

DIN EN 13445-5:2013-12 (E)

Unfired pressure vessels - Part 5: Inspection and testing

Contents	Page
Foreword	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	7
4 Performance of inspection and testing	9
4.1 General	9
4.2 Inspection	9
4.3 Non-destructive testing (NDT)	9
5 Technical documentation	9
5.1 General	9
5.2 Information to be contained in the technical documentation	9
5.2.1 General	9
5.2.2 General description of the pressure vessel	9
5.2.3 Design and construction drawings	10
5.2.4 Descriptions and explanations necessary for an understanding of the drawings and diagrams and the operation of the pressure vessel	10
5.2.5 Results of design calculations and examinations carried out	10
5.2.6 Test reports	12
5.2.7 Technical/manufacturing schedule	12
5.3 Design review	13
5.3.1 General	13
5.3.2 Design review	13
6 Inspection and testing during fabrication	13
6.1 General	13
6.2 Manufacturing procedures and construction drawings	14
6.3 Material traceability	14
6.3.1 General	14
6.3.2 Special Conditions - Material marking	14
6.4 Preparation for manufacturing processes	14
6.4.1 General	14
6.4.2 Joint preparation testing	14
6.4.3 Inspection of vessel supports	14
6.4.4 Inspection associated with forming	15
6.4.5 Testing of areas subject to significant through thickness tensile stress	15
6.5 Welding	15
6.5.1 General	15
6.5.2 Verification of welder and welding operator qualification and procedures approval	15
6.5.3 Inspection of repairs	16
6.6 Non-destructive testing of welded joints	16
6.6.1 Extent of non-destructive testing	16
6.6.2 Determination of extent of non-destructive testing	19
6.6.3 Performing non-destructive testing	27
6.6.4 Description and acceptance level of imperfections	29
6.6.5 Stage of performance	29
6.6.6 Procedure for non-destructive retesting	29
6.6.7 Non-destructive testing documentation	31

6.7	Destructive testing	31
6.7.1	Extent of destructive testing	31
6.7.2	Schedule for destructive testing	31
6.7.3	Verification of destructive tests	31
6.7.4	Records	31
6.8	Heat-treatment	31
Issue 5 (2013-07) 7 Subcontracted items		32
7.1	General	32
7.2	Subcontracted welding related activities	32
7.3	Subcontracted non-destructive testing activities	32
7.3.1	Use of contract NDT personnel at the premises of the vessel manufacturer	32
7.3.2	Subcontracting of NDT at a subcontractors premises	32
8	Miscellaneous tests	33
9	Calibration	33
9.1	General	33
9.2	Calibration procedure	33
9.2.1	General	33
9.2.2	Calibration	34
9.2.3	Frequency	34
9.3	Identification	34
9.4	Registration	34
10	Final assessment	35
10.1	General	35
10.2	Extent of final assessment	35
10.2.1	Visual and dimensional inspection	35
10.2.2	Review of documentation	36
10.2.3	Proof test	36
10.2.4	Post pressure test inspection	46
10.2.5	Inspection of safety accessories	46
11	Marking and declaration of compliance with the standard	46
11.1	General	46
11.2	Marking method	46
11.2.1	General	46
11.2.2	Direct stamping	47
11.2.3	Nameplate	47
11.3	Marking units	47
11.4	Marking contents	47
11.5	Declaration of compliance with the standard	48
12	Documents	48
12.1	Type of documents	48
12.2	Control and access of documents	49
12.3	Retention of documents	50
Annex A (normative) Inspection and testing of serially produced pressure vessels		51
Annex B (normative) Detailed dimensional requirements for pressure vessels		57
Annex C (normative) Access and inspection openings, closing mechanisms and special locking elements		59
Annex D (informative) Leak Testing		71
Annex E (informative) Acoustic emission		72
Annex F (normative) Inspection and testing of pressure vessels or parts subject to creep		74

Annex G (normative) Inspection and testing of pressure vessels subject to cyclic loads	77
Annex H (informative) Declaration of compliance with this standard	79
Issue 5 (2013-07) Annex I (informative) Specific tests during construction to assist in-service inspection	81
Annex ZA (informative) Relationship between this European Standard and the Essential Requirements of the EU Pressure Equipment Directive 97/23/EC	84
Bibliography	85