

DIN EN 13445-8:2018-12 (E)

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

| Contents | | Page |
|-----------------|--|-------------|
| Foreword | | 4 |
| 1 | Scope | 6 |
| 2 | Normative references | 6 |
| 3 | Terms, definitions, symbols and units | 7 |
| 4 | General requirements | 7 |
| 5 | Materials | 7 |
| 5.1 | General | 7 |
| 5.2 | Elongation after fracture | 7 |
| 5.3 | Prevention of brittle fracture | 7 |
| 5.4 | Lamellar tearing | 8 |
| 5.5 | Chemical composition | 8 |
| 5.6 | Material grouping system | 8 |
| 6 | Design | 9 |
| 6.1 | General | 9 |
| 6.2 | Design temperature and properties | 9 |
| 6.3 | Time-independent nominal design stress | 9 |
| 6.4 | Thick walled, small bore piping for shells | 9 |
| 6.5 | Fatigue design | 10 |
| 6.6 | Lapped joints, joggle joints, permanent backing strips | 10 |
| 6.6.1 | General | 10 |
| 6.6.2 | Lapped joints | 10 |
| 6.6.3 | Joggle joints | 10 |
| 6.6.4 | Joints with permanent backing strips | 11 |
| 6.7 | Flat ends | 11 |
| 6.8 | Design by experiment | 11 |
| 6.9 | Port-hole-extruded tubes | 11 |
| 7 | Manufacture | a |
| 7.1 | General | a |
| 7.2 | Materials | a |
| 7.3 | Tolerances | a |
| 7.4 | Welding procedure specification (WPS) | a |
| 7.5 | Qualification of welding procedure specifications (WPQR) | a |
| 7.6 | Qualification of welders and welding operators | 12 |
| 7.7 | Joint preparation | 12 |
| 7.8 | Preheat | 12 |
| 7.9 | Production test, reference criteria | 12 |
| 7.10 | Extent of testing | 13 |
| 7.11 | Performance of test and acceptance criteria | 13 |
| 7.12 | Forming procedures | 13 |
| 7.13 | Heat treatment after forming | 13 |
| 7.14 | Sampling of formed products | 15 |
| 7.15 | Tests | 15 |
| 7.15.1 | Base material | 15 |
| 7.15.2 | Butt welds | 16 |

| | | |
|------------------------|--|-----|
| 7.16 | Post weld heat treatment (PWHT) | 16 |
| 8 | Inspection and testing | 16 |
| 8.1 | General | 16 |
| 8.2 | Non-destructive testing of welded joints | 16 |
| 8.2.1 | General | 16 |
| 8.2.2 | Demonstration of satisfactory experience for testing group 2 | 17 |
| 8.2.3 | Symbols | 18 |
| Issue 4 (2017-07) | 8.3 Determination of extent of non destructive testing | 18 |
| 8.4 | Applicable non-destructive testing techniques | 21 |
| 8.4.1 | NDT methods | 21 |
| 8.4.2 | Acceptance criteria for radiographic testing (RT) | 22 |
| 8.4.3 | Acceptance criteria for visual and surface penetrant testing | 22 |
| 8.4.4 | Acceptance criteria for penetrant testing (PT) | 23 |
| 8.5 | Selection of non-destructive testing methods for internal imperfections | 23 |
| 8.6 | Standard hydrostatic test | 24 |
| 8.7 | Pneumatic testing | 24 |
| 9 | Inspection and testing of serially produced pressure vessels -- Model approval | 24 |
| 9.1 | General | 24 |
| 9.2 | Inspection and testing of pressure vessels subject to cyclic loads | 24 |
| Annex A (normative) | Allowable design strength values | 24a |
| Annex ZA (informative) | Relationship between this European Standard and the essential requirements of Directive 2014/68/EU aimed to be covered | 26 |
| Bibliography | | 27 |