



*Superconducting Magnet Division*

*Magnet Note*

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**Topic:** GSI  
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## Hypot testing of GSI collared coil section

Coil fabrication plans for GSI call for there to be gaps in the cable insulation in order to provide additional means for coolant to reach the cable strands. One of the means of accomplishing this is to have holes cut into the insulation on the minor edge of the cable using a laser. A test has been conducted to see how these gaps will affect the electrical integrity of the insulation.

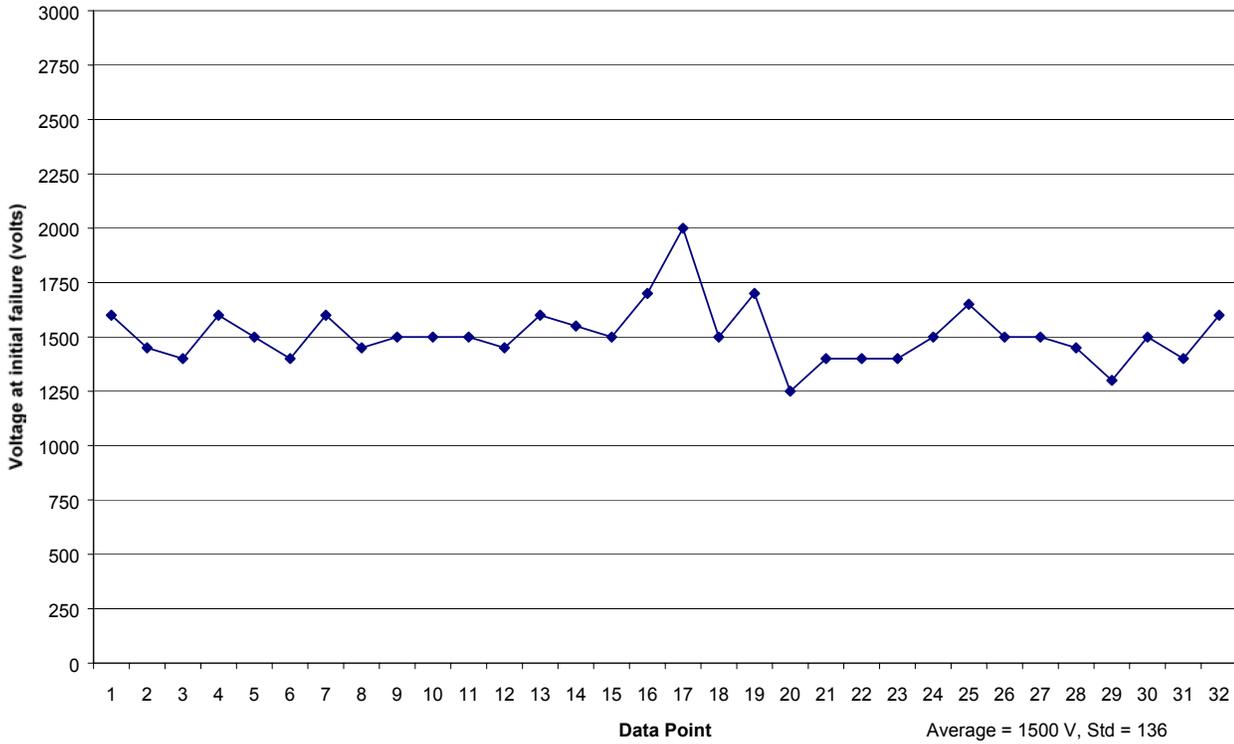
At JENA in Germany they have developed a machine for laser cutting holes in insulated cable. The insulation on a spool of RHIC cable was laser slit by JENA. The gaps are approximately .080" long by .030" wide, spaced .135" on center. A one meter long 8cm dipole coil was fabricated using this cable. The coil was cut in half, the two halves were mated, insulated and a 1 foot section of the straight section was collared in typical fashion. (Ref BNL drawing RD19010125). The individual coil turns at the cut end were separated, wired and insulated so that Hypot testing could be done between adjacent turns.

For the initial test, 500 volts was applied to every other turn, with the remaining turns grounded. There were no shorts between turns.

Next each individual coil turn was tested to the adjacent turns by increasing the Hypot voltage until a short was detected. The average value for initial failure was 1500V, see chart and table below.

Collars were then added to the coil end and the testing between individual turns was repeated. No shorts were detected in the coil ends. Failures in the straight section were at voltages similar to those recorded in the first round of testing.

**GSI Collared Coil Hypot Testing**  
Breakdown of individual turn to adjacent turns



Raw Data

NL Coil Half				LE Coil Half			
Powered Turn	Adjacent Turns		Failure Voltage	Powered Turn	Adjacent Turns		Failure Voltage
	A	B			A	B	
2	1	3	1600	1	-	2	2000
4	3	Wedge	1450	3	2	4	1500
6	5	7	1400	5	Wedge	6	1700
8	7	9	1600	7	6	8	1250
10	9	11	1500	9	8	10	1400
12	11	Wedge	1400	11	10	12	1400
14	13	15	1600	13	Wedge	14	1400
16	15	17	1450	15	14	16	1500
18	17	19	1500	17	16	18	1650
20	19	21	1500	19	18	20	1500
22	21	23	1500	21	20	22	1500
24	Wedge	25	1450	23	22	Wedge	1450
26	25	27	1600	25	24	26	1300
28	27	29	1550	27	26	28	1500
30	29	31	1500	29	28	30	1400
32	31	-	1700	31	30	32	1600