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Evaluation of accuracy about prediction method of cryogenic tensile strength for austenitic stainless steels in ITER Toroidal Field Coil Structure procurement activity

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Japan Atomic Energy Agency (JAEA) has developed a tensile strength prediction method at liquid helium temperature (4K) using the quadratic curve as a function of the content of carbon and nitrogen in order to establish the rationalized quality control of the austenitic stainless steel used in the ITER superconducting coil operating at 4K. ITER is under construction aiming to verify technical demonstration of a nuclear fusion generation. For the Toroidal Field Coil (TFC), one of the superconducting systems in ITER, procurement of material has been started in 2012. JAEA is producing materials for actual product which are the forged materials with shape of rectangle, round bar, asymmetry and etc. JAEA has responsibility to procure all ITER TFC Structures. In this process, JAEA obtained many tensile strength of both room temperature and 4K about these structural materials, for example, JJ1: High manganese stainless steel for structure (0.03C-12Cr-12Ni-10Mn-5Mo- 0.24N) and 316LN: High nitrogen containing stainless steel (0.2Nitrogen). Based on these data, accuracy of 4K strength prediction method for actual TFC Structure materials was evaluated and reported in this study.

The views and opinions expressed herein do not necessarily reflect those of the ITER Organization

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