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Aging of Cast 35Cr-45Ni Heat Resistant Alloys With Different Carbon Content

Reference

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ABSTRACT

The changes in microstructure that took place in two heat-resistant after aging alloys at 750°C for a period of time of up to 1000 h are reported in this work. The alloys selected had a similar composition, with the exception in carbon content that was of 0.15 and 0.50 %. The material was obtained from centrifugal cast pipes and their microstructure was made of an austenitic dendrite matrix with interdendritic primary cabides; light optical and scanning electron microscopy analyses were conducted to identify these carbides as NbC and Cr_7C_3. Selected area analyses were conducted to quantify the primary carbides in the as-cast and aged conditions; these analyses revealed that their amount was unaffected by aging, but depended on the carbon content, with the predominance of NbC in the alloy with lower carbon content, due to the higher affinity of carbon to niobium. Aging affected the NbC particles, as they transformed into silicides, precipitation of secondary $Cr_{23}C_6$ particles took place, while Cr_7C_3 remained unaffected. The changes in microstructure that were observed by microscopy were confirmed by X-ray diffraction. The mechanical properties of the materials changed, as hardness and tensile strength increased, while the ductility in both alloys was reduced.

Keywords

aging, heat resistant alloy, microstructure, precipitation

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