Design and Fabrication of 1 MVA Single Phase HTS Transformer for Power Distribution with Natural Convection Cooling System

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The design and fabrication of 1 MVA single phase HTS transformer is presented in this paper. The rated voltages are 22.9 kV for primary and 6.6 kV for secondary and the rated currents are 44 A and 152 A respectively. The transformer has HTS double pancake type windings. This type of windings have many advantages such as easy of fabrication and maintenance, good distribution of surge voltage and insulation of windings. Single HTS wire was used for primary and four HTS parallel wires were used for secondary. These windings are arranged reciprocally with the shell type iron core. An FRP cryostat with room temperature bore was fabricated to isolate the iron core from the coolant. The windings will be cooled down to 65K with sub-cooled liquid nitrogen using a GM cryocooler. The sub-cooled liquid nitrogen has advantages of good insulation because of no bobbles as well as increased current capacity of HTS wire. A natural convection cooling system with a GM-cryocooler and copper cooling channels will be installed at the top plate of the FRP cryostat. A test for characteristics of this transformer will be performed in near future.

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