



Fundamentals of the evaluation and diagnosis of welded structures [

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Monografía

Fundamentals of evaluation and diagnostics of welded structures provides an essential guide to the key principles and problems involved in the analysis of welded structures. Chapter one discusses design issues, key equations and calculations, and the effects of varied heat sources in relation to the temperature field in welding. Chapter two goes on to explore welding stresses and strains. Fracture mechanics and the load-carrying capacity of welded structures are the focus of chapter three. Chapter four considers diagnostics and prediction of the residual life of welded structures, whilst acous

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Contenido: Cover; Fundamentals of evaluation and diagnostics of welded structures; Copyright; Contents; Editor's foreword; Introduction; 1 The temperature field in welding; 1 General; 2 Brief information on the theory of integral transformations; 3 Thermal conductivity equation; 4 Examples of temperature field calculation in welding; 5 Continuous and moving heat sources; 6 Dependence of temperature fields in welding on some of the process features; 2 Welding stresses and strains; 1 Thermophysical and mechanical properties of materials; 2 Welding stresses and strains at concentrated heating 3 Residual stresses in butt welding and patches welding-in4 Integral transformations and numerical methods for solving temperature problems; 5 Welding stresses and strains in a three-axial stress state; 6 Principal estimated dependences used in measurement of thermophysical and mechanical quantities; 7 Measurement of residual stresses and strains; 8 Measurement errors; 3 Load-carrying capacity of welded structures; 1 Peculiarities of calculation of strength of welded joints containing different defects, under different external conditions and using different loading methods 2 Elements of fracture mechanics3 Pre-fracture

state and fracture of welded joints and materials; 4 Elements of quantum fracture mechanics; 5 Bending of round plate with residual stresses; 6 Method of fictitious forces to solve problems of stability of plates containing welds; 7 Variation and energy methods used in problems of stability of plates; 8 Welding strains and distortions; 4 Diagnostics and prediction of the residual life of welded structures; 1 General problems of technical diagnostics; 2 Strength prediction methods; 3 Diagnostics and residual life of structures 4 Estimation of life of structure materials by the acoustic emission method5 Acoustic emission techniques for the analysis of welded structures; 1 The essence of acoustic emission; 2 Theoretical issues of acoustic emission; 3 Acoustic emission equipment; 4 Application of acoustic emission; 6 Supplementary sections: Numerical techniques and tests for welded structures; 1 Method for mathematical processing of test results; 2 Estimation of errors of numerical calculations; 3 Empirical formulas; 4 Mechanical and technological tests of materials; 5 Stressed state of pressure vessels 6 Stress concentrationAppendices: Properties and formulae for the evaluation of welded structures; Appendix 1 Physical and thermophysical properties of materials; Appendix 2 Coefficients of statistical processing of experimental data; Appendix 3 Mathematical dependences for integral transformations; Appendix 4 Technological and mechanical properties of materials*; Appendix 5 On derivation of W_1 in the expression for w ; Appendix 6 Formulas for calculation of stresses through stress functions and Appendix 7 Evaluation of material crack resistance by tensile testing of simple specimens (Rapid method)

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