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Mechanical properties of dissimilar TIG welding for ARAA and SS316L

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Korea has designed a helium cooled ceramic reflector (HCCR) breeding blanket for developing the Korean DEMO and fusion reactor, including the development of the reduced activation alloy, ARRA (Advanced Reduced Activation Alloy). From the lesson of the developing procedure of the HCCR test blanket module (TBM) for ITER, it is known that the various fabrication methods, such as electron beam welding, TIG welding, and HIP (Hot Isostatic Pressing) bonding, should be developed for the fabrication of some complex structures. In the current research, the developed dissimilar TIG welding using ARAA and SS316L was introduced. The tensile, impact, bend tests were determined after post-weld heat treatment (PWHT) and hardness, microstructure characteristics were determined before and after to evaluate the welded specimen under the determined welding conditions. The average hardness values before were 338 HV in the HAZ and 199 HV in the WM, and after PWHT, the values decreases to 243 HV in the HAZ and 221 HV in the WM. Additional tests are underway for the ductile brittle transition temperatures (DBTT) on the heat affected zone (HAZ) and on the weld metal (WM). Tensile strength has decreased as the increase of temperature. The yield strength (YS) and ultimate tensile strength (UTS) were 286 MPa and 572 MPa, respectively

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