

Chimneys — Components — Concrete flue blocks

The European Standard EN 1858:2003 has the status of a British Standard

ICS 91.060.40; 91.100.30

National foreword

This British Standard is the official English language version of EN 1858:2003. It supersedes BS 1289-1:1986 which will be withdrawn.

EN 1858:2003 is a candidate “harmonized” European Standard and fully takes into account the requirements of the European Commission mandate M/105, *Chimneys*, given under the EU Construction Products Directive (89/106/EEC), and intended to lead to CE marking. The date of applicability of EN 1858:2003 as a “harmonized” European Standard, i.e. the date after which this standard may be used for CE marking purposes, is subject to an announcement in the *Official Journal of the European Communities*.

The Commission in consultation with Member States have agreed a transition period for the co-existence of “harmonized” European Standards and their corresponding national standard(s). It is intended that this period will comprise a period, usually nine months, after the date of availability of the European Standard, during which any required changes to national regulations are to be made, followed by a further period, usually of 12 months, for the implementation of CE marking. At the end of this co-existence period, the national standard(s) will be withdrawn.

EN 1858:2003 is the subject of transitional arrangements agreed under the Commission mandate. In the UK, the corresponding national standard is:

— BS 1289-1:1986, *Flue blocks and masonry terminals for gas appliances — Specification for precast concrete flue blocks and terminals*;

and based on this transition period of twenty-one months, BS 1289-1:1986 would be withdrawn in April 2005.

NOTE 1 This date is approximate. Users of this standard should contact BSI Customer Services for confirmation of withdrawal.

NOTE 2 Following the revision of Approved Document J to the Building Regulations in April 2002, bonding blocks for gas fire installation — Radiant/convector, ILFE or DFE require the designation T300, N2, O, D, 1.

The UK participation in the preparation of BS EN 1858:2003 was entrusted by Technical Committee B/506, Chimneys, to Subcommittee B/506/4, Chimneys and their components having inner linings of concrete, 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.

National annex NA (informative) gives recommendations for design and construction of Type B, concrete flue block systems for gas appliances in the UK.

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

Cross-references

The British Standards which implement international or European publications referred to in this document may be found in the *BSI Catalogue* under the section entitled “International Standards Correspondence Index”, or by using the “Search” facility of the *BSI Electronic Catalogue* or of British Standards Online.

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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Summary of pages

This document comprises a front cover, an inside front cover, the EN title page, pages 2 to 63 and a back cover.

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Amendments issued since publication

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English version

Chimneys - Components - Concrete flue blocks

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

Abgasanlagen - Bauteile - Betonformblöcke

This European Standard was approved by CEN on 2 December 2002.

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 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 Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and United Kingdom.



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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).

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

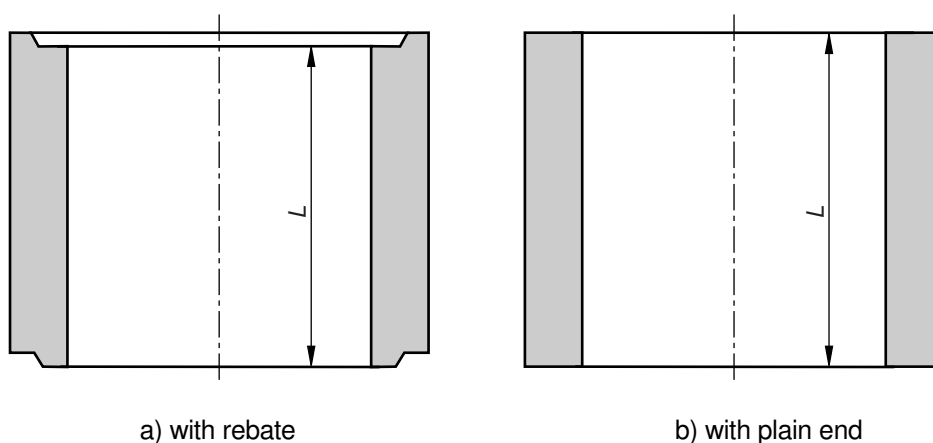
internal dimensions of the flue block measured perpendicular to the longitudinal axis

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

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.

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/m³, 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

7.1 Form

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

- a) single flue;
- 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

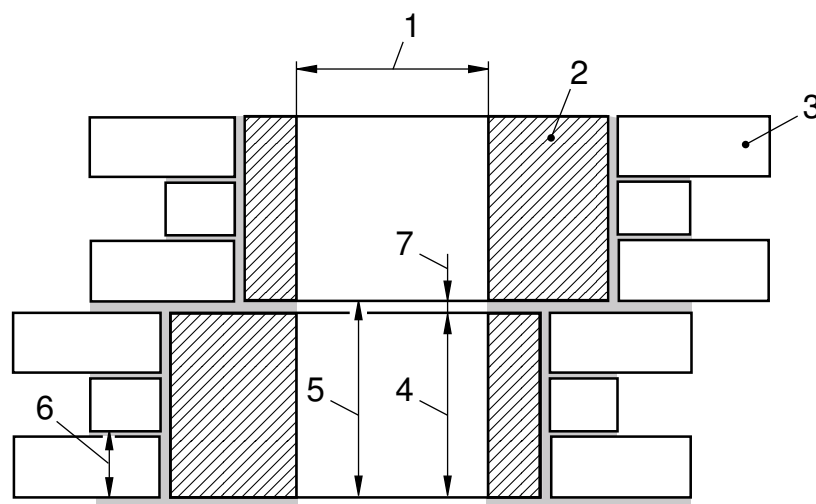
7.2.1 Type B flue blocks shall comply with the requirements for flue blocks designated T250, N, 0, D1.

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 mm². 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

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 × 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 : ± 7 mm

above 700 mm : ± 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.

7.5 Squareness of ends

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.

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 m²K/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 m²K/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.

Table 2 — Heat stress test temperature

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

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).

NOTE Procedures for assessing the stability under wind loading for masonry chimney structures are under development and will be introduced later.

8.11 Flow resistance

8.11.1 Flow resistance of flue blocks

The manufacturer shall declare the mean value of roughness for a flue block which shall be determined either:

a) by testing in accordance with EN 1859

or

b) from data obtained from EN 13384-1.

8.11.2 Flow resistance of fittings

The manufacturer shall declare the coefficient of flow resistance due to a directional and/or cross sectional and/or mass flow change which shall be determined either:

a) by testing in accordance with EN 1859

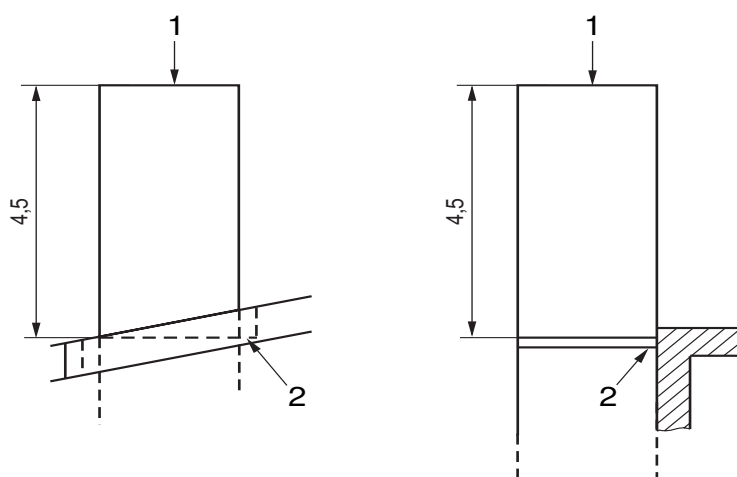
or

b) from data obtained from EN 13384-1.

8.12 Freeze-thaw resistance

Freeze-thaw resistance shall be tested in those cases where the characteristic is necessary/relevant and there is a requirement for this in national (local) regulations. In the absence of a European method the manufacturer shall verify compliance with this requirement in accordance with national provisions in the place of use of the flue block

NOTE A European test method for freeze-thaw is under development (prEN 14297).



Key

- 1 Top of chimney excluding any terminal or chimney pot
- 2 Last point of support

Figure 3 — Explanation of last point of support

9 Designation

9.1 General

All concrete flue blocks to this standard shall be designated in accordance with 4.2, for which an example of a designation system is given as follows:

	EN 1858	T 120	P1	W	1	O(20)
The number of this standard						
Flue gas temperature class						
Negative/positive pressure class						
Resistance to condensate						
Corrosion resistance						
Fire resistance (Sootfire resistance G(xx) or O(xx)						

9.2 Temperature class

For temperature class see Table 3.

Table 3 — Temperature class

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

9.3 Pressure class

For pressure classes see Table 4. The pressure class is assigned a gas tightness level, expressed as a maximum leakage rate at a specified test pressure.

- ¾ for flue blocks suitable for negative pressure chimneys: N1, N2;
- ¾ for flue blocks suitable for positive pressure chimneys: P1, P2;
- ¾ for flue blocks suitable for high positive pressure chimneys: H1, H2.

Table 4 – 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

9.4 Sootfire resistance class

Sootfire resistance classes:

- ¾ O (xx) for flue blocks for chimneys without sootfire resistance;
- ¾ G (xx) for flue blocks chimneys with sootfire resistance.

9.5 Resistance to condensate class

Resistance to condensate classes:

- ¾ W for flue blocks for chimneys intended to operate under wet conditions;
- ¾ D for flue blocks for chimneys intended to operate under dry conditions.

9.6 Corrosion resistance class

Corrosion resistance classes 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 5.

Table 5 — 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 block	1	2	3

10 Marking

A minimum of 20 % of the flue blocks or fittings in each consignment shall be legibly and indelibly marked with the following information:

- a) the name or trademark of the manufacturer;
- b) the manufacturers batch or date code;
- c) the number of this European Standard;
- d) the designation in accordance with 4.2;
- e) an arrow indicating direction of flue gas flow;
- f) identification of the flue in a flue/ventilation combination block.

NOTE For CE marking and labelling, clause ZA.3 applies.

11 Product information

The manufacturer's printed literature for the product shall include the following:

- a) the manufacturer's product description;
- b) manufacturer's declared sizes;
- c) the manufacturer's designation;
- d) distance to combustibles;
- e) thermal resistance;
- f) manufacturer's declared structural height;
- g) detailed installation instructions including method of jointing and flue identification.

NOTE For CE marking requirements for information on the product, clause ZA.3 applies.

12 Evaluation of conformity

12.1 Initial type testing

Type test relating to material composition shall be performed initially together with factory production control tests as given in Table 6. One test shall be carried out for each requirement.

The thermal testing shall be carried out on one size of flue block for each geometrical configuration, e.g. circular, square, rectangular. For circular flue blocks, the size to be tested shall be 200 mm $\pm$ 50 mm internal diameter. For other geometrical configurations, the flue liner shall have an equivalent cross-sectional area range.

12.2 Further type tests

Type tests shall be performed when a change is made either in material composition, processing technique or to the design or method of manufacture of the flue block, but they may be performed more frequently by incorporation into a plan for monitoring the consistency of manufacture (see Table 6).

Table 6 — Factory production control and type tests

Item	Relevant requirement clauses	
	Factory production control 12.3 ^a	Type tests 12.1 and 12.2
Flue blocks and fittings	4; 5; 6; 7.3, 7.4; 7.5; 8.4; 8.6; 8.9	8.1; 8.2; 8.3; 8.4; 8.5; 8.6; 8.7; 8.8; 8.10; 8.11; 8.12
^a The tests carried out during FPC are intended to verify that the performance requirements assessed through the initial type testing are maintained.		

12.3 Factory production control

To achieve compliance with this standard, the manufacturer shall establish and maintain an effective documented quality system.

Factory production control tests are carried out following manufacture to monitor the quality of product (see Table 6).

Sampling and testing of any batch shall be completed prior to removal from the works and shall be in accordance with ISO 2859-1 at an AQL of 10 % and inspection level S2. Isolated batches of units shall be assessed in accordance with tightened inspection procedures, with a maximum batch size of 2 500 (see Annex D).

Batches rejected under the factory production control procedure may be resubmitted once, after removal of units with previously undetected visible defects, under the tightened inspection procedures, in respect only of the defect that caused initial rejection.

NOTE A quality system assessed by a certification body which complies with the requirements of EN 45012 may be applied to ensure that the requirements of EN ISO 9001 and clause 12 are complied with.