

8.7.2 AGS Ring and Booster Ring Magnet Heat Run Procedure

1. Purpose

This procedure is to be used for checking that all AGS water-cooled magnet coils, or Booster water-cooled magnet coils, are operating at the correct temperature under full load conditions. This is also used to check that other main ring equipment are not adversely affected by the Main Magnet powering during this test. This procedure may be executed during scheduled machine operations or just prior to the beginning of scheduled operations.

2. Responsibilities

- 2.1 The MCR Coordinator shall verify that personnel entering the AGS ring or Booster ring enclosure shall have a valid, signed, Electrical Work Permit specific to the current task. ([See C-A-OPM-ATT 8.7.2.a.](#))
- 2.2 If a heat run is to be conducted during machine operations, a Radiological Control Technician (RCT) shall conduct a radiation survey of the Ring at the distance of three (3) feet, minimum, from the vacuum chamber or nearby energized equipment, prior to the test team entry. The RCT shall use a standard survey instrument, however, if a Teletector is used it shall not be extended. All abnormal or "hot" spots shall be recorded and conveyed to the test team.

Warning:

No tool or instrument shall break the 3'-0 barrier. Personnel shall not break a 3'-6 barrier.

- 2.3 The RCT shall be accompanied by a person knowledgeable with the hazards who is named in the permit. Prior to starting, the MCR Coordinator shall notify the C-A ESSHQ Associate Chair, the Environment Safety and Health (ESH) Coordinator, or the Head of the C-A Radiation Safety Committee.
- 2.4 The supervisor who signs the permit must verify that training requirements are met according to 3.4 prerequisites and the permit is signed by the Chief Engineer.

3. Prerequisites

- 3.1 All personnel working on any electrical system or equipment in the C-AD shall be familiar with BNL [SBMS Electrical Safety](#), BNL [SBMS Lockout/Tagout \(LO/TO\)](#), [C-A-OPM 1.5, "Electrical Safety Implementation Plan"](#), [C-A-OPM 1.5.3 "Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs"](#), [C-A-OPM 2.36, "Lockout/Tagout for Control of Hazardous Energy"](#). C-AD will provide on-site/work specific training to individuals in the electrical safety aspects of their job functions and assignments.

- 3.2 The AGS magnet power supplies, or Booster magnet power supplies, shall be placed in an energized state by the System Specialist or the MCR Operations Group, and have been so for at least one hour.
- 3.3 The power for all C-A equipment to be tested shall be at their rated or other proper load values. A heat run file, which is stored in the operations computers, shall be the default condition.
- 3.4 The AGS ring or Booster ring shall be placed in a Controlled Access state by the Operations Group.
- 3.5 The Test Team performing the procedure shall have the specific training in this procedure LOTO, Collider Access Training, Electrical Safety, and RW1, as well as meeting the general Department electrical training requirements.

4. Precautions

- 4.1 All personnel shall ensure their own safety by following the standards, safety rules, and the training they receive. In general, all energy sources must be locked out and tagged. Working on or near energized sources, "Working Hot", is not permitted unless a valid Electrical Work Permit has been issued. Personnel shall utilize tools, instruments, equipment (e.g., proper connectors and proper ac line cords), etc., that are safe and proper for the job. If any part of a job appears unsafe to any individual it is their duty to discontinue work and inform the supervisor, manager, ESH Coordinator or the C-A ESSHQ Division Head, of the unsafe condition.
- 4.2 All personnel entering the AGS ring or Booster ring under this procedure shall do so for the sole purpose of its execution, and NO MAINTENANCE shall be performed by the team or others.

Warning

All testing is "non-contact" with the magnet busses, coils, vacuum chamber, and any parts of energized equipment. Temperature readings shall be obtained from the aisle so that personnel are not exposed to any unknown hazards.

- 4.3 Personnel conducting the testing shall enter the AGS ring or Booster ring following the Controlled Access procedures.
- 4.4 The test team shall include one member from the C-A Power Room, one from the C-A Pump Room, and the C-A Maintenance Coordinator, or designee. If conducted just after machine beam operation, their entry shall be preceded by the RCT, who shall conduct a ring survey (see 2.2 and 2.3).

- 4.5 One person in the test team shall act as a Safety Watch who shall be equipped with high voltage gloves during the testing.

Warning

Remove all conductive and loose apparel and wear safety glasses before beginning the test.

- 4.6 All personnel entering the AGS ring or Booster ring shall maintain a clearance of at least three and one-half (3-1/2) feet from all equipment at all times during the test.
- 4.7 All personnel shall stay in the main aisle and no one is permitted on the catwalk above or behind the magnets.

5. Procedure

- 5.1 The test team shall have their calibrated, infrared, non-contact temperature meter (ITM) ready, and all other equipment necessary to perform the measurements.
- 5.2 The ITM shall be aimed at the appropriate locations of all magnet coils to be tested by the team.
- 5.3 When testing the main ring dipoles and high field magnets, a complete tour of the entire ring is required.
- 5.4 Any abnormal readings or malfunctioning equipment shall be recorded.
- 5.5 No repairs shall be undertaken until LOTO of the MMPS is performed following proper department procedures.
- 5.6 After repairs are completed, the LOTO shall be removed and the initial heat run conditions re-established to permit measurements to be repeated, if required.
- 5.7 After successful completion of the test, personnel shall exit the ring in accordance with the controlled access procedures.

6. Documentation

- 6.1 [C-A-OPM 15.3.1.4, AGS Heat Run Blank Data Sheets](#)
- 6.2 [C-A-OPM 15.3.2.4, Booster Heat Run Blank Data sheets](#)

7. References

- 7.1 [C-A-OPM 1.5, "Electrical Safety Implementation Plan"](#).
- 7.2 [C-A-OPM 1.5.3 "Procedure to Open or Close Breakers and Switches and Connecting/Disconnecting Plugs"](#).
- 7.3 [C-A-OPM 2.36, "Lockout/Tagout for Control of Hazardous Energy"](#).
- 7.4 [SBMS Electrical Safety](#).
- 7.5 [SBMS Lockout/Tagout \(LOTO\)](#).

8. Attachments

- 8.1 [C-A-OPM-ATT 8.7.2.a, "Electrical Work Permit to Measure the Magnet Temperatures in the AGS Ring and Booster Ring"](#).