Welding and Material Testing
Sudarea şi Încercarea Materialelor

4/2015
Year XXIV

The Bulletin of the National R&D Institute for Welding and Material Testing – ISIM Timişoara, Romania

ISSN 1453-0392

Investigations of precipitation in two different types of precipitation hardening stainless steels

Investigații ale precipitațiilor din două tipuri diferite de oțeluri inoxidabile durificate prin precipitare

S. Sakhawat[1, a], M. N. Baig[1, b], A.Falahati[2, c], H.P. Degischer[2], M. Dománková[3], A. Mahmood[1]

[1] Pakistan Welding Institute, Islamabad, Pakistan
[2] Vienna University of Technology, Vienna, Austria
[3]Slovak University of Technology, Bratislava, Slovakia

E-mail: [a]shahrozsakhawat@hotmail.com, [b]mnbaig8167@gmail.com, [c]ahmad.falahati@tuwien.ac.at

Abstract

Microstructural evolution during thermal aging treatment has been investigated in two different types of precipitation hardening stainless steels X4CrNiSiTi14-7 and X5CrNiCuNb 16-4. The chemical composition of these alloys controls the formation of inter-metallic precipitates that are precipitated during thermal ageing process. These inter-metallic precipitates contribute towards the final strength of the steel. The size of these precipitates is in the range of nano meters and hence they are difficult to observe.

This paper presents the results of a study carried out for the identification of the nano-sized precipitates that are formed during ageing process. Optical microscopy, X-Ray Diffractometry (XRD) and Transmission Electron Microscopy (TEM) techniques have been used to investigate and identify the precipitates. The TEM investigations have been performed by using thin foils and carbon extraction replica techniques. Various inter-metallic phases are found including G-phase, and carbides.

Keywords: *Precipitation hardening stainless steel, G-phase, Carbide, TEM, XRD*