Relativistic Heavy Ion Collider
Magnet Division procedure

Proc. No.: RHIC-MAG-R-7261

Issue Date: May 22, 1989

Rev. No.: A

Rev. Date: Jan. 3, 1991

Class: Dipole Electrical Testing
Title: RHIC Dipole Beam Tube Assembly Hypot Testing

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REVISION RECORD

Rev. No.	Date	Page	Subject	Approval
A	1/3/91	Through-out	Revised Procedure to Utilize Foil Wrapped tube to Hypot	On File

1. Scope:

This test provides a check of the insulation integrity between the beam tube and the electrical components in a dipole magnet which in operation may have a large voltage difference between the components. It is standard practice at BNL, prior to making a hypot check, to check that the electrical resistance between components being tested has a minimum value of 10 megohms. This check is included as a separate test in each of the process procedures and is not described in this document. This procedure describes in detail the operation of the hypot test equipment at BNL. Vendors may suggest use of alternate equipment. However, vendor selected test methods shall be submitted to BNL for written approval prior to use.

2. Applicable Documents:

Data Sheet - RHIC Dipole Beam Tube Assembly Hypot Testing.

3. Requirements:

3.1 Required Equipment:

3.1.1 DC Hypot Equipment: Model No. 5205 - Associated Research Inc., or equivalent.

3.1.2 Centigrade thermometer with accuracy $\pm$ 1^{o}C.

3.2 Safety Precaution:

IMPORTANT - When testing, a man must be stationed at any point where the item under test is accessible to unauthorized people, and barriers must be set up. Signs must be posted that read "DANGER HIGH VOLTAGE". At least two men must be in the test area when testing. Care must be excercised by the test technicians during application of high voltage.

3.3 Procedure:

3.3.1 Wrap the entire outer insulated surface of the beam tube with aluminum foil. Use care at the ends not allow the foil to touch any electrically conductive surfaces.

3.3.2 Make sure the power ON-OFF switch on the hypot equipment is in the OFF position, that the high voltage ON-OFF switch is in the OFF position, and that the voltage control is turned fully counter-clockwise to the zero voltage position.

3.3.3 Connect a grounding cable from the safety ground stud of the "Hypot" to a good electrical ground, and make sure the connection is secure at both ends. It is essential that this connection be made. At no time should the "Hypot" be operated without it.

3.3.4 Connect the return line from the beam tube to the Metered Return binding post of the "Hypot" and be sure the grounding switch on the "Hypot" panel is in the Metered Return position.

3.3.5 Connect the High Voltage lead of the "Hypot" to the aluminum foil surrounding the bema tube.

3.3.6 Turn the Microampere Range Switch to the highest range (2000 μa). (Note: The Microampere Range may be changed while the test is in progress.) Put the Kilovolt Range switch to Low.

3.3.7 Put the power ON-OFF switch to the ON position and put the HIGH VOLTAGE ON-OFF switch to the ON position.

3.3.8 Rotate the voltage control clockwise until 5000V is indicated on the Kilovoltmeter or until "arcing" takes place, in which case the voltage control should be rotated counter-clockwise until arcing just stops. (Note: Arcing must be kept to a minimum and must not be allowed to occur more than a few times.) The desired voltage, or test voltage, must remain for 60 seconds prior to reading leakage current. If other than the desired voltage is used for the test, as above, it must be recorded with the reason why under "Comments" on the data sheet.

3.3.9 Read and record the leakage current indicated on the Microammeter. If greater sensitivity is desired for the Microammeter, select a lower range with the Microamperes Selector Switch.

3.3.10 After the test is completed, rotate the Voltage control fully counter-clockwise, put the HIGH VOLTAGE OFF-ON switch the OFF position and put the power ON-OFF switch in the OFF position.

3.3.11 With the "Hypot" still connected to the electrical ground, connect a grounding cable from the "Hypot" safety ground stud to the "Hypot" High Voltage Lead (the clip end,still connected to the test item) for 60 seconds to discharge any stored charge.

3.3.12 Disconnect all "Hypot" leads from the test item.

3.3.13 Record room temperature on the data sheet, page 3 of this procedure and complete the data sheet.

4. Quality Assurance Provisions:

4.1 The Quality Assurance Provisions of this procedure requires compliance with the procedural instructions contained herein and the recording of test results on the attached data sheet.

5. Preparation for Delivery:

N/A

DATA SHEET

RHIC Dipole Beam Tube Assembly Hypot Testing

Hypot Test # _____ Beam Tube No. _____.

Room Temperature _____ ^{o}C

Required Hypot Test Voltage _____ volts

Did it reach the test voltage: _____ yes _____ no

If yes, give leakage current _____ amps

If no, give breakdown voltage _____ volts

If no, give leakage current _____ amps

Above work done By:

Comments: _____

_____

Name & Life No., Date

_____

List of Equipment Used for Measurements

Nomenclature	Manufacturer	Model	Serial No.	BNL Bar Code
Remarks:				