

ASG SUPERCONDUCTORS

MEETING INFN/CERN JULY, 31ST 2024

PROJECT: D2

VS-06 APERTURE COLLARING FAILURES ROOT CAUSE

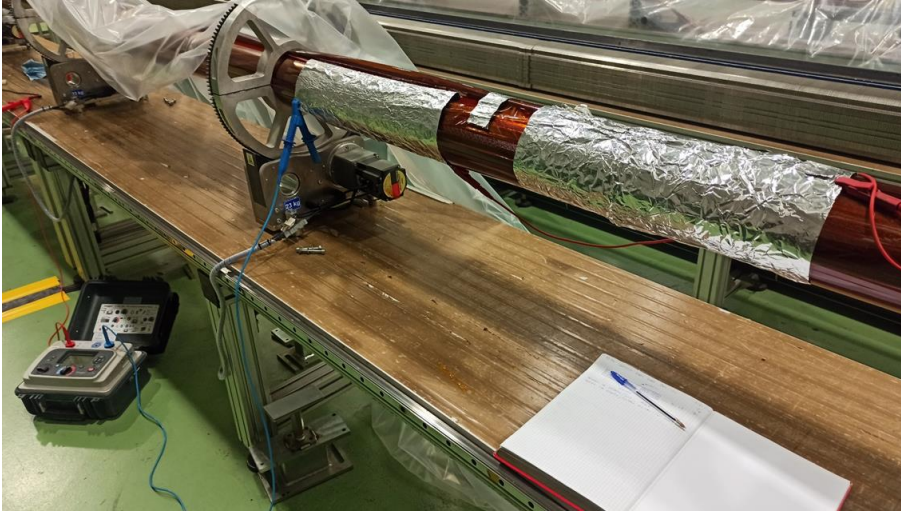
Date	Short Circuit between:	Localization from LC side end	Evidence	Cause	ASG RNC Nr.
10/04/2024	Coil AS-07 - QH dx	4000 mm	Punching/Burning	Foreign Debris	RNC240411A
12/04/2024	Coil BS-08 - Ground	500 mm	Ground Insulation damaging	PTFE Coated Sheets overlapped cut the ground insulation	RNC240422A
28/05/2024	Coil BS-08 - QH sx	4500 mm	Punching/Burning	Foreign Debris	RNC240529A
01/07/2024	Wedge - QH sx (*)	6400 mm	LF insulation breakage	See detail here below	RNC240705A

First Attempt > Foreign Debris > Workshop Cleaning Increase

Second Attempt > the Coil Protection Foils edge cut the ground insulation

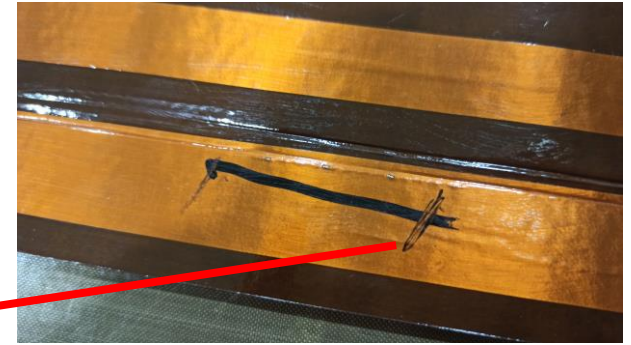
Third Attempt > Foreign Debris > Further Workshop Cleaning Increase > INFN Visit the premises for control > It was judged as OK by them

Fourth Attempt > (*) At first sight the short circuit has been localized in between the coil BS-08 and the QH left side but a capacity test performed in order to check if the insulation of the cable showed that the cable itself was not damaged.
 After further investigation it has been discovered that the origin was due to the coil protection foils that as they did not slide perfectly have damaged the Quench Heater by cutting its insulation in some locations.



Capacitance measurement carried out in between the Coil BS-08 and the adjcent wedge (2600 mm long) **5 nF** (vs calculation of 5,9 nF).





Circled in red are shown some location of defects detected onto the Quench Heater HCMBRDC006-CR000010 Insulation.

It happened as the adjacent coil protection foil edges damaged it.

About the location (at about 1640 mm from the LC side end) showed that the cross section into where the defect is mainly located is one used for carrying out the measurements of the elastic modulus.

As reference the SHIMMING PLAN #3 (as example), the ground insulation layout modification would consist into:

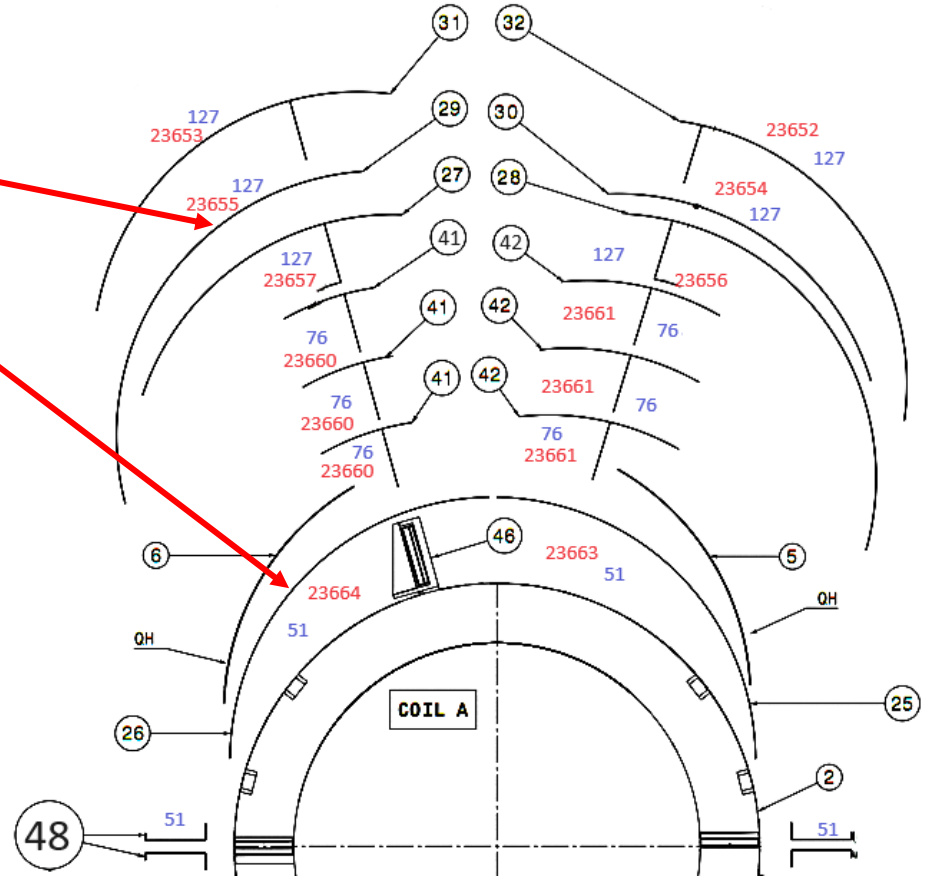
- Substitution of the details Pos.29 and 30 having at present **127 micron** of thickness with thinner ones having the thickness of **50 micron**.
- Substitution of the details Pos. 25 and 26 having at present **51 micron** of thickness with thicker ones having the thickness of **76 micron**.

Having this in mind the overall thickness saving would consist into 51 micron.

The overall reduction of the ground insulation thickness is about 50 micron.

To be taken into account that the repair procedure involves the use of adhesive kapton.

This can be applied locally or for the whole length of the coil in order to conform the thickness.



What is needed for the VS-06 Aperture revamping

- 1 – Authorization from INFN to proceed in this way having they proposed three solutions and the one shown before is the one the ASG would prefer to apply

Materials & Components

- 1 – New Quench Heater
- 2 – Adhesive kapton tape of 25 micron of thickness to be applied onto all the coil length in correspondence of the coil wedge (width 10-15 mm, length 8000 mm)
- 3 – Ground insulation foils (Ref. ASG drawings 23663-23664-23675-23676) to be realized with kapton film of thickness 76 microns instead of the ones having thickness 51 microns.
- 4 – Ground insulation foils (Ref. ASG drawings 23655-23654-23670-23671) to be realized with kapton film of thickness 51 microns instead of the ones having thickness 127 microns.