



4X-980424-CLN-01

TO: DISTRIBUTION
FROM: C NEUMEYER
SUBJECT: RESOLUTION OF PROBLEMS WITH FIRST ARTICLE
ROGOWSKI AT AIREX

A meeting was held to discuss plans and action items with respect to the DC breakdown which occurred on 4/23 during the 5kV test of the first article Rogowski coil. As of the meeting, while all three articles have been wound, only the first has been taped and tested.

In attendance were:

J Chrzanowski R Kaita T Meighan C Neumeyer M Ono

The following plan was agreed to:

1) Clarify details of breakdown at Airex

(ACTION: J. Chrzanowski call Airex)

- location w.r.t. transition from end to central section
- location w.r.t. flat vs. edge
- type of tester (DC hipot?)
- is wire irreversibly damaged?

2) Pending confirmation via further investigation/test (item 3) following), change design from Teflon to Kapton in central section

(ACTION : C Neumeyer to draft letter, B Mc Cormack to follow up with drawing change and NSTX Change Request)

- Dielectric strength of Kapton is superior
- Flexibility is less, but this is not important in central section

3) Confirm dielectric strength of new design

(ACTION: T Meighan)

- obtain data on 0.002" Teflon and Kapton, determine predicted dielectric strength of 1/2 lapped layer
- perform breakdown test on 1/2 lapped Teflon on sample
- perform breakdown test on 1/2 lapped Kapton on sample
- perform breakdown test on sample of Microtherm (the μ therm electrical insulation value is redundant with that over the Rogowski)

Note: Pending outcome of these results, we may reconsider the design (2) above), and may decide that the initial failure was a fluke, or that we need additional thickness of insulation in the center section and/or the ends.

4) Develop rework procedure

(ACTION: C Neumeyer letter, B McCormack follow up)

- remove 1/2 lapped Teflon over central section
- clean carbonized area using alcohol
- inspect wire for damage; contact PPPL if wire appears damaged
- coat with epoxy

(ACTION: J Chrzanowski to recommend specific epoxy)

- repeat electrical test between coil and return conductor
- ship to PPPL w/o insulation on central section, but with suitable protection against mechanical damage to winding during shipment
- clearly mark first article so that it can be identified by PPPL

5) Procedure for other two articles

(ACTION: C Neumeyer letter)

- apply Teflon insulation per existing specification and drawing but over the 1/3 wrap end sections only, applying the tape from the ends toward the center, with a 6" overlap into the 8' central section.
- perform all tests as called out in the specification except omit 5kV test of outer insulation (sec. 3)e) of SOW.
- clearly mark second and third articles so that it can be identified by PPPL

It was decided to complete the taping of the central section at PPPL because:

- with Kapton, the central section will not be flexible and not be easily coiled, thereby complicating shipping;
- Airex does not have a Megger. The use of the DC hipot tester is unsatisfactory because of the damage it causes in case of failure;
- contract amendment would be required to redirect Airex (purchase Kapton, obtain Megger, build long shipping container, etc.). Cost and schedule would suffer more so that under the plan proposed above.

cc:

J Chrzanowski
R Kaita
F Malinowski
B McCormack
T Meighan
C Neumeyer
M Ono
M Williams

NSTX File