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TENSILE AND FATIGUE QUALIFICATION TESTING of ITER-CS CONDUIT ALLOY JK2LB

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The ITER Central Solenoid (CS) coils utilize cable-in-conduit conductor (CICC) and the conduit alloy is JK2LB. The production grade conduit alloy (and its welds) must meet strict requirements for strength, toughness, fatigue crack resistance, and fabricability. The conduit alloy must retain good mechanical properties after additional fabrication steps such as welding, coil winding strain and exposure to the Nb₃Sn superconductor's reaction heat treatment. Here we present data from cryogenic tensile, fracture toughness, fatigue crack growth rate, and axial fatigue tests of JK2LB alloy and conduit butt welds, before and after the exposure to the reaction heat treatment. The tests of specimens removed directly from the conduit provide confirmation of the materials properties and its resistance to the effect of the cold work and aging. The 4 K fatigue performance is extremely important to the reliability of the CS is covered both by axial cyclic fatigue tests and the fatigue crack growth rate measurements.

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