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Vodocevni kotli in pomožne napeljave - 2. del: Materiali za tlačno obremenjene dele in opremo kotla

Water-tube boilers and auxiliary installations - Part 2: Materials for pressure parts of boilers and accessories

Wasserrohrkessel und Anlagenkomponenten - Teil 2: Werkstoffe für drucktragende Kesselteile und Zubehör

Chaudières à tubes d'eau et installations auxiliaires - Partie 2: Matériaux des parties sous pression des chaudières et accessoires

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Water-tube boilers and auxiliary installations - Part 2: Materials for pressure parts of boilers and accessories

Chaudières à tubes d'eau et installations auxiliaires -
Partie 2: Matériaux des parties sous pression des
chaudières et accessoires

Wasserrohrkessel und Anlagenkomponenten - Teil 2:
Werkstoffe für drucktragende Kesselteile und Zubehör

This European Standard was approved by CEN on 1 November 2021.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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EN 12952-2:2021 (E)

European foreword

This document (EN 12952-2:2021) 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of an identical text or by endorsement, at the latest by June 2022, and conflicting national standards shall be withdrawn at the latest by June 2022.

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 12952-2:2011.

Annex D provides details of significant technical changes between this document and the previous edition.

EN 12952 series concerning water-tube boilers and auxiliary installations 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: In service boiler life expectancy calculations;*
- *Part 5: Workmanship and construction of pressure parts of the boiler;*
- *Part 6: Inspection during construction, documentation and marking of pressure parts of the boiler;*
- *Part 7: Requirements for equipment for the boiler;*
- *Part 8: Requirements for firing systems for liquid and gaseous fuels for the boiler;*
- *Part 9: Requirements for firing systems for pulverized solid fuels for the boiler;*
- *Part 10: Requirements for safeguards against excessive pressure;*
- *Part 11: Requirements for limiting devices of the boiler and accessories;*
- *Part 12: Requirements for boiler feedwater and boiler water quality;*
- *Part 13: Requirements for flue gas cleaning systems;*
- *Part 14: Requirements for flue gas DENOX systems using liquefied pressurized ammonia and ammonia water solution;*
- *Part 15: Acceptance tests;*
- *Part 16: Requirements for grate and fluidized-bed firing systems for solid fuels for the boiler;*
- *CR 12952 Part 17: Guideline for the involvement of an inspection body independent of the manufacturer.*

- *Part 18: Operating Instructions*

Although these parts can be obtained separately, it should be recognized that the parts are inter-dependent. As such, the design and manufacture of water-tube boilers requires the application of more than one part in order for the requirements of the document 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 EN 12952 series and EN 12953 series, see the following website: <http://www.boiler-helpdesk.din.de>

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

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

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

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.

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EN 12952-2:2021 (E)

1 Scope

This document specifies the requirements for the product forms for use in pressure parts of water-tube boilers and for parts welded on to pressure parts:

- plates;
- wrought seamless tubes;
- electrically welded tubes;
- submerged, plasma and TIG arc-welded tubes;
- forgings;
- castings;
- rolled bars;
- welding consumables;
- fasteners;
- seamless composite tubes.

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 764-4:2014, *Pressure equipment - Part 4: Establishment of technical delivery conditions for metallic materials*

EN 764-5:2014, *Pressure equipment - Part 5: Inspection documentation of metallic materials and compliance with the material specification*

EN 1092-1:2018, *Flanges and their joints - Circular flanges for pipes, valves, fittings and accessories, PN designated - Part 1: Steel flanges*

EN 1759-1:2004, *Flanges and their joint - Circular flanges for pipes, valves, fittings and accessories, Class designated - Part 1: Steel flanges, NPS 1/2 to 24*

EN 10021:2006, *General technical delivery conditions for steel products*

EN 10028-2:2017, *Flat products made of steels for pressure purposes - Part 2: Non-alloy and alloy steels with specified elevated temperature properties*

EN 10028-3:2017, *Flat products made of steels for pressure purposes - Part 3: Weldable fine grain steels, normalized*

EN 10028-7:2016, *Flat products made of steels for pressure purposes - Part 7: Stainless steels*

EN 10160:1999, *Ultrasonic testing of steel flat product of thickness equal or greater than 6 mm (reflection method)*

EN 10164:2018, *Steel products with improved deformation properties perpendicular to the surface of the product - Technical delivery conditions*

EN 10213:2007+A1:2016, *Steel castings for pressure purposes*

EN 10216-2:2013+A1:2019, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 2: Non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10216-3:2013, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 3: Alloy fine grain steel tubes*

EN 10216-5:2021, *Seamless steel tubes for pressure purposes - Technical delivery conditions - Part 5: Stainless steel tubes*

EN 10217-2:2019, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 2: Electric welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10217-3:2019, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 3: Electric welded and submerged arc welded alloy fine grain steel tubes with specified room, elevated and low temperature properties*

EN 10217-5:2019, *Welded steel tubes for pressure purposes - Technical delivery conditions - Part 5: Submerged arc welded non-alloy and alloy steel tubes with specified elevated temperature properties*

EN 10222-2:2017+A1:2021, *Steel forgings for pressure purposes - Part 2: Ferritic and martensitic steels with specified elevated temperatures properties*

EN 10222-3:2017, *Steel forgings for pressure purposes - Part 3: Nickel steels with specified low temperature properties*

EN 10222-4:2017+A1:2021, *Steel forgings for pressure purposes - Part 4: Weldable fine grain steels with high proof strength*

EN 10222-5:2017, *Steel forgings for pressure purposes - Part 5: Martensitic, austenitic and austenitic-ferritic stainless steels*

EN 10228-1:2016, *Non-destructive testing of steel forgings - Part 1: Magnetic particle inspection*

EN 10228-3:2016, *Non-destructive testing of steel forgings - Part 3: Ultrasonic testing of ferritic or martensitic steel forgings*

EN 10253-2:2021, *Butt-welding pipe fittings - Part 2: Non alloy and ferritic alloy steels with specific inspection requirements*

EN 10253-4:2008/AC:2009, *Butt-welding pipe fittings - Part 4: Wrought austenitic and austenitic-ferritic (duplex) stainless steels with specific inspection requirements*

EN 10254:1999, *Steel closed die forgings - General technical delivery conditions*

EN 10269:2013, *Steels and nickel alloys for fasteners with specified elevated and/or low temperature properties*

EN 10273:2016, *Hot rolled weldable steel bars for pressure purposes with specified elevated temperature properties*

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EN 10308:2001, *Non destructive testing - Ultrasonic testing of steel bars*

EN 10314:2016, *Method for the derivation of minimum values of proof strength of steel at elevated temperatures*

EN 12074:2000, *Welding consumables - Quality requirements for manufacture, supply and distribution of consumables for welding and allied processes*

EN 12952-3:2011, *Water-tube boilers and auxiliary installations - Part 3: Design and calculation for pressure parts of the boiler*

EN 12952-5:2021, *Water-tube boilers and auxiliary installations — Part 5: Workmanship and construction of pressure parts of the boiler*

EN 12952-6:2021, *Water-tube boilers and auxiliary installations — Part 6: Inspection during construction, documentation and marking of pressure parts of the boiler*

EN 12952-7:2012, *Water-tube boilers and auxiliary installations - Part 7: Requirements for equipment for the boiler*

EN 12952-12:2003, *Water-tube boilers and auxiliary installations - Part 12: Requirements for boiler feedwater and boiler water quality*

EN 13479:2017, *Welding consumables - General product standard for filler metals and fluxes for fusion welding of metallic materials*

EN 16668:2016+A1:2018, *Industrial valves - Requirements and testing for metallic valves as pressure accessories*

EN ISO 148-1:2016, *Metallic materials - Charpy pendulum impact test - Part 1: Test method (ISO 148-1:2016)*

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EN ISO 544:2017, *Welding consumables - Technical delivery conditions for filler materials and fluxes - Type of product, dimensions, tolerances and markings (ISO 544:2017)*

EN ISO 636:2017, *Welding consumables - Rods, wires and deposits for tungsten inert gas welding of non-alloy and fine-grain steels - Classification (ISO 636:2017)*

EN ISO 2560:2020, *Welding consumables - Covered electrodes for manual metal arc welding of non-alloy and fine grain steels - Classification (ISO 2560:2020)*

EN ISO 2566-1:1999, *Steel - Conversion of elongation values - Part 1: Carbon and low alloy steels (ISO 2566-1:1984)*

EN ISO 2566-2:1999, *Steel - Conversion of elongation values - Part 2: Austenitic steels (ISO 2566-2:1984)*

EN ISO 3580:2017, *Welding consumables - Covered electrodes for manual metal arc welding of creep-resisting steels - Classification (ISO 3580:2017)*

EN ISO 3581:2016, *Welding consumables - Covered electrodes for manual metal arc welding of stainless and heat-resisting steels - Classification (ISO 3581:2016, Corrected version 2017-11-01)*

EN ISO 6892-1:2019, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1:2019)*

EN ISO 6892-2:2018, *Metallic materials - Tensile testing - Part 2: Method of test at elevated temperature (ISO 6892-2:2018)*

EN ISO 8495:2013, *Metallic materials - Tube - Ring-expanding test (ISO 8495:2013)*

EN ISO 10893-10:2011, *Non-destructive testing of steel tubes - Part 10: Automated full peripheral ultrasonic testing of seamless and welded (except submerged arc-welded) steel tubes for the detection of longitudinal and/or transverse imperfections (ISO 10893-10:2011)*

EN ISO 14171:2016, *Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode/flux combinations for submerged arc welding of non alloy and fine grain steels - Classification (ISO 14171:2016)*

EN ISO 14174:2019, *Welding consumables - Fluxes for submerged arc welding and electroslag welding - Classification (ISO 14174:2019)*

EN ISO 14341:2020, *Welding consumables - Wire electrodes and weld deposits for gas shielded metal arc welding of non alloy and fine grain steels - Classification (ISO 14341:2020)*

EN ISO 14343:2017, *Welding consumables - Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels - Classification (ISO 14343:2017)*

EN ISO 14344:2010, *Welding consumables - Procurement of filler materials and fluxes (ISO 14344:2010)*

EN ISO 16834:2012, *Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of high strength steels - Classification (ISO 16834:2012)*

EN ISO 17632:2015, *Welding consumables - Tubular cored electrodes for gas shielded and non-gas shielded metal arc welding of non-alloy and fine grain steels - Classification (ISO 17632:2015)*

EN ISO 17633:2018, *Welding consumables - Tubular cored electrodes and rods for gas shielded and non-gas shielded metal arc welding of stainless and heat-resisting steels - Classification (ISO 17633:2017)*

EN ISO 17634:2015, *Welding consumables - Tubular cored electrodes for gas shielded metal arc welding of creep-resisting steels - Classification (ISO 17634:2015)*

EN ISO 18276:2017, *Welding consumables - Tubular cored electrodes for gas-shielded and non-gas-shielded metal arc welding of high strength steels - Classification (ISO 18276:2017)*

EN ISO 20378:2018, *Welding consumables - Rods for gas welding of non-alloy and creep-resisting steels - Classification (ISO 20378:2017)*

EN ISO 21952:2012, *Welding consumables - Wire electrodes, wires, rods and deposits for gas shielded arc welding of creep-resisting steels - Classification (ISO 21952:2012)*

EN ISO 24598:2019, *Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of creep-resisting steels - Classification (ISO 24598:2019)*

EN ISO 26304:2018, *Welding consumables - Solid wire electrodes, tubular cored electrodes and electrode-flux combinations for submerged arc welding of high strength steels - Classification (ISO 26304:2017)*

ISO 6303:1981, *Pressure vessel steels not included in ISO 2604, Parts 1 to 6 — Derivation of long-time stress rupture properties*

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ISO 18275:2018, *Welding consumables — Covered electrodes for manual metal arc welding of high-strength steels — Classification*

CEN ISO/TR 15608:2017, *Welding - Guidelines for a metallic materials grouping system (ISO/TR 15608:2017)*

CEN ISO/TR 20172:2009, *Welding - Grouping systems for materials - European materials (ISO/TR 20172:2009)*

3 Terms and definitions

No terms and definitions are listed in this document.

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

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

4 General requirements**4.1 Selection of materials with regard to service conditions**

The manufacturer of the water-tube boilers shall select the material (including welding consumables) for the manufacture of the boilers so that, when the delivered material (including welding consumables) complies with the requirements specified in the material order and when the design rules in EN 12952-3:2011 and the rules for the fabrication, inspection and testing of the boilers in EN 12952-5:2021 and EN 12952-6:2021 are observed, the boilers can be operated without hazard under the service conditions (pressures, temperatures, environments, etc.) for the life time provided in the order for the boiler.

The materials specified in Clause 5 which satisfy the elongation and impact energy requirements of 5.2.5.3 and 5.2.5.4 respectively shall not be considered prone to brittle fracture during manufacture and subsequent operation in accordance with the provisions of this document. It is also considered that for operation within the parameters specified in EN 12952-3:2011 using feedwater and boiler water as specified in EN 12952-12:2003 the selected materials will not be significantly affected by ageing or chemical attack.

4.2 Selection of materials with regard to fabrication

The selection of the materials of construction for pressure parts of water-tube boilers and to parts welded on pressure parts shall take into account the suitability of the material with regard to fabrication, e.g. cold and hot forming, weldability, expanding, and heat treatment.

NOTE The rules for forming or post weld heat treatment are included in EN 12952-5:2021.

4.3 Material specification

4.3.1 General

The selection and order of materials for pressure parts shall be based on one of the following material specifications for pressure equipment in the form of:

- a) harmonized European material Standards;
- b) European approval of material (EAM);
- c) particular material appraisals.

4.3.2 European Standards

Materials in accordance with harmonized European Standards shall be selected for types, treatment conditions and dimensions of products frequently used in Europe.

NOTE Materials in accordance with European Standards are given in Annex A.

4.3.3 European approvals for materials

European approvals for materials are intended for repeated use. They are established in accordance with EN 764-4:2014 and apply to materials or treatment conditions and product forms or dimensions not covered in a European material Standard for pressure equipment. Additionally to the requirements of EN 764-4:2014 the requirements of this document shall be met.

NOTE Reference of available European approvals for materials is published in the Official Journal of the European Union.

4.3.4 Particular material appraisals

Particular material appraisals apply for individual cases as for example:

- a) a material or a product form or a thickness not covered by a European material Standard or EAM intended for use in a particular pressure equipment;
- b) a product specified in a European material Standard or EAM for materials for pressure equipment is intended in an exceptional case for service conditions outside its specified range of application.

Where relevant to the pressure equipment under consideration the requirements given in EN 764-4:2014 should be considered. Additionally to the requirements of EN 764-4:2014 the requirements of this document shall be met.

4.4 Consideration of special materials properties

When materials are chosen with properties other than those specified in the material specification, or which can influence the lifetime or the safe service behaviour of the water-tube boiler, they shall be taken into account when selecting the material and its dimensions.

NOTE Examples are the scaling or ageing behaviour of the material.

4.5 Contents of material specification

The different types of specifications for materials for water-tube boilers include the clauses given in Table 1 as a minimum.