BS EN 12953-1:2012

BSI Standards Publication

Shell boilers

Part 1: General

National foreword

This British Standard is the UK implementation of EN 12953-1:2012. It supersedes BS EN 12953-1:2002 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PVE/2, Water Tube And Shell Boilers.

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

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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English Version

Shell boilers - Part 1: General

Chaudières à tubes de fumée - Partie 1: Généralités

Großwasserraumkessel - Teil 1: Allgemeines

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Foreword

This document (EN 12953-1:2012) 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of an identical text or by endorsement, at the latest by September 2012, and conflicting national standards shall be withdrawn at the latest by September 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 12953-1:2002.

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.

Annex D provides details of significant technical changes between this European Standard and the previous edition.

The European Standard 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 of the boiler and accessories*;

— *Part 10: Requirements for feedwater and boiler water quality*;

— *Part 11: Acceptance tests*;

— *Part 12: Requirements for grate firing systems for solid fuels for the boiler*;

— *Part 13: Operating instructions;*

— *CR 12953 Part 14: Guideline for involvement of an inspection body independent of the manufacturer.*

Although these parts may be obtained separately, it should be recognized that the parts are interdependent. 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.

For any questions arising when using these standards the Boiler Helpdesk of CEN/TC 269 may be contacted:

http://www.boiler-helpdesk.din.de

According to the CEN/CENELEC Internal Regulations, the national standards organizations 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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

1 Scope

1.1 General

This European Standard applies to shell boilers with volumes in excess of 2 litres for the generation of steam and/or hot water at a maximum allowable pressure greater than 0,5 bar and with a temperature in excess of 110 °C.

The purpose of this European Standard is to ensure that the hazards associated with the operation of shell boilers are reduced to a minimum and that adequate protection is provided to contain the hazards that still prevail when the shell boiler is put into service. This protection will be achieved by the proper application of the design, manufacturing, testing and inspection methods and techniques incorporated in the various parts of this European Standard. Where appropriate, adequate warning of residual hazards and the potential for misuse are given in the training and operating instructions and local to the equipment concerned (see EN 12953-7 and EN 12953-8).

It is the manufacturer's responsibility, in addition to complying with the requirements of this standard, to take into consideration special measures which could be necessary in order to achieve by manufacturing the required level of safety in accordance with the EU Directive 97/23/EC (PED).

NOTE 1 Further requirements relating to operating instructions in EN 12953-13 and to hazard analysis in CEN/TS 764-6 should be taken into consideration.

This European Standard specifies requirements for both directly fired and electrically heated boilers including Low Pressure Boilers (LPB, see 3.6) as well as for heat recovery boilers with a gas-side pressure not exceeding 0,5 bar of cylindrical design, constructed from carbon or carbon manganese steels by fusion welding and a design pressure not exceeding 40 bar. The boilers covered by this European Standard are intended for land use for providing steam or hot water (typical examples are shown in Figures 1 to 6).

For Low Pressure Boilers (LPB) less stringent requirements concerning design and calculation are acceptable. Details are defined in the respective clauses.

NOTE 2 For boilers operating at a pressure on the gas-side greater than 0,5 bar the rules of this standard equally apply. However, it is generally considered that additional design analysis, inspection and testing may be necessary.

Where a particular boiler is a combination of shell and water-tube design then the water-tube standard series EN 12952 is used in addition to this European Standard. One such example of this combination is shown in Figure 3.

This European Standard applies to the generator, from the feed-water or water inlet connection to the steam or water outlet connection and to all other connections, including the valves and steam and water fittings. If welded ends are used, the requirements specified herein begin or end at the weld where flanges, if used, would have been fitted.

1.2 Exclusions

This European standard does not apply to the following types of boilers and equipments:

a) water-tube boilers;

b) non stationary boilers, e.g. locomotive boilers;

c) thermal oil boilers;

d) boilers where the main pressure housing is made of cast material.

e) pumps, gaskets, etc.

f) brickwork setting and insulation, etc.

NOTE Stainless steel boilers are covered by EN 14222.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 12953-3:2002, *Shell boilers — Part 3: Design and calculation for pressure parts*

EN 12953-10:2003, *Shell boilers — Part 10: Requirements for feedwater and boiler water quality*

EN 12953-13:2012, *Shell boilers — Part 13: Operating instructions*

CR 12953-14:2002, *Shell boilers — Part 14: Guideline for involvement of an inspection body independent of the manufacturer*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
purchaser
individual or organization that buys the boiler or part thereof from the manufacturer

3.2
manufacturer
individual or organisation that is responsible for the design, fabrication, testing, inspection, installation of pressure equipment and assemblies where relevant

[SOURCE: EN 764-3:2002]

Note 1 to entry: The manufacturer can subcontract one or more of the above mentioned tasks under its responsibility (for example, designer, installer, etc.).

3.3
material supplier
individual or organisation, that may or may not be the material manufacturer, who supplies material or parts used in the manufacture of pressure equipment and assemblies

[SOURCE: EN 764-3:2002]

Note 1 to entry: A material supplier may be a stockist.

3.4
material manufacturer
individual or organisation that produces material in the basic product forms used in the manufacture of pressure equipment

[SOURCE: EN 764-3:2002]

3.5
installer
individual or organisation that carries out the assembly of the pressure equipment at the location where it is to be put into service

Note 1 to entry: Depending on the contractual circumstances, the installer may be considered as the manufacturer of the assembly.

3.6
low pressure boilers (LPB)
steam boilers with a maximum saturation temperature of 120 °C (this corresponds to a pressure of 1 bar gauge) or hot water boilers with a maximum outlet temperature of 120 °C and a maximum allowable pressure of 10 bar gauge

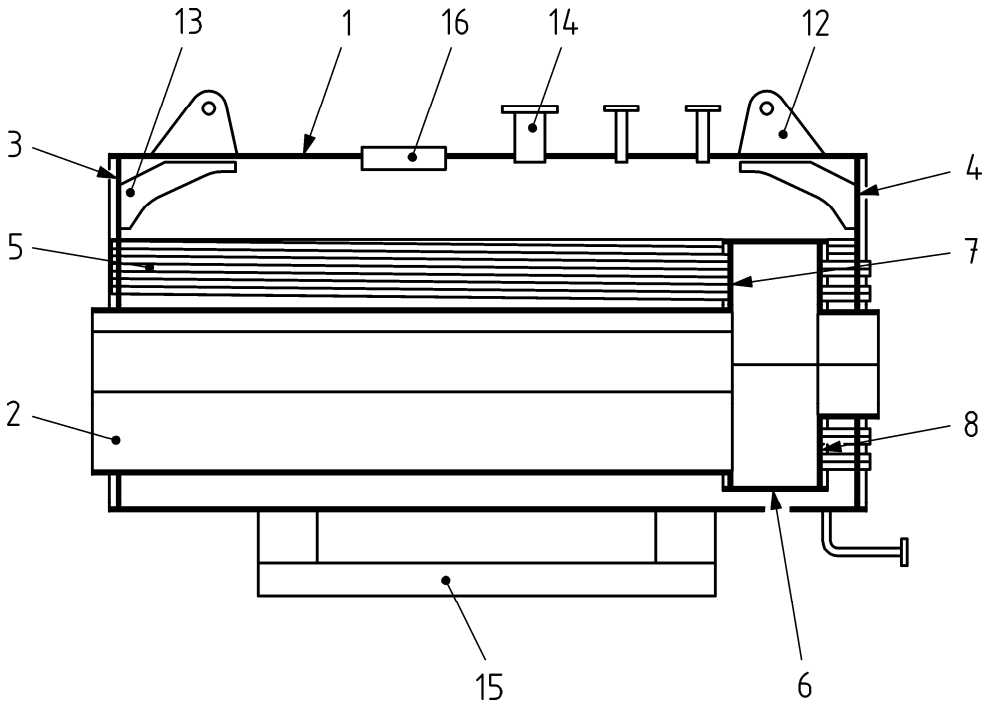
Note 1 to entry: The manufacturer may have the option of using this harmonised European Standard or alternatively EN 14394 for low pressure boilers which are to be used as hot water heating boilers.

3.7
shell boiler
closed vessel containing water in which flames and/or hot gases pass through the inside of tubes located within the shell which forms part of an assembly

Note 1 to entry: This is opposed to water-tube boiler where the water is inside the tubes and flue gas is outside the tubes.

Note 2 to entry: Figures 1 to 6 are typical configurations and examples of shell boilers. Other configurations are also permissible (e.g. vertical shell).

Note 3 to entry: Informative Annex C gives translations of some typical components of a shell boiler.

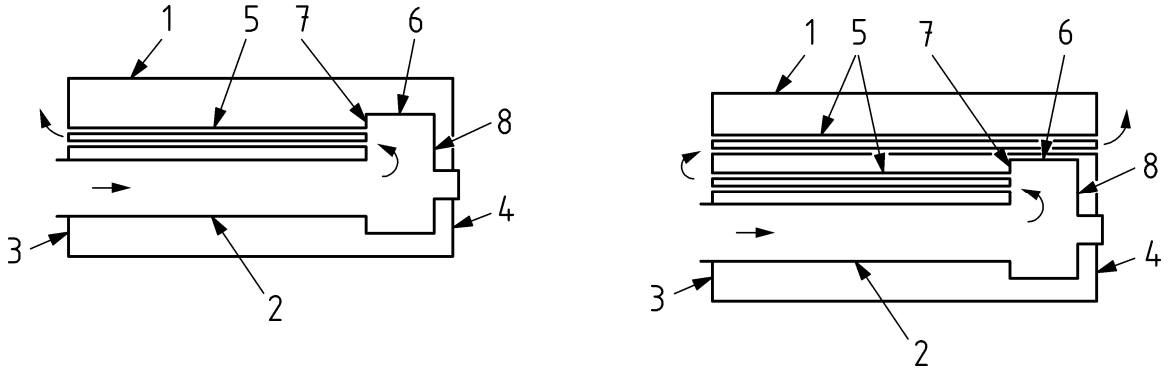


Key

1) cylindrical shell
2) furnace tube (1st pass): for example plain or corrugated or with bowling hoops
3) front tube plate (or front plate depending on the configuration)
4) rear plate (or rear tube plate depending on the configuration)
5) smoke tube(s) (2nd pass/3rd pass) (maybe with stay tubes or bar stays)
6) wrapper plate (shell of reversal chamber)
7) reversal chamber tube plate
8) wet back rear plate
12) lifting lugs
13) gusset stays
14) branches
15) supports
16) inspection opening

NOTE The main pressure-bearing parts are the parts, which constitute the envelope under pressure, and the parts which are essential for the integrity of the boiler.

Figure 1 — Typical components of a shell boiler



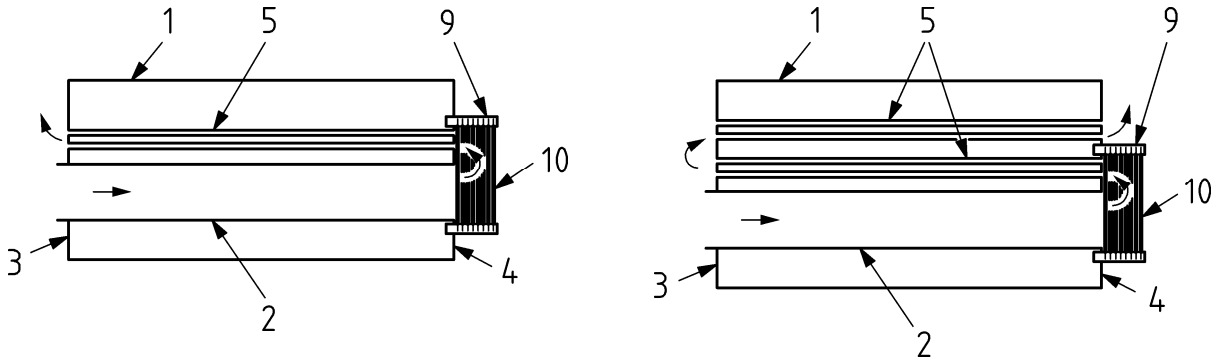
a) two pass boiler b) three pass boiler

Key

1) cylindrical shell
2) furnace tube (1st pass): for example plain or corrugated or with bowling hoops
3) front tube plate (or front plate depending on the configuration)
4) rear plate (or rear tube plate depending on the configuration)
5) smoke tube(s) (2nd pass/3rd pass) (maybe with stay tubes or bar stays)
6) wrapper plate (shell of reversal chamber)
7) reversal chamber tube plate
8) wet back rear plate

NOTE The effective radiant heating surface comprises the furnace tube and the surface of the reversal chamber, where applicable.

Figure 2 — Wet back boiler with internal reversal chamber



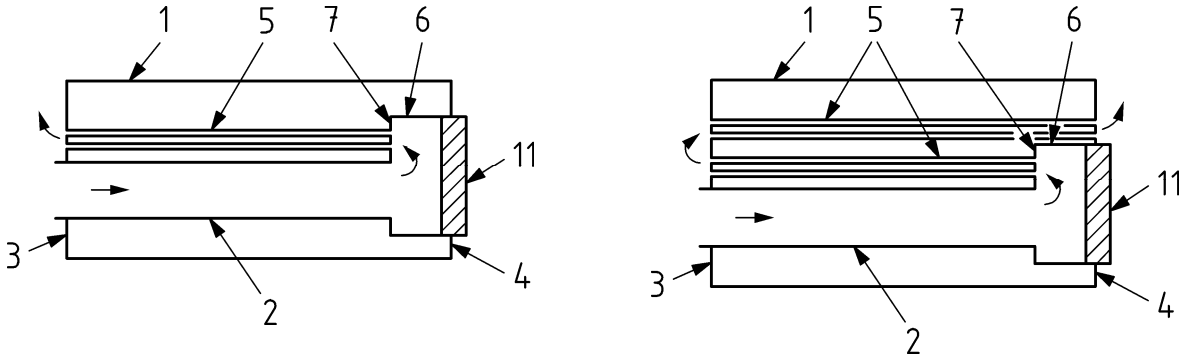
a) two pass boiler b) three pass boiler

Key

1) cylindrical shell
2) furnace tube (1st pass): for example plain or corrugated or with bowling hoops
3) front tube plate (or front plate depending on the configuration)
4) rear plate (or rear tube plate depending on the configuration)
5) smoke tube(s) (2nd pass/3rd pass) (maybe with stay tubes or bar stays)
9) header
10) membrane wall

NOTE The effective radiant heating surface comprises the furnace tube and complete surface of the reversal chamber.

Figure 3 — Wet back boiler with external reversal chamber



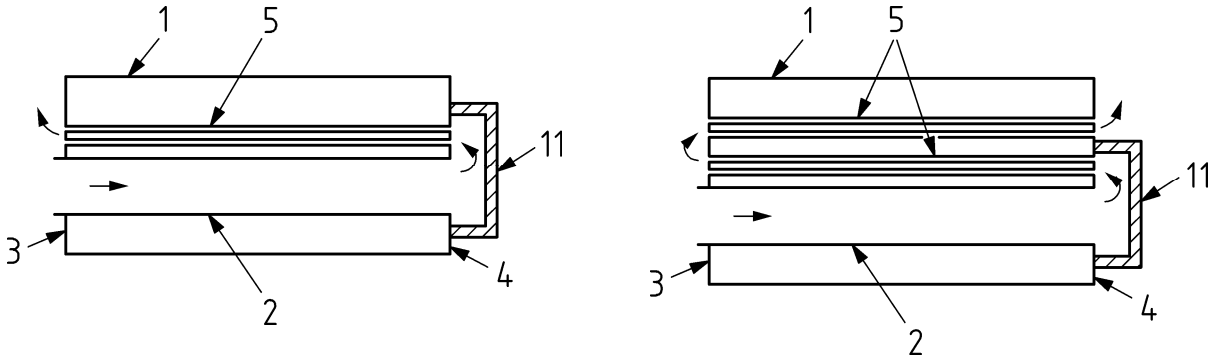
a) two pass boiler b) three pass boiler

Key

1) cylindrical shell
2) furnace tube (1st pass): for example plain or corrugated or with bowling hoops
3) front tube plate (or front plate depending on the configuration)
4) rear plate (or rear tube plate depending on the configuration)
5) smoke tube(s) (2nd pass/3rd pass) (maybe with stay tubes or bar stays)
6) wrapper plate (shell of reversal chamber)
7) reversal chamber tube plate
11) insulation: for example refractory

NOTE The effective radiant heating surface comprises the furnace tube wrapper plate and reversal chamber tube plate.

Figure 4 — Semi-wet back boiler



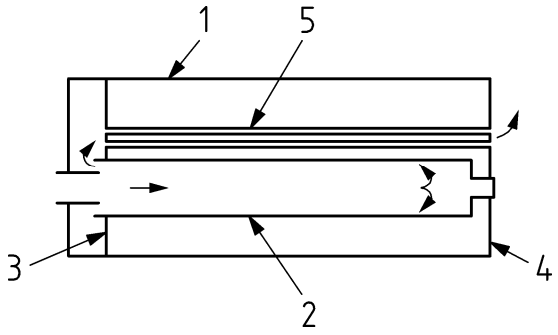
a) two pass boiler b) three pass boiler

Key

1) cylindrical shell
2) furnace tube (1st pass): for example plain or corrugated or with bowling hoops
3) front tube plate (or front plate depending on the configuration)
4) rear plate (or rear tube plate depending on the configuration)
5) smoke tube(s) (2nd pass/3rd pass) (maybe with stay tubes or bars)
11) insulation: for example refractory

NOTE The effective radiant heating surface comprises the furnace tube and rear tube plate.

Figure 5 — Dry back boiler



Key

1) cylindrical shell
2) furnace tube (1st pass): for example plain or corrugated or with bowling hoops
3) front tube plate (or front plate depending on the configuration)
4) rear plate (or rear tube plate depending on the configuration)
5) smoke tube(s) (2nd pass/3rd pass) (maybe with stay tubes or bars)

NOTE The effective radiant heating surface consists of the furnace only.

Figure 6 — Reverse flame boiler

3.8
generator
assembly with boiler, burner, valves and, if applicable, protective devices

Note 1 to entry: For this European Standard, the term “generator” is applicable to shell boilers (see Figure B.2).

3.9
assembly
consists, as a minimum a generator, and where applicable, with an economiser and/or a superheater, inter-connecting piping and instrumentation (protective, control and indicating devices) placed on the market by one manufacturer

Note 1 to entry: See also Figure B.3.

3.10
operating instructions
see EN 12953-13

4 Interdependency of the Parts of the series

Parts 2 to 13 of EN 12953, together with Part 1, form a consistent set of specifications which shall be followed for compliance to the Standard.

NOTE 1 Parts 10 and 11 of the series are published as supporting European Standards.

NOTE 2 Part 14 of the series is published as a CEN Report. It is not a European Standard.

5 Symbols and abbreviations

For the purposes of this European Standard, the general symbols and abbreviations indicated in Table 1 shall apply, however specific symbols and abbreviations can be used for specific requirements in other Parts of the standard.

Table 1 — Symbols and abbreviations — *(1 of 6)*

Symbol	Description	Unit
A	Effective radiant heating surface (see Figures 1 to 6)	m^2
A_f	Cross-sectional area effective as compensation without consideration of allowances	mm^2
A_{fb}	Cross-sectional area of branch effective as compensation	mm^2
A_{fp}	Cross-sectional area of reinforcing pad effective as compensation	mm^2
A_{fs}	Cross-sectional area of main body effective as compensation	mm^2
A_p	Pressure-loaded area without consideration of allowances	mm^2
A_{pb}	Pressure-loaded area relative to branch	mm^2
A_{ps}	Pressure-loaded area relative to main body	mm^2
A_t	Original cross-sectional area of test piece subjected to a tensile test	mm^2
a	Dimensions indicated in EN 12953-3, Figures 10.1-1, 10.2-2 to 10.2-4	mm
a_i	Inner major axis of compensation plate	mm
a_o	Outer major axis of compensating plate	mm
b	Dimensions indicated as examples in EN 12953-3, Figures 10.1-1, 10.2-2 to 10.2-5, 13.1-1 and in EN 12953-3, Annex B	mm
b_1	Minor axis of manhole	mm
b_i	Inner minor axis of compensating plate	mm
b_o	Outer minor axis of compensating plate	mm
C	Shape factor for unstayed dished heads without openings indicated in EN 12953-3, Figure 9.1-1	—
C_1	Shape factor for unstayed walls, ends or plates as given in EN 12953-3, 9.2	—

Table 1 — Symbols and abbreviations — *(2 of 6)*

Symbol	Description	Unit
c_1	Minus tolerance on the ordered nominal wall thickness	mm
c_2	Allowance for metal wastage	mm
C_4	Constant determined from EN 12953-3, Table 10.2-1	—
D_b	Gasket mean diameter	mm
D_L	Bolt circle diameter	mm
d	Diameter of tube hole	mm
d_g	Depth of welded-on girder stay	mm
d_i	Inside diameter	mm
d_{ib}	Inside diameter of branch without allowances (defined by $d_{ib} = d_{ob} - 2 * (e_b - c_1 - c_2)$)	mm
d_{ip}	Diameter of inner periphery of circular pad or compensating plate	mm
d_{is}	Inside diameter of main body (cylindrical shell, spherical shell or dished end) without allowances (defined as an example by $d_{is} = d_{os} - 2 * (e_s - c_1 - c_2)$)	mm
d_m	Mean diameter	mm
d_o	Nominal outside diameter	mm
d_{ob}	Nominal outside diameter of branch	mm
d_{op}	Diameter of outer periphery of circular pad of compensating plate	mm
d_{os}	Nominal outside diameter of main body	mm
d_s	Diameter of stay	mm
E	Modulus of elasticity at design temperature	MPa
e	Wall thickness	mm
e_{cb}	Calculated wall thickness of branch or nozzle without allowances	mm
e_{cf}	Calculated wall thickness of furnace without allowances	mm

Table 1 — Symbols and abbreviations — *(3 of 6)*

Symbol	Description	Unit
e_{ch}	Calculated wall thickness of flat end without allowances	mm
e_{cp}	Calculated wall thickness of reinforcing pad	mm
e_{cs}	Calculated wall thickness of the main body (cylindrical or spherical shells or dished ends) without allowances	mm
e_{ct}	Calculated wall thickness of straight tube without allowances	mm
e_{fa}	Calculated wall thickness of furnace with allowances	mm
e_{g}	Calculated thickness of gusset stay	mm
e_{h}	Ordered thickness of flat end	mm
e_{h1}	Wall thickness in relief groove	mm
e_{p}	Ordered wall thickness of reinforcing pad	mm
e_{rb}	Actual wall thickness of branch or nozzle without allowances	mm
e_{rf}	Actual wall thickness of furnaces	mm
e_{rh}	Actual wall thickness of flat end without allowances	mm
e_{rp}	Actual wall thickness of reinforcing pad without allowances	mm
e_{rs}	Actual wall thickness of main body (cylindrical or spherical shell or dished end) without allowances	mm
e_{rt}	Actual tube wall thickness without allowances	mm
e_{s}	Ordered wall thickness of main body	mm
e_{sa}	Required wall thickness of main body with allowances	mm
e_{t}	Ordered tube wall thickness	mm
e_{ta}	Required wall thickness of straight tube with allowances	mm
F	Calculation overall exchange factor	—
f	Nominal design stress	MPa
f_{a}	Existing mean stress	MPa
$f_{a\Phi}$	Existing mean stress between the centres of two openings	MPa
f_{b}	Nominal design stress for branch material	MPa
f_{c}	Combined stress at supports	MPa
f_{p}	Nominal design stress for reinforcing ring material	MPa
f_{s}	Nominal design stress for main body material	MPa
G	Gas mass flow rate in first pass tubes	$kg/(m^2 \cdot s)$

Table 1 — Symbols and abbreviations — *(4 of 6)*

Symbol	Description	Unit
g, g_1	Clear height as shown in EN 12953-3, Figure 14.2-1	mm
h_c	Depth of curvature of dished head (with knuckle, without cylindrical skirt)	mm
h_f	Height of manhole frame	mm
h_g	Minimum width of gusset stay	mm
h_s	Height of cylindrical skirt of dished end	mm
H	Heat input (see EN 12953-3, note 3 of Figure 5.4-1)	W
I_1	Second moment of area of one complete furnace corrugation about its neutral axis excluding corrosion allowance	mm^4
I_2	Second moment of area of stiffeners	mm^4
K	Design strength value	MPa
K_t	Design strength value at test (gauge) pressure	MPa
λ (K_C)	Thermal conductivity	$(W \cdot mm) / (m^2 \cdot K)$
L	Distance between two effective points of furnace support	mm
L_1	Shortest distance from the edge of the access opening to the centre-line of the stay furthest away from the access opening, or, where is no access opening, half the maximum distance between the centre-lines of the stays	mm
L_2	Distance between the rear plate of the reversal chamber and the boiler back end plate	mm
L_b	Length of boiler between end plates	mm
L_{cor}	Total length of corrugation	mm
L_i	Length of leg of fillet weld around inner periphery of pad or compensating plate	mm
L_g	Length of welded-on girders	mm
L_h	Heated length of furnace	mm
L_o	Length of leg of fillet weld around outer periphery of pad or compensating plate	mm
L_s	Length of shell between end plates	mm
L_t	Mean pitch of adjacent tubes	mm
l_{b0}	Cylindrical length of the branch from the transition zone up to the weld	mm
l_{b1}	Measured length of external projection of branch	mm
l_{b2}	Measured length of internal projection of branch	mm

Table 1 — Symbols and abbreviations — *(5 of 6)*

Symbol	Description	Unit
l_{rb}	Effective length of branch contributing to reinforcement	mm
l_{rbi}	Effective length of inward projection of set-through branch contributing to reinforcement	mm
l_{rp}	Effective width of reinforcing ring	mm
l_{rs}	Effective length of main body contribution to reinforcement	mm
l_{s0}	Cylindrical length of the main body from the transition zone up to the weld	mm
P_{cor}	Pitch of corrugations	mm
P_g	Pitch of welded-on girders	mm
P_Φ	Centre-to-centre distance of adjacent openings, staggered by the angle Φ referring to centre of wall	mm
PS	Maximum allowable pressure as defined by the PED	MPa, bar [a]
p_c	Calculation pressure	MPa, bar [a]
p_d	Design pressure	MPa, bar [a]
p_s	Allowable (total gauge) pressure for hot-water generators	MPa, bar [a]
p_t	Test (gauge) pressure	MPa, bar [a]
R_m	Minimum tensile strength of the grade of material concerned at room temperature	MPa
$R_{p0,2tc}$	Minimum value of 0,2 % proof strength for the grade of steel concerned at temperature t_c	MPa
r_{ik}	Inside radius of dishing of dished ends or of knuckle or relief groove of flat ends	mm
r_{is}	Inside corner radius of dished end or spherical shell	mm
r_{ms}	Mean radius of shell	mm
r_{ok}	Outside radius of knuckle of dished end	mm
r_{os}	Outside corner radius of dished end or spherical shell	mm
S	Safety factor	—
S_t	Safety factor for test (gauge) pressure	—
TS	Maximum/Minimum allowable temperature	°C
t_c	Calculation temperature	°C
t_d	Design temperature	°C
t_m	Maximum metal temperature	°C

Table 1 — Symbols and abbreviations — *(6 of 6)*

Symbol	Description	Unit
t_s	Saturation temperature corresponding to design pressure	°C
u	Departure from circularity	%
v	Weld factor	—
v_a	Allowable ligament efficiency for branches or openings	—
v_b	Ligament efficiency for isolated branches or openings	—
v_m	Ligament efficiency for adjacent branches or openings	—
W	Force exerted by the pressure on the end plate in the zone assumed to be supported by the gusset	N
w	Nominal overall depth of corrugation (see EN 12953-3, Figure 13.1-1)	mm
h (w_c)	Measured depth of corrugations (see EN 12953-4, Figure 5.9-1)	mm
X_2	Cross-sectional area of longitudinal section of furnace wall of length equal to one pitch and thickness e_{rf} — c_2	mm^2
x	Stress reduction factor	—
y	Factor determined from EN 12953-3, Figure 10.2-4 using the ratio *b/a*	—
Φ	Angle of connecting lines between the centres of two openings relative to the axis of the main body	degree
δ_5	Elongation after fracture (gauge length ratio = 5)	%
Ψ	Angle of inclination of branch relative to the normal to the circumferential line of the main body	degree

[a] In this European Standard units are referenced both in bar and MPa: 1 MPa = 1 N/mm^2 = 1 MN/m^2 = 10 bar

6 Responsibilities

6.1 Purchaser

The purchaser shall be responsible for specifying the overall output requirements.

Where the boiler is being designed for a specific application, the purchaser shall be responsible for furnishing the manufacturer with the performance requirements and operating conditions of the boiler, together with details of any transient or adverse conditions under which the boiler is required to operate. In addition, any special requirements to facilitate in-service inspection (see also guide for procurement EN 45510-3-2, where applicable).

Two options apply for the technical specification:

— “Standard” case: the manufacturer proposes a boiler from his standard range of equipment for the purchaser based upon his specific requirements and needs. In this case, the tender shall become the technical specification and then form the contract for supply;

— “Bespoke” case: detailed technical specification document produced by the purchaser defining the scope of supply. This document shall be agreed by the manufacturer and then form the contract for supply.

NOTE For typical minimum information to be supplied by the purchaser, see Annex A.

6.2 Manufacturer

Manufacturer(s) shall supply and/or install a boiler, a generator or an assembly, where applicable, in accordance with:

— applicable legislation related to supply the boiler;

— this European Standard;

— the contractual document.

The manufacturer is also responsible to provide the relevant documentation:

— operating instructions (see EN 12953-13);

— declaration of conformity.

The limitations for the operation conditions of the boiler shall be agreed between manufacturer and purchaser. It is the responsibility of the manufacturer to specify the conditions and limitations necessary for the safe use of the boiler.

Duties carried out by Notified Bodies shall not absolve the manufacturer from his responsibility.

Components of the shell boiler are not subjected to individual conformity assessment procedures (no CE mark). However, manufacturers of such components shall demonstrate that they comply with the relevant requirements of EU Directive(s) such that the conformity assessment can take place on the completed equipment.

NOTE 1 The completed shell boilers placed on the market as an individual item of equipment (e.g. without safety accessories and other fittings) should be CE marked.

NOTE 2 Materials which are supplied to EN 12953-2 and have not been subjected to any additional work are not regarded as components of the shell boiler.

NOTE 3 When the boiler is to be installed in a country outside of EU, National requirements should determine the Responsible Authority.

6.3 Notified Body

Responsibilities of the Notified Body are indicated in CR 12953-14.

NOTE See also PED Annex III.

6.4 Owner and/or user

In order to maintain the ongoing integrity of the boiler, the user and/or owner is responsible for ensuring that manufacturer's operating instructions are met, this includes ensuring the feedwater and boiler water are controlled in accordance with the requirements of EN 12953-10.

NOTE This may require the owner and/or user to produce his own procedures for use and maintenance.

6.5 Installer

Dependent on the scope of supply and the contractual arrangement, the installer (for example reseller, end user, installation contractor, etc.) may be considered as a manufacturer and in such cases shall apply the relevant applicable legislation related to supply the boiler.

Annex A
(informative)

Information to be supplied by the purchaser to the manufacturer

A.1 General

This Annex is typical of the minimum information which is required by the manufacturer and which should be supplied to him by the purchaser at the time of the enquiry, subject to confirmation/ agreement/updating at the placement of the order.

a) The limits of certain characteristic values on which the performance guarantees should be based.

b) Electrical power supply specification, (e.g. voltage, frequency, number of phases, number of wires and any limitations for the direct starting of motors).

c) Site location and conditions (e.g. erection height above sea level, climatic conditions, earthquake…).

d) The language for operating instructions.

A.2 For saturated steam boilers

a) Steam capacity, in tonnes per hour, actual.

b) Working pressure, in bar[1)] (gauge).

c) Feed-water inlet temperature, in degrees Celsius.

A.3 For superheated steam boilers

a) Steam capacity, in tonnes per hour, actual.

b) Working pressure at the superheater outlet, in bar[1)] (gauge).

c) Superheated steam temperature at actual steam capacity, in degrees Celsius.

d) Feed-water inlet temperature, in degrees Celsius.

A.4 For hot-water boilers

a) Heat capacity, in kilowatts.

b) Working pressure, in bar[1)] (gauge).

c) Hot-water return temperature, in degrees Celsius.

d) Hot-water flow temperature, in degrees Celsius.

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1) 1 bar = 10^5 N/m^2 = 0,1 N/mm^2 = 0,1 MPa

A.5 Fuels

A.5.1 Liquid fuels

a) Type.

b) Specification and analysis.

c) Gross and net calorific values.

A.5.2 Gaseous fuels

a) Type.

b) Specification and analysis.

c) Gross and net calorific values.

d) Available gas pressure at installation.

A.5.3 Solid fuels and waste

a) Type and origin (e.g. country, district, mine, manufacturer, industrial undertaking, community).

b) Specification and analysis (e.g. state of material as supplied, gross and net calorific values, size of granule, ash-fusion point).

c) Type of solid fuel supply to firing system.

A.5.4 Mixed fuels

The proportion of the various fuels and the method of combustion.

A.5.5 Heat recovery boilers

a) Mass flow of gas coming to the boiler.

b) Temperature of gas coming to the boiler.

c) Composition of gas coming to the boiler.

A.6 Operating conditions

a) Location of the generator (for example indoor or outdoor).

b) Type of supervision.

Annex B
(informative)

Vocabulary for shell boiler

This Annex provides the common vocabulary for the technical terms used in various European countries (see Table B.1 and Figures B.1 to B.4).

Table B.1 — Vocabulary for shell boiler — *(1 of 6)*

PED terminology	EN 12953-1	Description	Remark	English	Austria Germany	France	Denmark	Sweden	Netherlands
Fired or otherwise heated pressure equipment	**Pressure part: Shell boiler** (see Figure B.1)	See 3.7	In this standard, the term boiler refers to shell boiler	Shell boiler	Großwasser-raumkessel	Chaudière tubes de fumée	Kanal røgrørskedel	Eldrörspanna	Cilindrische ketel
Fired or otherwise heated pressure equipment	**Pressure part: Steam boiler** (see Figure B.2)	A boiler for the purpose of producing steam.	In this standard, the term steam boiler refers to a shell boiler	Steam Boiler	Dampfkessel (im Sinne von Dampferzeuger)	Chaudière vapeur	Dampkedel	Ångpanna	Stoomketel

Table B.1 — Vocabulary for shell boiler — *(2 of 6)*

PED terminology	EN 12953-1	Description	Remark	English	Austria Germany	France	Denmark	Sweden	Netherlands
Vessel	**Pressure part: Hot water boiler** (see Figure B.2)	A boiler for the purpose of producing hot water	In this standard, the term hot water boiler/generator refers to a shell boiler	Hot water boiler	Heisswasser-kessel	Chaudière eau chaude ou eau surchauffée	Hedtvands-generator (dampkedel til produktion af overhedet vand over 110°C)	Hetvattenpanna	Heet water ketel
—	**Pressure part: Economizer**	A system for heating the feedwater or the return flow water entering a boiler, utilising the exhaust flue gases from the boiler.	—	Economizer	Economiser	Economiseur	Economiser	Ekonomiser	Economiser
Vessel	**Pressure part: Superheater**	A system which raises the temperature of the steam above its saturation point utilising heat from the flue gases or other source	—	Superheater	Überhitzer	Surchauffeur	Overheder	Överhettare	Oververhitter

Table B.1 — Vocabulary for shell boiler — *(3 of 6)*

PED terminology	EN 12953-1	Description	Remark	English	Austria Germany	France	Denmark	Sweden	Netherlands
Piping	—	Interconnecting piping	—	Pipework	Verrohrung	Tuyauterie	Rørsystem	Rörledningar	Leidingen
Safety accessories	See EN 12953-6	—	—	—	Ausrüstungs-teile mit Sicherheits-funktion	Accessoires de sécurité	Sikkerhedstilbehør	Säkerhetsutrusning	Veiligheidsappendages
Pressure accessories	See EN 12953-6	—	—	—	Druckhaltende Ausrüstungs-teile	Accessoires sous pression	Trykbærende tilbehør	Tryckbärande tillbehör	Drukhoudende appendages
Assemblies	**Assembly** (see Figure B.3)	See 3.9	—	Boiler assembly Assembly	Kesselbaugruppe Baugruppe	Générateur Ensemble	Enhed med dampkedel Enhed	Pannaggregat Aggregat	Samenbouw
—	—	A type of boiler where no combustion takes place in the boiler	—	Heat recovery boiler	Abhitzekessel	Chaudière de récupération	Afgaskedel (røggaskedel)	Avgaspanna	Afgassenketel

Table B.1 — Vocabulary for shell boiler — *(4 of 6)*

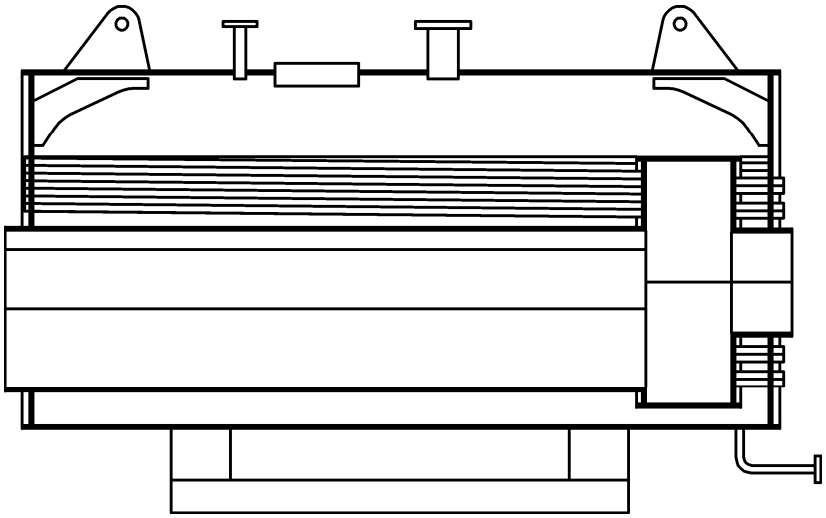
PED terminology	EN 12953-1	Description	Remark	English	Austria Germany	France	Denmark	Sweden	Netherlands
Not applicable	**Not applicable**	A separate building, the main function of which is to enclose the boiler and the main parts of the boiler plant. The fuel storage, feedwater treatment, flue/chimney stack and blowdown/heat recovery vessels may be outside the boiler house or in separate buildings.	This definition is for information. Not used in this standard.	Boiler house	Kesselhaus	Chaufferie	Kedelbygning (Kedelhus)	Pannhus	Ketelhuis

Table B.1 — Vocabulary for shell boiler — *(5 of 6)*

PED terminology	EN 12953-1	Description	Remark	English	Austria Germany	France	Denmark	Sweden	Netherlands
Not applicable	**Not applicable**	The room in a building in which the boiler and the main parts of the boiler plant are located. (for example the basement of a block of flats or a room at the end of a factor). The fuel storage, feedwater treatment, Flue/chimney stack and blowdown/heat recovery vessels may be outside the building or in separate room.	This definition is for information. Not used in this standard.	Boiler room	Kesselraum	Chaufferie	Kedelrum	Pannrum	Ketelruimte

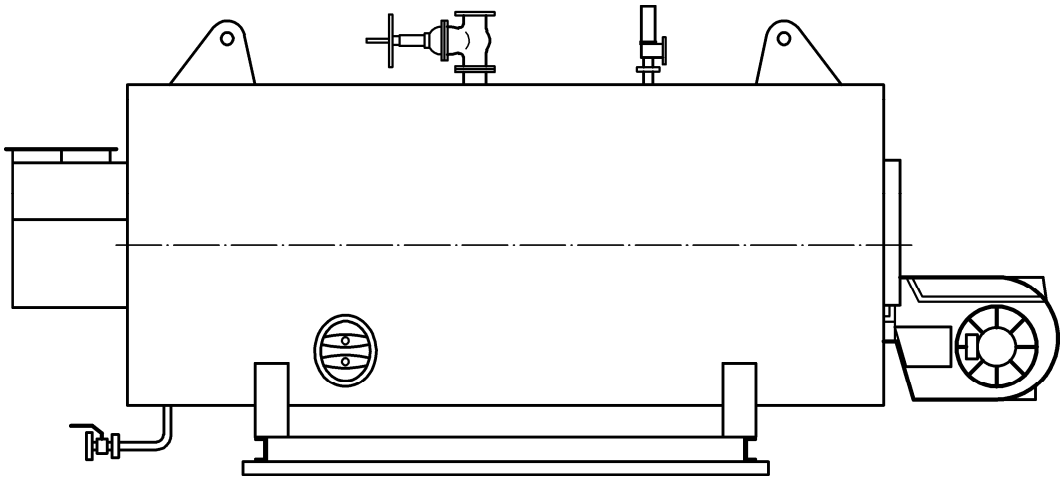
Table B.1 — Vocabulary for shell boiler — *(6 of 6)*

PED terminology	EN 12953-1	Description	Remark	English	Austria Germany	France	Denmark	Sweden	Netherlands
Not applicable	**Not applicable**	The area where the boiler and main parts of the boiler plant are sited. This may be the Boiler House or Boiler Room, but could be an unenclosed area outdoors not protected from the weather.	This definition is for information. Not used in this standard.	Boiler location	Aufstellungs-ort der Kessel	Chaufferie	Kedel placering	Uppställningsplats för panna	Ketellocatie



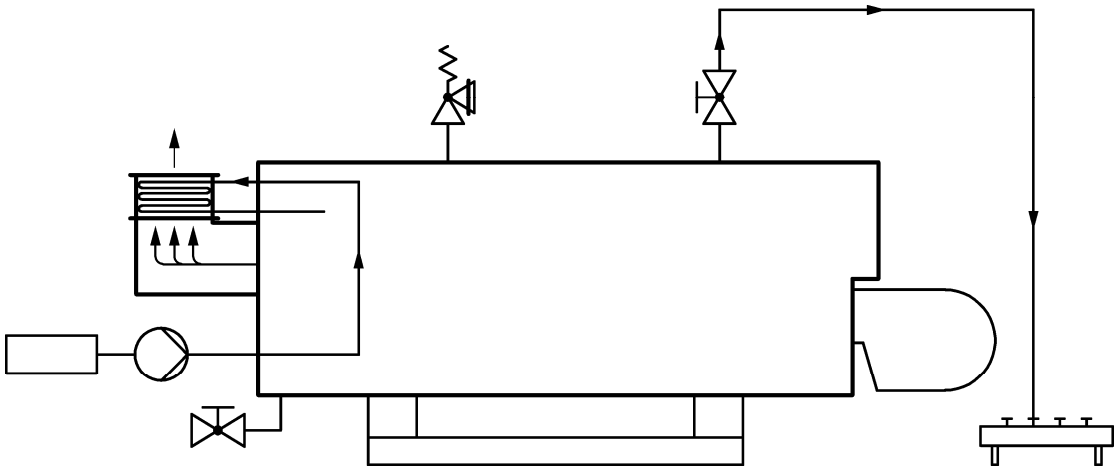
NOTE See 3.7

Figure B.1 – Example of shell boiler



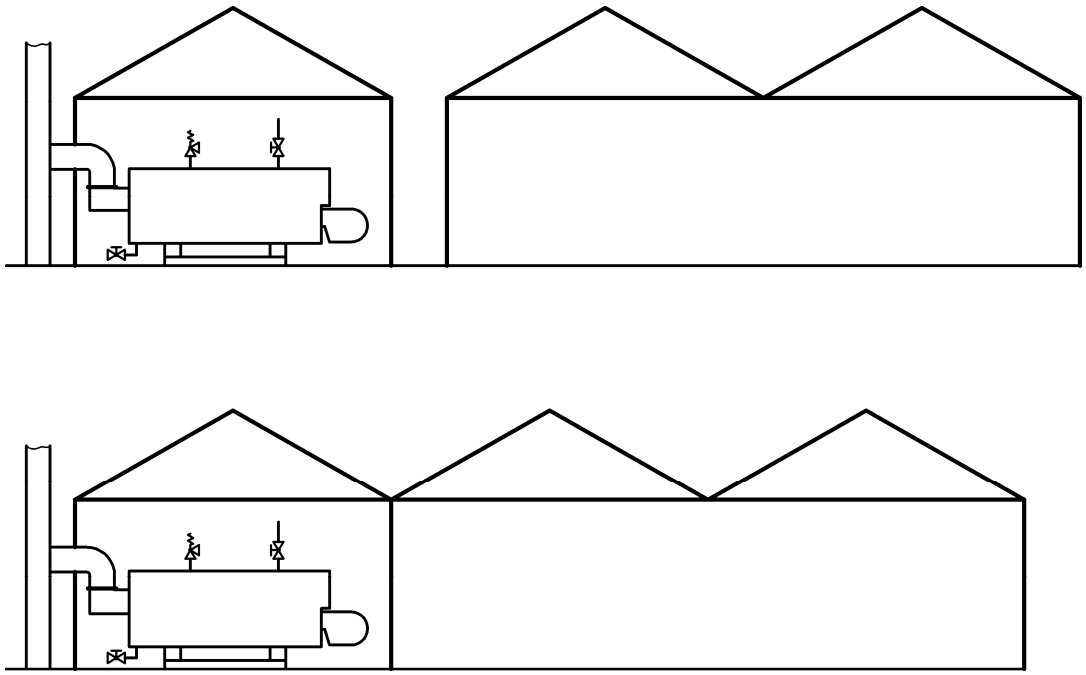
NOTE See 3.8

Figure B.2 – Example of steam and/or hot water generator



NOTE See 3.9

Figure B.3 – Example of assembly



NOTE See Table B.1.

Figure B.4 – Example of boiler house and boiler room

Annex C
(informative)

Vocabulary on typical components of a shell boiler

This Annex provides the common vocabulary for the technical terms used in various European countries (see Table C.1).

Table C.1 — Vocabulary on typical components of a shell boiler — *(1 of 4)*

English terms	English definition	Remark	Austria Germany	France	Denmark	Sweden	Netherlands
Cylindrical shell	The external cylindrical part of the boiler which retains pressure	—	Kesselmantel	Virole	Cylindrisk svøb	Cylindrisk mantel	Cilindrische mantel
Furnace tube (1st pass)	The cylindrical chamber within the boiler where the firing takes place	For example plain or corrugated or with bowling hoops	Flammrohr (1. Zug)	Tube foyer (1er parcours)	Ildkanal (1.træk)	Eldrör (1:a stråk)	Vuurgang
Front tube plate	The plate located at the firing end or heat supply end of a horizontal boiler into which the smoke tubes are installed	—	Vordere Rohrplatte or Vorderboden	Fond avant corps	Forreste rørplade	Främre tubplatta	Voor plaat of front plaat

Table C.1 — Vocabulary on typical components of a shell boiler — *(2 of 4)*

English terms	English definition	Remark	Austria Germany	France	Denmark	Sweden	Netherlands
Rear plate	The plate located at the opposite end to the front tube plate of a horizontal boiler. The plate may or may not incorporate smoke tubes, depending on the boiler configuration	—	Hinterboden	Fond arrière corps	Bageste rørplade/endebund	Bakre tubplatta	Achterplaat
Smoke tube(s) (2nd pass/3rd pass)	The tubes mounted between tube plates through which the hot gasses pass	Maybe with stay tubes or bars	Rauchrohr(e) 2. Zug / 3. Zug	Tube(s) fumés 2ème et 3ème parcours	Røgrør (2. og 3. træk)	Tubstråk (2:a stråk /3:e stråk)	Vlampijp (tweede trek / derde trek)
Wrapper plate	The plate (usually cylindrical) which attaches to the reversal chamber tube plate to form the chamber enclosure	—	Wendekammer mantel	Fond avant Virole Boîte de retour	Bageste vendekammer (plade/svøb)	Vändkammar mantel	Vlampijp plaat

Table C.1 — Vocabulary on typical components of a shell boiler — *(3 of 4)*

English terms	English definition	Remark	Austria Germany	France	Denmark	Sweden	Netherlands
Reversal chamber tube plate	The plate forming part of the reversal chamber enclosure into which the 2nd pass tubes are installed	—	Wendekammer-Rohrplatte	Boîte de retour	Rørplade I bageste vendekammer	Tubplatta i vändkammare	Keerkast
Wet back rear plate	The plate located opposite the reversal chamber tube plate on reversal chambers that entirely enclosed within the boiler water space	—	Hinterboden wassergekühlte Wendekammer	Fond arrière boîte de retour	Wet back bagplade	Kyld bakre vändkammarg avel	Watergekoelde vlampijp plaat

Table C.1 — Vocabulary on typical components of a shell boiler — *(4 of 4)*

English terms	English definition	Remark	Austria Germany	France	Denmark	Sweden	Netherlands
Header	A part normally of cylindrical form for the purpose of distributing or collecting steam or water	—	Sammler	Collecteur	Samler	Samlingsrör	Verdeler
Membrane wall	Gas tight welded wall made from tubes and plates (membrane) between the tubes	—	Membranwand	Ecran tubulaire (membrane tubulaire)	Rørvæg	Tubvägg	Vlampijpwand
Insulation	Insulating material (usually refractory or fibrous material) used on the boiler to reduce surface temperatures to a safe level	Example refractory	Isolierung	Isolant (réfractaire)	Ildfast isolering (støbning/andet)	Isolering	Isolatie

Annex D
(informative)

Significant technical changes between this European Standard and the previous edition

Clause/Paragraph/Table/Figure	Change
General	Alignment with EN 12952-1:2001
1 / Scope	Redefinition of the scope
2 / Normative references	References updated.
3 / Terms and definitions	Clarification of the definitions and nomenclature
4 /Interdependency of the parts of the series	New Clause added.
Annex B / Vocabulary for shell boiler	New annex introduced.
Annex C / Vocabulary on typical components of a shell boiler	New annex introduced.
Annex ZA / Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC	Modification of the Annex.
NOTE The technical changes referred include the significant technical changes from the EN revised but is not an exhaustive list of all modifications from the previous version.	

Annex ZA
(informative)

Relationship between this European Standard and the Essential Requirements of EU Directive 97/23/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission to provide a means of conforming to Essential Requirements of the New Approach Directive 97/23/EC of the European Parliament and of the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment.

Once this standard is cited in the Official Journal of the European Union under that Directive and has been implemented as a national standard in at least one Member State, compliance with the clauses of this standard given in Table ZA.1 confers, within the limits of the scope of this standard, a presumption of conformity with the corresponding Essential Requirements of that Directive and associated EFTA regulations.

Table ZA.1 — Correspondence between this European Standard and Directive 97/23/EC on Pressure Equipment

Clause(s)/subclause(s) of this EN 12953-1	Essential Requirements (ERs) of Directive 97/23/EC on Pressure Equipment Annex I	Qualifying remarks/Notes
4	1.1	General

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

Bibliography

Directive 97/23/EC of the European Parliament and of the Council of 29 May 1997 on the approximation of the laws of the Member States concerning pressure equipment; OJEC, L181

EN 764-1, *Pressure equipment — Part 1: Terminology — Pressure, temperature, volume, nominal size*

EN 764-2, *Pressure equipment — Part 2: Quantities, symbols and units*

EN 12953-2, *Shell boilers — Part 2: Materials for pressure parts of boilers and accessories*

EN 14222, *Stainless steel shell boilers*

EN 14394, *Heating boilers — Heating boilers with forced draught burners — Nominal heat output not exceeding 10 MW and maximum operating temperature of 110 °C*

EN 45510-3-2, *Guide for procurement of power station equipment — Part 3-2: Boilers — Shell boilers*

EN 764-3:2002, *Pressure equipment — Part 3: Definition and parties involved*

CEN/TS 764-6:2004, *Pressure equipment — Part 6: Structure and content of operating instructions*

EN 12953-7:2002, *Shell boilers — Part 7: Requirements for firing systems for liquid and gaseous fuels for the boiler*

EN 12953-8:2001, *Shell boilers — Part 8: Requirements for safeguards against excessive pressure*

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