

# Shell boilers —

## Part 8: Requirements for safeguards against excessive pressure

The European Standard EN 12953-8:2001 has the status of a  
British Standard

ICS 27.060.30; 27.100

## National foreword

This British Standard is the official English language version of EN 12953-8:2001, including Corrigendum May 2002. It partially supersedes BS 2790:1992 and BS 1894:1992 which will be withdrawn when Parts 1, 2, 3, 4, 5, 6 and 9 of BS EN 12953 are published.

The UK participation in its preparation was entrusted to Technical Committee PVE/16, Shell boilers, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

A list of organizations represented on this committee can be obtained on request to its secretary.

### Additional information

The United Kingdom voted against the acceptance of this European Standard at the Formal Vote stage. The principal UK objections have been resolved by the issue of Corrigendum No. 1.

### Cross-references

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### Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 7 and a back cover.

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### Amendments issued since publication

Amd. No.	Date	Comments
14006 Corr. No. 1	6 August 2002	Indicated by a sideline

This British Standard, having been prepared under the direction of the Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 24 May 2002

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ISBN 0 580 39775 0

English version

## Shell boilers - Part 8: Requirements for safeguards against excessive pressure

Chaudières à tubes de fumée - Partie 8: Exigences pour la protection vis-à-vis des excès de pression

Großwasserraumkessel - Teil 8: Anforderungen an Sicherheitseinrichtungen gegen Drucküberschreitung

This European Standard was approved by CEN on 7 September 2001.

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## Foreword

This European Standard 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 May 2002, and conflicting national standards shall be withdrawn at the latest by May 2002.

This European Standard 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 standard.

The European Standard series EN 12953 concerning shell boilers 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: Workmanship and construction of pressure parts of the boiler
- Part 5: Inspection during construction, documentation and marking of pressure parts of the boiler
- Part 6: Requirements for equipment for the boiler
- Part 7: Requirements for firing systems for liquid and gaseous fuels for the boiler
- Part 8: Requirements for safeguards against excessive pressure
- Part 9: Requirements for limiting devices, and safety circuits of the boiler and accessories
- Part 10: Requirements for boiler feedwater and boiler water quality
- Part 11: Acceptance tests
- Part 12: Requirements for firing systems for solid fuels for the boiler
- Part 13: Operating instructions
- Part 14: Guideline for the involvement of an inspection body independent of the manufacturer (TR)

Although these Parts may be obtained separately, it should be recognised that the Parts are inter-dependent. As such, the design and manufacture of shell boilers requires the application of more than one Part in order for the requirements of the European Standard to be satisfactorily fulfilled.

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, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

## 1 Scope

This Part of this European Standard specifies the requirements for safeguards against excessive pressure in shell boilers as defined in EN 12953-1.

## 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 12953-1, *Shell boilers — Part 1: General*.

EN 12953-6, *Shell boilers — Part 6: Requirements for equipment for the boiler*.

prEN ISO 4126-1, *Safety devices for protection against excessive pressure — Part 1: Safety valves*.

## 3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 12953-1 and EN 12953-6 apply.

## 4 Requirements

### 4.1 General requirements for safeguards (safety pressure relief devices)

**4.1.1** Generators, with the exception of open vented hot water generators, shall have at least one safety device sized for the rated output (see 4.2) of the generator which shall ensure against excessive pressure. The device shall conform to prEN ISO 4126-1. For steam generators, a hot test shall additionally be performed on the generator.

Additionally every superheater shall have at least one safety device on the outlet side. The capacity of this safety device shall be a minimum of 25 % of the maximum continuous rating. However, this requirement may be waived in the case of non-isolatable superheaters when the maximum metal temperature achieved does not exceed its design temperature.

NOTE Safety valves of fully flooded hot water generators should open proportionally to the increase in pressure.

**4.1.2** When a boiler is provided with an integral superheater without an intervening stop valve, the safety devices fitted on the superheater can be considered as forming part of the safety device capacity of the boiler. If an intervening stop valve is fitted, the safety devices shall not be considered.

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

**4.1.4** When an economizer is fitted to a boiler with an intervening stop valve between it and the boiler, a safety device is required on the economizer. The capacity of this safety device shall not be counted as forming part of the relieving capacity of the boiler.

Where a safety device is required for an economizer, the safety device capacity shall be calculated on the basis of the economizer thermal capacity.

**4.1.5** Safety valve seats of inside diameter smaller than 15 mm shall not be used.

**4.1.6** It shall be possible to open safety valves with lifting gear at a pressure below the set pressure.

## 4.2 Discharge capacity

### 4.2.1 Steam boilers

The certified discharge capacity of the safety device applicable to the boiler under consideration shall not be less than the maximum continuous rating.

The calculation of the discharge capacity of the safety device in relation to the conditions of the steam for which no certified capacity is available, shall be in accordance with prEN ISO 4126-1 and shall not be less than the required maximum continuous rating.

Notwithstanding the requirements for safety devices herein, the safety devices fitted to any boiler (including non isolatable superheater and/or economiser) shall be capable of discharging all the steam produced at maximum continuous rating without causing a pressure rise in excess of 10 % of the maximum allowable pressure of the boiler.

### 4.2.2 Hot water generators

When safeguarding against excessive pressure in hot water generators, it shall be assumed that valves under water pressure will discharge steam at that saturated steam condition which corresponds to the safety valve set pressure.

The safety device shall be so sized that the steam mass flow corresponding to the allowable heat output can be discharged without causing a pressure rise in excess of 10 % of the maximum allowable pressure.

Alternatively, the safety valve shall be sized for the maximum expansion of the water volume and for the quantity of water to be fed by the feeding device at the maximum allowable pressure if, in the case of oil and gas firing systems, two pressure and two temperature limiters cut-off and lock-out the energy supply when the respective limit values are exceeded.

## 4.3 Set pressures

The safety device shall be set to lift at a pressure which shall be not higher than the maximum allowable pressure of the unit to which it is fitted.

Where multiple safety devices are provided, the set pressures can be set so as to provide progressive opening, in which case at least one safety device shall respond if the maximum allowable pressure is reached. The requirements of 4.2 shall not be affected hereby.

## 4.4 Cross-sections and pressure losses in the inlet pipe of safety valves in accordance with prEN ISO 4126-1

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

Direct-loaded safety valves shall be installed in the vertical position and the line leading to the safety valve (inlet pipe) should be as short and as straight as possible.

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 greatest mass flow to be discharged. A blow down of the installed safety valve (difference between set and reseating pressures) of at least 5 % is a prerequisite to undisturbed functioning at this pressure loss. At a blow down of less than 5 %, the difference between the blow down 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.

## 4.5 Discharge lines

The discharge system shall be designed and installed so as not to impair the required mass flow through the safety device.

The outlet pipe cross-section shall not be less than the safety valve outlet cross-section.

The diameter and length of outlet pipes, bends, silencers etc., determines the build-up back pressure. These parts

**EN 12953-8:2001 (E)**  
**Issue 2 (2002:05)**

shall be so dimensioned and installed so that the allowable back pressure indicated by the valve manufacturer is not exceeded.

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

Safety device outlet pipes shall discharge safely. No water shall be allowed to accumulate in the outlet system. Where the pipe is endangered by freezing, it shall be protected accordingly. Taking into account the local operating conditions, the pipes shall also be dimensioned and installed so as to safely withstand the static, dynamic (reaction forces) and thermal loadings.



**Annex ZA**  
(informative)

**Clauses of this European Standard addressing essential safety requirements or other provisions of the Pressure Equipment Directive**

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential safety requirements of the Pressure Equipment Directive 97/23/EC with regard to **requirements for safeguards against excessive pressure**.

**WARNING:** Other requirements and other EU Directives **may** be applicable to the product(s) falling within the scope of this standard.

The following clauses of this European Standard given in Table ZA.1 are likely to support essential safety requirements of the Pressure Equipment Directive 97/23/EC:

**Table ZA.1 — Comparison between EN 12953-8 and the Pressure Equipment Directive 97/23/EC with respect to requirements for safeguards against excessive pressure for shell boilers**

EN 12953-8 harmonized clauses	Content	Pressure Equipment Directive 97/23/EC Annex I
4	Pressure limiting devices	2.11.2
4.2	Pressure surge	7.3
4.5, 5 <sup>th</sup> para	Discharge of pressure relief blow-off	2.3, 2 <sup>nd</sup> indent

Compliance with the clauses of this European Standard provides one means of conforming with the specific essential safety requirements of the Directive concerned and associated EFTA regulations.

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