Verification Testing for a 1 MVA 3-Phase Demonstration Transformer Using 2G-HTS Roebel Cable

Neil. D. Glasson, Mike. P. Staines, Zhenan Jiang, and Nathan. S. Allpress

Abstract - We present results from testing to verify performance of major sub-system components for a 1 MVA 3-phase transformer demonstration project. The transformer utilizes a 15 strand Roebel cable for the low voltage windings and 4mm wide superconductor for the high voltage windings. Both windings use YBCO conductor. The winding assemblies are housed in three individual vacuum insulated glass-fiber composite cryostats and are cooled by circulated liquid nitrogen, sub-cooled to a target operating temperature of 70K. Results from thermal insulation performance tests on a sample composite cryostat are presented. AC loss test results of a low voltage winding assembly are also presented. The Roebel cable is proven to exhibit low AC loss operation at high current. We conclude that AC loss is not a fundamental obstacle to HTS transformer commercialization.

Keywords - Cables, Cryogenics, Superconducting Transformers.

IEEE/CSC & ESAS European Superconductivity News Forum (ESNF) No. 22 October/November 2012. ESNF Reference No.ST313 Category 6.
The published version of this preprint appeared in *IEEE Transactions on Applied Superconductivity* 23, 5500206 (June 2013).