PRESSURE DEPENDENCE OF THE THERMAL CONDUCTIVITY OF STEEL 12Kh18N10T AND STEEL 15Kh2MFA-A MODIFICATION B AT HIGH TEMPERATURES

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A number of works are devoted to the study of the electro- and thermophysical properties of hull and intracorporate steels of power water reactor at high temperatures. However, the experimental data available in the literature on the electro- and thermophysical properties of hull steels appear to be explicit functions of temperature only. Publications devoted to the thermophysical properties of these steels under conditions of high static or dynamic loads, taking into account changes in pressure, and therefore volume, have not been found in the available literature.

In this regard, a semi-empirical approach to the calculation of the electro- and thermophysical properties of the BCC phases of reactor steels has been developed in this work, the volume-temperature dependences of the resistivity, thermal conductivity coefficient have been reconstructed and the baric dependence of the thermal conductivity of the BCC phase of steel 15Kh2MFA-A modification B, as well as austenitic steel 12Kh18N10T in the temperature range 350–700 K and pressures from -2GPa to +2 GPa. The accuracy of the reconstruction of the temperature dependence of the specific electrical conductivity and the coefficient of thermal conductivity of the BCC phases of chromium-molybdenum-vanadium steels at atmospheric pressure in the temperature range 350-700 K is ±5%.

The results obtained are presented in the form of a comparative series of graphs (surfaces) of the volumetric (V)-temperature (T) dependence of the thermal conductivity coefficients k=k(V,T) of iron, chromium-molybdenum-vanadium steel 15Kh2MFA-A modification B and chromium-nickel austenitic steel 12Kh18N10T. The reconstruction of the volume-temperature dependences of the thermal conductivity coefficient of the considered metals was carried out taking into account the developed thermal equations of state of the bcc phases of 15Kh2MFA-A steels of modification B and modification A. The results were obtained under Contract No.1770641334821000138 0/22398/90, as well as on the topic of State Assignment No.AAAA19/119071190040/5.