SLOVENSKI STANDARD
SIST EN 12953-5:2020

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Nadomešča:
SIST EN 12953-5:2002

Mnogovodni kotli - 5. del: Kontrola med proizvodnjo, dokumentacija in označevanje tlačno obremenjenih delov kotla

Shell boilers - Part 5: Inspection during construction, documentation and marking of pressure parts of the boiler

Großwasserraumkessel - Teil 5: Prüfung während der Herstellung, Dokumentation und Kennzeichnung für drucktragende Kesselteile

Chaudières à tubes de fumée - Partie 5 : Contrôles en cours de construction, documentation et marquage des parties sous pression de la chaudière

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27.060.30	Grelniki vode in prenosniki toplote	Boilers and heat exchangers

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English Version

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This European Standard was approved by CEN on 6 January 2020.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Contents

Page

European foreword

This document (EN 12953-5:2020) has been prepared by Technical Committee CEN/TC 269 “Shell and water-tube boilers”, the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2020, and conflicting national standards shall be withdrawn at the latest by September 2020.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12953-5:2002.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

The informative Annex B lists the significant technical changes between this document and the previous edition.

EN 12953, *Shell boilers*, consists of the following parts:

— *Part 1: General*;

— *Part 2: Materials for pressure parts of boilers and accessories*;

— *Part 3: Design and calculation for pressure parts*;

— *Part 4: Workmanship and construction of pressure parts of the boiler*;

— *Part 5: Inspection during construction, documentation and marking of pressure parts of the boiler*;

— *Part 6: Requirements for equipment for the boiler*;

— *Part 7: Requirements for firing systems for liquid and gaseous fuels for the boilers*;

— *Part 8: Requirements for safeguards against excessive pressure*;

— *Part 9: Requirements for limiting devices of the boiler and accessories*;

— *Part 10: Requirements for feedwater and boiler water quality*;

— *Part 11: Acceptance tests*;

— *Part 12: Requirements for grate firing systems for solid fuels for the boiler*;

— *Part 13: Operating instructions*;

— *Part 14: Guideline for involvement of an inspection body independent of the manufacturer* [CR 12953-14].

Although these parts can be obtained separately, the parts are interdependent. As such, the design and manufacture of shell boilers requires the application of more than one part in order for the requirements of the standard to be satisfactorily fulfilled.

NOTE A "Boiler Helpdesk" has been established in CEN/TC 269 which can be contacted for any questions regarding the application of the European Standards series EN 12952 and EN 12953, see the following website: http://www.boiler-helpdesk.din.de.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

This document specifies requirements for the inspection during and after construction, documentation and marking of shell boilers as defined in EN 12953-1:2012.

NOTE For other components, such as water tube walls, reference will be made to the EN 12952 series [1].

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 764-1:2015+A1:2016, *Pressure equipment - Part 1: Vocabulary*

EN 764-2:2012, *Pressure equipment - Part 2: Quantities, symbols and units*

EN 12953-1:2012, *Shell boilers - Part 1: General*

EN 12953-3:2016, *Shell boilers - Part 3: Design and calculation for pressure parts*

EN 12953-4:2018, *Shell boilers - Part 4: Workmanship and construction of pressure parts of the boiler*

EN 13018:2016, *Non-destructive testing - Visual testing - General principles*

EN ISO 3452-1:2013, *Non-destructive testing - Penetrant testing - Part 1: General principles (ISO 3452-1:2013, Corrected version 2014-05-01)*

EN ISO 4136:2012, *Destructive tests on welds in metallic materials - Transverse tensile test (ISO 4136:2012)*

EN ISO 5173:2010, *Destructive tests on welds in metallic materials - Bend tests (ISO 5173:2009)*

EN ISO 5178:2019, *Destructive tests on welds in metallic materials - Longitudinal tensile test on weld metal in fusion welded joints (ISO 5178:2019)*

EN ISO 5817:2014, *Welding - Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) - Quality levels for imperfections (ISO 5817:2014)*

EN ISO 6520-1:2007, *Welding and allied processes - Classification of geometric imperfections in metallic materials - Part 1: Fusion welding (ISO 6520-1:2007)*

EN ISO 9016:2012, *Destructive tests on welds in metallic materials - Impact tests - Test specimen location, notch orientation and examination (ISO 9016:2012)*

EN ISO 9712:2012, *Non-destructive testing - Qualification and certification of NDT personnel (ISO 9712:2012)*

EN ISO 11666:2018, *Non-destructive testing of welds - Ultrasonic testing - Acceptance levels (ISO 11666:2018)*

EN ISO 15614-1:2017, *Specification and qualification of welding procedures for metallic materials - Welding procedure test - Part 1: Arc and gas welding of steels and arc welding of nickel and nickel alloys (ISO 15614-1:2017, Corrected version 2017-10-01)*

EN ISO 17636-1:2013, *Non-destructive testing of welds - Radiographic testing - Part 1: X- and gamma-ray techniques with film (ISO 17636-1:2013)*

EN ISO 17636-2:2013, *Non-destructive testing of welds - Radiographic testing - Part 2: X- and gamma-ray techniques with digital detectors (ISO 17636-2:2013)*

EN ISO 17637:2016, *Non-destructive testing of welds - Visual testing of fusion-welded joints (ISO 17637:2016)*

EN ISO 17638:2016, *Non-destructive testing of welds - Magnetic particle testing (ISO 17638:2016)*

EN ISO 17639:2013, *Destructive tests on welds in metallic materials - Macroscopic and microscopic examination of welds (ISO 17639:2003)*

EN ISO 17640:2018, *Non-destructive testing of welds - Ultrasonic testing - Techniques, testing levels, and assessment (ISO 17640:2018)*

EN ISO 23279:2017, *Non-destructive testing of welds - Ultrasonic testing - Characterization of discontinuities in welds (ISO 23279:2017)*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12953-1:2012, EN 764-1:2015+A1:2016, EN 764-2:2012 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
seam
generic term for welded joints, welded seams or welds

3.2
non-destructive testing (NDT)
non-destructive examination (NDE)
conventional and new techniques of radiographic, ultrasonic, magnetic particle examination, visual testing and/or penetrant testing

3.3
pressure part
pressure bearing part
component directly subjected to pressure (e.g. shell) or needed to withstand the pressure (e.g. reinforcement ring of the branch or the furnace)

4 Symbols

For the purposes of this document, the symbols given in EN 12953-1:2012, Table 1 shall apply.

5 Inspection and testing

5.1 General

The manufacturer shall be responsible for ensuring the boiler conforms to the requirements of this European Standard. Conformity shall be confirmed by the completion of a series of inspection activities as given in Table 1.

Depending upon the conformity assessment module chosen by the manufacturer for the design and manufacture of each boiler, the inspection activities shall involve, to a greater or lesser extent, organizations which are independent of the manufacturer.

The manufacturer shall provide all the necessary access to enable the responsible authority to carry out the activities in which it is required to be involved.

5.2 Approval of personnel

5.2.1 Check of welder and welding operator approval

The manufacturer shall ensure that the welding of the boiler has been done by welders and welding operators who have been approved under the requirements of EN 12953-4:2018, 5.14 and the appropriate certification shall be made available on request.

5.2.2 Approval of non-destructive examination personnel

Personnel responsible for non-destructive testing, including interpretation, evaluation and reporting shall be certified in accordance with the general requirements of EN ISO 9712:2012.

An exception to this requirement shall be made for visual testing of welds and final inspection of boilers, for which EN ISO 9712:2012 is not applicable.

Magnetic particle testing (MT) shall be performed under the direct supervision of personnel qualified to level 2 of EN ISO 9712:2012 as a minimum.

Penetrant testing (PT) shall be performed under the direct supervision of personnel qualified to level 2 of EN ISO 9712:2012 as a minimum.

Ultrasonic testing (UT) shall be performed by an operator qualified to level 2 of EN ISO 9712:2012 as a minimum for UT.

Images of radiographic testing (RT) shall be viewed by personnel qualified to level 2 of EN ISO 9712:2012 as a minimum.

For new NDT techniques, the operator shall be qualified to the equivalent level as MT, PT, UT and RT.

Visual testing (VT) shall be carried out by trained and experienced personnel having sufficient knowledge in welding techniques, and a full comprehension of this European Standard, to identify and interpret imperfections that might occur at the surface of the weld and the heat affected zone.

5.3 Calibration of equipment

The manufacturer shall establish procedures to ensure that tools, gauges, instruments and other measuring and testing devices used in the manufacture and inspection activities affecting boiler quality, are properly controlled, calibrated and adjusted at specific intervals, to maintain accuracy within defined limits.

5.4 Inspection activities

The manufacturer shall confirm that the boiler components, as a minimum, conform to the requirements of this European Standard by performing and authenticating the inspection activities listed in Table 1.

Table 1 — List of inspection activities to be undertaken by the manufacturer

Reference no.	Area of activity	Inspection operation
1	**Design and general documentation**	
1.1	Design data/calculations	Ensure that the design data/calculations conform to: — technical specifications — the requirements of this European Standard
1.2	Design drawings	Ensure that drawing information conforms to: — design data and calculations — technical specifications — the requirements of this European Standard
1.3	Specifications for suppliers	Ensure that material and component specifications conform to: — technical specifications — design drawings, if applicable — the requirements of this European Standard
1.4	Specifications for sub-contracted parts	Ensure that the specification for sub-contracted parts conform to: — technical specifications — design drawings, if applicable — the requirements of this European Standard
2	**Material for pressure parts**	
2.1	Material certificates	Verify that certificate information and results conform to the design specification
2.2	Welding consumables	Verify that the consumables to be used are in accordance with the design specification
2.3	Material identification	Identify the material with the material certificates and check the markings
2.4	Traceability of identification marks	Ensure that the traceability of identification marks is in accordance with the approved procedure

Reference no.	Area of activity	Inspection operation
2.5	Acceptance of sub-contracted parts	Verify that sub-contracted parts conform to the boiler manufacturer's specification
3	**Material for attachments welded to a pressure part**	
3.1	Material certificates	Verify that certificate information and results conform to the design specification
3.2	Welding consumables	Verify that the consumables to be used are in accordance with the design specification
3.3	Acceptance of sub-contracted parts	Verify that sub-contracted parts conform to the boiler manufacturer's specification
4	**Fabrication and welding**	
4.1	Welding procedure specifications	Verify that appropriate welding specifications are available and that their contents are compatible with the welding procedure approvals
4.2	Welding procedure approvals	Verify that the welding procedures are appropriate for the materials and the field of welding application, and that they have been approved by a responsible authority
4.3	Welder approval	Verify that the welder approvals have been approved by a responsible authority and that they are available and valid
4.4	Forming procedures	Verify that forming procedures are available, where applicable, and their contents are appropriate to the product to be formed
4.5	Formed parts	Examine formed parts in accordance with the requirements of this European Standard
4.6	Welding	Weld preparation and welding shall be in accordance with the welding procedure specification (WPS) and the Quality Management System or Quality Procedure of the manufacturer
4.7	Production test plates, if any	Witness removal and marking of production test plates
		Verify that any post-weld heat treatment (PWHT) on production test plates independent of the boiler complies with the specific heat treatment applied to the boiler
		Examine NDT reports on production test plates
		Identify and mark the test specimens taken from production test plates for mechanical tests

Reference no.	Area of activity	Inspection operation
		Verify that the test information and results from the mechanical tests contained in the manufacturer's report conform to the requirements of this European Standard
5	**Non-destructive examination of welds**	
5.1	Non-destructive examination procedures	Verify that appropriate non-destructive examination procedures are available and ensure the qualification of the originator is appropriate
5.2	Non-destructive examination operator qualifications	Ensure the non-destructive examination operator's qualifications are appropriate
5.3	Non-destructive examination operation	Scrutinize any radiographs and check conformance to the acceptance criteria
		Verify that the results of any ultrasonic examination conforms to the acceptance criteria
5.4	Non-destructive examination reports	Verify that the information and results conform to the acceptance criteria
6	**Post-weld heat treatment (PWHT) (if applicable)**	
6.1	PWHT procedures	Verify that the post-weld heat treatment procedures conform to this European Standard
6.2	PWHT records	Verify that temperature/time recordings conform to the requirements of this European Standard
7	**Final inspection and hydrostatic pressure test**	
7.1	Final inspection before hydrostatic pressure test	Carry out dimensional checking, visual testing and identification of accessible parts after component completion, prior to hydrostatic pressure test
7.2	Hydrostatic pressure test	Ensure the final hydrostatic pressure test is carried out in accordance with the requirements of this European Standard
7.3	Final inspection after hydrostatic pressure test	Perform visual testing on completion of the hydrostatic pressure test
		Check marking on boiler, detachable boiler parts and nameplate
		Ensure completeness of the data dossier, the documentation, and actions 1.1 to 7.2 carried out