SLOVENSKI STANDARD
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Vodocevni kotli in pomožne napeljave - 13. del: Zahteve za čistilne naprave dimnih plinov

Water-tube boilers and auxiliary installations - Part 13: Requirements for flue gas cleaning systems

Wasserrohrkessel und Anlagenkomponenten - Teil 13: Anforderungen an Rauchgasreinigungsanlagen

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Chaudieres a tubes d'eau et installations auxiliaires - Partie 13: Exigences pour les systemes de traitement des fumées

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

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English version

Water-tube boilers and auxiliary installations - Part 13: Requirements for flue gas cleaning systems

Chaudières à tubes d'eau et installations auxiliaires - Partie 13: Exigences pour les systèmes de traitement des fumées

Wasserrohrkessel und Anlagenkomponenten - Teil 13: Anforderungen an Rauchgasreinigungsanlagen

This European Standard was approved by CEN on 27 December 2002.

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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 Management Centre has the same status as the official versions.

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Foreword

This document (EN 12952-13:2003) 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of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.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(s).

For relationship with EU Directive(s), 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 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 and safety circuits 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*
— *Part 15: Acceptance tests*
— *Part 16: Requirements for grate and fluidized bed firing systems for solid fuels for the boiler*

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

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Although, these parts may be obtained separately, it should be recognised 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 European Standard to be satisfactorily fulfilled.

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

Annex A 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, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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1 Scope

This part of this European Standard applies to the design of equipment for boiler plants to reduce air pollutants in the flue gases.

NOTE The effects of explosion are not considered in this part of this European Standard.

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

prEN 12952-14, *Water-tube boilers and auxiliary installations – Part 14: Requirements for flue gas DENOX-systems*

EN 13445 (all parts), *Unfired pressure vessels*.

prEN 50156-1:1997, *Electrical equipment for furnaces and ancillary equipment – Part 1: Requirements for application design and installation*.

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3 Design, calculation, construction and manufacture

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3.1 The plant components, vessels, absorbers, DENOX reactors, scrubbers, heat exchangers, pipework, ducts, expansion joints, shut-off devices, blanking disks and other related equipment shall be designed such that they will safely withstand the mechanical loadings from internal pressure, vacuum, if any, dead weight and additional forces e.g. expansion joint working spring rates, at the intended operating temperature and for the service lifetime. Pressures and loadings resulting from operating upset conditions and their consequences shall be considered separately. In such cases, the safety factor referred to the pertinent yield stress shall be at least 1.0.

Temperatures below dew point, if any, and the consequences arising therefrom shall be prevented by suitable measures or by proper selection of materials. Additional effects such as corrosion/erosion attack by other chemicals in the flue gas may be considered by wall thickness allowances, if required. The suitability of plant components containing water-polluting substances shall comply with European Standards (e.g. prEN 12285).

3.2 The design shall be based on the load assumptions of EN 13445 unless deviations from these assumptions occur locally.

For additional loadings not covered by the above mentioned standard the respective values shall be taken from the design data, in which case distinction has to be made between normal and abnormal operating load conditions.

3.3 Unfired pressure vessels included in the system shall be designed and manufactured in accordance with EN 13445.

3.4 The design shall assume that under any operating condition the flue gas pressure is not higher or lower than the value used in the design. Particular consideration of the damper positions and the heads of pumps and fans shall be taken into account.

3.5 The design of the components shall take into account the requirements for corrosion resistant materials, for items such as linings and coatings.

3.6 Structural components of the flue-gas cleaning plant shall meet the relevant European Standards (e.g. ENV 1993, ENV 1994). Fire-protection requirements shall be taken into account.

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3.7 Firing systems for reheating the flue-gas (e.g. flat flame burners) shall be designed in accordance with EN 12952-8.

4 Equipment and erection

4.1 Suitable control equipment shall be provided to prevent pressure or temperature excursions:

a) in the flue gas path, e. g. by cut-out of the firing system or changeover to the flue-gas bypass system

b) in isolated sections when

- supplementary firing systems for flue-gas reheating;
- seal-air fans on isolating dampers;
- fans are operating.

c) in the case of failure of or operating problems on

- equipment, e. g. fans, heat exchangers, back-up burners;
- dampers.

Electrical drive units having safety functions shall meet the requirements of prEN 50156-1.

4.2 Drains shall be provided to permit the discharge of any condensate formed below the dew point temperature.

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4.3 Access openings, e.g. manhole doors, shall be provided in vessels, ducts and similar equipment to facilitate the required maintenance work.

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4.4 Access openings shall wherever possible have the following dimensions

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- an internal diameter of at least 800 mm or
- a cross-section of at least 0,5 m^2 for rectangular sections in which case no side length of the opening shall be less than 600 mm.

If the design precludes the aforementioned dimensions, the access openings shall not be less than 600 mm diameter.

It shall be possible to open covers of access openings without danger, and such covers shall not close automatically.

In the case of openings on the side of components, their lower edge shall not be higher than 500 mm above the access level. If necessary, mobile access platforms shall be used. Access openings shall be provided with latching handles which shall be so located as to ensure safe holding.

When locating access openings care shall be taken to ensure that there is no danger of falling through the opening. If the danger of falling cannot be excluded, handles and guides for the attachment of safety harness equipment shall be provided.

The danger of falling shall be clearly indicated by a warning notice.

4.5 During any operating condition no appreciable amount of flue gas or other substances shall enter plant areas released for work, e. g. the operation of a boiler with isolated flue-gas ducts or the operation of several boilers with one common flue-gas duct.

This may be achieved for example by;

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a) two shut-off devices arranged in series with a seal-air space between them supplied with reliably[1] monitored seal air;

b) one shut-off device with double seal and seal-air space between the two seals supplied with reliably[1] monitored seal air;

c) two shut-off devices arranged in series with an intermediate opening to atmosphere and monitoring equipment to detect leaking flue gas;

d) readily visible, tight blanking disc;

e) one shut-off device situated between the section to be inspected and the induced-draught fan with reliably[1] monitored sub-atmospheric pressure between the shut-off device and the induced-draught fan. In this case one monitoring criteria shall become effective which directly indicates the failure of the draught, e. g. by means of flow or air measurements. This induced-draught fan shall not be used for boiler operation during inspection;

f) Other equivalent means.

The seal air pressure shall be monitored continuously e. g. by measuring the differential pressure between seal air and flue gas. The seal air pressure shall always be higher than the respective pressure on the flue gas side.

NOTE Only the seal air pressure need be monitored if the maximum possible flue gas pressure (gauge) is known for all operating and upset conditions[2].

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Where the seal air pressure is less than its fixed limit value, at least one locally positioned optical and acoustic alarm shall automatically be tripped. The alarm shall be tripped so as to be recognizable by all personnel working in the respective work area.

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The measuring points for seal air monitoring shall be arranged so as to give representative values for the seal-air space even under unfavourable conditions, e. g. caking, dust deposition, leaking sealing elements.

The closed shut-off devices shall be safeguarded against unintentional or erroneous opening. This means mechanical interlocking or similar means shall be required in addition to cutting off the auxiliary energy. The interlocking device shall be designed so as to withstand 1.5 times the design value of the opening forces.

4.6 For operational or maintenance measures, suitable access shall be provided. Areas to be inspected shall have a free height of at least 2 m and a free width of at least 1 m. However, the latter may be restricted to 0,8 m local to individual valves.

Where access is required to valves which have to be inspected or actuated for operational reasons, such access may be by treads, steps, platforms with stairways or permanently installed access ladders.

4.7 Suitable facilities shall be provided for maintenance purposes as well as storage and lay-down spaces. The assembly and disassembly of components, e. g. drive units, pumps, spray lances, catalysts, may be achieved by the use of scaffolds, staging or platforms with storage or lay-down spaces as well as by the provision of appropriate transport routes.

For the inspection of flue-gas ducts, silos, scrubbers or vessels by means of inspection equipment, provision shall be made to ensure the safety of personnel.

4.8 Where gas-flue ducts, heat exchangers, reactors, and other similar equipment are to be inspected, safeguards against falling shall be provided in the case of vertical or extremely sloping walls. This shall be by fixed railings or temporary railings or railings which shall be installed prior to beginning the respective maintenance work.

1) Requirements according to prEN 50156-1:1997, clause 10.

2) Attention is drawn to the fact that the temperature will be below dew point when using cold seal air.

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4.9 Where ammonia storage, treatment and supply facilities for pressurized liquefied ammonia are installed, they shall be in accordance with prEN 12952-14.

4.10 In the proximity of locations where acids, alkaline solutions or similar substances are handled regularly (e. g. sampling points), readily accessible emergency showers and facilities for rinsing the eyes with water shall be provided and be marked, and their functional capability shall be permanently ensured.

4.11 To ensure sufficient venting of the flue gas system, venting openings, which may also be designed as access openings, shall be provided in sufficient number and dimension at suitable locations. Venting openings shall be safeguarded against closing during venting. It shall be possible to safely discharge gases or vapours which are present or may be generated.

4.12 Where in systems, e. g. in areas of scrubbers, heat exchangers, flue-gas ducts, reactors, and vessels, deposits or caking may be expected, appropriate facilities shall be provided to permit safe cleaning.

4.13 Facilities shall be provided and measures shall be taken to prevent the formation of explosive mixtures; e. g. a sufficient quantity of diluent air shall be provided in the case of ammonia injection.

4.14 Plant components containing potential water-polluting substances shall be equipped in accordance with the European Standards (e.g. prEN 12285, prEN 13160) for water protection.

4.15 Fire protection measures shall be taken in conformance with regulations on fire protection in power plants.

5 Inspection and testing

5.1 Inspection of workmanship and leakage testing

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All components containing polluting substances shall be inspected for workmanship and be submitted to leakage testing by the manufacturer.

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The inspection of workmanship of walls shall comprise of the walls to be lined, as well as the rubber lining and the coating.

Leakage tests shall be performed by hydrostatic, pneumatic or vacuum testing or by means of other processes.

The type and extent of the tests and inspections as well as the persons conducting such tests and inspections shall be the responsibility of the manufacturer.

5.2 Final inspection before putting into operation

The inspection shall include functional tests of the safety-relevant plant components.

6 Operating manual and instructions

The manufacturer shall provide the flue-gas cleaning plant user with an operating manual containing the following information:

a) arrangement drawings of the flue-gas cleaning plant;

b) instructions for plant start-up and shutdown and, if required, the testing instructions for safety devices;

c) measures to be taken in the event of operating problems or dangers arising, especially hazards from the substances or products used or generated;

d) references to specific dangers which may arise during plant operation;

e) identifications of system escape routes.

NOTE Guidance on operation matters is given in annex A.