

Designing a Cooling System for an HTS Superconducting Magnetic Energy Storage Using Solid Nitrogen

K. L. Kim ^{a,*}, J. B. Song ^a, J. H. Kim ^a, D. Y. Koh ^b, H. M. Kim ^c, K. C. Seong ^c, H. G. Lee ^a

^a *Department of Materials Science and Engineering, Korea University, Seoul, Korea*

^b *Korea Institute of Machinery & Materials, Daejeon, Korea*

^c *Korea Electrotechnology Research Institute, Changwon, Kyungnam, Korea*

In order to cool the HTS SMES coil to the operating temperature, a cryocooler for conduction cooling is generally used. However, conduction cooling often consumes a large amount of electric power because of its continuous cryocooler operation. This can also lead to poor thermal stability and protection problems of the system. Solid nitrogen (SN₂), which has a large heat capacity, can counter those disadvantages in the conduction cooling system. In particular, a large amount of enthalpy with a minimal weight to the cold body of SN₂ makes a compact and portable system by increase a recooling to recooling time period (RRTP) value. A conceptual design of the proto-type SN₂ cooling system for a portable HTS superconducting magnetic energy storage (SMES) will be introduced in this presentation.

Keywords : HTS SMES, Solid nitrogen (SN₂), Conduction cooling, SN₂ cooling system

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