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Vodocevni kotli in pomožne napeljave - 16. del: Zahteve za kurilne sisteme na trdna goriva z zgorevalno rešetko ali z lebdečo plastjo

Water-tube boilers and auxiliary installations - Part 16: Requirements for grate and fluidized-bed firing systems for solid fuels for the boiler

Wasserrohrkessel und Anlagenkomponenten - Teil 16: Anforderungen an Rost- und Wirbelschichtfeuerungsanlagen für feste Brennstoffe für den Kessel

Chaudières à tubes d'eau et installations auxiliaires - Partie 16: Exigences pour les équipements de chauffe à lit fluidisé pour combustibles solides

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Water-tube boilers and auxiliary installations - Part 16: Requirements for grate and fluidized-bed firing systems for solid fuels for the boiler

Chaudières à tubes d'eau et installations auxiliaires -
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Anforderungen an Rost- und
Wirbelschichtfeuerungsanlagen für feste Brennstoffe
für den Kessel

This European Standard was approved by CEN on 15 August 2022.

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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
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Contents	Page
European foreword	4
1 Scope	6
1.1 Firing systems	6
1.2 Fuels.....	6
1.3 Operation.....	6
2 Normative references	7
3 Terms and definitions	7
4 Fuel storage facilities with conveying plant	9
4.1 General.....	9
4.2 Conveying plant.....	10
4.3 Fuel bunkers.....	10
4.4 Fuel bins.....	11
5 Fuel treatment	11
5.1 General.....	11
5.2 Size reduction of the fuel.....	11
5.3 Drying of the fuel.....	12
6 Fuel feeding	12
7 Explosion prevention measures	13
Table 1 — Overview of important prevention measures for different operational areas	13
8 Equipment for combustion air supply and flue gas discharge	13
8.1 Air supply.....	13
8.2 Combustion air/fuel ratio.....	14
8.3 Flue gas discharge.....	14
9 Firing system	15
9.1 General.....	15
9.2 Monitoring and control.....	15
9.3 Electrical equipment.....	16
9.4 Safety precautions	16
9.4.1 General.....	16
9.4.2 Purging	16
9.4.3 Lighting-up	17
9.4.4 Start-up.....	17
9.4.5 Shutting down	18
9.5 Common stack for several firing systems	18
10 Ash handling and extraction	19
11 Operating manual	19
Annex A (informative) Operational requirements for permanently supervised firing systems for solid fuels for fluidized-bed and grate firing systems	20
A.1 General.....	20
A.2 Operation.....	20

A.3	Operation and maintenance	20
A.3.1	General	20
A.3.2	Operating instructions.....	20
Annex B (informative)	Significant technical changes between this European Standard and the previous edition.....	21
Annex ZA (informative)	Relationship between this European Standard and the essential requirements of EU Directive 2014/68/EU aimed to be covered.....	22
Table ZA.1 — Correspondence between this European Standard and Directive 2014/68/EU		22
Bibliography		23

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EN 12952-16:2022 (E)**European foreword**

This document (EN 12952-16:2022) 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 April 2023, and conflicting national standards shall be withdrawn at the latest by April 2023.

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 12952-16:2002.

The technical modifications in comparison with the previous edition are listed in Annex B.

The 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.

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, Türkiye and the United Kingdom.

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EN 12952-16:2022 (E)**1 Scope****1.1 Firing systems**

This document applies to atmospheric fluidized-bed and grate firing systems of steam boilers and hot water generators. These systems commence at the fuel bunkers and end at the ash extraction plant. For combination of various firing systems, the individual requirements of each system apply, especially those included in EN 12952-8:2022 and EN 12952-9:2022.

If several fuels are burnt simultaneously or if a fuel quality varies considerably (e.g. moisture content), additional safety measures can be necessary, especially with respect to limitation of the fuel flow into the firing system and ensuring proper air supply to the individual fuels.

Pressurized firing systems can require enhanced safety measures, which are not given in this European Standard.

1.2 Fuels

This document covers the use of solid fuels. Pulverized fuel fired in an entrained air flow (burner) system is covered by EN 12952-9:2022.

Solid fuels covered are:

- all coal qualities, e.g. lignite or brown coal, sub-bituminous or hard brown coal, bituminous coal or hard coal, pitch coal, anthracite, coke, coal culm, coal sludge;
- other fossil solid fuels (e.g. peat, oil shale);
- biomass solid fuels (e.g. wood, wood wastes [bark], pellets, energy plants [miscanthus], harvest wastes [straw] and briquettes);
- municipal waste solid fuels (e.g. garbage, sewage sludge, refuse derived fuels [RDF]);
- industrial waste solid fuels (e.g. petrol coke, soot, tyres, paper wastes, coated wood chips, spent wood, animal product wastes).

Fuel blends from two or more groups, or fuels of unconventional or unknown quality can require special safety measures which can be proved either by practical experience gained from comparable fuels, or by suitable tests, e.g. in accordance with EN 14034-2:2006+A1:2011. Such measures specified and documented by the manufacturer.

Fuels on which the design is documented in the operating instructions (see 11.2). This includes the fuel data for 100 % input of the basic fuel and the data for any supplementary fuels together with their maximum thermal input percentage.

1.3 Operation

The requirements for operational equipment in Clause 4, Clause 5, Clause 6, Clause 7, Clause 8, Clause 9, Clause 10 and Clause 11 apply to steam boilers and hot water generators with permanent supervision by properly trained personnel familiar with the special conditions of the firing systems and the type of fuel.

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 12952-8:2022, *Water-tube boilers and auxiliary installations — Part 8: Requirements for firing systems for liquid and gaseous fuels for the boiler*

EN 12952-9:2022, *Water-tube boilers and auxiliary installations — Part 9: Requirements for firing systems for pulverized solid fuel for the boiler*

EN 12952-18:2012, *Water-tube boilers and auxiliary installations - Part 18: Operating instructions*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

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

3.1 annunciator

device to sense a non-standard or abnormal condition and initiate a visual and/or audible signal

3.2 back-up firing system

separate firing system to maintain safe ignition and stable combustion

3.3 basic fire

in the case of grate firing systems the layer of glowing fuel, fire bed, or flame of the fed fuel

Note 1 to entry: The basic fire ensures safe ignition.

3.4 carrier gas

transport medium for pneumatic conveying

3.5 combustion air

total air supplied to the firing system for combustion

3.6 combustion process monitoring device

device which detects the presence of the fire, or the conditions required for a stable combustion process

3.7 firing system heat input

heat input into the combustion chamber

Note 1 to entry: This normally is calculated as the mass flow of the fuel multiplied by its net calorific value.

EN 12952-16:2022 (E)**3.8****firing system**

total equipment required for the combustion of fuels

Note 1 to entry: Included are the installation for the storage in the boiler house, preparation and supply of fuels, the combustion air supply, the grate or fluidized bed, the flue gas discharge, and all related control and monitoring devices

3.9**fluidized-bed combustion firing system (FBC)**

fuel is burnt in its fluidized state together with an inert component

3.10**fuel bin****silo**

dust-tight and air-tight container for storage of fuels

3.11**fuel bunker**

container for the storage of solid fuel

3.12**fuel feeding system**

device to transport fuel into the combustion chamber

Note 1 to entry: This can be effected e.g. by feeders through ports in the furnace walls, by means of chutes or lances, through the bottom grate or fluidizing gas distributor, or indirectly into the ash recirculation or combustion air supply.

3.13**fuel handling plant**

installation for conveying, mixing and distributing solid fuels to the individual fuel bunkers or fuel bins

3.14**grate firing system**

fuel is burnt in a layer supported by a system e.g. firebars, which can have a cooling system

3.15**indicator**

measuring instrument which indicates a variable value (e.g. pressure, temperature, flow, level)

Note 1 to entry: It can be equipped with an annunciator.

3.16**lighting-up equipment**

facility to achieve safe ignition of the feed fuel

3.17**limiter**

transducer, which, on reaching a fixed limit value (e.g. pressure, temperature, flow, level) is used to interrupt and lock-out the energy supply. It requires manual unlocking before restart

3.18**lockout**

interruption of the energy supply

Note 1 to entry: Manual unlocking is required before restart.

3.19**minimum fluidized-bed temperature**

lowest temperature of the fluidized material at which it can be safely burnt

3.20**minimum heat input of the firing system**

minimum heat input at which the firing system can be safely operated

3.21**monitor**

transducer which on reaching of a fixed limit value and initiates an alarm and/or a cut-out. The output signal only reverses if the causing value has changed at a defined range

3.22**purging of the flue gas passes**

flow including air through the combustion chamber, flue gas passes, treatment systems and associated ducts which effectively removes any gaseous combustibles

3.23**cold start-up condition**

plant started when the temperature of ceramic lining and bed material is at ambient value

3.24**safety time**

time period during which the effectiveness of the safety device may be inhibited without a hazardous condition occurring

4 Fuel storage facilities with conveying plant**4.1 General**

4.1.1 All facilities shall be designed so as to withstand mechanical and thermal stresses. Fuel shall not be heated to an unacceptable level. Sites where fuel can accumulate shall be avoided.

4.1.2 Conveyance, temporary storage, and extraction of fuel shall be arranged such that blockage is avoided.

4.1.3 Fuels liable to volatilise or pyrolysis in the absence of external heating require measures to prevent fire, explosion and injuries to personnel.

WARNING — Wet sludges can have an inherent explosion risk due to the release of volatiles (e.g. methane) when stored. Dried sludges have a fire and dust explosion risk comparable to that of pulverized fuels. Sludge storage in bins is preferable to bunker storage (see 4.4.1).

4.1.4 The storage of fuels supplied in small grain sized particles or fibres which can be stirred up and become airborne shall only be permitted in bins (silos).