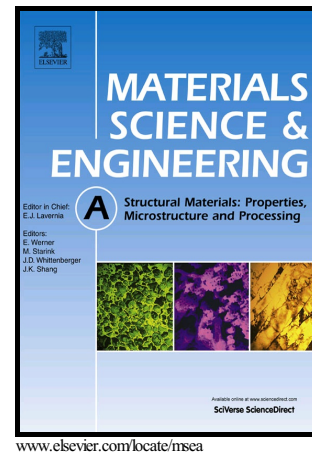


Author's Accepted Manuscript

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PII: S0921-5093(18)30438-6
DOI: <https://doi.org/10.1016/j.msea.2018.03.080>
Reference: MSA36273

To appear in: *Materials Science & Engineering A*

Received date: 4 February 2018
Revised date: 19 March 2018
Accepted date: 20 March 2018

Cite this article as: P. Prakash, J. Vanaja, N. Srinivasan, P. Parameswaran, G.V.S. Nageswara Rao and K. Laha, Effect of Thermo-Mechanical Treatment on Tensile Properties of Reduced Activation Ferritic-Martensitic Steel, *Materials Science & Engineering A*, <https://doi.org/10.1016/j.msea.2018.03.080>

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Effect of Thermo-Mechanical Treatment on Tensile Properties of Reduced Activation Ferritic-Martensitic Steel

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Abstract

Effect of thermo-mechanical processing on tensile behaviour of reduced activation ferritic martensitic (RAFM) steel has been assessed and compared with those of the normalized and tempered steel. The thermo-mechanical treatment (TMT) was carried out by performing hot rolling and ageing in the austenite phase field, air cooled followed by tempering. TMT of the steel increased its hardness compared to the normalized and tempered condition. Tensile strength of the steel increased on TMT over the investigated temperature range of 300-923 K and more importantly was accompanied with increase in ductility. The strength increase on TMT was accomplished with the refinement of microstructure of the steel having finer martensite lath size and intra-granular precipitates. The tensile flow behaviour of steel has been assessed in the frame work of Voce's constitutive equation. The strength related parameters of the constitutive equation i.e. initial stress and saturation stress increased on TMT, while the recovery related parameter (n_v) decreased marginally. The enhancement of tensile strength and ductility of the steel on TMT is considered due to microstructural refinement and its enhanced stability as reflected in appreciable lower relaxation and creep rates and the delayed in onset of tertiary stage of creep deformation.

Keywords: Reduced Activation Ferritic-Martensitic Steel; Thermo-Mechanical Treatment; Microstructural stability; Tensile Properties; Constitutive Equations.

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