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Vodocevni kotli in pomožne napeljave - 10. del: Zahteve za opremo in varnostne naprave za preprečevanje prekoračitve tlaka

Water-tube boilers and auxiliary installations - Part 10: Requirements for safety devices against excessive pressure

Wasserrohrkessel und Anlagenkomponenten - Teil 10: Anforderungen an Sicherheitseinrichtungen gegen Überdruck

Chaudières à tubes d'eau et installations auxiliaires - Partie 10 : Exigences pour la protection vis-à-vis des excès de pression

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ICS:

13.240	Varstvo pred previsokim tlakom	Protection against excessive pressure
27.060.30	Grelniki vode in prenosniki toplote	Boilers and heat exchangers

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NORME EUROPÉENNE
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Will supersede EN 12952-10:2002

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Water-tube boilers and auxiliary installations - Part 10: Requirements for safety devices against excessive pressure

Chaudières à tubes d'eau et installations auxiliaires -
Partie 10 : Exigences pour la protection vis-à-vis des
excès de pression

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Überdruck

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 269.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN 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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 12952-10:2020) has been prepared by Technical Committee CEN/TC 269 “Shell and water-tube boilers”, the secretariat of which is held by DIN.

This document will supersede EN 12952-10:2002.

This document is currently submitted to the CEN Enquiry.

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 may 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.

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NOTE A "Boiler Helpdesk" has been established in CEN/TC 269 which may be contacted for any questions regarding the application of EN 12952 series and EN 12953 series, see the following website: <http://www.boiler-helpdesk.din.de>

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 2014/68/EU.

For relationship with EU Directive 2014/68/EU, see informative Annex ZA which is an integral part of this document.

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1 Scope

This document specifies the requirements for safety devices against excessive pressure in water-tube boilers as defined in EN 12952-1:2015.

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

EN ISO 4126-4:2013, *Safety devices for protection against excessive pressure - Part 4: Pilot-operated safety valves (ISO 4126-4:2013)*

EN ISO 4126-5:2013, *Safety devices for protection against excessive pressure - Part 5: Controlled safety pressure relief systems (CSPRS) (ISO 4126-5:2013)*

EN 12952-1:2015, *Water-tube boilers and auxiliary installations - Part 1: General*

EN 13480-3:2017, *Metallic industrial piping - Part 3: Design and calculation*

3 Terms and definitions

For the purposes of this document the terms and definitions given in EN 12952-1:2015, EN ISO 4126-1:2013, EN ISO 4126-4:2013 and EN ISO 4126-5:2013 apply.

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

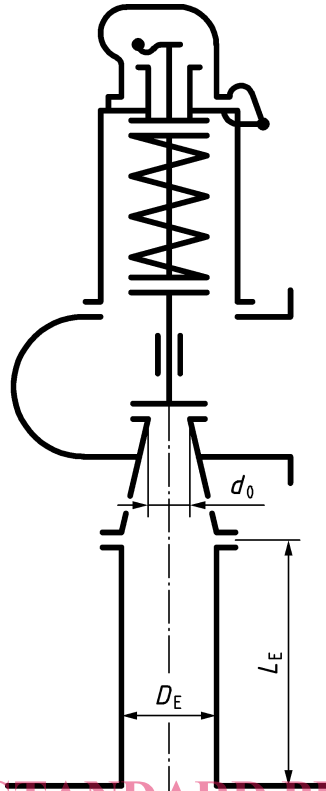
- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

4 Symbols and abbreviations

For the purposes of this document, the symbols given in EN 12952-1:2015, Table 1 shall apply. Throughout this document, additional terminology and symbols have been included where necessary to meet the requirements of the specific text concerned (see Table 1 and Figure 1).

Table 1 — Symbols and units

Symbol	Explanation	Unit
D_E	inlet pipe internal diameter	mm
d_0	smallest flow diameter (minimum free bore)	mm
L_E	developed length of inlet pipe	mm



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Key

- D_E inlet pipe internal diameter, in mm
- d_0 smallest flow diameter (minimum free bore), in mm
- L_E developed length of inlet pipe, in mm

Figure 1 — Safety valves

5 Requirements

5.1 Steam boiler

5.1.1 Each steam boiler and each isolatable heated compartment (e.g. reheater, superheater, economizer) shall be provided with at least one suitable safety device which shall ensure against excessive pressure. The total certified discharge capacity of all safety devices mounted on the boiler shall be at least equal to the maximum continuous rating (MCR) of the boiler. The suitability of the safety device shall be demonstrated by a hot test on the assembled boiler.

The number and type of safety devices to be installed shall be specified by the manufacturer and shall meet the requirements of this clause.

At least one of the following safety devices shall be considered suitable:

- safety valves in accordance with EN ISO 4126-1:2013 or;
- pilot-operated safety valve (POSV) in accordance with EN ISO 4126-4:2013, consisting of a main valve, controlled by signals from 3 pilot valves;
- controlled safety pressure relief system (CSPRS) in accordance with EN ISO 4126-5:2013, consisting of a main valve, controlled by 3 redundant control paths.

In the case of safety devices in accordance with b) and c) the following shall apply:

- The safety device shall be capable of operating when the signal from only one pressure sensing line is available.
- The size and position of the pressure sensing lines shall ensure that the risk of loss of function is reduced to a minimum.

NOTE The common size of sensing line is 15 mm internal diameter.

- The mechanical and electrical parts of the pilot and control unit which are used to actuate the main valves shall still be functionally fit even in the case of an assumed individual defect.
- It shall be possible to prove the reliability of the safety pressure relief device by functional testing on the plant.

It is permissible to operate more than one main valve from a single control unit.

Safety devices shall have a set pressure not exceeding the maximum allowable pressure (P_s) of the equipment to be protected, except as permitted as follows.

The discharge capacity corresponding to the required relief capacity at maximum continuous rating of the applicable boiler parts shall be achieved without causing the pressure to be increased by more than 10 % of the maximum allowable pressure.

If the capacity is provided by more than one safety device, only one of the devices needs to be set at a pressure not exceeding P_s . The other device(s) may be set at a pressure not more than 5 % in excess of P_s (see example in prEN 764-7:2019, Annex A). In these cases, it is necessary to use safety devices with certified overpressure lower than 10 %.

The pressure at which a safety device is set to operate shall take into account the effect of static head, of superimposed back pressure and whether this is constant or variable.

5.1.2 The minimum flow diameter of safety valves or main valves of POSV or CSPRS for boilers with a volume ≤ 10 litres shall be at least 6 mm and for volumes > 10 litres shall be at least 15 mm.

5.1.3 In the case of boilers without superheater(s) the safety valves or main valves of POSV or CSPRS shall be connected to the steam space.

If the total required discharge capacity is q_m and the steam space is simultaneously protected by n safety devices ($n > 1$) the discharge capacity of each of them should be at least $q_m/(n + 1)$.

5.1.4 In the case of once-through steam generators the safety valves or main valves of POSV or CSPRS shall be located at the steam outlet of the boiler.

5.1.5 In the case of natural and forced circulation boilers with superheaters which cannot be isolated the following shall apply:

- a) Safety devices in accordance with 5.1.1 located at the superheater outlet shall be of sufficient capacity to prevent the allowable wall temperature of the superheater from being exceeded. The safety device at the superheater outlet shall be so arranged, that it is always open when the safety device on the saturated steam space opens, or alternatively, the heat source is immediately cut-out with no residual heat release allowed.

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- b) Safety devices in accordance with 5.1.1 a) rated for at least 75 % or in accordance with 5.1.1 b) or c) rated for at least 25 % of the required discharge capacity shall be located at the saturated steam space of the boiler. No safety devices need to be installed at the saturated steam space if the capacity of the safety device in accordance with 5.1.1 b) or c) located at the superheater outlet corresponds to the total steam quantity to be discharged. At least one pressure signal shall be transmitted to the control unit from the saturated steam space and at least one pressure signal shall be taken from the superheater outlet.
- c) The superheater safety device shall be so set as to respond before the safety device on the saturated steam space.

5.1.6 A superheater that can be isolated shall be equipped with at least one safety valve or main valve of POSV or CSPRS at the superheater outlet. The safety valve or main valve of POSV or CSPRS shall be rated for at least 20 % of the required discharge capacity of the boiler. The safety valve or main valve of POSV or CSPRS located on the saturated steam space of the steam generator shall in this case be rated for the maximum continuous rating. If the superheater can be isolated precautions shall be taken to prevent overheating. Superheaters that can be isolated from the saturated steam space are not allowed for boilers firing fuels with considerable residual heat release.

5.1.7 Every reheater shall have at least one safety valve or main valve of POSV or CSPRS with a total discharge capacity of not less than the maximum steam flow for which the reheater is designed.

5.1.8 There shall be no shut off devices between the boiler and its protective safety devices or between the safety devices and their points of discharge.

5.1.9 Direct-loaded safety valves shall be installed in the vertical position.

Safety devices shall be safeguarded against damaging external influences, e.g. the weather, which may impair the functional capability of the safety device. The transfer of vibrations onto the safety device shall be avoided.

Safety devices where leaking fluid, e.g. due to open bonnet, may directly or indirectly endanger persons or the environment, shall be provided with suitable protective devices.

5.1.10 The cross-section of the line leading to the safety valve or main valve of POSV or CSPRS (inlet pipe) shall not be less than the safety valve or main valve of POSV or CSPRS inlet cross-section.

The line leading to the safety valve (inlet pipe) shall be as short and straight as possible and should not be located opposite to other nozzles.

The pressure loss in the inlet pipe shall not exceed 3 % of the pressure difference between the set pressure and the superimposed back pressure at the highest discharged mass flow. A blow down of the installed safety valve (difference between set and reseating pressure) of least 5 % is a prerequisite to undisturbed functioning at this pressure loss.

At a blowdown of less than 5 % the difference between the blowdown and the pressure loss in the inlet pipe shall be at least 2 % of the pressure difference between set pressure and the superimposed back pressure.

For controlled safety pressure relief systems the requirements for pressure loss in the inlet pipe shall only apply if these valves operate as direct-loaded valves in the event of releasing the operating force.

For calculation of pressure losses see ISO 4126-9:2008, Annex C.

5.1.11 The outlet pipe cross-section shall not be less than the safety valve or main valve of POSV or CSPRS outlet cross-section.