

# DIN EN 15776:2022-09 (E)

Unfired pressure vessels - Requirements for the design and fabrication of pressure vessels and pressure vessels parts constructed from cast iron with an elongation after fracture equal or less than 15 %

---

<b>Contents</b>		<b>Page</b>
European foreword .....		4
Introduction .....		5
1	Scope .....	6
2	Normative references .....	6
3	Terms, definitions, units and symbols .....	7
3.1	Terms and definitions .....	7
3.2	Symbols .....	9
3.3	Inter relation of thicknesses definitions (EN 13445-6:2021) .....	11
4	Materials, limitations and service conditions .....	11
4.1	Materials and limitations on temperature, maximum allowable pressure and energy content .....	11
4.2	Cyclic loading .....	13
5	Design requirements .....	14
5.1	Design principle .....	14
5.2	Conceptual design and construction drawings .....	15
5.3	Static loading .....	15
5.3.1	General .....	15
5.3.2	Design by formula (DBF) .....	15
5.3.3	Design by analysis (DBA) .....	16
5.3.4	Design by experiment (DBE) .....	16
5.4	Temperature reduction factor .....	16
5.5	Wall thickness correction factor .....	16
5.6	Design for external pressure .....	17
5.7	Testing conditions .....	17
5.8	Design methods .....	17
5.8.1	General .....	17
5.8.2	Static loading .....	17
5.8.3	Dynamic loading .....	20
5.9	Construction details .....	25
5.9.1	Reinforcement of openings in cylinders, flat ends, dished ends, etc .....	25
5.9.2	Fillet radius .....	25
5.9.3	Dished cover .....	26
5.10	Technical documentation .....	26
5.10.1	General .....	26
5.10.2	Information to be contained in the technical documentation .....	26
5.10.3	Test reports .....	28
5.10.4	Design review .....	28
6	Founding, material and casting testing .....	29
6.1	Founding .....	29
6.1.1	General .....	29
6.1.2	Welding .....	29
6.2	Material testing .....	29

6.2.1	General .....	29
6.2.2	Frequency and number of tests .....	29
6.2.3	Inspection documents .....	30
6.3	Casting testing .....	30
6.3.1	General .....	30
6.3.2	Surface imperfections .....	30
6.3.3	Cracks, laps, cold shot and non-fused chaplets .....	30
6.3.4	Ultrasonic testing and/or sectioning .....	30
6.3.5	Liquid penetrant testing .....	31
6.3.6	Surface roughness .....	31
6.3.7	Minimum wall thickness .....	31
6.3.8	Wall thickness tolerances .....	31
6.3.9	Other dimensions .....	31
6.3.10	Qualification of testing personnel .....	31
7	Final assessment .....	31
7.1	General .....	31
7.2	Hydraulic test pressure .....	31
8	Pressure vessels assembled of a combination of parts in different materials .....	32
9	Marking and documentation .....	32
9.1	Marking of castings .....	32
9.2	Name plate for the complete pressure vessel .....	32
9.3	Documentation .....	32
Annex A (informative) Technical data for design calculations .....		33
Annex B (informative) Recommendations for in-service validation and inspection .....		36
B.1	Purpose .....	36
B.2	Tests during operation .....	36
Annex C (informative) Examples of fatigue design curves .....		37
Annex ZA (informative) Relationship between this European standard and the essential requirements of Directive 2014/68 EU aimed to be covered .....		40
Bibliography .....		41