



SLOVENSKI STANDARD
SIST EN 1857:2003+A1:2008
01-april-2008

Dimniki - Sestavni deli - Betonske tuljave

Chimneys - Components - Concrete flue liners

Abgasanlagen - Bauteile - Betoninnenrohre

Conduits de fumée - Composants - Conduits intérieurs en béton

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Ta slovenski standard je istoveten z: EN 1857:2003+A1:2008

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English Version

Chimneys - Components - Concrete flue liners

Conduits de fumée - Composants - Conduits intérieurs en
béton

Abgasanlagen - Bauteile - Betoninnenrohre

This European Standard was approved by CEN on 2 December 2002 and includes Amendment 1 approved by CEN on 2 December 2007 and the Corrigendum issued by CEN on 25 April 2007.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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 CEN Management Centre has the same status as the official versions.

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

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thermal-resistance-calculation-method/2003a1-2008

Foreword

This document (EN 1857:2003+A1:2008) has been prepared by Technical Committee CEN /TC 166, "Chimneys" the secretariat of which is held by UNI.

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of an identical text or by endorsement, at the latest by August 2008 and conflicting national standards shall be withdrawn at the latest by August 2008.

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 Directives.

For the relationship with the EU Directives, see informative Annex ZA, which is an integral part of this document.

This document includes Amendment 1 approved by CEN on 2007-12-02 and the corrigendum issued in 2007.

The start and finish of text introduced or altered by amendment is indicated in the text by tags $\boxed{A_1}$ $\boxed{A_1}$.

The modifications of the related CEN Corrigenda have been implemented at the appropriate places in the text and are indicated by the tags \boxed{AC} \boxed{AC} .

This document supersedes EN 1857:2003.

This standard is one of a series of standards dealing with the specification, design, testing and execution of chimneys with concrete liners, both single and multi wall.

The co-ordinated package of standards is further divided by material of construction and this European Standard is one of a series of specifications and execution documents dealing with design and execution of concrete chimney products and systems.

The standards in this series for concrete chimney products are :

EN 1857, *Chimneys - Components - Concrete flue liners*

EN 1858, *Chimneys - Components - Concrete flue blocks*

EN 12446, *Chimneys - Components - Concrete outer wall elements*

In this European Standard the Annexes A, C and D are normative and Annexes B and ZA are 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, Bulgaria, 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 and United Kingdom.

1 Scope

This European Standard specifies the material, dimensional and performance requirements, including methods of test, for factory-made concrete flue liners and fittings for the construction of multi-wall chimneys.

This standard also applies to storey-height and reinforced flue liners.

NOTE 1 Classes in this standard, unless otherwise specified, e.g. temperature pressure, are not derived from conditions referred to in article 3.2 of Directive 89/106/EC, and should only be considered as technical classes in the sense of Commission Guidance Paper E 'Levels and classes in the Construction Products Directive'.

NOTE 2 Any reference to the term flue liners implies both flue liners and their fittings, except where otherwise indicated.

2 Normative references

The following referenced documents are indispensable for the application 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 1443:2003, *Chimneys — General requirements*

EN 1859:2000, *Chimneys — Metal chimneys — Test methods*

EN 10088-2, A_1 *Stainless steels - Part 2: Technical delivery conditions for sheet/plate and strip of corrosion resisting steels for general purposes* A_1

EN 10218-2, *Steel wire and wire products - General — Part 2: Wire dimensions and tolerances*

EN 13384-1 *Chimneys – Thermal and fluid dynamic calculation methods – Part 1: Chimneys serving one appliance*

A_1 EN 14297:2004, *Chimneys - Freeze-thaw resistance test method for chimney products* A_1

EN ISO 7500-1, A_1 *Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Verification and calibration of the force-measuring system (ISO 7500-1:2004)* A_1

ISO 2859-1, *Sampling procedures for inspection by attributes — Part 1: Sampling schemes indexed by acceptable quality limit (AQL) for lot-by-lot inspection* A_1 deleted text A_1 .

3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 1443:2003 and the following apply.

3.1

flue liner bend

flue liner that changes the direction of the flue

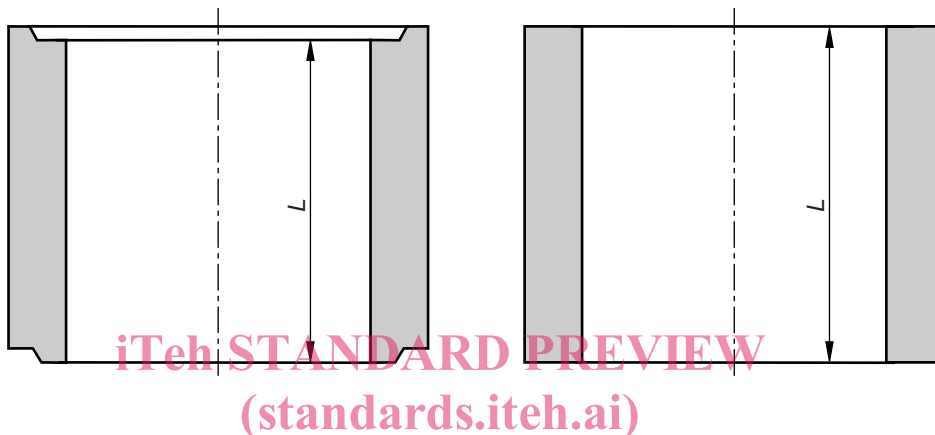
3.2**manufacturer's declared internal transverse dimensions**

internal dimensions of the flue liner measured perpendicular to the longitudinal axis

3.3**manufacturer's declared length**

internal length of the flue liner.

NOTE Examples of measurement are shown in Figure 1.



a) with rebate EN 1857:2003+A1:2008 b) with plain end

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L Internal length

Figure 1 — Manufacturers declared length

3.4**manufacturer's declared structural height**

maximum height of construction of the flue liners as declared by the manufacturer

3.5**reinforced flue liner**

flue liner having reinforcement to assist handling

NOTE The reinforcement is not for structural stability

3.6**storey-height liner**

flue liner having manufacturer's declared length relating to the floor to floor height of a building

3.7**concrete**

material formed by mixing cement, aggregate and water and with or without the incorporation of admixtures or additions, which develops its properties by hydration of the cement

[EN 206-1:2000]

3.8

precast concrete

concrete cast and cured in a place other than the final location of use

3.9

resistance to fire of flue liners

ability of the flue liners and fittings to be resistant to soot fires

4 Materials and designations of flue liners

4.1 Materials

Flue liners shall be precast concrete.

Materials used shall be identified for factory production control purposes.

NOTE 1 Additions may include glass or steel fibres.

NOTE 2 Attention is drawn to Commission decision 96/603/EC, as amended, in which non-combustible masonry units containing not more than a mass or volume fraction of 1 % (whichever is the more onerous) of homogeneously distributed organic materials are classified as reaction to fire class A1 without testing.

4.2 Designations and classes

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4.2.1 General

Flue liners shall be designated according to clause 9.

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Designation classes for flue liners for temperature, pressure, resistance to soot fire, condensate resistance and corrosion resistance shall be according to [AC] 4.2.2 to 4.2.6 [AC].

Abbreviated designations for common types of flue liners, according to temperature, pressure, soot fire resistance, and condensate resistance (wet or dry conditions) are given in Table 1.

Where a flue liner is manufactured for an application not covered by the abbreviated designations A to L the manufacturer shall declare the characteristics and appropriate designation in full as in clause 9.

Table 1 — Abbreviated designations for common types of concrete flue liners

Type	Temperature	Pressure	Sootfire resistance	Condensate resistance
A1	T600	Negative N1	Yes G	Dry
A2	T600	Negative N2	Yes G	Dry
B1	T450	Negative N1	Yes G	Dry
B2	T450	Negative N2	Yes G	Dry
B3	T450	Negative N1	No O	Dry
C1	T400	Negative N1	Yes G	Dry
C2	T400	Negative N2	Yes G	Dry
C3	T400	Negative N1	No O	Dry
D1	T300	Negative N1	No O	Dry
D2	T300	Negative N1	No O	Wet and Dry
D3	T300	Positive P1	No O	Wet and Dry
E1	T250	Negative N1	No O	Dry
E2	T250	Negative N1	No O	Wet and Dry
E3	T250	Positive P1	No O	Wet and Dry
F1	T200	Negative N1	No O	Dry
F2	T200	Negative N1	No O	Wet and Dry
G1	T160	Negative N1	No O	Wet and Dry
G2	T160	Positive P1	No O	Wet and Dry
H1	T140	Negative N1	No O	Wet and Dry
H2	T140	Positive P1	No O	Wet and Dry
J1	T120	Negative N1	No O	Wet and Dry
J2	T120	Positive P1	No O	Wet and Dry
K1	T100	Negative N1	No O	Wet and Dry
K2	T100	Positive P1	No O	Wet and Dry
L1	T80	Negative N1	No O	Wet and Dry
L2	T80	Positive P1	No O	Wet and Dry

NOTE A designated class of flue liner is suitable for use in a chimney with nominal working temperature up to a maximum of that designated. The designation for pressure, soot fire resistance, condensate resistance and corrosion resistance apply throughout the temperature range.

4.2.2 Temperature class.

For temperature class see Table 2.

Table 2 — Temperature class

Temperature class	Nominal working temperature °C
T600	≤ 600
T450	≤ 450
T400	≤ 400
T300	≤ 300
T250	≤ 250
T200	≤ 200
T160	≤ 160
T140	≤ 140
T120	≤ 120
T100	≤ 100
T080	≤ 80

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4.2.3 Pressure class

For pressure classes see Table 3. The pressure class is assigned a gas tightness level, expressed as a maximum leakage rate at a specified test pressure.

- for flue liners suitable for negative pressure chimneys : N1 and N2;
- for flue liners suitable for positive pressure chimneys : P1 and P2.;
- for flue liners suitable for high positive pressure chimneys : H1 and H2.

Table 3 — Pressure classes and gas tightness

Pressure class	Test pressure Pa	Gas tightness – Maximum leakage rate L/s/m ²
N1	40	2,0
N2	20	3,0
P1	200	0,006
P2	200	0,120
H1	5000	0,006
H2	5000	0,120

4.2.4 Sootfire resistance class

Sootfire resistance classes:

- O for flue liners for chimneys without sootfire resistance;
- G for flue liners for chimneys with sootfire resistance.

4.2.5 Condensate resistance class

Condensate resistance classes:

- W for flue liners for chimneys intended to operate under wet conditions;
- D for flue liners for chimneys intended to operate under dry conditions.

4.2.6 Corrosion resistance class

Corrosion resistance classes for flue liners for chimneys which convey products of combustion from gas or light oils and natural wood or heavy oils and solid mineral fuels, are given in Table 4.

Table 4 — Corrosion resistance classes

Corrosion from products of combustion according to fuel used	Gas	Light oils with sulphur content up to 0,2% and natural wood	Heavy oils with sulphur content over 0,2% and solid mineral fuels and peat
Corrosion resistance class of flue liners	1	2	3

5 Reinforcement

5.1 In a reinforced liner the reinforcement shall have a diameter of not more than 8 mm and a minimum concrete cover of 20 mm on all sides.

5.2 In reinforced liners having a bulk density of less than 2 000 kg/m³, when measured according to A.10, any reinforcement shall be protected against corrosion by:

- a) use of stainless steel conforming to EN 10088-2;
- b) by completely covering any mild steel reinforcement conforming to EN 10218-2 with a coating.

NOTE Typically ordinary Portland cement mixed with water to form a slurry or epoxy resin.)

6 Surface treatment

Any surface treatment of the flue liner, e.g. coatings, shall be factory applied before the product is tested.

7 Tolerances

7.1 Size

Tolerances on manufacturer's declared dimensions, including taper, shall be:

a) Declared internal transverse dimensions

below 300 mm	: ± 3 mm
300 mm and above	: ± 3 % but not more than 10 mm. See A.1.1.

b) Declared length

below 300 mm	: ± 5 mm
300 mm to 700 mm	: ± 7 mm

above 700 mm : ± 3 % but not more than 10 mm. See A.1.2.

c) Declared wall thickness

below 10 mm	: + 2 mm - 1 mm
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10 mm to 40 mm	: + 5 mm - 1,5 mm
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above 40 mm	: + 12 % - 5 %
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7.2 Straightness

7.2.1 When tested as described in A.2 the limit deviation from straightness of a straight concrete flue liner of manufacturer's declared length less than or equal to 1 000 mm shall not be greater than 1% of the declared length.

7.2.2 When tested as described in A.2 for flue liners having a manufacturer's declared length greater than 1 000 mm the limit deviation shall not be greater than 0,5 % of the manufacturer's declared length.

7.3 Squareness of ends

When tested in accordance with either procedure described in A.3 the flue liner shall not touch the upright for the first procedure and the dimension 'G' shall not be greater than 5 mm for the second procedure.

8 Performance requirements

8.1 Heat stress resistance

8.1.1 When a flue liner is tested in accordance with A.4 to the test temperature appropriate to the flue liner designation given in Table 5, the flue liner shall subsequently meet the requirements of 8.3.

The thermal testing shall be carried out on one size of flue liner for each geometrical configuration, e.g. circular, rectangular, square, also for each material mix, method of manufacture and wall thickness. For circular flue liners the size to be tested shall be (200 ± 50) mm internal transverse dimension. For other geometrical configurations the flue liner shall have an equivalent cross-sectional area.

Table 5 — Heat stress test temperature

Temperature class	Temperature of flue gas °C
T 600	700 <input type="checkbox"/>
T 450	550 <input type="checkbox"/>
T 400	500 <input type="checkbox"/>
T 300	350 <input type="checkbox"/>
T 250	300 <input type="checkbox"/>
T 200	250 <input type="checkbox"/>
T 160	190 <input type="checkbox"/>
T 140	170 <input type="checkbox"/>
T 120	150 <input type="checkbox"/>
T 100	120 <input type="checkbox"/>
T 080	100 <input type="checkbox"/>

8.1.2 Flue liner bends or fittings made of the same material mix and by the same method of manufacture as the tested straight flue liner shall be deemed to conform to the requirement in 8.1.1.