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Water-tube boilers and auxiliary installations - Part 9: Requirements for firing systems for pulverized solid fuels for the boiler

Wasserrohrkessel und Anlagenkomponenten - Teil 9: Anforderungen an Staubfeuerungsanlagen für den Kessel

Chaudières à tubes d'eau et installations auxiliaires - Partie 9: Exigences pour les équipements de chauffe pour combustibles solides de la chaudière

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Water-tube boilers and auxiliary installations - Part 9: Requirements for firing systems for pulverized solid fuels for the boiler

Chaudières à tubes d'eau et installations auxiliaires -
Partie 9: Exigences pour les équipements de chauffe
pour combustibles solides de la chaudière

Wasserrohrkessel und Anlagenkomponenten - Teil 9:
Anforderungen an Staubfeuerungsanlagen für den
Kessel

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

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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EN 12952-9:2022 (E)**European foreword**

This document (EN 12952-9:2022) 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of an identical text or by endorsement, at the latest by April 2023, and conflicting national standards shall be withdrawn at the latest by April 2023.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 12952-9:2002.

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 12952-9:2022 (E)**1 Scope****1.1 Firing systems**

This document applies to pulverized fuel firing systems of steam boilers and hot water generators and commences at the filling equipment for the boiler bunkers or for the pulverized fuel storage system and ends at the ash extraction plant. For multifuel firing systems using separate or combined burners, these requirements apply to the pulverized fuel firing part involved. For other fuels or firing systems used in combination, other requirements apply, e.g. EN 12952-8:2022.

1.2 Fuels

These requirements cover the use of pulverized fuels (e.g. coke, anthracite, bituminous coal or hard coal, lignite or brown coal, petrol coke, oil shale and pulverized bio mass) ranging from low to high volatile matter content.

1.3 Operation

Requirements for operational equipment apply for steam boilers and hot water generators with permanent supervision by properly trained persons.

As firing systems using pulverized fuel can be designed either as direct-firing or as indirect-firing systems, operational requirements have to be differentiated. Annex A summarizes the operational requirements for firing systems including the pulverizing system.

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 1127-1:2019, *Explosive atmospheres - Explosion prevention and protection - Part 1: Basic concepts and methodology*

EN ISO 4126-1:2013,¹ *Safety devices for protection against excessive pressure - Part 1: Safety valves (ISO 4126-1:2013)*

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

¹ As impacted by EN ISO 4126-1:2013/A1:2016 and EN ISO 4126-1:2013/A2:2019.

3 Terms and definitions

For the purposes of this document the terms and definitions given in EN 12952-8:2022 and the following 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

back-up firing system

separate firing system to maintain safe ignition and stable combustion of the pulverized fuel

3.2

burner group

burners operated in forced unison and controlled jointly and the burners supplied by the same mill or the same pulverized fuel feeder

3.3

burner management system

system which performs a predetermined sequence of actions and always operates in conjunction with a flame monitor

Note 1 to entry: It reacts to signals from control and safety devices, gives control commands, controls the start-up sequence, supervises the burner operation, and causes controlled shutdown and lock-out.

3.4

carrier gas

transport medium for pulverized fuel through mill, classifier, and pulverized fuel lines

Note 1 to entry: It can consist of primary air and/or inert gas.

3.5

clearing

removal of accumulation or settlement of pulverized fuel in the case of insufficient purging of the pulverizing system

3.6

bunker

bunker for the storage of raw fuel for an individual mill

3.7

fuel feeder

installation for the extraction of fuel from the fuel bunker and the controlled feeding of fuel into the mill

3.8

combustion air

total air supplied to the firing system for combustion

3.9

conveying plant (fuel handling plant)

installation for conveying and distributing raw fuel to the individual fuel bunkers

EN 12952-9:2022 (E)**3.10****direct-firing system**

system where the fuel is ground and dried in the mill and then is fed directly to the burners

3.11**explosion**

unintentional instantaneous combustion phenomenon occurring in a confined space with considerable pressure build-up

Note 1 to entry: A weak explosion is called puffing.

3.12**explosion pressure resistant design**

installation that is dimensioned so as to withstand the maximum explosion pressure without sustaining permanent deformation

3.13**explosion pressure shock resistant design**

installation that is dimensioned so as to withstand the pressure surge occurring during an explosion without rupture although permanent deformation can occur

3.14**firing rate during start-up**

firing rate of a burner or a burner group forming part of a pulverizing system of a direct-fired system during start-up

3.15**firing system**

equipment for the combustion of fuels, including the installations for the storage in the boiler house, preparation and supply of fuels, the combustion air supply, the burner(s), the flue gas discharge, and all related control and monitoring devices

Note 1 to entry: A flue gas recirculation system can be installed as an integral part of the firing system.

3.16**firing system heat input**

heat input into the combustion chamber

Note 1 to entry: Firing system heat input is normally calculated as the mass flow of the fuel supplied multiplied by its net calorific value

3.17**flame monitor**

device that detects the presence or absence of the flame and transmits a signal to the control device

Note 1 to entry: For a pulverized fuel firing system the flame can be defined as:

- an individual flame of a single burner,
- the flame of a burner group for instance all burners connected to a pulverizing system,
- the flame of all burners in one combustion chamber.

3.18**flame-resistant material**

combustible only when subjected to a continual supply of heat energy and extinguishes upon removal of the ignition source

3.19**flue gas recirculation**

return of flue gas from downstream of the flame zone or from the flue gas exit

Note 1 to entry: This can be achieved by pressure difference or the use of a separate fan or fans into the pulverizing system, the air register of the burner, or directly into the combustion chamber.

3.20**implosion**

unintentional instantaneous negative pressure build-up

Note 1 to entry: This can occur as a consequence of an explosion in a confined space, by rapid closing of dampers, or by rapid reduction in temperature, e.g. flame out.

3.21**indirect-firing system**

system where the fuel that has been ground and dried in the mill is intermediately stored in bins and the vapours are separated

Note 1 to entry: The pulverized fuel is extracted from the bin and fed to the burners.

3.22**inerting**

dilution of the oxygen content of an air/fuel mixture by the addition of an inert gas or steam to a level where it is no longer ignitable

3.23**lighting-up equipment**

facility to achieve safe ignition of pulverized fuel at the burner

Note 1 to entry: It may also be used for the provision of heat to initiate the drying process during start-up of a mill in a direct-firing system.

3.24**limiter**

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

3.25**lockout**

interruption of the energy supply

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

3.26**master fuel trip**

device for rapid automatic shutoff of all fuel supplies to the boiler area and power to the electrical igniters in the event of danger

EN 12952-9:2022 (E)**3.27****maximum heat input of the firing system**

maximum heat input including the reserves required for load control at which the firing system can be safely operated including all reserves

3.28**mill**

installation for grinding and drying the raw coal or bio mass and for classifying and conveying the pulverized fuel

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

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

3.30**monitor**

limit transducer that senses the reaching of a fixed limit value and initiates an alarm and/or a cut out

Note 1 to entry: The output signal is only cancelled if the cause of the alarm has been removed and the value has returned to within its fixed limits.

3.31**multi-fuel burner**

burner in which more than one fuel is burned either simultaneously or alternately

3.32**multi-fuel firing system**

firing system where, in a common combustion chamber, more than one fuel can be burned simultaneously or alternately by separate or multi-fuel burners

3.33**primary air**

part of the combustion air flow fed to the mill for the drying and conveying of pulverized fuel. This primary air may be mixed with flue gas

3.34**pulverized fuel bin**

bin (silo) for the intermediate storage of pulverized fuel

3.35**pulverized fuel burner**

device for the introduction of fuel and air into a combustion chamber at required velocities, turbulence, and local fuel concentration in order to establish and maintain proper ignition and stable combustion of the fuel

3.36**pulverized fuel feeder**

device for the controlled feeding of pulverized fuel from the pulverized fuel bin into the pulverized fuel supply lines to the burners or other equipment

3.37**pulverizing system heat input**

firing system heat input is the sum of the heat input from the single pulverizing systems