



# SLOVENSKI STANDARD

## SIST EN 1858:2003

01-december-2003

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### Dimniki – Sestavni deli – Betonski bloki za dimnike

Chimneys - Components - Concrete flue blocks

Abgasanlagen - Bauteile - Betonformblöcke

Conduits de fumée - Composants - Conduits de fumée simple et multiparois en béton

Ta slovenski standard je istoveten z: **EN 1858:2003**

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#### **ICS:**

91.060.40	Dimniki, jaški, kanali	Chimneys, shafts, ducts
91.100.30	Beton in betonski izdelki	Concrete and concrete products

**SIST EN 1858:2003**

**en**

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ICS 91.060.40; 91.100.30

English version

## Chimneys - Components - Concrete flue blocks

Conduits de fumée - Composants - Conduits de fumée  
simple paroi en béton

Abgasanlagen - Bauteile - Betonformblöcke

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

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## Foreword

This document (EN 1858:2003) 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of an identical text or by endorsement, at the latest by January 2004, and conflicting national standards shall be withdrawn at the latest by April 2005.

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 standard.

This Standard is one of a series of co-ordinated standards dealing with specification, design, testing and installation of chimneys, 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 installation of concrete chimney products and systems.

The standards in this series for concrete chimney products and systems 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, B, D and ZA are informative (not forming part of the product specification) and the Annex C is normative.

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.

## 1 Scope

This European Standard specifies the materials, dimensional and performance requirements for concrete flue blocks as defined in clause 3 for use in system chimneys. The flue blocks may be of single wall or multi wall construction. The standard does not apply to blocks with back ventilation.

The standard specifies a type of block to dimensionally co-ordinate with masonry unit coursing height, referred to as a type B (Bonding block).

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

NOTE 1 Classes in this standard 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

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).

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EN 1443:2003, *Chimneys - General requirements*

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

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

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.'*

ISO 2859-1, *Sampling procedures for inspection by attributes - Part 1 : Sampling schemes indexed by acceptance quality limit(AQL)for lot-by-lot inspection.*

EN ISO 7500-1 *Metallic materials -- Verification of static uniaxial testing machines -- Part 1: Tension/compression testing machines. (ISO 7500-1:1999)*

### 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

##### **hollow wall flue block**

flue block having vertical cavities

NOTE cavities may pass through both ends of the block

#### 3.2

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

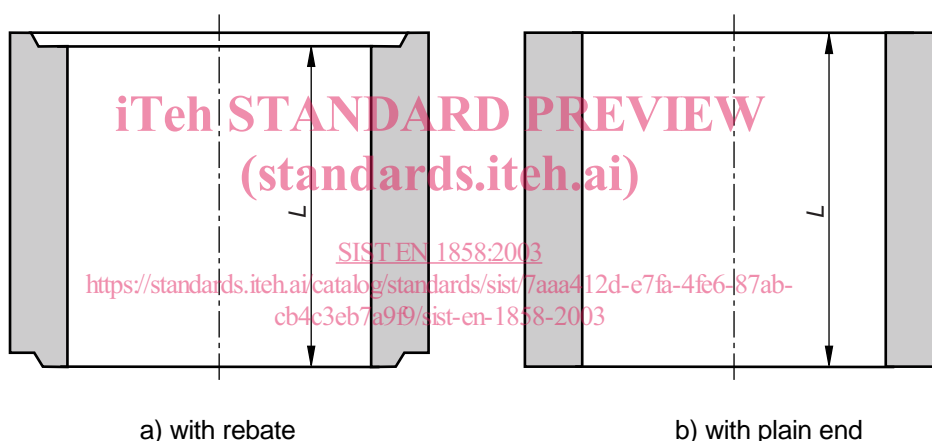
internal dimensions of the flue block measured perpendicular to the longitudinal axis

#### 3.3

##### **manufacturer's declared length**

internal length of the flue block

NOTE Examples of measurement are shown in Figure 1



#### Key

$L$  Internal length

**Figure 1 — Manufacturer's declared length**

#### 3.4

##### **manufacturer's declared structural height**

maximum constructional height of the flue blocks as declared by the manufacturer

#### 3.5

##### **manufacturer's declared overall wall thickness**

dimensions at its thinnest point, between the inside face of the flue and the outside face of the flue block, not measured at any joint feature, e.g. spigot/socket end

#### 3.6

##### **multi wall flue block**

flue block consisting of a flue liner and at least one additional wall

#### 3.7

##### **reinforced flue block**

flue block having reinforcement to assist handling (not for structural stability)

**3.8**

**solid wall flue block**

flue block without cavities in the thickness of its walls

**3.9**

**straight flue block**

flue block designed to be used in a vertical section of a chimney, without having any special characteristics and having the ends perpendicular to the axis of the flue

**3.10**

**storey-height flue block**

factory made flue block having an overall length relating to the floor to floor height of a building

**3.11**

**transfer block**

flue block designed to facilitate connection to another chimney product

**3.12**

**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]

**3.13**

**precast concrete**

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

**3.14**

**resistance to fire of flue blocks**

ability of the flue blocks and fittings to be resistant to soot fire

**3.15**

**Type B (Bonding) block**

flue block dimensionally co-ordinated with masonry unit coursing height

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## 4 Materials and designations of flue blocks

### 4.1 Materials

**4.1.1** The wall or walls of flue blocks shall be pre-cast concrete. For multiwall flue blocks the liner and outer wall may be separated by an air space or insulation.

Materials used in the manufacture of flue blocks shall be identified for factory production control purposes.

**4.1.2** When insulation forms part of a flue block, it shall be of bonded material as specified by the manufacturer. If the insulation is supplied as a separate item, it shall be installed according to the flue block manufacturers installation instructions.

**4.1.3** The manufacturer shall declare the density of the insulation material used with the flue block and when tested to A.9 the density shall be within  $\pm 10\%$  of the declared value.

NOTE 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

Flue blocks shall be designated according to clause 9.

Designation classes for flue blocks for temperature, pressure, resistance to soot fire, condensate resistance and corrosion resistance shall be according to 9.2 to 9.6

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

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

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 block 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 apply throughout the temperature range.

## 5 Reinforcement

**5.1** Where a flue block is reinforced the reinforcement shall have a maximum diameter of 8 mm and a minimum concrete cover of 20 mm on all sides.

**5.2** In flue blocks having a bulk density of less than 2 000 kg/m<sup>3</sup>, when measured according to clause A.9, any reinforcement shall be protected against corrosion by one of the following means:

- a) use of stainless steel to EN 10088-2;
- b) by completely covering any mild steel reinforcement to EN 10218-2 with a coating.(e.g. typically Portland cement CEM 1 or CEM 2 mixed with water to form a slurry or epoxy resin).

## 6 Surface treatment

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

**6.2** Any external surface treatment of the flue block e.g. render, shall be applied, as described by the product manufacturer, before the product is tested.

## 7 Form, dimensions and tolerances

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### 7.1 Form

**7.1.1** Single wall or multi-wall flue blocks shall be manufactured in one of the following forms:

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- a) single flue; <https://standards.iteh.ai/catalog/standards/sist/7aaa412d-e7fa-4fe6-87ab-cb4c3eb7a9f9/sist-en-1858-2003>
- b) multi-flue;
- c) flue/ventilation combination.

NOTE See Annex B for examples of typical flue block types.

**7.1.2** Flue blocks shall have a maximum of four flues or ventilation passages.

### 7.2 Type B flue block

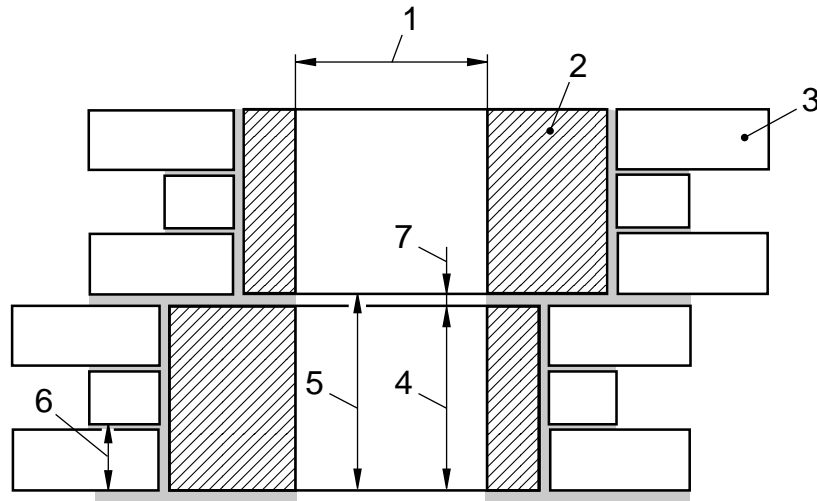
**7.2.1** Type B flue blocks shall comply with the requirements for flue blocks designated T250, N, 0, D1.

**7.2.2** The co-ordinating height of Type B flue blocks shall be declared by the manufacturer.

NOTE The co-ordinating height is the height of the flue block plus an allowance for jointing so that the flue block will align with one or more specified coursing heights in a brick or block wall. See Figure 2.

**7.2.3** When measured perpendicular to the axis of the flue for Type B flue blocks the minimum dimensions of the flue shall be 90 mm and the cross-sectional flue area shall be not less than 16 500 mm<sup>2</sup>. In transfer blocks the flue shall taper to a diameter of not less than 125 mm.

**7.2.4** The bonding extension on a straight bonding Type B flue blocks shall not be less than 75 mm (see B.3).



**Key**

- 1 Flue
- 2 Flue block
- 3 Masonry unit
- 4 Flue block height
- 5 Co-ordinating height
- 6 Coursing height
- 7 Jointing allowance

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**Figure 2 — Type B flue blocks jointing with masonry units**

**7.2.5** The angle of offset in any Type B flue block shall not exceed 30° (see clause B.3).

**7.2.6** Starter Type B flue blocks shall have internal transverse dimensions not less than 305 mm side x 115 mm deep (see clause B.3).

**7.2.7** When jointed together in accordance with the manufacturer's installation instructions, the flue in adjacent Type B flue blocks shall align to within 3 mm.

**7.3 Tolerances**

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

a) Declared internal transverse dimensions

below 300 mm : ± 3 mm

300 mm and above : ± 1,5 %

b) Declared length

below 300 mm : ± 5 mm

300 mm to 700 mm :  $\pm 7$  mm

above 700 mm :  $\pm 10$  mm

c) Declared overall wall thickness

below 10 mm : + 2 mm  
- 1 mm

10 mm - 40 mm : + 5 mm  
- 1,5 mm

above 40 mm : + 12 %  
- 5 %

## 7.4 Straightness

**7.4.1** When tested as described in A.2 the limit deviation from straightness of a straight concrete flue block of manufacturers declared length greater than 300 mm and less than 1000 mm shall not be greater than 1 % of the declared length.

**7.4.2** When tested as described in A.2 for flue blocks having a manufactured length equal to or greater than 1 000 mm the limit deviation shall not be greater than 0,5 % of the manufacturers declared length.

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## 7.5 Squareness of ends (standards.iteh.ai)

When tested in accordance with either procedure described in A.1 shall not touch the upright for the first procedure and the dimension G shall not be greater than 5 mm for the second procedure.

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## 8 Performance

### 8.1 Heat stress resistance

**8.1.1** When flue blocks and fittings, including those designated soot fire resistant, are tested in accordance with A.3 at the test temperature appropriate to the designation specified in Table 2, the flue block shall subsequently meet the requirements of 8.4. In addition, flue blocks and fittings having a compressive strength less than 10 MPa, or having a temperature designation above T250 and/or designated soot fire resistant shall meet the requirements of 8.5.

When a flue block is multi-flued with an equal wall thickness, the heat stress test shall be carried out on the flue with the highest designation and temperature.

**8.1.2** Flue block bends, made of the same material mix and by the same method of manufacture as the tested straight flue block shall be deemed to comply with the requirement in 8.1.1.

**8.1.3** For flue block bends and fittings, made of a different material mix or using a different method of manufacture from those described in 8.1.2, shall be checked for heat stress resistance by testing a special straight test sample in accordance with 8.1.1. This straight test sample shall be made using the same material mix and manufacturing method as the bend or fitting.

**8.1.4** The maximum temperature measured on the surface of adjacent combustible materials shall not exceed 85°C when related to an ambient temperature of 20 °C. The distance to the a combustible partition wall with a thermal resistance of 0,4 m<sup>2</sup>K/W at 100 °C shall be declared. This distance shall be determined in accordance with A.3 at a test temperature specified in Table 2 appropriate to the product designation.

NOTE This requirement is declared fulfilled when flue blocks, where combustibles are at least 50 mm from the outer wall and the spaces ventilated are tested in a free standing assembly at the test temperature given in Table 2 and the temperature of the outer wall does not exceed 100 °C at an ambient temperature of 20 °C.

**8.2 Heat shock resistance**

**8.2.1** Following the heat stress resistance test in 8.1, when a flue block designated as soot fire resistant is tested as described in A.3 at a flue gas temperature of 1000 °C for a period of 30 min ± 1 min the block shall subsequently meet the requirements of 8.4.

**8.2.2** Flue block bends made of the same material mix and by the same method of manufacture as the tested straight flue block shall be deemed to comply with the requirement in 8.4.

**8.2.3** Flue block bends and fittings made of a different material mix or using a different method of manufacture from those described in 8.2.1 shall be checked for heat shock by testing a special straight test in accordance with 8.1.1.

**8.2.4** The maximum temperature measured on the surface of adjacent combustible materials shall not exceed 100 °C when related to an ambient temperature of 20 °C when the test assembly is tested at the test temperature of 1 000 °C over a period of 30 min. The distance to the combustible partition with a thermal resistance of 0,04 m<sup>2</sup>K/W shall be declared.

NOTE This requirement is declared fulfilled when flue blocks, where combustibles are at least 50 mm from the outer wall and the space ventilated are tested in a free standing assembly at the test temperature of 1 000 °C over a period of 30 min the temperature of the outer wall does not exceed 140 °C at an ambient temperature of 20 °C.

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**Table 2 — Heat stress test temperature**

Temperature group	Temperature of flue gas °C
T 600	700 <sup>+50</sup> <sub>0</sub>
T450	550 <sup>+50</sup> <sub>0</sub>
T 400	500 <sup>+50</sup> <sub>0</sub>
T 300	350 <sup>+35</sup> <sub>0</sub>
T250	300 <sup>+30</sup> <sub>0</sub>
T 200	250 <sup>+25</sup> <sub>0</sub>
T 160	190 <sup>+19</sup> <sub>0</sub>
T140	170 <sup>+17</sup> <sub>0</sub>
T 120	150 <sup>+15</sup> <sub>0</sub>
T100	120 <sup>+12</sup> <sub>0</sub>
T 080	100 <sup>+10</sup> <sub>0</sub>

**8.3 Thermal resistance**

Thermal resistance shall be measured according to the method given in A.4 or calculated according to the method given in Annex C and the value obtained declared.

## 8.4 Gas tightness

When tested in accordance with A.5 the gas tightness expressed as a leakage rate of the flue block shall not be greater than the values specified in Table 4 for the relevant gas tightness class.

## 8.5 Abrasion resistance

All flue blocks having satisfied the gas tightness requirements of 8.4, when tested as described in A.6 the weight of the deposit collected shall not exceed  $0,03 \text{ kg/m}^2$  of the total area of the inner surface of the block, and shall subsequently meet the gas tightness requirements of 8.4.

## 8.6 Compressive strength

**8.6.1** The manufacturer shall declare the structural height. When tested as described in A.7, straight flue blocks and straight fittings shall withstand an intensity of loading equivalent to four times the manufacturer's declared structural height.

NOTE The manufacturers declared structural height can be derived from the ultimate compressive strength determined by the method in clause A.10.

Type B flue blocks shall be tested as a complete element and shall not be cut.

**8.6.2** Flue block bends and fittings made of the same material mix and by the same method of manufacture as the tested straight flue block shall be deemed to comply with the requirement in 8.6.1.

**8.6.3** Flue block bends and fittings made of a different material mix or using a different method of manufacture from those described in 8.6.2, shall be checked for compressive strength by testing a special straight test sample in accordance with 8.6.1.

The special straight test sample shall be made using the same material mix and manufacturing method as the bend or fitting.

## 8.7 Corrosion resistance

When flue blocks designated condensate resistance class W (suitable for use in wet operating conditions) are tested as described in clause A.8 the weight loss of the test pieces shall not be greater than 0,1 % of the initial mass.

Flue blocks designated condensate resistance class D (dry) and which meet the requirements of 8.1, 8.3, 8.5, and 8.6, may be assigned corrosion resistance class 3.

## 8.8 Condensate resistance

When flue blocks designated W (for use in wet operating conditions) are tested as described in clause A.8 the maximum amount of test solution passing through the wall of the flue block during any  $24_{0}^{+2}$  h test period shall not be greater than  $0,5 \text{ g/h/m}^2$  of the flue block external surface.

## 8.9 Bulk density

When flue blocks are tested as described in clause A.9 the lowest and highest bulk density value shall be within a limit deviation of  $\pm 10 \%$  of the manufacturers declared bulk density for the block.

## 8.10 Flexural strength under wind loading

Flue blocks to this standard are not tested for stability under wind loading. The manufacturer shall declare the maximum free standing height of flue blocks to this standard which shall be at least 4,5 times the least lateral overall external dimension of the flue block from the last point of lateral support (see Figure 3).