

Calculation of dc Resistance of Strand-to-strand Joints for KSTAR

Ho-Jin Lee, Hyun-Il Nam*, Ki-Baik Kim, Gye-Won Hong

Korea Atomic Energy Research Institute, Taejeon, Korea

** Chungbuk National University, Cheongju, Korea*

Since the strand-to-strand type joint has low DC resistance and small size, it is expected to be useful type for a superconducting magnet system which has compact structure like the KSTAR (Korea Superconducting Tokamak Advanced Research) coils. The DC resistance is changed according to the distribution patterns of strands of cables connected together in the joint. The commercial code was used to calculate the DC resistance of the strand-to-strand joint with changing the several parameters expected to have effects on DC resistance. With decrease of outer diameter of the joint, which means the increase of strand volume fraction in the joint, the calculated DC resistance decreased rapidly and non-linearly. The variation of resistance was mainly governed by the volume fraction of solder which has higher resistivity than copper. The resistance decreased inversely with increase of the length of the joint. The resistance increased with increase of number of triplets in each stack contacted with that of another terminal cable. In case of the strand-to-strand joint that had 62mm of outer diameter, 52mm of inner diameter, 100mm of overlapped length, and four triplets in each stack, the calculated DC resistance was blow 1 n-Ohm.

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