3.7.5 Slide bellows assembly back into position over the RF shield until it is engaged with the end flange and the bellows flange.
  - 3.3.7.6 Weld bellows assembly and extension ring in place.

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3.3.7.7 Inspect welds (to be performed by qualified weld inspector).

3.3.7.8 Wrap any remaining exposed cold mass parts with superinsulation.

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:

5.1 N/A