

# DIN EN 13445-8:2010-12 (E)

## Unfired pressure vessels - Part 8: Additional requirements for pressure vessels of aluminium and aluminium alloys

---

<b>Contents</b>		<b>Page</b>
Foreword .....		4
1	Scope .....	5
2	Normative references .....	5
3	Terms, definitions, symbols and units .....	6
4	General requirements .....	6
5	Materials .....	6
5.1	General .....	6
5.2	Elongation after fracture .....	6
5.3	Prevention of brittle fracture .....	6
5.4	Lamellar tearing .....	7
5.5	Chemical composition .....	7
5.6	Material grouping system .....	7
6	Design .....	8
6.1	General .....	8
6.2	Design temperature and properties .....	8
6.3	Time-independent nominal design stress .....	8
6.4	Thick walled, small bore piping for shells .....	8
6.5	Fatigue design .....	9
6.6	Lapped joints, joggle joints, permanent backing strips .....	9
6.6.1	General .....	9
6.6.2	Lapped joints .....	9
6.6.3	Joggle joints .....	9
6.6.4	Joints with permanent backing strips .....	10
7	Manufacture .....	10
7.1	General .....	10
7.2	Materials .....	10
7.3	Welding procedure specification (WPS) .....	10
7.4	Qualification of welding procedure specifications (WPQR) .....	10
7.5	Qualification of welders and welding operators .....	11
7.6	Joint preparation .....	11
7.7	Preheat .....	11
7.8	Production test, reference criteria .....	11
7.9	Extent of testing .....	11
7.10	Performance of test and acceptance criteria .....	12
7.11	Forming procedures .....	12
7.12	Heat treatment after forming .....	12
7.13	Sampling of formed products .....	14
7.14	Tests .....	14
7.14.1	Base material .....	14
7.14.2	Butt welds .....	15
7.15	Post weld heat treatment (PWHT) .....	15
8	Inspection and testing .....	15
8.1	General .....	15

8.2	Non-destructive testing of welded joints .....	15
8.2.1	General .....	15
8.2.2	Demonstration of satisfactory experience for testing group 2 .....	16
8.2.3	Symbols .....	17
8.3	Determination of extent of non destructive testing .....	17
8.4	Applicable non destructive testing techniques .....	20
8.4.1	NDT methods .....	20
8.4.2	Acceptance criteria for radiographic testing (RT) .....	21
Issue 2 (2010-07) 8.4.3 Acceptance criteria for visual and surface penetrant testing .....		21
8.4.4	Acceptance criteria for penetrant testing (PT) .....	22
8.5	Selection of non-destructive testing methods for internal imperfections .....	22
8.6	Standard hydrostatic test .....	23
8.7	Pneumatic testing .....	23
9	Inspection and testing of serially produced pressure vessels -- Model approval .....	23
9.1	General .....	23
9.2	Inspection and testing of pressure vessels subject to cyclic loads .....	23
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of the EU Pressure Equipment Directive 97/23/EC .....		25
Bibliography .....		26