JRC Dataset

Small punch tensile/fracture test data for P91 wm material at -158 °C and a displacement rate of .003 mm/s (repeat test)

Description:

The data relate to a thesis concerned with demonstrating the suitability of Small Punch (SP) testing for lifetime prediction of metallic materials operating at high temperatures. The lack of standardisation of this technique and doubts about the correlation of the data with that obtained from conventional creep tests, supports the need to exploit the recently launched Code of Practice for Small Punch Testing (CEN/WS 21). The present work is specifically concerned with investigating the creep behaviour of P91 steel weldments at 600 Celsius along with low-temperature fracture behaviour. Thin discs, 8 mm in diameter and 0.5 mm thick, were manufactured from different zones of a component containing a P91 welded joint: base metal (BM), service- exposed material (SE), weld metal (WM), fine-grain and coarse-grain heat affected zones (FG-HAZ & CG-HAZ). The results of SP creep tests on these disks, performed at 600 Celsius under different loads carefully following the Code of Practice, could be correlated with uniaxial creep data. The SP test is shown to be a reliable method to depict creep behaviour of this alloy and its weldments and a creep model derived, useful for life time prediction, could also be demonstrated through FEA to predict the creep deformation of the SP discs. Additionally, the SP testing method shows potential to evaluate the fracture properties of P91 weldments, in particular the ductile-to-brittle transition temperature and fracture toughness estimations.

Contributors:

- Blagoeva, Darina darina.blagoeva@ec.europa.eu
- Hurst, Roger Christopher None

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Data access

MatDB XML distribution

MatDB XML distribution

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