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Vodocevni kotli in pomožne napeljave - 8. del: Zahteve za gorilnike kotlov na tekoča in plinasta goriva

Water-tube boilers and auxiliary installations - Part 8: Requirements for firing systems for liquid and gaseous fuels for the boiler

Wasserrohrkessel und Anlagenkomponenten - Teil 8: Anforderungen an Feuerungsanlagen für flüssige und gasförmige Brennstoffe für den Kessel

Chaudières à tubes d'eau et installations auxiliaires - Partie 8 : Exigences pour les équipements de chauffe pour combustibles gazeux et liquides de la chaudière

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

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

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European foreword

This document (EN 12952-8:2022) 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of an identical text or by endorsement, at the latest by April 2023, and conflicting national standards shall be withdrawn at the latest by April 2023.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 12952-8:2002.

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

The EN 12952 series "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.

1 Scope

1.1 Firing systems

This document specifies requirements for liquid and gaseous fuel firing systems of steam boilers and hot water generators as defined in EN 12952-1:2015.

These requirements also apply to firing systems of chemical recovery boilers (black liquor boilers) with the additions and amendments specified in Annex A.

These requirements also apply to gas turbines in combination with fired/unfired heat recovery steam generators with the additions and amendments specified in Annex B.

NOTE 1 This document is not applicable to coil type boilers (flash boilers/small boilers) that use burners in accordance with EN 12953-7 for single burner installations.

NOTE 2 This document is not applicable to the storage of liquid fuels and to transfer stations of long-distance gas pipelines.

1.2 Fuels

This document specifies requirements which cover the use of liquid and gaseous fuels as defined in this document. Fuels deviating from standardized commercially available types can require additional or alternative safety measures. For black liquor these safety measures are given in Annex A.

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 161:2011+A3:2013, *Automatic shut-off valves for gas burners and gas appliances*

EN 751-3:1996,[1] *Sealing materials for metallic threaded joints in contact with 1st, 2nd and 3rd family gases and hot water – Part 3: Unsintered PTFE tapes*

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

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

EN 13480-2:2017, *Metallic industrial piping - Part 2: Materials*

EN 16678:2015, *Safety and control devices for gas burners and gas burning appliances - Automatic shut-off valves for operating pressure of above 500 kPa up to and including 6 300 kPa*

EN ISO 228-1:2003, *Pipe threads where pressure-tight joints are not made on the threads - Part 1: Dimensions, tolerances and designation (ISO 228-1:2000)*

EN ISO 9606-1:2017, *Qualification testing of welders - Fusion welding - Part 1: Steels (ISO 9606-1:2012 including Cor 1:2012 and Cor 2:2013)*

[1] As impacted by EN 751-3:1996/AC:1997.

EN ISO 23553-1:2022, *Safety and control devices for oil burners and oil-burning appliances - Particular requirements - Part 1: Automatic and semi-automatic valves (ISO 23553-1:2022)*

ISO 7-1:1994, *Pipe threads where pressure-tight joints are made on the threads — Part 1: Dimensions, tolerances and designation*

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
black liquor
spent liquor from the pulp cook

3.2
black liquor gun
device for the introduction of the black liquor as a spray of droplets into the furnace

Note 1 to entry: The black liquor gun is not a burner.

3.3
high volume low concentration odorous gas
mixtures of air and a low concentration of odorous gases collected from the pulp mill processes, where the concentration of the combustible odorous gas is always kept below the lower explosion limit

3.4
burner
device (including main or igniter burners) for the introduction of fuel and air into a combustion chamber of a steam generator at required velocities, turbulence and local fuel concentration to establish and maintain proper ignition and stable combustion of the fuel

Note 1 to entry: Burners are differentiated by their mode of operation.

3.4.1
chemical recovery boiler start-up burner
oil- or gasfired burner mainly intended for the initiation of the black liquor combustion process

Note 1 to entry: The chemical recovery boiler start-up burners are located in and integrated with a combustion air register, like the primary or the secondary air register of the furnace. Thus, they have no individual air supply and no individual combustion air control.

3.4.2
multi-fuel burner
burner in which more than one fuel is burned either simultaneously or alternately

3.4.3
pilot burner
burner which maintains a proper permanent ignition source for one or a group of other non-monitored burners

3.5
burner group
burners operated in unison and controlled jointly, one of which can be a master burner

3.6
burner management system
system that performs a predetermined sequence of actions and always operates in conjunction with a flame monitor that reacts to signals from control and safety devices, gives control commands, controls the start-up sequence, supervises the burner operation, and manages controlled shutdown and lockout

3.7
firing system
total equipment required for the combustion of fuels including the installations for the storage, 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 an integral part of the firing system.

3.8
firing system heat input
heat input into the combustion chamber according to the mass flow of the fuel supplied multiplied by the net calorific value

3.9
flame monitor
device which detects the presence or absence or break-away of the flame and transmits a signal to the control device, and generally consists of a sensing device (with amplifier if necessary) and switching equipment

3.10
flue gas recirculation
return of flue gas from downstream of the flame zone or from the flue gas exit by hydrodynamic pressure difference or a separate fan into the air register of the burner or directly into the combustion chamber

3.11
implosion
unintentional instantaneous negative pressure build-up caused, for example, by an explosion in a confined space, by rapid closing of dampers, or by rapid reduction in temperature (flame out)

3.12
limiters
transducer, which, on reaching a fixed value (e.g. pressure, temperature, flow, water level) is used to interrupt and lock-out the energy supply, and requires manual unlocking before restart

3.13
lock-out
isolation of energy supply which requires a manual intervention to reinstate

3.14
master fuel trip
extinction of all burners and igniters in the combustion chamber

3.15
maximum heat input of the firing system
heat input including the reserve required for load control at which the boiler can be safely operated

3.16
maximum firing rate of the burners
firing rate at which the burner may be operated

3.17
monitor
limit transducer which 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.

3.18
multi-fuel firing system
firing system where, in a common combustion chamber, more than one fuel can be burnt simultaneously or alternately by separate or multi-fuel burners

3.19
purge of burner guns
carried out after shutdown of a burner to ensure the removal of residual fuel by the introduction of steam or pressurized air into the fuel lines downstream of the shut-off devices

3.20
purging of the flue gas passes
forced flow of air through the combustion chamber, flue gas passes, and associated ducts which effectively removes any gaseous combustibles and replace them with air

3.21
quick-acting shut-off device
safety trip valve which closes within 1 s according to EN 161:2011+A3:2013, EN 16678:2015 or EN ISO 23553-1:2022, as appropriate

3.22
relative density
ratio of the density of the gas to the density of dry air under equal conditions of pressure and temperature

3.23
liquid fuel
fuel including light fuel oils, and heavy fuel oils which need preheating for proper atomisation

Note 1 to entry: For improvement of atomisation, emulsions of heavy fuel oil with water may be used with appropriate precautions

3.24
gaseous fuel
standardized quality differentiated mainly by their relative density

3.24.1
light gas
with relative density below 1,3 e.g. natural gas, coke-oven gas, blast-furnace gas

Note 1 to entry: Natural gas in accordance with ISO 6976 [4].

3.24.2
heavy gas
with relative density exceeding 1,3 e.g. liquefied petroleum gases, the main components of which are propane and butane

3.25
restart
operation where fuel supply shut-off is initiated within 1 s at the latest after extinction of the flame during operation, and a directly following attempt of re-ignition is automatically made in compliance with the start-up sequence

Note 1 to entry: This operation ends with the operating condition being reached or, if the flame is not ignited after expiration of the ignition safety time, with the lock-out.

3.26
return-flow atomizer
oil burners where a portion of the quantity of oil supplied to the burner via the flow line does not flow from a burner gun vortex chamber into the combustion chamber, but flows backwards into the storage tank or to the suction side of the pump via a separate return line

Note 1 to entry: Output is adjusted by a control device in the return line.

3.27
safety shut-off device
safety trip valve
valve which automatically and totally cuts off the fuel supply

3.28
safety time
time taken from the occurrence of an unsafe operating condition (for example, flame interrupt during normal operation) to the point at which the actuating element is initiated

Note 1 to entry: The reaction time of the actuating element is to be considered separately.

[SOURCE: EN 50156-1:2015 [9], 3.43]

3.28.1
ignition time
when starting-up the burner, the period of time between the first fuel entering the combustion chamber and the first indication of the flame by the flame monitor

3.28.2
ignition safety time
when starting-up the burner, the period of time between the first fuel entering the combustion chamber and the de-energizing of the quick-acting shut-off device if the flame monitor does not indicate a flame