QUALIFICATION OF THE RESIN FOR THE ITER TF COIL INSULATION

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Cyanate ester / epoxy blends with a mixing ratio of 40:60 were supplied by Huntsman, Switzerland, and by CTD, USA, according to the ITER resin specification and subjected to qualification tests for the ITER TF coils. Several sets of test samples were produced under exactly the same conditions. The composites consist of a wrapped R-glass / polyimide reinforcement, which was vacuum pressure impregnated with the CE blends. The mechanical properties of these materials were characterized prior to and after reactor irradiation to a fast neutron fluence of $2x10^{22}$ m⁻² (E>0.1 MeV), i.e. twice the ITER design fluence. Static and dynamic tensile as well as static short beam shear tests were carried out at RT and 77 K. In addition, stress strain relations were recorded to determine the Young's modulus.

The results show that the mechanical properties of both materials are hardly affected by the irradiation at this fluence level. As an example, Figure 1 shows the interlaminar shear strength before and after irradiation. Also the differences in the ILSS between the two resins are negligible. Therefore, both systems are clearly qualified for ITER.



Figure 1: Apparent interlaminar shear strength (ILSS) parallel (0°) and perpendicular (90°) to the reinforcement direction measured at 77 K before and after irradiation to a fast neutron fluence of $2x10^{22}$ m⁻² (E>0.1 MeV).