

DIN EN 13445-2:2015-12 (E)

Unfired pressure vessels - Part 2: Materials

Contents		Page
Foreword		4
1	Scope	6
2	Normative references	6
3	Terms, definitions, symbols and units	8
3.1	Terms and definitions	8
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
Annex A (normative) Grouping system for steels for pressure equipment		17
Annex B (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	28
B.2.4	Method 3 -- Fracture mechanics analysis	40
B.3	General test requirements	41
B.3.1	General	41
B.3.2	Sub-sized specimens	42
B.4	Welds	43
B.4.1	General	43
B.4.2	Welding procedure qualification	43
B.4.3	Production test plates	43
B.5	Materials for use at elevated temperatures	43
B.5.1	General	43
B.5.2	Materials	43
B.5.3	Welding procedure qualification and production test plates	44
B.5.4	Start up and shut down procedure	44
B.5.5	Pressure test	44

Annex C (informative) Procedure for determination of the weld creep strength reduction factor (WCSRF)	52
Annex D (informative) Technical delivery conditions for clad products for pressure purposes	53
D.1 Introductory note	53
D.2 Requirements for the material	53
D.3 Requirements for the deposited material	53
D.4 Qualification of the cladding procedure	54
D.5 Production tests	55
Annex E (informative) European steels for pressure purposes	57
E.1 European Standards for steels and steel components for pressure purposes	57
E.2 European standardised steels grouped according to product forms	58
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of the EU Pressure Equipment Directive 97/23/EC	82
Bibliography	83