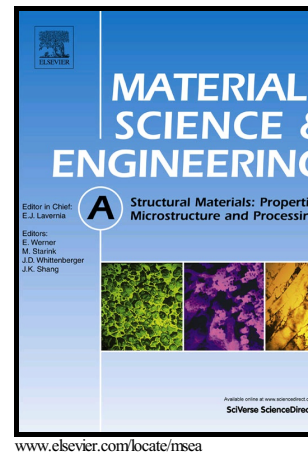


Author's Accepted Manuscript

effect of High temperature ageing on microstructure and mechanical properties of a nickel-free High nitrogen austenitic stainless steel

B. Kartik, R. Veerababu, M. Sundararaman, D.V.V. Satyanarayana



PII: S0921-5093(15)30164-7
DOI: <http://dx.doi.org/10.1016/j.msea.2015.07.011>
Reference: MSA32547

To appear in: *Materials Science & Engineering A*

Received date: 24 February 2015
Revised date: 6 July 2015
Accepted date: 6 July 2015

Cite this article as: B. Kartik, R. Veerababu, M. Sundararaman and D.V.V. Satyanarayana, effect of High temperature ageing on microstructure and mechanical properties of a nickel-free High nitrogen austenitic stainless steel *Materials Science & Engineering A* <http://dx.doi.org/10.1016/j.msea.2015.07.011>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting galley proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Effect of High Temperature Ageing on Microstructure and Mechanical properties of a Nickel-free High Nitrogen Austenitic Stainless SteelB. Kartik¹, R. Veerababu², M. Sundararaman³ and D. V. V. Satyanarayana²¹School of Engineering Sciences and Technology, University of Hyderabad, Hyderabad-500046, India²Defence Metallurgical Research Laboratory, Hyderabad-500058, India³Department of Metallurgical and Materials Engineering, Indian Institute of Technology, Madras-600036, India

Corresponding author E-mail: dvvsn25@gmail.com

Abstract

The effect of ageing and oxidation at 850 °C for different durations viz., 1, 10, 100 and 200 h on microstructure and mechanical properties of a nickel free high nitrogen steel (Fe-Cr-Mn-N) was investigated. The microstructure of the alloy in as-received condition essentially consists of fine equi-axed austenite grains with annealing twins. However, ageing at 850 °C has resulted in the formation of very fine, globular and discrete Cr₂N precipitates initially at grain boundaries for an ageing time of 1 h and subsequently within the grains with increasing ageing time beyond 1 h. The size of these precipitates has progressively increased with further ageing. In addition, coarse intermetallic precipitates of (Fe,Mn)Cr type with body centered tetragonal structure were observed in the samples aged for ≥100 h at 850 °C. The effect of these precipitates on mechanical properties of the alloy was studied. It was noticed that the mechanical properties deteriorated on ageing, which has been attributed to the depletion of solid solution strengthening elements like nitrogen, chromium and manganese from the matrix to form nitrides and intermetallic precipitates. Moreover the alloy aged in air (i.e., oxidised) exhibits marginally inferior tensile properties as compared to unoxidised alloy.

Key words: Ageing, oxidation, Ni-free austenitic stainless steel, chromium nitride

Download English Version:

<https://daneshyari.com/en/article/7977332>

Download Persian Version:

<https://daneshyari.com/article/7977332>

[Daneshyari.com](https://daneshyari.com)