

12. EVALUATION OF WWER-1000 VESSEL MATERIALS FRACTURE TOUGHNESS

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The lifetime of WWER-1000-type reactor vessels is finally conditioned by the fracture toughness (crack growth resistance) of RPV materials. Up to now in line with the regulations the fracture toughness is characterized by the critical temperature of brittleness determined by the results of the Charpy specimen impact testing. Such approach is typical for all countries operating the water pressure reactors. However, regulatory approach is known from the western specialists not always to characterize adequately the crack growth resistance of the vessel materials and in some cases to underestimate their characteristics in the reference state that leads to unreasonably high conservatism. Excessive conservatism may lead to the invalid restrictions in the operating modes and the service life of the reactor vessel. Therefore there appeared the necessity to apply another approaches based on the state-of-the-art experimental methods of the fracture mechanics and allowing evaluating the fracture toughness parameters sufficiently. The paper presents the results of the comparison of the regulatory approach and the Master curve approach from the point of view of the adequate determination of the vessel material crack growth resistance parameters. Analysis of the experimental data of the surveillance specimens illustrated the potential possibility of applying the new statistical method for the WWER-1000-type reactor vessel lifetime extension.