Contribution ID: **685** Type: **Poster**

Preventive measures to avoid electrical arcing incidences in SST-1 PF current leads

Friday, October 26, 2018 8:30 AM (4 hours)

Steady-State Superconducting Tokamak-1 (SST-1) has 16 Toroidal field (TF) and 9 superconducting poloidal field (PF) coils rated for 10 kA DC. TF coils are connected in series and operated in DC condition, whereas PF coils are operated independently in pulse mode. SST-1 current feeder system (CFS) houses 9 pairs of PF superconducting current leads and 1 pair of TF superconducting current leads. The SST-1 CFS had observed arcing incidences during OT discharge in past SST-1 campaigns. Similar arcing incidences have also been observed in other tokamaks devices also like KSTAR, W7X, and EAST. The conditions which led to the electrical arcing in SST-1 CFS, thereby resulting in severe damages to PF current leads and helium Hydraulic lines will be presented in this paper. As an important preventive measure to avoid such arcing at PF current leads during SST-1 operation, insulation strengthening processes of the PF current leads have been initiated to increase the voltage withstand capability of the PF current leads. In the view of same, development of an insulation scheme using combination of polyimide and GFRP along with DGEBA epoxy resin and its validation at lab scale has been carried out. It involves study of chemical kinetics of resin towards curing cycle, electrical and mechanical characterizations of insulation samples at room temperature as well as at LN2 temperature. A breakdown voltage of > 25 kV DC has been successfully achieved with ~1.2 mm of insulation thickness at lab scale insulation samples. In order to validate the proposed insulation system under specified Helium Paschen conditions, a lab scale setup considering SST-1 operational requirements has been developed. The operation, salient features of test setup and results will also be presented in this paper. The progressive development of insulation system and validation from prototype scale to half -dummy current lead scale and thereafter implementation on actual PF current leads will also be presented in this paper.

Country or International Organization

India

Paper Number

FIP/P7-26

Primary author: Ms ROY, Swati (Institute for Plasma Research, Gandhinagar)

Co-authors: Mr KUMAR, Nitish (Institute for Plasma research); Mr GHATE, Mahesh (Institute For Plasma Research); Mr KANABAR, Deven (Institute for Plasma Research); Mr PRASAD, Upendra (Institute for Plasma Research); Mr SRINIVASAN, R (Institute for Plasma Research)

Presenter: Ms ROY, Swati (Institute for Plasma Research, Gandhinagar)

Session Classification: P7 Posters

Track Classification: FIP - Fusion Engineering, Integration and Power Plant Design