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Joints for cable-in-conduit conductors

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A review of the joints for the ITER CS CICC is given. More detailed discussion of the design and performance of the ITER CS joints is presented including successes and the revealed problems. ITER CS has three types of joints: 1) sintered joints to connect conductor lengths in the CS module; 2) coaxial joints to connect the CS module terminations to the superconducting buses; 3) twin box joints, which are bi-metal copper -stainless steel boxes containing the compacted cables that connect the buses to the ITER feeders. All the ITER CS joints have different requirements for space allocation and ability to be assembled/disassembled. Thus, different designs of the joints are used. The CS joints went through the R&D and qualification effort, but recent verification results showed a necessity of making the design more robust by revisiting some issues that seemed to be established to satisfaction in the qualification phase. We discuss requirements for the strands treatment, quality of interfaces, heat treatment conditions and other technological issues. We also discuss the effect of oxidation of the cable to copper surface interface, effect of the joint compaction, Cr removal and soldering parameters on performance of the joint. Recent results of the ITER CS joints performance and autopsy studies are presented.

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