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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 DARD PREVIEW

Chaudieres a tubes d'eau et installations auxiliaires - Partie 9: Exigences pour les équipements de chauffe pour combustibles pulverisés de la chaudiere

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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 pulverisés de la chaudière Wasserrohrkessel und Anlagenkomponenten - Teil 9: Anforderungen an Staubfeuerungsanlagen für den Kessel

This European Standard was approved by CEN on 4 November 2002.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

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Foreword

This document (EN 12952-9:2002) 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of an identical text or by endorsement, at the latest by June 2003, and conflicting national standards shall be withdrawn at the latest by June 2003.

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 97/23/EC [1].

For relationship with EU Directive 97/23EC, see informative Annex ZA, which is an integral part of this document.

The European Standard EN 12952 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 boileds.iteh.ai)
- 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 B-
- Part 10: Requirements for safeguards against excessive pressure
- Part 11: Requirements for limiting devices of the boiler and accessories
- Part 12: Requirements for feedwater and boiler water quality
- Part 13: Requirements for flue gas cleaning systems
- Part 14: Requirements for flue gas DENOX-systems
- Part 15: Acceptance tests
- Part 16: Requirements for grate and fluidized bed-firing systems for solid fuels for the boiler

CR 12952-17, Water-tube boilers and auxiliary installations — Part 17: Guideline for the involvement of an inspection body independent of the manufacturer.

Although these parts may be obtained separately, it shall be recognized that the parts are interdependent. 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 standard to be satisfactorily fulfilled.

NOTE Parts 4 and 15 are not applicable during the design, construction and installation stages.

Annex A of this European Standard is informative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

1.1 Firing systems

This European Standard 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.

1.2 Fuels

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

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 may 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.

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1.4 Boundary of pulverizing systemstandards.iteh.ai)

A pulverizing system is bounded by:

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- the outlet of the fuel bunkters' feedings the mill talog/standards/sist/0b15632b-4e68-4dd8-aaf3-58837b88c6bb/sist-en-12952-9-2003
- the outlet of the burners fed from that mill;
- the points at which the hot air or flue gas and tempering air or flue gas leave their main supply ducts including the primary air fan if associated individually with the mill.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1127-1, Explosive atmospheres — Explosion prevention and protection — Part 1: Basic concepts and methodology.

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

prEN 50156-1, Electrical equipment for furnaces and ancillary equipment — Part 1: Requirements for application design and installation.

Terms and definitions 3

For the purposes of this European Standard, the terms and definitions given in EN 12952-8 and the following apply.

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

burner management system performs a predetermined sequence of actions and always operates in conjunction with a flame monitor. 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. It may consist of primary air and/or inert das

3.5 clearing

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removal of accumulation or settlement of pulverized fuel in the case of insufficient purging of the pulverizing system (standards.iten.ai)

3.6

coal bunker

SIST EN 12952-9:2003 bunker for the storage of raw coal for an individual millandards/sist/0b15632b-4e68-4dd8-aaf3-58837b88c6bb/sist-en-12952-9-2003

3.7

coal feeder

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

3.8

combustion air

total air supplied to the firing system for combustion

3.9

conveying plant (Coal handling plant)

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

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 A weak explosion is called puffing.

3.12

explosion pressure resistant design

installations that are dimensioned so as to withstand the maximum explosion pressure without substaining permanent deformation

3.13

explosion pressure shock resistant design

installations that are dimensioned so as to withstand the pressure surge occurring during an explosion without rupture although permanent deformation may 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 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, 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

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For a pulverized fuel firing system the flame can be defined as: (standards.iteh.ai)

— an individual flame of a single burner,

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the flame of a burner group for instance all burners connected to a pulverizing system,

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the flame of all burners in one combustion chamber.

3.18

flame-resistant material

flame-resistant material that is 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 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 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 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. 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. 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

3.27

maximum heat input of the firing system ANDARD PREVIEW

maximum heat input including the reserves required for load control at which the firing system can be safely operated including all reserves (standards.iteh.ai)

3.28 mill

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installation for grinding and drying the raw coal 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. 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 burners

burners 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 of a direct-fired system divided by the number of pulverizing systems in operation

3.38

purging of the flue gas passes

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

3.39

purging of the pulverizing system

removal of any accumulation or settlement of pulverized fuel from inside the pulverizing system

3.40

safety time

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

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4 Fuel bunkers with conveying plant_{SIST EN 12952-9:2003}

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4.1 General

4.1.1 The conveyance of raw coal, temporary storage in bunkers, and extraction shall be arranged such that the flow of the fuel is ensured as far as possible.

4.1.2 Coarse coal lumps, foreign matter, and tramp metal shall be removed to avoid damage or blockage of the pulverizing system.

4.1.3 Access to the coal handling plant area shall be limited to authorized staff (see annex A).

4.1.4 Dangerous areas of the coal handling plant shall be marked by warning signs.

4.2 Conveying plant

4.2.1 Automatic facilities for the conveyance and distribution of coal into the bunkers shall only be started if visual and/or audible warning signals have been given beforehand. Precautions necessary for the protection of personnel against injury by moving components shall be taken. Sufficient waiting time between warning signal and start-up shall be provided (see A.4).

4.2.2 Several continuous conveyors arranged in series to form one conveying line shall be interlocked such that the normal operation of any conveyor is possible only if the downstream conveyors are in operation and the storage facility is ready to accept the coal.

4.3 Coal bunkers

4.3.1 The coal bunkers shall be built to achieve uniform discharge by the selection of proper shape and design in order to ensure a continuous uniform flow of the coal and to avoid segregation.

4.3.2 To avoid ingress of hot air/gas into the bunker or the suction of leakage air into the pulverizing system, a minimum fuel level shall be maintained in the bunker, unless other suitable measures are taken.

4.3.3 The minimum filling level of coal bunkers shall be monitored and an alarm activated when the level falls below the predetermed level.

4.3.4 The inner surface of the coal bunker roof shall be designed so as to avoid the accumulation of dust and gas in dead pockets.

4.3.5 Bunker charging openings shall be guarded to prevent personnel from falling in (see A.5).

4.3.6 Fuel bunkers shall be equipped with fire fighting or fire prevention equipment. Coal bunkers may be emptied by use of emergency chutes.

5 Pulverizing system and pulverized fuel system

5.1 General

5.1.1 The pulverizing system shall be readily accessible to enable cleaning operations to be carried out. Pressurized systems shall be dust-tight and gas-tight.

5.1.2 All practicable steps should be taken to eliminate sites in the pulverizing system where pulverized fuel and raw coal may become lodged.

5.1.3 If there is a possibility of settlement of pulverized fuel on components that have become hot during operation, facilities shall be provided for purging and clearing after shut-down.

5.1.4 The system shall include throughout indicators and annunciators which will provide the operator with adequate information about significant operating conditions, both normal and abnormal.

5.1.5 To avoid the build up of electrostatic charges, all components shall be earthed unless forced and faultless earthing is inherent in the design.

NOTE Further information is given in CENELEC Report R 044-001 [2].

5.2 Coal feeders

5.2.1 Coal feeders and chutes shall be designed to provide a uniform flow of coal into the mill.

5.2.2 Means shall be provided for monitoring the flow of coal. In the event of loss of flow an audible or visible alarm shall be acturated.

5.3 Mills

5.3.1 Mills shall be designed to withstand the mechanical and thermal loadings which occur during operation.

Pulverising mills are machines within the meaning of Council Directive 98/37/EC and should be designed and constructed to comply with specified essential safety requirements, in particular requirements to avoid risks from fire or explosion. Equipment within coal pulverising mills and associated control devices may also fall within the scope of European Council Directive 94/9/EC on equipment and protective systems for use in potentially explosive atmospheres. Manufacturers of pulverised fuel systems shall follow the requirements of EN 1127-1, where applicable to ensure that the risks from coal dust explosions are eliminated or properly controlled.

5.3.2 The temperature downstream of the mill or classifier shall be continuously measured. If the allowable operating temperature is exceeded, this shall be annunciated by an optical and/or accoustic alarm. Suitable automatic devices shall prevent the upper temperature limit from being exceeded.