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BSI Standards Publication

Chimneys — Concrete System Chimneys

Part 1: Non-balanced flue applications

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National foreword

This British Standard is the UK implementation of EN 16497-1:2015.

The UK participation in its preparation was entrusted to Technical Committee B/506/4, Chimneys and their components having inner linings of concrete.

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

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Conduits de fumée - Conduits-systèmes de fumée en béton - Partie 1: Applications non équilibrées

Abgasanlagen - System-Abgasanlagen aus Beton - Teil 1: Raumluftabhängige Anwendungen

This European Standard was approved by CEN on 29 November 2014.

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COMITÉ EUROPÉEN DE NORMALISATION
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Foreword

This document (EN 16497-1:2015) has been prepared by Technical Committee CEN/TC 166 “Chimneys”, the secretariat of which is held by ASI.

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of an identical text or by endorsement, at the latest by August 2015 and conflicting national standards shall be withdrawn at the latest by November 2016.

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 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 Regulations.

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

This standard is one of a series of co-ordinated standards dealing with specification, design, and testing 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*

— CEN/TS 16134, *Chimney terminals — General requirements and material independent test methods*

— EN 16497-1, *Chimneys — Concrete system chimneys — Part 1: Non-balanced flue applications*

— prEN 16497-2, *Chimneys — Concrete system chimneys — Part 2: Balanced flue applications*

NOTE A chimney in accordance with EN 16497-1 can also be used for room-sealed applications using a separate combustion air supply in a non-balanced flue configuration.

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, Former Yugoslav Republic of Macedonia, 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

This European Standard specifies the materials and the dimensional and performance requirements for straight concrete system chimneys for non-balanced flue applications comprising a concrete flue liner and a combination of compatible chimney components, which may be concrete flue blocks (see Clause 4), obtained or specified from one manufacturing source with product responsibility for the whole chimney.

This European Standard does not apply to concrete system chimneys with back ventilation.

This European Standard does not cover products designated wet (W) in conjunction with corrosion class 3.

This European Standard also applies to concrete system chimneys constructed from storey-height elements and flue blocks reinforced for handling.

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

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 1443:2003, *Chimneys - General requirements*

EN 13216-1, *Chimneys - Test methods for system chimneys - Part 1: General test methods*

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

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

EN ISO 7500-1, *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)*

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

3 Terms and definitions

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

3.1
flue block fitting
element fitted to the flue block

Note 1 to entry: Such as an access opening or offset.

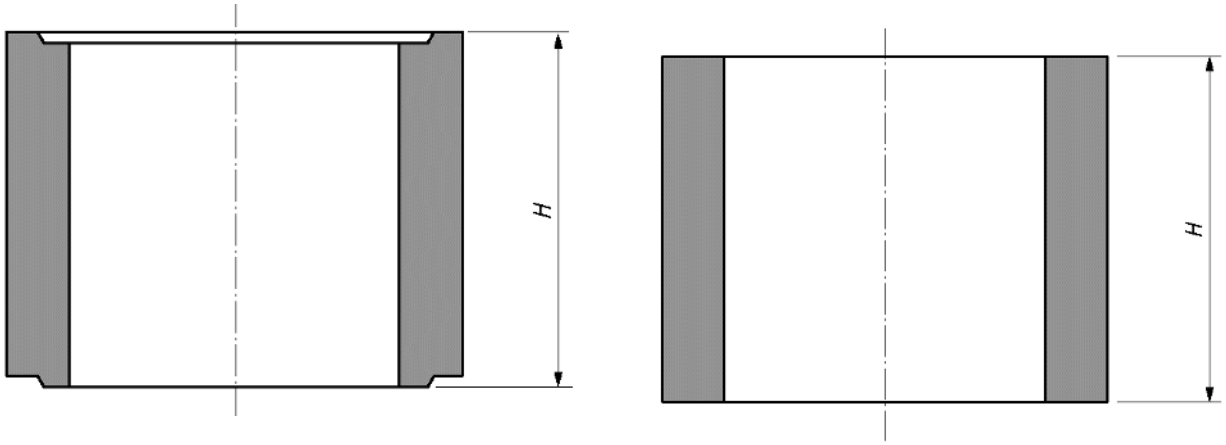
3.2
hollow wall flue block
flue block having vertical cavities

Note 1 to entry: Cavities may pass through both ends of the block.

3.3
declared internal transverse dimension
internal dimension of the flue block measured perpendicular to the longitudinal axis

3.4
declared height
internal height of the flue block

Note 1 to entry: Examples of measurement are shown in Figure 1.



a) with rebate b) with plain end

Key
H internal height

Figure 1 — Manufacturer's declared height

3.5
manufacturer's declared structural height
maximum constructional height of the flue blocks as declared by the manufacturer

3.6
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

Note 1 to entry: Joint features include a spigot/socket end etc.

3.7
multi-wall flue block
flue block consisting of a flue liner and at least one additional wall

3.8
reinforced flue block
flue block having reinforcement to assist handling (not for structural stability)

3.9
solid wall flue block
flue block without cavities in the thickness of its walls

3.10
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

3.11
storey-height flue block
factory made flue block having an overall height relating to the floor to floor height of a building

3.12
transfer block
flue block designed to facilitate connection to another chimney product

3.13
concrete
material formed by mixing cement, coarse and fine aggregate and water with or without the incorporation of admixtures or additions, which develops its properties by hydration of the cement

[SOURCE: EN 206:2013, 3.1.1.1]

3.14
precast concrete
concrete that is cast in a place other than its final location of use

3.15
balanced flue chimney system
system where the air entry to the combustion air supply duct is adjacent to the discharge of combustion products from the flue, the inlet and outlet being so positioned that wind effects are substantially balanced

4 Form

The concrete system chimney shall comprise of flue blocks, which may be of single wall or multi-wall construction.

In the context of this standard the term ‘flue block’ means a vertical element of a system chimney which may also comprise the following items where appropriate:

— flue blocks in accordance with EN 1858;

— flue liners in accordance with EN 1857;

— insulation layer;

— outer wall elements in accordance with EN 12446, or EN 13069, or of appropriate metal;

— mortar for jointing flue liners;

— mortar for jointing a flue block or outer wall elements;

— terminal in accordance with TS 16134;

— chimney base;

— cladding;

— opening section;

— reinforcement for handling.

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

— single flue;

— multi-flue;

— flue/ventilation combination.

See Annex B for examples of typical flue block types.

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

5 Materials

5.1 General

The wall or walls of concrete flue liners or concrete flue blocks shall be precast concrete. For multi-wall concrete flue blocks the concrete liner and outer wall may be separated by an air space or insulation.

Materials used in the manufacture of system chimneys shall be identified for factory production control purposes.

When insulation forms part of a system chimney, it shall be of bonded material as specified by the manufacturer. If the insulation is supplied as a separate item, it shall be installed in accordance with the system chimney manufacturer's installation instructions.

The density of any insulation and the bulk density of the concrete elements shall be declared and when tested to A.11 the density shall be within ± 10 % of the declared value (see 8.10).

Where a system chimney to this standard comprises CE marked chimney components in accordance with Clause 4, the above requirements are deemed to be satisfied.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications may be presumed to have the performances declared in the Declaration of Performance (DoP), although this does not replace the responsibility on the concrete system chimney manufacturer to ensure that the concrete system chimney as a whole is correctly manufactured and its component products have the declared performance values.

5.2 Reaction to fire

In accordance with the Commission Decision 96/603/EC, as amended, concrete elements of system chimneys to this standard are classified as reaction to fire class A1 without tests provided they contain no more than a mass or volume fraction of 1 % (whichever is the more onerous) of homogeneously distributed organic materials.

5.3 Reinforcement for handling

5.3.1 Where a concrete element is reinforced for handling, the reinforcement shall have a maximum diameter of 8 mm and a minimum concrete cover of 15 mm on all sides for temperature classes up to and including T250 and a minimum concrete cover of 20 mm on all sides for all other temperature classes.

5.3.2 For concrete elements with a bulk density of less than 2 000 kg/m^3, when measured in accordance with A.10, any reinforcement shall be protected against corrosion by one of the following means:

a) use of stainless steel;

b) by completely covering any mild steel reinforcement with a coating (e.g. typically Portland cement CEM I or CEM II mixed with water to form a slurry, or epoxy resin).

CE marked chimney components are deemed to satisfy these requirements.

6 Surface treatment

Any surface treatment of the concrete elements, e.g. render, shall be applied, as described by the product manufacturer, before the product is tested.

7 Tolerances on dimensions of individual concrete components

NOTE CE marked chimney components are deemed to satisfy these requirements.

7.1 Declared dimensions

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

a) Declared internal transverse dimensions below

300 mm: ± 3 mm

above 300 mm: ± 1,5 %

b) Declared height

below 300 mm: ± 5 mm

300 mm to 700 mm: ± 7 mm

above 700 mm: ± 10 mm

c) Storey height elements constructed from individual blocks

Declared height up to 3 m: ± 10 mm

Declared height over 3 m: ± 30 mm

d) Declared overall wall thickness

below 10 mm: $^{+1}_{-2}$ mm

10 mm to 40 mm: $^{+5}_{-1,5}$ mm

above 40 mm: $^{+12}_{-5}$ %

7.2 Straightness

7.2.1 When tested as described in A.2, the limit deviation from the straightness of a straight concrete flue block of manufacturer's declared height, greater than 300 mm and less than 1 000 mm, shall not be greater than 1 % of the declared height.

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

7.3 Squareness of ends

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

8 Performance

8.1 Heat stress resistance

8.1.1 When concrete system chimneys, including those designated soot fire resistant, are tested for heat stress resistance in accordance with A.3, at the test temperature appropriate to the designation specified in Table 1, the system chimney shall subsequently meet the requirements of 8.4 and 8.5.

When a concrete system chimney 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 The distance to combustible material, xx, shall be declared. 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.

8.2 Heat shock resistance

8.2.1 Following the heat stress resistance test in 8.1, when a concrete system chimney designated as soot fire resistant is tested for heat shock resistance in accordance with A.3, at a flue gas temperature of 1 000 °C for a period of 30 min ± 1 min, the block shall subsequently meet the requirements of 8.4 and 8.5.

8.2.2 The distance to combustible material, xx, shall be declared. 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 ± 1 min.

Table 1 — Heat stress test temperature

Temperature group	Temperature of flue gas °C
T600	$700\ ^{+50}_{0}$
T450	$500\ ^{+50}_{0}$
T400	$500\ ^{+50}_{0}$
T300	$350\ ^{+35}_{0}$
T250	$300\ ^{+30}_{0}$
T200	$250\ ^{+25}_{0}$

T160	190^{+19}_{0}
T140	170^{+17}_{0}
T120	150^{+15}_{0}
T100	120^{+12}_{0}
T080	100^{+10}_{0}

8.3 Thermal resistance

Thermal resistance shall be measured in accordance with the method given in A.4 (reference method) or calculated in accordance with the method given in Annex C and the value obtained declared.

The value for CE marked flue block chimney components may be used.

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 before and after the thermal performance tests.

For factory production control the test sample may be one element.

8.5 Abrasion resistance

All flue blocks having satisfied the gas tightness requirements of 8.4, when tested in accordance with A.6, the weight of the deposit collected shall not exceed the values in Table 2, and shall subsequently meet the gas tightness requirements of 8.4.

Table 2 — Abrasion resistance

Dry density kg/m³	**Maximum abrasion of inner surface** kg/m²
1 000	1 000
1 100	1 100
1 200	1 200
1 300	1 300
1 400	1 400
1 500	1 500
1 600	1 600
1 700	1 700
1 850	1 850

CE marked chimney components are deemed to satisfy these requirements

8.6 Compressive strength

The manufacturer shall declare the structural height. When tested in accordance with A.7, straight flue blocks and straight fittings shall withstand an intensity of loading equivalent to four times the declared structural height.

The declared structural height is dependent on the lowest compressive strength of the individual walls of the flue block, and/or any opening element.

The value of CE marked chimney components may be used

The declared structural height can be derived from the ultimate compressive strength determined by the method in A.12.

8.7 Corrosion resistance

When flue blocks designated condensate resistance class W (suitable for use in wet operating conditions) are tested as described in A.8, flue blocks shall be designated corrosion class 1 or class 2 depending on the test solution used, provided that the mass loss of the test pieces is not greater than 0,1 % of the initial mass.

Flue blocks designated condensate resistance class D (dry) and which meet the requirements of 8.1 and 8.2, may be assigned corrosion resistance class 3.

CE marked chimney components are deemed to satisfy these requirements.

8.8 Condensate resistance

When flue blocks designated W (suitable for use in wet operating conditions) are tested as described in A.8, the maximum amount of test solution passing through the wall of the flue block during any 24 $(^{+2}_{0})$h test period shall not be greater than 0,5 $gh^{-1}m^{-2}$ of the flue block external surface.

Otherwise the flue block shall be designated D (dry).

CE marked chimney components are deemed to satisfy these requirements.

8.9 Water vapour diffusion resistance

When flue blocks designated W are tested in accordance with A.9 the maximum amount of test solution passing through the wall of the flue block during any 24 $(^{+2}_{0})$h test period shall not be greater than 0,5 $gh^{-1}m^{-2}$ of the flue block external surface.

The flue block shall show no water vapour saturation in any part of the chimney.

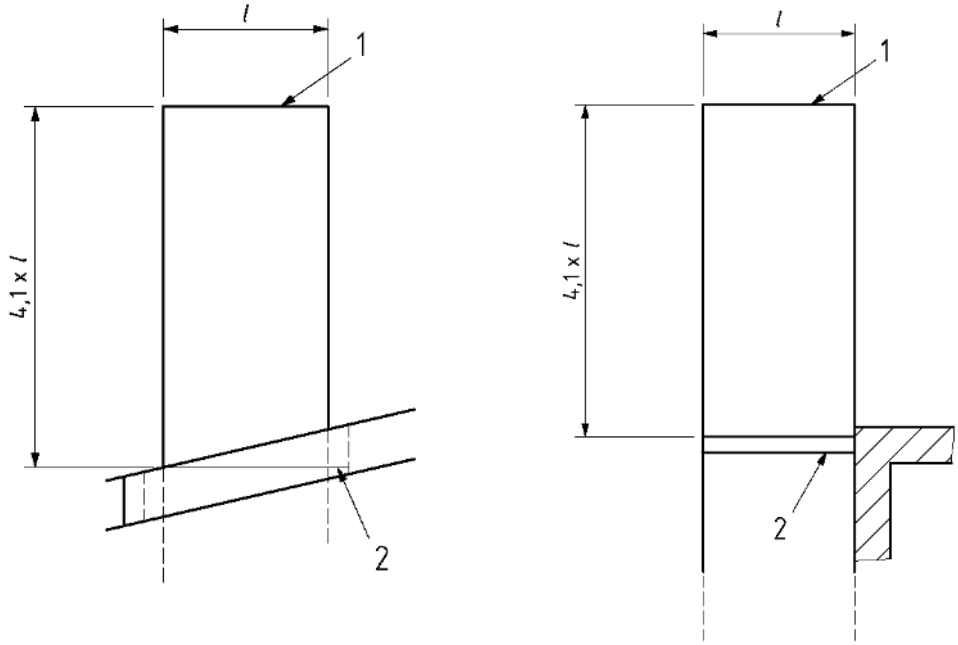
8.10 Bulk density

When concrete components are tested as described in A.11, the lowest and highest bulk density value shall be within a limit deviation of ± 10 % of the declared bulk density for the component.

8.11 Flexural strength under wind loading

The maximum free standing height of flue blocks shall be no greater than 4,5 times the least lateral overall external dimension of the flue block from the last point of lateral support (see Figure 2).

Alternatively, the free standing part of the chimney above the last lateral support of the concrete flue block shall withstand a wind load of 1,5 kN/m^2 (or a value in accordance with national regulations), when tested in accordance with A.10.



Key

1 top of chimney excluding any terminal or chimney pot

2 last point of support

l least lateral overall external dimension of the flue block

Figure 2 — Explanation of last point of support

8.12 Flow resistance

8.12.1 Flow resistance of straight flue blocks

The mean value of roughness for a straight flue block shall be determined either:

a) by testing in accordance with EN 13216-1 (being the reference method), or

b) from data obtained from EN 13384-1.

Where the system chimney comprises of CE marked flue blocks in accordance with Clause 4 the values obtained from the products may be used.

8.12.2 Flow resistance of fittings

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

a) by testing in accordance with EN 13216-1 (being the reference method), or

b) from data obtained from EN 13384-1.

Where the system chimney comprises of CE marked flue blocks in accordance with Clause 4 the values obtained from the products may be used.

8.13 Freeze-thaw resistance

Where national regulations require freeze/thaw resistance of flue blocks, they shall be tested in accordance with EN 14297. The product shall not present any damage of type 7, 8, 9 and 10 in accordance with EN 14297:2004, Table 1.

A flue block to this standard comprising of CE marked chimney components (see Clause 4) designated freeze/thaw resistant are deemed to satisfy these requirements.

8.14 Resistance to fire external to external

Where national regulations require resistance to fire external to external (see EN 1443) of flue blocks, they shall be evaluated and declared in accordance with those regulations.

8.15 Dangerous substances

National regulations on dangerous substances, other than those already covered in other clauses of this standard, may require verification and declaration on release, and sometimes content, when construction products covered by this standard are placed on those markets. In the absence of European harmonized test methods, verification and declaration on release/content should be done taking into account national provisions in the place of use.

NOTE An informative database covering European and national provisions on dangerous substances is available at the construction web site on EUROPA accessed through: http://ec.europa.eu/enterprise/construction/cpd-ds/

8.16 Relative movement between inner liner and outer wall

After thermal testing (heat stress and where appropriate heat shock) in accordance with EN 13216-1, the final position of the upper flue liner after cooling down to room temperature shall be ± 5 mm to the original position.

8.17 Terminals

8.17.1 Types

Terminals may consist of two main types.

8.17.1.1 Type I

8.17.1.1.1 Type 1a

A terminal for non-balanced flue applications, tested for flow resistance but not for wind velocity pressure (wind influence) and not for rainwater ingress.

NOTE The terminal is suitable for non room-sealed and non-balanced flue room-sealed applications.

8.17.1.1.2 Type Ib

A terminal for non-balanced flue applications, tested for flow resistance but not for wind velocity pressure (wind influence). This terminal is additionally tested for rainwater ingress.

NOTE The terminal is suitable for non room-sealed and non-balanced flue room-sealed applications.

8.17.1.2 Type II

A terminal for non-balanced flue applications, tested for flow resistance and for wind velocity pressure at least. The terminal may be additionally tested for rainwater ingress and icing behaviour.

NOTE The terminal is suitable for non room-sealed and non-balanced flue room-sealed applications when wind influence in accordance with EN 13384-1 is covered.

8.17.2 Flow resistance of terminals.

The flow resistance of the terminal shall be determined in accordance with EN 13216-1.

8.17.3 Wind velocity pressure of Type II terminals

The aerodynamic properties of a terminal under wind condition shall be tested in accordance with EN 13216-1

The manufacturer shall declare the coefficient of wind velocity pressure for wind direction characteristics specified/determined in accordance with CEN/TS 16134.

The following requirements for the coefficient of wind velocity pressure c_F apply:

> $c_F \geq 0$ both for terminals for chimneys operating under negative pressure and for terminals for chimneys operating under positive pressure.

In addition, for a Type II terminal the manufacturer shall declare the wind velocity pressure P_L in accordance with CEN/TS 16134.

NOTE Reference to CEN/TS 16134 is made in the absence of these test methods being available in EN 13216-1. When EN 13216-1 is updated the reference shall be changed.

8.17.4 Rainwater ingress

A terminal declared to be rainwater ingress resistant shall be tested in accordance with CEN/TS 16134 without wind or in accordance with CEN/TS 16134 with wind in accordance with the manufacturer's declaration.

In a flue duct of a terminal the volume of water collected in the flue shall not exceed 0,05 mm^3/s related to the declared internal diameter in mm.

9 Designation

9.1 General

All concrete flue blocks in accordance with this standard shall be designated in accordance with 9.2 to 9.6 for temperature, pressure, resistance to soot fire, condensate resistance and corrosion resistance respectively.

NOTE An example of a designation system is given in Figure 3.

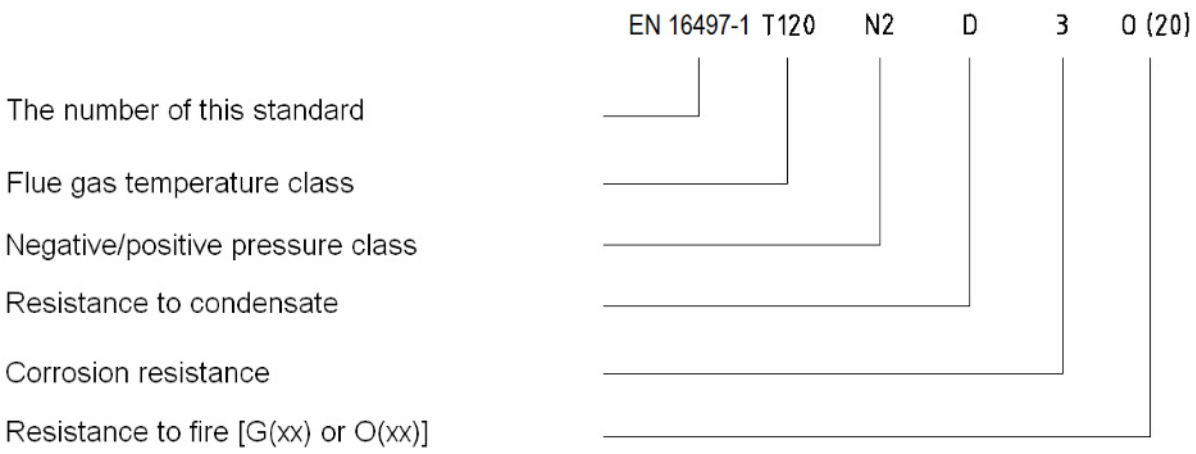


Figure 3 — Example of a designation system

9.2 Temperature class

The temperature class shall be as given in 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

The pressure class shall be as follows, with the corresponding test pressure and gas tightness level as given in Table 4:

— for flue blocks suitable for negative pressure chimneys: N1, N2;

— for flue blocks suitable for positive pressure chimneys: P1, P2;

— for flue blocks suitable for medium positive pressure chimneys M1, M2;

— for flue blocks suitable for high positive pressure chimneys: H1, H2.

Table 4 — Pressure classes and gas tightness/leakage rate

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
M1	1500	0,006
M2	1500	0,120
H1	5 000	0,006
H2	5 000	0,120

9.4 Resistance to condensate class

The resistance to condensate class shall be as follows:

— W for flue blocks for chimneys intended to operate under wet conditions;

— D for flue blocks for chimneys intended to operate under dry conditions.

9.5 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 shall be as given in Table 5 (see 8.7).

Table 5 — Corrosion resistance classes

Fuel types	1 Possible fuel types	2 Possible fuel types	3 Possible fuel types
Gas	gas: sulphur-content ≤ 50 mg/m^3 natural gas L + H	gas natural gas L + H	gas natural gas L + H
Liquid	kerosene: sulphur-content ≤ 50 mg/m^3	oil: sulphur-content ≤ 0,2 mass % kerosene: sulphur-content > 50 mg/m^3	oil: sulphur-content > 0,2 mass % kerosene: sulphur-content > 50 mg/m^3
Wood		wood in open fire places	wood in open fire places wood in closed stoves
Coal			coal
Peat			peat

NOTE Table 5 does not categorize process gases or liquids.

9.6 Resistance to fire class

Resistance to fire class shall be as follows:

— O for flue blocks for chimneys without soot fire resistance;

— G for flue blocks chimneys with soot fire resistance;

— followed by the distance to combustible material (xx).

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) name or trademark of the manufacturer;

b) the manufacturer's batch or date code;

c) the number of this European Standard;

d) designation in accordance with Clause 9;

e) an arrow indicating direction of flue gas flow (for rebated components - see 3.4);

f) identification of the flue in a multi passage block.

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

11 Product information

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

a) product description;

b) declared sizes;

c) designation;

d) distance to combustibles and how it was obtained (i.e. in which test assembly);

e) maximum outer surface temperature;

f) thermal resistance of the flue blocks;

g) manufacturer's declared internal transverse dimensions, height, structural height and overall wall thickness;

h) detailed installation instructions including method of jointing and flue identification;

i) characteristics of any terminal, e.g. whether rainwater resistant, aerodynamic properties.

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

12 Assessment and Verification of the Constancy of Performance (AVCP)

12.1 General

Compliance with the requirements of this standard and with the performances declared by the manufacturer in the DoP shall be demonstrated by:

— determination of the product type;

— factory production control by the manufacturer, including product assessment.

The manufacturer shall always retain the overall control and shall have the necessary means to take responsibility for the conformity of the product with its declared performance(s).

NOTE The assignment of tasks to the notified body(ies) and the manufacturer is shown in Annex ZA, Table ZA.3.

12.2 Type testing

12.2.1 General

All performances related to characteristics included in this standard shall be determined when the manufacturer intends to declare the respective performances unless the standard gives provisions for declaring them without performing tests (e.g. use of previously existing data, CWFT and conventionally accepted performance).

Assessments previously performed in accordance with the provisions of this standard may be taken into account provided that they were done to the same or a more rigorous test method, under the same AVCP system on the same product or products of similar design, construction and functionality, such that the results are applicable to the product in question.

For the purposes of assessment, the products may be grouped into families, where it is considered that the results for one or more characteristics from any one product within the family are representative for that same characteristics for all products within that same family.

NOTE 1 Products can be grouped in different families for different characteristics.

NOTE 2 Reference to the assessment method standards should be made to allow the selection of a suitable representative sample.

In addition, the determination of the product type shall be performed for all characteristics included in this standard for which the manufacturer declares the performance:

— at the beginning of the production of new or modified Chimneys - Concrete System Chimneys - Part 1: Non-balanced flue applications (unless a member of the same product range), or

— at the beginning of a new or modified method of production (where this may affect the stated properties), or

— they shall be repeated for the appropriate characteristic(s), whenever a change occurs in this standard's design, in the raw material or in the supplier of the components, or in the method of production (subject to the definition of a family), which would affect significantly one or more of the characteristics.

Where components are used whose characteristics have already been determined, by the component manufacturer on the basis of assessment methods of other product standards, these characteristics need not be re-assessed. The specifications of these components shall be documented.

Products bearing regulatory marking in accordance with appropriate harmonized European specifications can be presumed to have the performances declared in the DoP, although this does not replace the responsibility of the manufacturer to ensure that the applications of this standard as a whole are correctly manufactured and its component products have the declared performance values.

12.2.2 Type testing

12.2.2.1 Initial type testing

Type tests 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 ± 50 mm internal diameter. For other geometrical configurations, the flue block shall have an equivalent cross-sectional area range.

12.2.2.2 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 can be performed more frequently by incorporating them into a plan for monitoring the consistency of manufacture (see Table 6).

12.2.3 Test reports

The results of the determination of the product type shall be documented in test reports. All test reports shall be retained by the manufacturer for at least 10 years after the last date of production of this standard to which they relate.

12.2.4 Shared other party results

A manufacturer may use the results of the product type determination obtained by someone else (e.g. by another manufacturer, as a common service to manufacturers, or by a product developer), to justify his own declaration of performance regarding a product that is manufactured in accordance with the same design (e.g. dimensions) and with raw materials, constituents and manufacturing methods of the same kind, provided that:

— the results are known to be valid for products with the same essential characteristics relevant for the product performance;

— in addition to any information essential for confirming that the product has such same performances related to specific essential characteristics, the other party who has carried out the determination of the product type concerned, or has had it carried out, has expressly accepted[1)] to transmit to the manufacturer the results and the test report to be used for the latter's product type determination, as well as information regarding production facilities and the production control process that can be taken into account for factory production control (FPC);

— the manufacturer using other party results accepts to remain responsible for the product having the declared performances; and also

— ensures that the product has the same characteristics relevant for performance as the one that has been subjected to the determination of the product type, and that there are no significant differences with regard to production facilities and the production control process compared to that used for the product that was subjected to the determination of the product type; and

— keeps a copy of the determination of the product type report available, which also contains the information needed for verifying that the product is manufactured in accordance with the same design and with raw materials, constituents and manufacturing methods of the same kind.

1) The formulation of such an agreement can be done by licence, contract, or any other type of written consent.

12.2.5 Cascading determination of the product type results

For some construction products, there are companies (often called 'system houses') which supply or ensure the supply of, on the basis of an agreement[2)], some or all of the components (e.g. in case of windows: profiles, gaskets, weather strips)[3)] to an assembler who then manufactures the finished product (referred to below as the 'assembler') in their factory.

Provided that the activities for which a system house is legally established include manufacturing/assembling of products the same as the assembled one, the system house may take responsibility for the determination of the product type regarding one or several essential characteristics of an end product which is subsequently manufactured and/or assembled by other firms in their own factory.

When doing so, the system house shall submit an 'assembled product' using components manufactured by it or by others, to the determination of the product type and then make the determination of the product type report available to the assemblers, i.e. the actual manufacturer of the product placed on the market.

To take into account such a situation, the concept of cascading determination of the product type might be taken into consideration in the technical specification, provided that this concerns characteristics for which either a notified product certification body or a notified test laboratory intervene, as presented below.

The determination of the product type report that the system house has obtained with regard to tests carried out by a notified body, and which is supplied to the assemblers, may be used for the regulatory marking purposes without the assembler having to involve again a notified body to undertake the determination of the product type of the essential characteristic(s) that were already tested, provided that:

— the assembler manufactures a product which uses the same combination of components (components with the same characteristics), and in the same way, as that for which the system house has obtained the determination of the product type report. If this report is based on a combination of components not representing the final product as to be placed on the market, and/or is not assembled in accordance with the system house's instruction for assembling the components, the assembler needs to submit his finished product to the determination of the product type;

— the system house has notified to the manufacturer the instructions for manufacturing/assembling the product and installation guidance;

— the assembler (manufacturer) assumes the responsibility for the correct assembly of the product in accordance with the instructions for manufacturing/assembling the product and installation guidance notified to him by the system house;

— the instructions for manufacturing/assembling the product and installation guidance notified to the assembler (manufacturer) by the system house are an integral part of the assembler's Factory Production Control system and are referred to in the determination of the product type report;

— the assembler is able to provide documented evidence that the combination of components he is using, and his way of manufacturing, correspond to the one for which the system house has obtained the determination of the product type report (he needs to keep a copy of the system house's determination of the product type report);

— regardless the possibility of referring, on the basis of the agreement signed with the system house, to the latter's responsibility and liability under private law, the assembler remains responsible for the product being in compliance with the declared performances, including both the design and the manufacture of the product, which is given when he affixes the regulatory marking on his product.

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2) This can be, for instance, a contract, licence or whatever kind of written agreement, which should also contain clear provisions with regard to responsibility and liability of the component producer (system house, on the one hand, and the assembler of the finished product, on the other hand).

3) These companies can produce components but they are not required to do so.

12.3 Factory production control (FPC)

12.3.1 General

The manufacturer shall establish, document and maintain an FPC system to ensure that the products placed on the market comply with the declared performance of the essential characteristics.

The FPC system shall consist of procedures, regular inspections and tests and/or assessments and the use of the results to control raw and other incoming materials or components, equipment, the production process and the product.

All the elements, requirements and provisions adopted by the manufacturer shall be documented in a systematic manner in the form of written policies and procedures.

This factory production control system documentation shall ensure a common understanding of the evaluation of the constancy of performance and enable the achievement of the required product performances and the effective operation of the production control system to be checked. FPC therefore brings together operational techniques and all measures allowing maintenance and control of the compliance of the product with the declared performances of the essential characteristics.

In case the manufacturer has used shared or cascading product type results, the FPC shall also include the appropriate documentation as foreseen in 12.2.4 and 12.2.5.

12.3.2 Requirements

12.3.2.1 General

The manufacturer is responsible for organizing the effective implementation of the FPC system in line with the content of this product standard. Tasks and responsibilities in the production control organization shall be documented and this documentation shall be kept up to date.

The responsibility, authority and the relationship between personnel that manages, performs or verifies work affecting product constancy, shall be defined. This applies in particular to personnel that need to initiate actions preventing product inconstancies from occurring, actions in case of inconstancies and to identify and register product constancy problems.

Personnel performing work affecting the constancy of performance of the product shall be competent on the basis of appropriate education, training, skills and experience for which records shall be maintained.

In each factory the manufacturer may delegate the action to a person having the necessary authority to:

— identify procedures to demonstrate constancy of performance of the product at appropriate stages;

— identify and record any instance of inconstancy;

— identify procedures to correct instances of inconstancy.

The manufacturer shall draw up and keep up-to-date documents defining the factory production control. The manufacturer's documentation and procedures should be appropriate to the product and manufacturing process. The FPC system should achieve an appropriate level of confidence in the constancy of performance of the product. This involves:

a) the preparation of documented procedures and instructions relating to factory production control operations, in accordance with the requirements of the technical specification to which reference is made;

b) the effective implementation of these procedures and instructions;

c) the recording of these operations and their results;

d) the use of these results to correct any deviations, repair the effects of such deviations, treat any resulting instances of non-conformity and, if necessary, revise the FPC to rectify the cause of inconstancy of performance.

Where subcontracting takes place, the manufacturer shall retain the overall control of the product and ensure that he receives all the information that is necessary to fulfill his responsibilities in accordance with this European Standard.

If the manufacturer has part of the product designed, manufactured, assembled, packed, processed and/or labelled by subcontracting, the FPC of the subcontractor can be taken into account, where appropriate for the product in question.

The manufacturer who subcontracts all of his activities may not pass the above responsibilities on to a subcontractor.

NOTE Manufacturers having an FPC system, which complies with EN ISO 9001 [3] and which addresses the provisions of the present European Standard are considered as satisfying the FPC requirements of the Regulation (EU) No 305/2011.

12.3.2.2 Equipment

12.3.2.2.1 Testing

All weighing, measuring and testing equipment shall be calibrated and regularly inspected in accordance with documented procedures, frequencies and criteria.

12.3.2.2.2 Manufacturing

All equipment used in the manufacturing process shall be regularly inspected and maintained to ensure use, wear or failure does not cause inconsistency in the manufacturing process. Inspections and maintenance shall be carried out and recorded in accordance with the manufacturer’s written procedures and the records retained for the period defined in the manufacturer's FPC procedures.

12.3.2.3 Raw materials and components

The specifications of all incoming raw materials and components shall be documented, as shall the inspection scheme for ensuring their compliance. In case supplied kit components are used, the constancy of performance system of the component shall be that given in the appropriate harmonized technical specification for that component.

12.3.2.4 Controls during manufacturing process

Production shall be planned and carried out under controlled conditions.

12.3.2.5 Product testing and evaluation

FPC tests shall be 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 acceptable quality level (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 FPC procedure may be resubmitted once under the tightened inspection procedures, after the removal of units with previously undetected visible defects, , in respect only of the defect that caused initial rejection.

12.3.2.6 Handling, storage and packaging

The manufacturer shall have procedures providing methods of product handling and shall provide suitable storage areas preventing damage or deterioration.

12.3.3 Product specific requirements

The FPC system shall address this European Standard and ensure that the products placed on the market comply with the DoP.

The FPC system shall include a product specific FPC, which identifies procedures to demonstrate compliance of the product at appropriate stages, i.e.:

a) the controls and tests to be carried out prior to and/or during manufacture in accordance with a frequency laid down in the FPC test plan,

and/or

b) the verifications and tests to be carried out on finished products in accordance with a frequency laid down in the FPC test plan.

If the manufacturer uses only finished products, the operations under b) shall lead to an equivalent level of compliance of the product as if the FPC had been carried out during the production.

If the manufacturer carries out parts of the production himself, the operations under b) can be reduced and partly replaced by operations under a). Generally, the more parts of the production that are carried out by the manufacturer, the more operations under b) can be replaced by operations under a).

In any case the operation shall lead to an equivalent level of compliance of the product as if FPC had been carried out during the production.

NOTE Depending on the specific case, it can be necessary to carry out the operations referred to under a) and b), only the operations under a) or only those under b).

The operations under a) refer to the intermediate states of the product as on manufacturing machines and their adjustment, and measuring equipment, etc. These controls and tests and their frequency shall be chosen based on product type and composition, the manufacturing process and its complexity, the sensitivity of product features to variations in manufacturing parameters, etc.

Records shall be established and maintained that provide evidence that the production has been sampled and tested. These records shall show clearly whether the production has satisfied the defined acceptance criteria and shall be available for at least three years.

12.3.4 Initial inspection of factory and of FPC

The initial inspection of the factory and of FPC shall be carried out when the production process has been finalized and is in operation. The factory and FPC documentation shall be assessed to verify that the requirements of 12.3.2 and 12.3.3 are fulfilled.

During the inspection it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard are in place and correctly implemented,

and

b) that the FPC procedures in accordance with the FPC documentation are followed in practice,

and

c) that the product complies with the product type samples, for which compliance of the product performance to the DoP has been verified.

All locations where final assembly or at least final testing of the relevant product is performed, shall be assessed to verify that the above conditions a) to c) are in place and implemented. If the FPC system covers more than one product, production line or production process, and it is verified that the general requirements are fulfilled when assessing one product, production line or production process, then the assessment of the general requirements does not need to be repeated when assessing the FPC for another product, production line or production process.

All assessments and their results shall be documented in the initial inspection report.

12.3.5 Continuous surveillance of FPC

Surveillance of the FPC shall be undertaken once per year. The surveillance of the FPC shall include a review of the FPC test plan(s) and production processes(s) for each product to determine if any changes have been made since the last assessment or surveillance. The significance of any changes shall be assessed.

Checks shall be made to ensure that the test plans are still correctly implemented and that the production equipment is still correctly maintained and calibrated at appropriate time intervals.

The records of tests and measurement made during the production process and to finished products shall be reviewed to ensure that the values obtained still correspond with those values for the samples submitted to the determination of the product type and that the correct actions have been taken for non-compliant products.

12.3.6 Procedure for modifications

If modifications are made to the product, production process or FPC system that could affect any of the product characteristics declared in accordance with this standard, then all the characteristics for which performance is declared, which might be affected by the modification, shall be subject to the determination of the product type, as described in 12.2.1.

Where relevant, a re-assessment of the factory and of the FPC system shall be performed for those aspects, which might be affected by the modification.

All assessments and their results shall be documented in a report.

12.3.7 One-off products, pre-production products (e.g. prototypes) and products produced in very low quantity

The products produced as a one-off, and products produced in very low quantities (less than 10 per year) shall be assessed as follows.

For type assessment, the provisions of 12.2.1, third paragraph apply, together with the following additional provisions:

The FPC system of one-off products and products produced in very low quantities shall ensure that raw materials and/or components are sufficient for production of the product. The provisions on raw materials and/or components shall apply only where appropriate. Records shall be maintained allowing traceability of the product.

In the initial assessment of the factory and FPC it shall be verified:

a) that all resources necessary for the achievement of the product characteristics included in this European Standard are available, and

b) that the FPC procedures in accordance with the FPC documentation shall be implemented and followed in practice, and

c) that procedures are in place to demonstrate that the factory production processes can produce a product complying with the requirements of this European Standard and that the product will be the same as the samples used for the determination of the product type, for which compliance with this European Standard has been verified.

Once series production is fully established, the provisions of 12.3 shall apply.

Table 6 — Factory production control and type tests

Item	Relevant requirement clauses	
	Factory production control 12.3[a]	Initial Type tests 12.2 and Further type tests 12.3
Flue blocks and fittings	4, 5, 6, 7.2, 7.3, 8.4, 8.6, 8.10	4, 5, 6, 7, 8.1, 8.2, 8.3, 8.4, 8.5, 8.6, 8.7, 8.8, 8.9, 8.10, 8.11, 8.12, 8.13, 8.16
Terminals	4, 5, 6, 7.2, 7.3, 8.6, 8.10	4, 5, 6, 7, 8.1, 8.2, 8.5, 8.6, 8.7, 8.10, 8.11. 8.13. 8.17.2, and where appropriate 8.17.3 and 8.17.4
[a] The tests carried out during FPC are intended to verify that the performance requirements assessed through the initial type testing are maintained.		

Annex A
(normative)

Test methods

NOTE Annex E gives the recommended test sequence.

A.1 Squareness of ends test

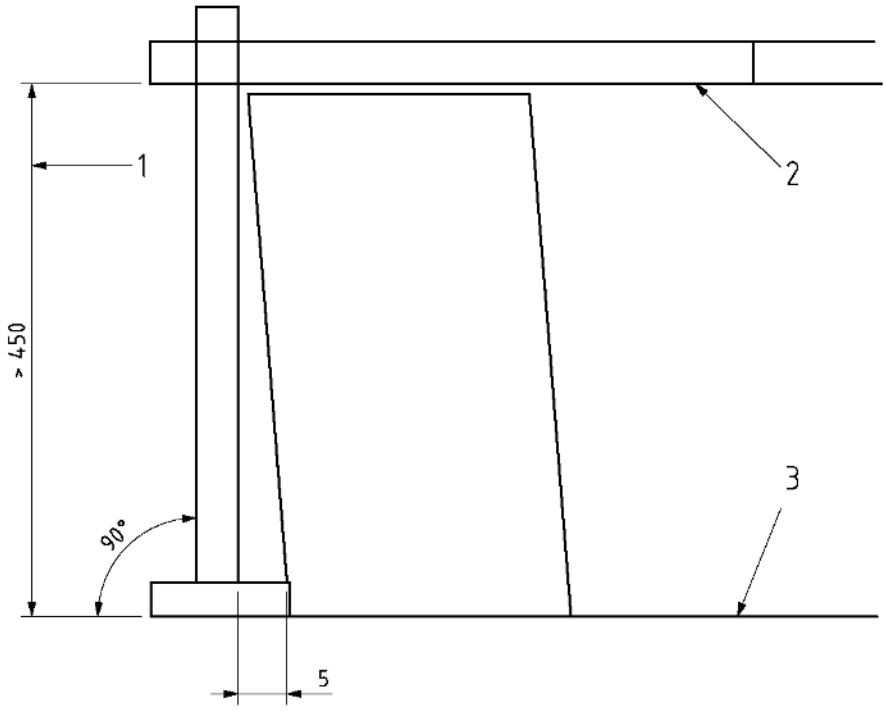
A.1.1 Apparatus

The apparatus shall include the following:

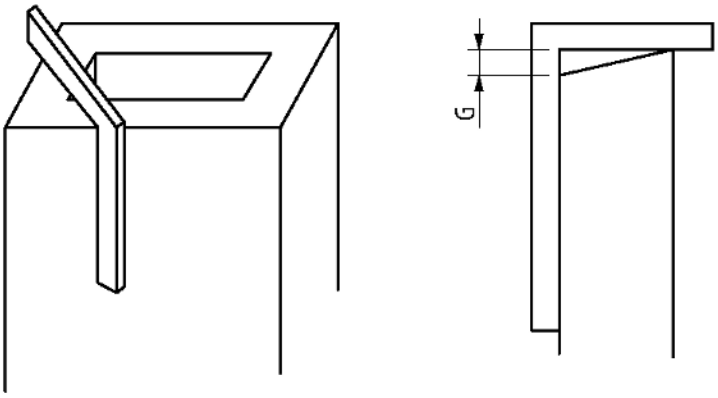
A.1.1.1 A level test bench with a fixed upright at 90°, see Figure A.1 a);

A.1.1.2 A square having one arm 300 mm long and the second arm 400 mm long, see Figure A.1 b).

Dimensions in millimetres



a) First procedure



b) Second procedure

Key

1 adjustable
2 adjustable cantilevered straight edge
3 level test surface

Figure A.1 — Apparatus for squareness test

A.1.2 First procedure

Place the flue block upright on the test bench with the base of the flue block touching the collar. Rotate the flue block 360°.

A.1.3 Test result — first procedure

Record any case where the flue block touches the upright.

A.1.4 Second procedure

Place the flue block upright on the test bench and apply one arm of the square along its side with the other arm touching the end of the flue block. Rotate the square across the end of the flue block as shown in Figure A.1 b).

A.1.5 Test result — second procedure

Record any case where the dimension exceeds 5 mm.

A.2 Straightness test

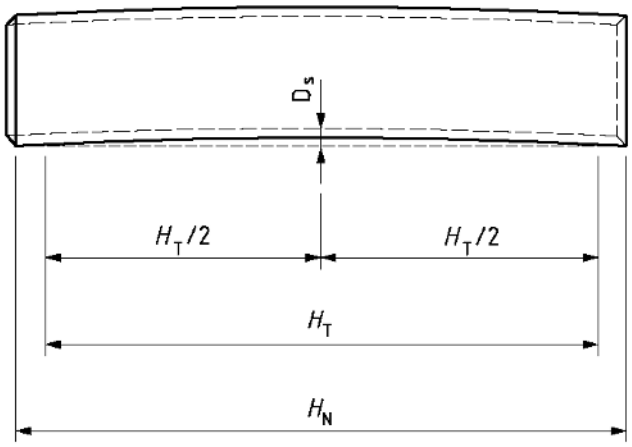
A.2.1 Apparatus

A straightness measuring device, such as a straight edge, with a height 100 mm less than the nominal height of the flue block under test.

A.2.2 Procedure

A.2.2.1 Place the measuring device along the line H_T as shown in Figure A.2.

A.2.2.2 Measure the maximum distance from the centre of the straight line created by the apparatus in A.2.1 spanning any concave curve on the outside of the flue block surface (D_S) as shown in Figure A.2.



Key

H_N	nominal height of the flue block in mm
H_T	test height in mm
D_S	deviation from straightness in mm
H_N - H_T	= 100 mm ± 5 mm

Figure A.2 — Straightness test

A.2.3 Test result

Record any case where D_S is greater than 1 % or, in the case of flue blocks equal to or greater than 1 000 mm in height, any case where D_S is greater than 0,5 % of the declared height.

A.3 Thermal performance tests

A.3.1 Test method

The thermal performance tests shall be undertaken in accordance with EN 13216-1, using the thermal test procedure for the heat stress resistance, and the thermal shock test procedure for the heat shock resistance.

The test assembly (e.g. free standing, corner installation non-enclosed, corner installation enclosed) shall be that declared by the manufacturer.

The test assembly construction (whether enclosed, open but sealed at the sides and top, with or without fire stops, thicker roof insulation, etc.) shall be that which reflects the manufacturer's installation requirements and therefore be specified by the manufacturer.

The test assembly shall be specified using the structure of the EN 13216-1 specification, but shall include similar specification in Zone B from the test assembly in EN 1858, where the product is sealed in the corner. However, WG5 shall think through if it's necessary, and how, to test for the additional roof insulation possibility.

The test chimney shall be constructed in accordance with the installation instructions.

Allow the test sample to cool to ambient without assistance, e.g. without forced ventilation, before undertaking the next test.

Subject the test sample to the test described in A.5 and A.6.

A.3.2 Test results

Record the maximum temperature of the test assembly, and either:

a) if the test temperature for the free standing test assembly was used, calculate what the surface temperature of a combustible partition, nominally 12 mm thick plywood to give a total thickness of 114 mm ± 1,0 mm insulated in the voids with mineral wool insulation having a thermal conductivity of 0,035 W/mK ± 0,002 W/mK at 20 °C, with a minimum density of 70 kg/m^3, would have been when separated from the test sample by the specified distance to combustible materials (as declared by the manufacturer); or

b) if the test assembly is a corner installation non-enclosed or a corner installation enclosed, record the maximum surface temperature of the combustible partition.

Record the leakage rate of the test sample.

Record the weight of any material that has been dislodged from the internal surface of the test assembly.

NOTE A method for calculating the surface temperature of adjacent combustible material is given in EN 15287-1 [2].

The specified distance to combustibles might be specified in local regulations.

A.4 Thermal resistance

A.4.1 Test method

Thermal resistance shall be determined in accordance with the test method of EN 13216-1 on a test sample not previously thermally conditioned.

For chimneys designated suitable for wet conditions, the hot gas shall be water vapour saturated and shall have a heat content and temperature so that the inner surface reaches a temperature of 70 °C. For chimneys designated suitable for dry conditions, the hot gas shall have a heat content and temperature so that the inner surface reaches a temperature 20 % below the designated temperature (normal working temperature), but not more than 200 °C.

A.4.2 Test results

Record the thermal resistance.

A.5 Gas tightness test

A.5.1 Test Method

Gas tightness shall be measured in accordance with the test method of EN 13216-1.

Ensure that the test sample has been conditioned for a minimum of 28 d at ambient temperature unless otherwise specified by the manufacturer.

A.5.2 Test result

Calculate the leakage rate, E of the assembly, expressed in l m^{-2}·s-1, using the formula:

$$E \frac{Q}{S \cdot t} \quad \text{(A.1)}$$

where

Q is the air volume passing through the test assembly during test, in litres;

S is the inside surface area of the flue block, in m^2;

t is the test duration, in s.

A.6 Abrasion resistance test

A.6.1 Test method

The abrasion resistance test shall be undertaken in accordance with EN 13216-1.

The test sample shall be constructed in accordance with the manufacture's installation instructions.

Discard the material dislodged during the first 20 cycles. Continue the test for a further 80 cycles and collect the material dislodged.

A.6.2 Test result

Record the weight of any material that has been dislodged from the internal surface of the test assembly and calculate the total area of the internal surface of the flue between the sleeves.

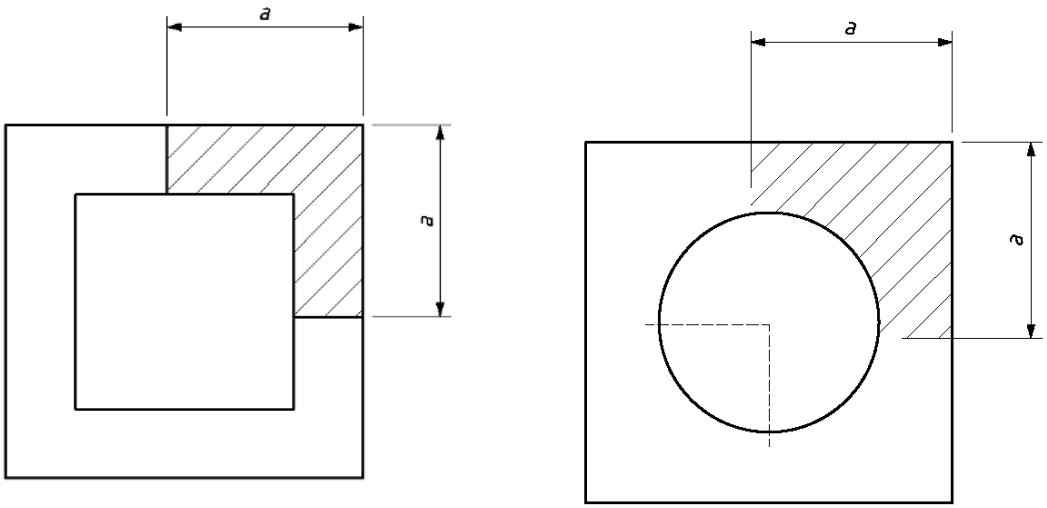
A.7 Compressive strength test

A.7.1 Apparatus

A machine with a verified accuracy as specified in EN ISO 7500-1, Class 3, capable of applying the test load at the rate specified in A.7.3.

A.7.2 Preparation of test sample

A.7.2.1 Prepare a section of flue block at least 150 mm in height or one complete flue block height if shorter than 150 mm, by sawing each end to produce flat and parallel ends, to within the tolerances specified in 7.3, square to the axis. For flue blocks having external transverse dimensions greater than 300 mm, cut by sawing a section as indicated in Figure A.3, and saw the upper and lower ends to produce flat and parallel ends, square to the axis.



a) parallelepiped flue block **b) cylindrical flue block**

Figure A.3 — Compressive strength sample

A.7.2.2 Determine by calculation, the gross sectional area of the section and the position of the vertical axis of the centre of gravity of the test sample.

A.7.2.3 Prepare the ends of the sample with cement mortar (1 part calcium aluminate cement and 2 parts ordinary Portland cement) to achieve flat and parallel ends, square to the axis. Allow 24 h to harden, or more if specified by the manufacturer.

A.7.2.4 Place sample between the test plates so that the axis of the plates corresponds with the axis of the centre of gravity of the test sample, with a limit deviation of 1 mm.

A.7.3 Test procedure

Apply a load without shock to the test sample and increase at a rate of 0,3 MPa/s ± 0,05 MPa/s until the required load as specified in 8.6 is reached.

A.7.4 Test result

Record whether the load in 8.6 was reached.

A.8 Corrosion and condensate resistance test

A.8.1 Test apparatus

A.8.1.1 An upper tank containing an acid test solution (see A.8.2), connected by means of a pipe and gate valve to a lower tank (see Figure A.4).

A.8.1.2 A lower tank containing:

a) an electrical heating element immersed in test solution;

b) a thermometer (T) to measure temperature of test solution;

c) a gauge (L) to measure the level of test solution;

d) a mechanical stirrer (S) to agitate the test solution;

e) a gauge (pH) to measure pH of the test solution;

f) a collection collar.

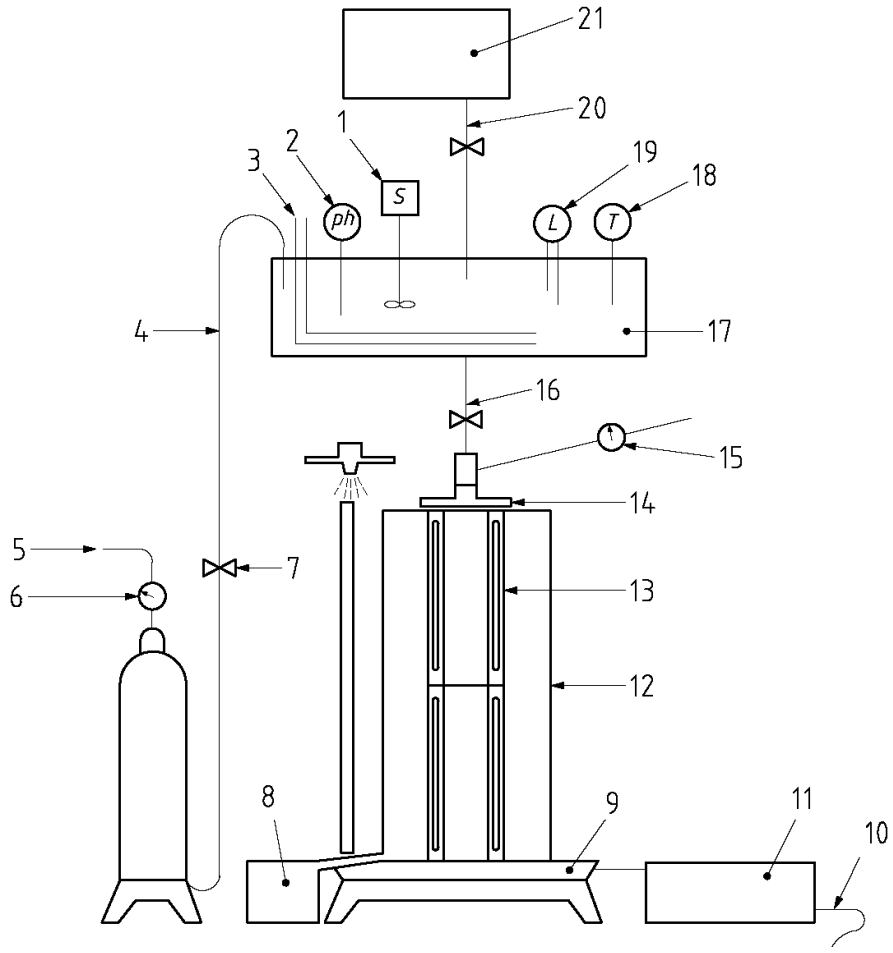
A.8.1.3 A spray nozzle connected by means of a pipe and gate valve to the lower tank, with the nozzle passing an air-tight cap closing off the top of the flue blank under test.

A.8.1.4 A pressurized air supply connected to the spray nozzle fitted with a pressure gauge to regulate the air pressure.

A.8.1.5 A controlled supply of pressurized de-ionized water feeding into the lower tank.

A.8.1.6 A collection tray, fitted with a grid, connected to a holding tank to allow safe removal of the used test solution.

A.8.1.7 An air-tight vessel providing an annulus of 75 mm ± 10 mm around the flue block under test.



Key

1 mechanical stirrer
2 gauge for measuring pH value
3 electrical heating elements
4 pipe supplying de-ionized water
5 water supply pipe
6 pressure gauge
7 gate valve
8 holding tank for collecting test solution having passed through flue block test assembly walls
9 collection tray for used test solution
10 pipe for removal of used test solution
11 holding tank for used test solution
12 air-tight cylinder
13 flue block test assembly
14 air-tight cap
15 air supply pipe with pressure gauge controlling air supply to spray nozzle
16 pipe with gate valve supplying test solution to spray nozzle
17 lower tank containing test solution
18 thermometer for measuring temperature of test solution
19 gauges for measuring level of test solution
20 pipe with gate valve controlling supply of acid solution to lower tank
21 upper tank containing acid solution

Figure A.4 — Corrosion test apparatus

A.8.2 Acid solution and test solution

The acid solution in the upper tank (Figure A.4, item 21) for W1 conditions shall have the following composition:

$(SO_4)^{2-}$ = 40 mg/l;

$(NO_3)^{2-}$ = 26 mg/l;

$(Cl)^{1-}$ = 5 mg/l.

The test solution in the lower tank (Figure A.4, item 17) shall be adjusted to a pH of 3,5 ± 0,2 by the addition of either acid solution or deionised water.

The acid solution in the upper tank (Figure A.4, item 21) for W2 conditions shall have the following composition:

$(SO_4)^{2-}$ = 250 mg/l;

$(NO_3)^{2}$-= 80 mg/l;

$(Cl)^{1}$-= 10 mg/l.

The test solution in the lower tank (Figure A.4, item 17) shall be adjusted to a pH of 2,3 ± 0,2 by the addition of either acid solution or deionised water.

A.8.3 Test sample

Join two flue blocks, which have been subjected to the heat stress to their appropriate temperature group designation (for temperature designations greater than T200), having internal transverse dimensions of 200 mm ± 10 mm or the nearest size in the manufacturer's range, in accordance with the manufacturer's installation instructions.

If the flue block is of multi-wall construction, with a separate concrete flue liner, carry out the test on the flue liner only.

A.8.4 Conditioning

Store the test assembly in a closed and ventilated room for seven days or dry in an oven at 70 °C ± 5 °C until constant weight is achieved.

A.8.5 Test procedure

After conditioning, record the weight of the test assembly (A.8.3), fit and seal the air-tight vessel around the flue block and then position it on the collection tray (A.8.1.6) directly under the spray nozzle and cap (A.8.1.3) as shown in Figure A.4.

Pass the test solution (A.8.2) at a pressure of (0,3 ± 0,03) MPa at a temperature of (50 ± 5) °C through the spray nozzle onto the inside face of the test assembly at a rate of 26 l/h ± 3 l/h and maintain for (15 ± 2) min.

After the spraying cycle dry the test assembly, by blowing dry air at a pressure of (0,3 ± 0,03) MPa and temperature of (20 ± 5) °C through the test assembly for (15 ± 2) min. Every 24 $^{+2}_{0}$ h weigh any solution collected at the base of the vessel.

Repeat the spraying and drying cycle 240 times, then wash out the inside of the test assembly by spraying clean water for a period of 30 $^{+2}_{0}$ min at a pressure of (0,3 ± 0,03) MPa. Then condition the test assembly as described in A.8.4. Record the weight of test assembly. Maintain the temperature of the test room at (20 ± 5) °C throughout the test.

A.8.6 Test results

A.8.6.1 Compare the first recorded weight with the final weight after testing and record any change in weight.

A.8.6.2 Record the mass of any solution collected at the base of the vessel of each reading during the test and calculate the flow of solution expressed in $gh^{-1}m^{-2}$ of external surface of the flue block.

A.9 Water vapour diffusion resistance

A.9.1 Test method

The water vapour diffusion resistance test shall be undertaken in accordance with the water vapour diffusion resistance test of EN 13216-1.

A.9.2 Test results

Record the location of any appearance of water on the outside of any fitting or chimney section of the test chimney.

Record any change in the weight of the test sample.

Record any change in humidity and temperature within the boundary layer between insulation and outer wall.

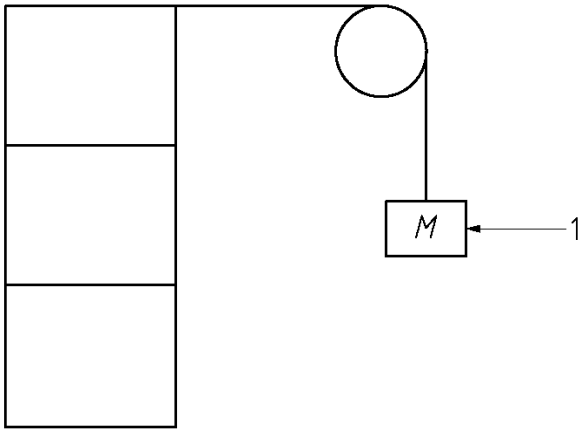
The results are different for lower ambient temperatures; therefore, it is possible to calculate the temperatures and humidity in the walls of multi-wall chimneys for ambient conditions specified for the region where the chimney is to be installed. For this specified ambient conditions, no condensation shall occur within the walls (see Annex B).

A.10 Flexural strength under wind load

A.10.1 Principle

The flexural strength under wind load is determined by measuring the tilt momentum of a chimney top under a horizontal load (see Figure A.5).

The flexural strength under wind load can be used to work out the maximum height above the roof (free standing part of the chimney outside the building) in accordance with national regulations.



Key

1 tilt-load, M

Figure A.5 — Wind load test

A.10.2 Preparation of test specimen

The test shall be carried out with an element of at least 1 m height, consisting of the manufacturer's declared components (e.g. single wall or multi-wall flue blocks). The flue blocks shall be jointed in accordance with the manufacturer's instructions.

Carry out the test on three different geometrical sizes (small, medium, large), in accordance with the dimensional range of the chimney system.

A.10.3 Test procedure

Fit the components together on the floor. Anchor the lower section. Put a steel frame on the top of the test section. Apply a horizontal load on the frame, increase the load until the top section tilts.

A.10.4 Test result

Record the measured tilt-load M in kN.

A.11 Bulk density

A.11.1 Apparatus

A.11.1.1 Callipers, graduated in 0,5 mm, or flat metal rule, graduated in 0,5 mm and having a square at one end which can be fitted to the edge of the test piece.

A.11.1.2 Drying oven, capable of being controlled at 70 °C ± 5 °C.

A.11.1.3 Balance, with an error limit of ± 0,1 g.

A.11.1.4 Desiccator.

A.11.2 Procedure

A.11.2.1 Cut three nominally rectangular test pieces each having a volume not less than 500 cm^3 from three separate units from each type of concrete used in the chimney. Cut the first test piece from the upper portion of one unit, the second test piece from the middle portion of the second unit and a third piece from the lower portion of a third unit.

The lower portion of the third unit is the end opposite to the end from which the first test piece has been taken, to take account of any material variance that may occur during manufacture.

For multi-wall products, test the liner and outer wall separately.

A.11.2.2 Using the callipers or flat metal rule, measure the three principal dimensions (length *l*, breadth *b* and thickness *d*) of each test piece to within 1 mm. Take these measurements at the centre line of each face (i.e. four times for each dimension) and note the average of the four measurements for each of the three dimensions.

A.11.2.3 Dry the test piece in the drying oven for at least 30 min, controlled at 70 °C ± 5 °C, then remove and allow to cool to ambient temperature in the desiccator. Weigh each piece to the nearest 1 g.

Repeat until weight does not continue to reduce by more than 0,2 %.

A.11.3 Test result

A.11.3.1 Calculate and record the bulk volume and bulk density values for each test piece and the average values for the three pieces.

Calculate and express the results in accordance with A.11.3.2, A.11.3.3 and A.11.3.4.

A.11.3.2 Calculate the bulk volume V_b of the test piece, in cubic centimetres, using the formula

$$V_b = l \cdot b \cdot d \qquad \text{(A.2)}$$

where

l is the length of the test piece, in cm;

b is the breadth of the test piece, in cm;

d is the thickness of the test piece, in cm.

A.11.3.3 Calculate the bulk density Q_b of the test piece, in kilograms per cubic metre, using the formula

$$Q_b = \frac{m}{V_b} \cdot 10^3 \qquad \text{(A.3)}$$

where

m is the dry mass, in grams (g);

V_b is the bulk volume, in cubic centimetres (cm^3).

A.11.3.4 Express the bulk density in kilograms per cubic metre to three significant figures.

A.12 Ultimate compressive strength

A.12.1 Test procedure

Using the apparatus specified in A.7.1 and a sample specified in A.7.2, apply a load without shock and increase at a rate of 0,3 MPa/s ± 0,05 MPa/s until no further load can be applied (until the sample fractures).

A.12.2 Test result

Record the maximum load.

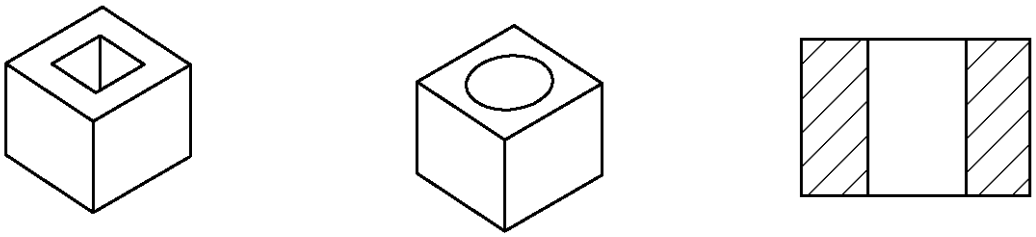
Annex B
(informative)

Examples of concrete flue block shapes

B.1 Straight flue blocks

B.1.1 Solid wall flue blocks

Examples of solid wall flue blocks are given in Figure B.1.



a) square flue area **b) round flue area** **c) Section**

Figure B.1 — Solid wall flue blocks

B.1.2 Hollow wall flue blocks

Examples of hollow wall flue blocks are given in Figure B.2.

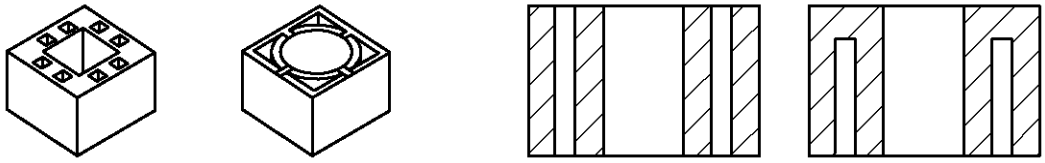
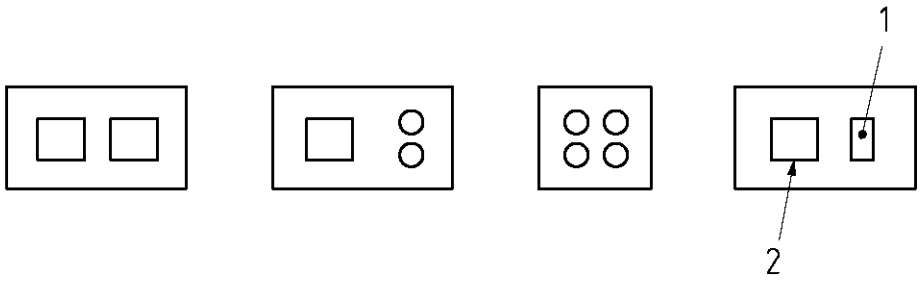


Figure B.2 — Hollow wall flue blocks with hollows through block and with hollows closed at one end

B.1.3 Multi-flued flue blocks

Plan views of multi-flued flue blocks, which can have solid or hollow walls, are shown in Figure B.3. The maximum number of flues or ventilation passages in a block is 4 (see 7.1 b).

The passages may be of different sizes. An example of a flue block with flue and ventilation passage is shown in Figure B.3.



Key

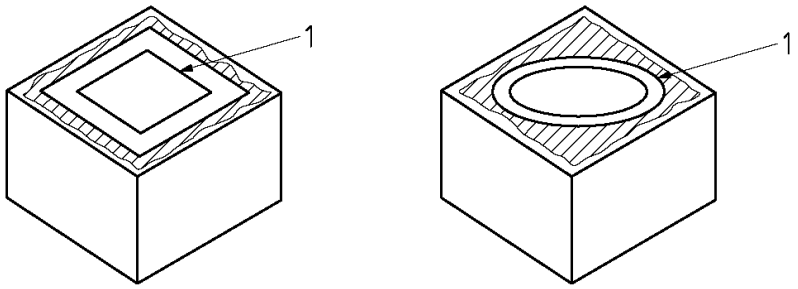
1 flue

2 ventilation passage

Figure B.3 — Multi-flued flue blocks

B.1.4 Multi-wall blocks

Examples of multi-wall flue blocks are given in Figure B.4.



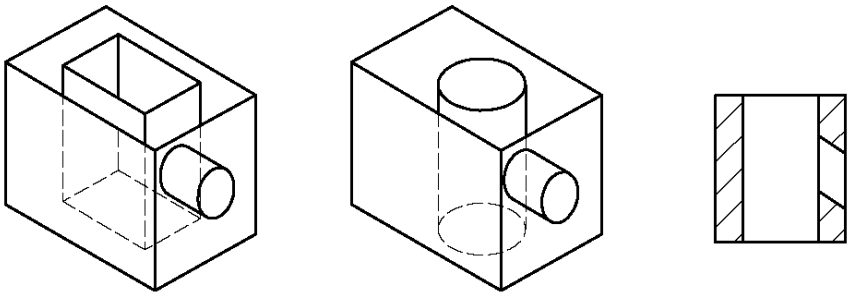
Key

1 concrete flue liner

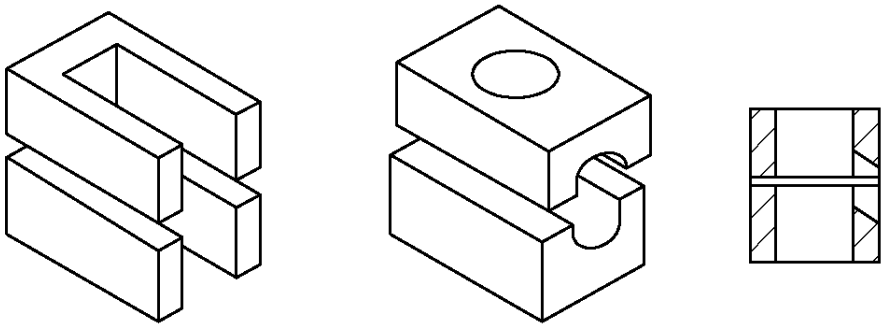
Figure B.4 — Multi-wall blocks

B.2 Flue block fittings - Tee/access/connection unit

Examples of flue block fittings/tee/access/connection units are given in Figure B.5. All these examples can be in solid wall or hollow wall flue blocks or multi-wall construction.



a) one piece



b) two pieces

Figure B.5 — Flue block fittings - Tee/access/connection unit

Annex C
(normative)

Thermal resistance calculation method

C.1 Thermal resistance of the individual element

The calculation method shall be validated to give results within ± 10 % of the reference method (see A.4).

For calculation of the thermal resistance of the element, the temperature of the flue gas shall be taken to be equal to 200 °C and the value of α_1 shall be equal to 17 W/m °C and α_2 equal to 11 W/m °C.

NOTE The values of α have been determined as conventional values for the temperature of the flue gas of 200 °C with a flow of 5 m/s and the temperature of the outside face of up to 50 °C.

C.2 Thermal resistance of the chimney and of enclosures

If the specific material properties and layer thickness are known, determine the thermal resistance, *R*, in $m^2 \cdot K \cdot W^{-1}$ approximately in accordance with the following formulas:

a) with knowledge of the thermal resistance of the individual element:

$$R = D_h \sum_n \left[R_n \frac{1}{D_{h,n}} \right] \quad \text{(C.1)}$$

b) with knowledge of the coefficients of thermal conductivity of layers:

$$R = y \sum_n \frac{D_h}{2\lambda_n} \ln \left[\frac{D_{h,n+1}}{D_{h,n}} \right] \quad \text{(C.2)}$$

where

R_n is the thermal resistance of an individual element, *n*, in $m^2 \cdot K \cdot W^{-1}$;

y is the coefficient of form:

1,0 for round and oval cross-sections,

1,10 for square and rectangular cross-sections up to a ratio of a side of 1:1,5;

D_h is the internal hydraulic diameter in metres (m);

$D_{h,n}$ is the hydraulic diameter of the inside of each layer in metres (m);

λ_n is the coefficient of thermal conductivity of the material of the layer at operation temperature in W/(mK).

The source of any data should be referenced.

Annex D
(normative)

Requirements of sampling plan in accordance with ISO 2859-1 at an Acceptable Quality Level (AQL) of 10 % and inspection level S2

D.1 Acceptability determination

NOTE Single or double sampling can be used.

D.1.1 Single sampling

If the number of defectives found in the sample is equal to or less than the acceptance number, the batch shall be accepted. If the number of defectives is equal to or greater than the rejection number, the batch shall be rejected.

When reduced inspection is in effect and the acceptance number has been exceeded, but the rejection number has not been reached, the batch shall be accepted and normal inspection reinstated. If the rejection number is reached or exceeded, the batch shall be rejected and normal inspection reinstated.

D.1.2 Double sampling

The number of sample units shall be equal to the first sample size in the plan. If the number of defectives found in the first sample is equal to or less than the first acceptance number, the batch shall be accepted. If the number of defectives found in the first sample is equal to or greater than the first rejection number, the batch shall be rejected. If the number of defectives found in the first sample is between the first acceptance and rejection numbers, the second sample of the size given in the plan shall be inspected.

The number of defectives found in the first and second samples shall be accumulated. If the cumulative number of defectives is equal to or less than the second acceptance number, the batch shall be accepted. If the cumulative number of defectives is equal to or greater than the second rejection number, the batch shall be rejected. If this occurs on reduced inspection, normal inspection shall be reinstated for the next batch.

When reduced inspection is in effect and, after the second sample, the acceptance number has been exceeded but the rejection number has not yet been reached, the batch shall be accepted and normal inspection reinstated.

D.2 Normal inspection

The sample size appropriate to the batch size and the acceptance and rejection values for numbers of defectives shall be in accordance with Table D.1. Sample units shall be selected at random.

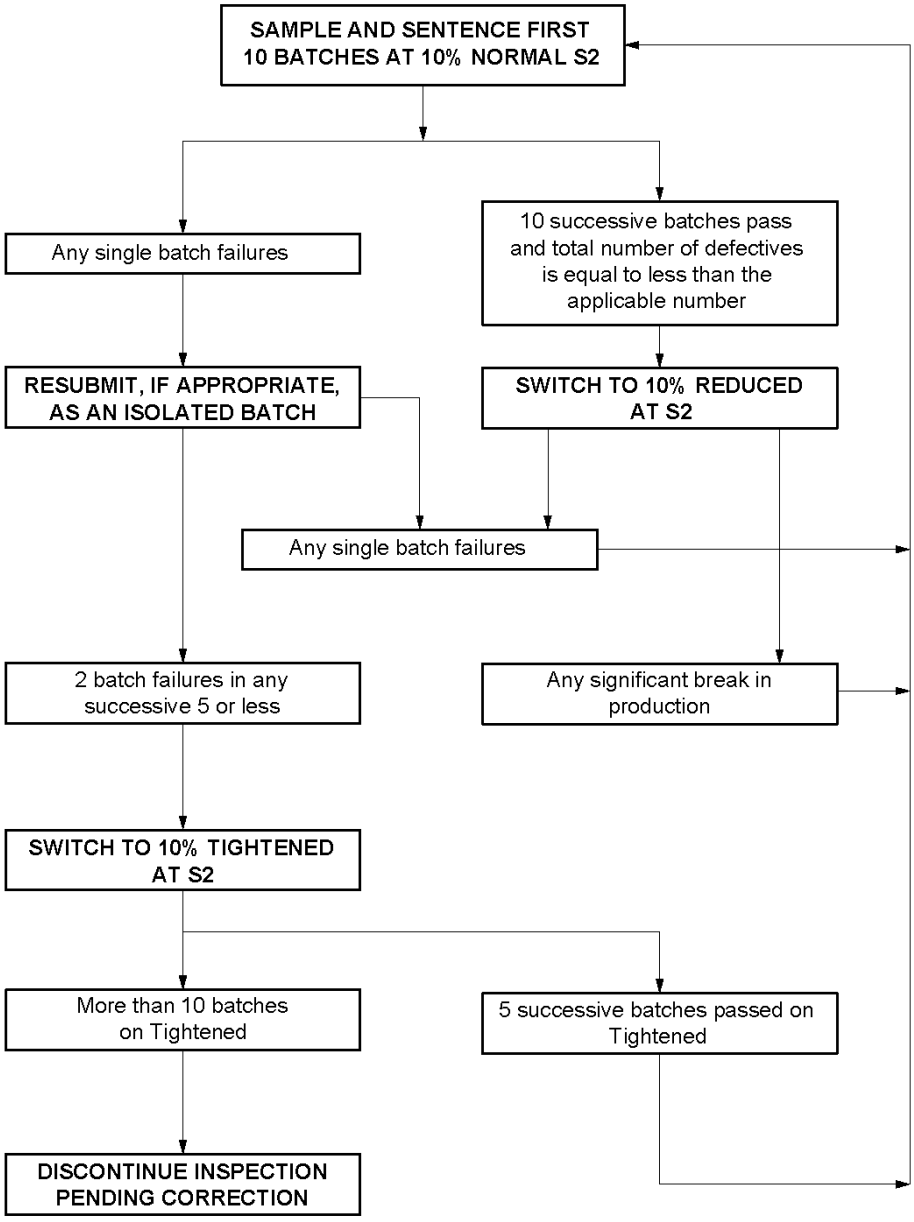


Figure D.1 — Summary of sampling procedures (continuous batches)

Table D.1 — Sampling plans for normal inspection

Batch size	Single sampling			Double sampling					
	Sample size	Accept number	Reject number	First sample size	Accept number	Reject number	Second sample number	Accept number	Reject number
2 to 1 200	5	1	2	3	0	2	3	1	2
1 201 to 20 000	8	2	3	5	0	3	5	3	4

D.3 Reduced Inspection

A reduced inspection level as shown in Table D.2 shall be used when normal inspection is in effect, provided that the following conditions are satisfied:

a) the preceding 10 batches have been on normal inspection, and none have been rejected on original inspection;

b) the total number of defectives in the samples from the 10 preceding batches (or such other number required by Table D.3 is equal to or less than the limit number given in Table D.1.

When double sampling is in use, all samples inspected should be included, not just first samples.

Table D.2 — Sampling plans for reduced inspection

Batch size	**Single sampling**			**Double sampling**					
	Sample size	Accept number	Reject number	First sample size	Accept number	Reject number	Second sample number	Accept number	Reject number
2 to 1 200	2	0	2	not applicable					
1 201 to 20 000	3	1	3	2	0	3	2	0	4

Table D.3 — Limit number of defectives for normal to reduced inspection

Number of samples from last 10 batches	Limit number of defectives
20 to 29	0
30 to 49	0
50 to 79	2
80 to 129	4

D.4 Reduced to normal inspection

When reduced inspection is in effect, normal inspection shall be reinstated if a batch is rejected, or if a batch is accepted without either acceptance or rejection criteria having been made (see D.1.1 and D.1.2).

D.5 Tightened inspection

Tightened inspection as shown in Table D.4 shall be used either when inspecting a new product or when two or more batches have been rejected in any five consecutive batches of normal inspection or for inspecting a batch which has previously been rejected after removal of units with previously undetected visible defects.

Table D.4 — Sampling plans for tightened inspection

Batch size	Single sampling			Double sampling					
	Sample size	Accept number	Reject number	First sample size	Accept number	Reject number	Second sample number	Accept number	Reject number
8 to 20 000	8	1	2	5	0	2	5	1	2

D.6 Tightened to normal inspection

Tightened inspection shall continue until five consecutive batches are accepted when normal inspection shall be resumed.

D.7 Discontinuation of inspection

If 10 consecutive batches remain on tightened inspection, the provision of these sampling plans shall be discontinued pending action to improve the quality of the submitted batches.

Annex E
(informative)

Recommended test sequence for performance characteristics

The following performance test sequence is recommended:

1) gas tightness;
2) abrasion resistance;
3) heat stress test at nominal working temperature;
4) gas tightness;
5) abrasion resistance;
6) relative movement;
7) thermal shock;
8) gas tightness;
9) abrasion resistance;
10) relative movement;
11) compressive strength;
12) flexural strength;
13) flow resistance;
14) freeze thaw.

And where appropriate:

15) corrosion/condensate resistance;
16) water vapour diffusion resistance;
17) terminal characteristics.

Annex ZA
(informative)

Clauses of this European Standard addressing the provisions of the EU Construction Products Regulation

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under Mandate M105 'Chimneys, flues and specific products' as amended by Mandate M/117 and M/134 given to CEN by the European Commission and the European Free Trade Association.

If this European Standard is cited in the Official Journal of the European Union (OJEU), the clauses of this standard, shown in this annex, are considered to meet the provisions of the relevant mandate, under the Regulation (EU) No. 305/2011.

This annex deals with the CE marking of the concrete system chimneys in non-balanced flue applications intended for the uses indicated in Table ZA.1.1 and Table ZA.1.2 and shows the relevant clauses applicable.

This annex has the same scope as in Clause 1 of this standard related to the aspects covered by the mandate and is defined by Table ZA.1.1 to Table ZA.1.2.

Table ZA.1.1 — Relevant clauses for concrete system chimney for non-balanced flue applications

Product: Concrete system chimneys **Intended use:** Conveying products of combustion from heating appliances to the outside atmosphere in non-balanced flue applications			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Gas tightness/leakage	8.4 Gas tightness	-	Declared pressure class
Flow resistance	8.12.1 Flow resistance of straight flue blocks	-	Declared mean roughness (in metres)
	8.12.2 Flow resistance of fittings	-	Declared coefficient of flow resistance
Thermal resistance	8.3 Thermal resistance	-	Declared value of thermal resistance
Resistance to fire internal to external	8.1 Heat stress resistance	-	Declared non soot fire resistant product class O xx
	8.2 Heat shock resistance	-	Declared soot fire resistant product class G xx
Resistance to fire external to external	8.14 Resistance to fire external to external	-	As declared

Product: Concrete system chimneys **Intended use:** Conveying products of combustion from heating appliances to the outside atmosphere in non-balanced flue applications			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Reaction to fire	5.2 Reaction to fire	A1 to F	Declared class
Compressive strength	8.6 Compressive strength	-	Declared structural height
Flexural strength	8.11 Flexural strength under wind loading	-	Declared maximum unsupported height
Durability: chemicals	8.8 Condensate resistance 8.9 Water vapour diffusion resistance	-	Declared condensate resistance class (subject to a threshold value for class W products)
Durability: corrosion	8.7 Corrosion resistance	-	Declared corrosion resistance class (subject to a threshold value for class W products)
Durability: Abrasion	8.5 Abrasion resistance	-	Declared abrasion resistant subject to a threshold value
Durability: resistance to freeze-thaw	8.13 Freeze-thaw resistance	-	Declared freeze thaw resistant
Dangerous substances	8.15 Dangerous substances	-	As indicated in ZA.1 and ZA.3

Table ZA.1.2 — Relevant clauses for terminals for concrete system chimney for non-balanced flue applications

Product: Terminals for concrete system chimneys **Intended use:** Conveying products of combustion from heating appliances to the outside atmosphere for non-balanced flue applications			
Essential Characteristics	**Clauses in this and other European Standard(s) related to essential characteristics**	**Regulatory classes**	**Notes**
Flow resistance	8.17.2	-	Declared coefficient

The declaration of the product performance related to certain essential characteristics is not required in those Member States (MS) where there are no regulatory requirements on these essential characteristics for the intended use of the product.

In this case, manufacturers placing their products on the market of these MS are not obliged to determine nor declare the performance of their products with regard to these essential characteristics and the option 'No performance determined' (NPD) in the information accompanying the CE marking and in the declaration of performance (see ZA.3) may be used for those essential characteristics.

ZA.2 Procedure for AVCP of concrete system chimneys

ZA.2.1 Systems of AVCP

The AVCP systems of concrete system chimneys and terminals indicated in Table ZA.1.1 to Table ZA.1.2, established by EC Decisions 95/467/EC (OJ l 268 of 10.11.1995) amended by 2001/596/EC of 8 January 2001 (L209) and 2002/592/EC of 15 July 2002 and 2010/679/EU of 8 November 2010 (L292) is shown in Table ZA.2 for the indicated intended use(s) and relevant level(s) or class(es) of performance.

Table ZA.2 — System(s) of AVCP

Product(s)	Intended use(s)	Level(s) or class(es) of performance	AVCP systems
Kits of free standing chimneys and attached chimneys of prefabricated concrete, comprising flue liners (elements or blocks), multi-wall chimneys (elements or blocks), single walled chimneys (elements or blocks), and including storey height elements.	Chimneys	Any	2+
Chimney terminals	Chimneys	Any	4
System 2+: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.3 including certification of the factory production control by a notified production control certification body on the basis of initial inspection of the manufacturing plant and of factory production control as well as of continuous surveillance, assessment and evaluation of factory production control. System 4: See Regulation (EU) No. 305/2011 (CPR) Annex V, 1.5			

The AVCP of the concrete system chimneys and terminals in Table ZA.1.1 to Table ZA.1.2 shall be in accordance with the AVCP procedures indicated in Table ZA.3.1 to Table ZA.3.2 resulting from application of the clauses of this or other European Standards indicated therein. The content of tasks of the notified body shall be limited to those essential characteristics as provided for, if any, in Annex III of the relevant mandate and to those that the manufacturer intends to declare.

Table ZA.3.1 — Assignment of AVCP tasks for concrete system chimneys in non-balanced applications under system 2+

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1.1 relevant for the intended use which are declared	12.3 and Annex D
	Determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product	Parameters related to essential characteristics of Table ZA.1.1 relevant for the intended use which are declared	12.2
	Further testing of samples taken at factory in accordance with the prescribed test plan	Essential characteristics of Table ZA.1.1 relevant for the intended use which are declared	12.3
Tasks for the notified production control certification body	Initial inspection of the manufacturing plant and of FPC	Parameters related to essential characteristics of Table ZA.1.1, relevant for the intended use which are declared. Documentation of the FPC.	12.3 and Annex D
	Continuous surveillance, assessment and evaluation of FPC	Parameters related to essential characteristics of Table ZA.1.1, relevant for the intended use which are declared,. Documentation of the FPC.	12.3 and Annex D

Table ZA.3.2 — Assignment of AVCP tasks for terminals in concrete system chimneys and in non-balanced applications under system 4

Tasks		Content of the task	AVCP clauses to apply
Tasks for the manufacturer	Factory production control (FPC)	Parameters related to essential characteristics of Table ZA.1.2 relevant for the intended use	12.3 and Annex D
	Determination of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product	Essential characteristics of Table ZA.1.2 relevant for the intended use which are declared	12.2 & 12.3

ZA.2.2 Declaration of performance (DoP)

ZA.2.2.1 General

The manufacturer draws up the DoP and affixes the CE marking on the basis of the different AVCP systems set out in Annex V of the Regulation (EU) No 305/2011:

In case of products under system 2+

— the determination of the product-type on the basis of type testing (including sampling), type calculation, tabulated values or descriptive documentation of the product; the factory production control and the testing

of samples taken at the factory in accordance with the prescribed test plan, carried out by the manufacturer; and

— the certificate of conformity of the FPC, issued by the notified production control certification body on the basis of:

  — initial inspection of the manufacturing plant and of FPC, and

  — continuous surveillance, assessment and evaluation of FPC.

In case of products under system 4:

— the FPC carried out by the manufacturer;

— the determination by the manufacturer of the product-type on the basis of type testing, type calculation, tabulated values or descriptive documentation of the product.

ZA.2.2.2 Content

The model of the DoP is provided in Annex III of the Regulation (EU) No 305/2011.

In accordance with this Regulation, the DoP shall contain the following information:

— the reference of the product-type for which the declaration of performance has been drawn up;

— the AVCP system or systems of the construction product, as set out in Annex V of the CPR;

— the reference number and date of issue of the harmonized standard which has been used for the assessment of each essential characteristic;

— where applicable, the reference number of the Specific Technical Documentation used and the requirements with which the manufacturer claims the product complies.

The DoP shall in addition contain:

(a) the intended use or uses for the construction product, in accordance with the applicable harmonized technical specification;

(b) the list of essential characteristics, as determined in the harmonized technical specification for the declared intended use or uses;

(c) the performance of at least one of the essential characteristics of the construction product, relevant for the declared intended use or uses;

(d) where applicable, the performance of the construction product, by levels or classes, or in a description, if necessary based on a calculation in relation to its essential characteristics determined in accordance with the Commission determination regarding those essential characteristics for which the manufacturer shall declare the performance of the product when it is placed on the market or the Commission determination regarding threshold levels for the performance in relation to the essential characteristics to be declared.

(e) the performance of those essential characteristics of the construction product which are related to the intended use or uses, taking into consideration the provisions in relation to the intended use or uses where the manufacturer intends the product to be made available on the market;

(f) for the listed essential characteristics for which no performance is declared, the letters 'NPD' (No Performance Determined);

Regarding the supply of the DoP, Article 7 of the Regulation (EU) No 305/2011 applies.

The information referred to in Article 31 or, as the case may be, in Article 33 of Regulation (EC) No 1907/2006, (REACH) shall be provided together with the DoP.

ZA.2.2.3 Example of DoP

The following gives an example of a filled-in DoP for vertical air/flue terminals

DECLARATION OF PERFORMANCE
No. 001DoP2013-09-06

1. Unique identification code of the product-type:

Concrete system chimney
EN 16497-1:2015

2 Type, batch or serial number or any other element allowing identification of the construction product as required under Article 11(4):

Concrete system chimney for non-balanced flue applications

CSCNB45

Model 1 - T 120, P1, D, 1, O (20)
Model 2 - T 400, N1, D, 3, G (50)

Plus manufacturer's batch or date code: see product marking

3. Intended use or uses of the construction product, in accordance with the applicable harmonized technical specification, as foreseen by the manufacturer:

Concrete system chimney for non-balanced flue applications

Convey products of combustion from appliances to the outside atmosphere.

NOTE The manufacturer may supply additional information for the optional performance characteristics e.g. for the Terminal

4. Name, registered trade name or registered trade mark and contact address of the manufacturer as required under Article 11(5):

AnyCo SA,
PO Box 21
B-1050 Brussels, Belgium
Tel. +32987654321
Fax: +32123456789
Email: anyco.sa@provider.be

5. Where applicable, name and contact address of the authorized representative whose mandate covers the tasks specified in Article 12(2):

Anyone Ltd
Flower Str. 24
West Hamfordshire
UK-589645 United Kingdom
Tel. +44987654321
Fax: +44123456789
e-mail: anyone.ltd@provider.uk

6. System or systems of assessment and verification of constancy of performance of the construction product as set out in CPR, Annex V:

System 2+

7. In case of the declaration of performance concerning a construction product covered by a harmonized standard:

Notified factory production control certification body No. 5678 performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control and issued the certificate of conformity of the factory production control.

8. Declared performance

Essential characteristics	Performance	Harmonized technical specification
Gas tightness/Leakage	**Model 1 – P1** **Model 2 – N1**	EN 16497-1: 2015
Flow resistance: **Straight liner** **30^0 bend** **T-piece**	**Model 1 & 2** **Mean roughness 0,0015 m** **Zeta value 0,3** **Zeta value 0,5**	
Thermal Resistance	**Model 1 & 2 0,2 m2 K/W**	
Resistance to fire internal to external **Heat stress resistance** **Heat shock resistance**	**Model 1 O - 20 mm – Not heat shock resistant** **Model 2 G - 50 mm - Yes**	
Resistance to fire external to external	**NPD – unless evaluated and declared in accordance with national regulations, where required**	
Reaction to fire	**A1**	
Compressive strength **Structural height**	**Model 1 & 2 - 30 m** **30 m straight.** **30 m with T-piece**	
Flexural strength **Maximum height above last support**	**2 m (for 450 mm outer dimension)** **1,8 m (for 400 mm outer dimension)**	
Durability: Chemicals **Condensate resistance**	**Model 1 & 2** **Dry**	
Durability: Corrosion	**Model 1 & 2** **3** **(Suitable for all fuels under dry operation)**	
Durability: Abrasion	**Pass**	
Durability: Freeze thaw	**NPD**	
Dangerous substances	**None**	

10. The performance of the product identified in points 1 and 2 is in conformity with the declared performance in point 8.

This declaration of performance is issued under the sole responsibility of the manufacturer identified in point 4.

Signed for and on behalf of the manufacturer by:

……..

(name and function)

…… ……..

(place and date of issue) (signature)

ZA.3 CE marking and labelling

The CE marking symbol shall be in accordance with the general principles set out in Article 30 of Regulation (EC) No 765/2008 and shall be affixed visibly, legibly and indelibly:

— to the concrete system chimney and/or the concrete terminal,

or

— to a label attached to it.

Where this is not possible or not warranted on account of the nature of the product, it shall be affixed:

— to the packaging,

or

— to the accompanying documents.

The CE marking shall be followed by:

— the last two digits of the year in which it was first affixed,

— the name and the registered address of the manufacturer, or the identifying mark allowing identification of the name and address of the manufacturer easily and without any ambiguity,

— the unique identification code of the product-type,

— the reference number of the declaration of performance *[see example of DoP],*

— the level or class of the performance declared,

— the dated reference to the harmonized technical specification applied,

— the identification number of the notified body, [only for products under systems 2+],

— the intended use as laid down in the harmonized technical specification applied.

The CE marking shall be affixed before the construction product is placed on the market. It may be followed by a pictogram or any other mark notably indicating a special risk or use.

Figures ZA.1 and ZA.2 give examples of the information related to products subject to AVCP under each of the different systems to be given on the concrete system chimney/terminal or to a label or to the packaging or to the accompanying documents.

CE 5678	*CE marking, consisting of the "CE"-symbol* *Identification number of the notified production control certification body*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **13** 001DoP2013-09-06	*Nname and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 16497-1:2015 T120 P1 W1 O(20) Intended to be used in concrete system chimney for non-balanced applications **Flow resistance–mean roughness:** 0,001 5 m **Thermal resistance:** 0,2 m^2 K/W **Compressive strength:** 30 m **Flexural strength:** 400 mm **Durability - abrasion:** pass **Reaction to fire**: A1 **Dangerous substance:** none	*No. of European Standard applied, as referenced in OJEU (see note 14)* *Unique identification code of the product-type* *Intended use of the product as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.1 — Example CE marking information of products under AVCP system 2+

CE	*CE marking, consisting of the "CE"-symbol*
AnyCo Ltd, PO Box 21, B-1050, Brussels, Belgium **13** 001DoP2013-09-06	*Name and the registered address of the manufacturer, or identifying mark* *Last two digits of the year in which the marking was first affixed* *Reference number of the DoP*
EN 16497-1:2015 Concrete Terminal Intended to be used in system chimney for non-balanced application **Flow resistance – coefficient of fraction:** 0,5	*No. of European Standard applied, as referenced in OJEU* *Unique identification code of the product-type* *Intended use of the product as laid down in the European Standard applied* *Level or class of the performance declared*

Figure ZA.2 — Example CE marking information of terminals under AVCP system 4

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[5] Regulation (EU) No. 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

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