DIN EN 13445-2:2021-12 (E)

Unfired pressure vessels - Part 2: Materials

Contents

Page

European foreword 4

1 Scope 5

2 Normative references 5

3 Terms, definitions, symbols and units 7
3.1 Terms and définitions 7
3.2 Symbols and units 9

4 Requirements for materials to be used for pressure-bearing parts 11
4.1 General 11
4.2 Special provisions 13
4.2.1 Special properties 13
4.2.2 Design temperature above 20 °C 13
4.2.3 Prevention of brittle fracture 14
4.2.4 Design properties in the creep range 14
4.2.5 Specific requirements for steels for fasteners 14
4.3 Technical delivery conditions 15
4.3.1 European Standards 15
4.3.2 European Approval for Materials 15
4.3.3 Particular material appraisals 15
4.3.4 Clad products 15
4.3.5 Welding consumables 15
4.4 Marking 15

5 Requirements for materials to be used for non-pressure parts 16

(normative) Grouping system for steels for pressure equipment 17

(normative) Requirements for prevention of brittle fracture at low temperatures 19

B.1 General 19
B.2 Material selection and impact energy requirements 20
B.2.1 Introduction 20
B.2.2 Method 1 20
B.2.3 Method 2 30
B.2.4 Method 3 -- Fracture mechanics analysis 42
B.3 General test requirements 43
B.3.1 General 43
B.3.2 Sub-sized specimens 44
B.4 Welds 45
B.4.1 General 45
B.4.2 Welding procedure qualification 45
B.4.3 Production test plates 45
B.5 Materials for use at elevated temperatures 45
B.5.1 General 45
B.5.2 Materials 46
B.5.3 Welding procedure qualification and production test plates 46
B.5.4 Start up and shut down procedure 46
B.5.5 Pressure test 46

Issue 1 (2021-05) (informative) Procedure for determination of the weld creep strength reduction factor (WCSRF) 54

(informative) Technical delivery conditions for clad products for pressure purposes 55

D.1 Introductory note 55
D.2 Requirements for the material 55
D.3 Requirements for the deposited material 55
D.4 Qualification of the cladding procedure 56
D.5 Production tests 57

(informative) European steels for pressure purposes 59

E.1 European Standards for steels and steel components for pressure purposes 59
E.2 European standardised steels grouped according to product forms 60

(normative) Special provisions for materials and components 83

F.1 General 83
F.2 Mechanical properties and technical delivery conditions for fasteners in accordance with EN ISO 3506 83
F.2.1 Mechanical properties for austenitic bolts in accordance with EN ISO 3506-1 83
F.2.2 Delivery conditions for austenitic fasteners 84

Annex ZA (informative) Relationship between this European Standard and the essential requirements of Directive 2014/68/EU aimed to be covered 86

Bibliography 87