

In-cryostat Helium Line Installation and Test for KSTAR Superconducting Coil

E. N. Bang, H. T. Park, Y. M. Park, C. H. Choi, J. S. Bak

National Fusion Research Center

In-cryostat helium line cool down the KSTAR cold components for normal operation of superconducting magnet system. The cryogenic systems supply three kinds of cryogen to the cold components of the KSTAR which are supercritical helium for the SC coils, magnet structures and SC bus-line, liquid helium for the current lead system, and gas helium for the thermal shields. So we need the cryogenic systems, outer transfer line, in-cryostat helium line, current feeder system, electrical break to isolate between the in-cryostat helium line and component. In-cryostat helium line must be helium leak tightness during long time operation, isolate from SC coil and survive 20 bar high pressure. We wrapped the helium line with multi-layer insulator(MLI) to reduce radiation heat and insulate the surface of the high potential part with G10 prepreg tape. The electrical break made of metal and ceramic brazing which have to survive preview requirements. So we experimented all the electrical breaks at LN₂ thermal cycle test and hydraulic test at high pressure. Additionally we isolate surface of the electrical break to structural safety.

We installed all the SC magnet and most of the in-cryostat helium line. And the final inspection test is progressing.

[Reference]

1. Eun Nam Bang, "Electrical Breaks for KSTAR In-Cryostat Helium Line" JKPS, Vol 49, S232~S235, (2006).
2. Eun Nam Bang, "Cryogenic Helium Line Routing for In-cryostat Components of the KSTAR", 2006 Korean Nuclear Society (2006).