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Irradiated in the BN-350 Reactor over Wide Ranges of Irradiation Temperature and Dose

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Ferritic/martensitic (F/M) steels appear to be the most promising materials for advanced nuclear systems, especially for fusion reactors. Their main advantages are higher resistance to swelling and lower irradiation creep rate as has been repeatedly demonstrated in examinations of these materials after irradiation. Nevertheless, available experimental data on irradiation resistance of F/M steels are insufficient, with the greatest deficiency of data for high doses and for both low and high irradiation temperatures.

From the very beginning of operation the BN-350 fast reactor has been used for irradiation of specimens of structural materials, including F/M steels. The most unique feature of BN-350 was its low inlet sodium temperature, allowing irradiation at temperatures over a very wide range of temperatures compared with the range in other fast reactors.

In this paper data are presented on swelling and irradiation creep of three Russian F/M steels EP-450, EP-823 and EI-852, irradiated in experimental assemblies of the BN-350 reactor at temperatures in the range of 305-700°C to doses ranging from 20 to 89 dpa. The investigation was performed using gas-pressurized creep tubes with hoop stresses in the range of 0 - 294 MPa.

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