BRITISH STANDARD

BS EN
13502:2002

Chimneys — Requirements and test methods for clay/ceramic flue terminals

The European Standard EN 13502:2002 has the status of a British Standard

ICS 91.060.40

BSI
British Standards

National foreword

This British Standard is the official English language version of EN 13502:2002.

EN 13502:2002 is a candidate "harmonized" European Standard and fully takes into account the requirements of the European Commission mandate M105, *Chimneys*, given under the EU Construction Products Directive (89/106/EEC), and is intended to lead to CE marking. The date of applicability of EN 13502:2002 as a "harmonized" European Standard, i.e. the date after which this standard may be used for CE marking purposes, is subject to an announcement in the *Official Journal of the European Communities*.

EN 13502:2002 is the subject of transitional arrangements agreed under the European Commission mandate. The Member States have agreed a nominal transition period for the co-existence of EN 13502:2002 and their corresponding national standard(s). It is intended that this period will comprise a nominal nine month period during which any required changes to national regulations are to be made, followed by a further nominal twelve month period for the implementation of CE marking. At the end of this co-existence period, the national standard(s) will be withdrawn. In the UK, the corresponding national standard is:

— BS 1181:1999, *Specification for clay flue terminals;*

and based on this transition period of twenty-one months, BS 1181:1999 would be withdrawn in July 2004

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

The UK participation in its preparation was entrusted by Technical Committee B/506, Chimneys, to Subcommittee B/506/3, Chimneys and their components having inner linings of clay/ceramic, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

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

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

Compliance with a British Standard does not of itself confer immunity from legal obligations.

This British Standard, having been prepared under the direction of the Building and Civil Engineering Sector Policy and Strategy Committee, was published under the authority of the Standards Policy and Strategy Committee on 31 October 2002

Summary of pages

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 13502

October 2002

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English version

Chimneys - Requirements and test methods for clay/ceramic flue terminals

Conduits de fumée - Terminaux en terre cuite/céramique - Prescriptions et méthodes d'essai

Abgasanlagen - Anforderungen und Prüfverfahren für Keramik-Aufsätze

This European Standard was approved by CEN on 31 August 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 13502:2002 E

Contents

Foreword

This document EN 13502:2002 has been prepared by Technical Committee CEN/TC 166 “Chimneys”, the secretariat of which is held by UNI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by April 2003, and conflicting national standards shall be withdrawn at the latest by July 2004.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association and supports essential requirements of EU Directive(s).

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

Annex A is normative.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This European Standard specifies requirements and test methods for clay/ceramic flue terminals with solid walls, which serve to convey the products of combustion from the flue to the atmosphere by negative pressure. It includes terminals used on domestic and industrial chimneys which are not structurally independent (free standing). This standard specifies the performance requirements for factory made terminals. Marking and inspection are also covered by this standard.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1443, *Chimneys – General requirements*.

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 European Standard, the terms and definitions given in EN 1443 and the following apply.

3.1
nominal size (DN)
numerical designation of size of the base of flue terminals which is a convenient round number equal to or approximately equal to either:

a) the internal diameter in millimetres of circular flue terminals;

b) the internal width in millimetres of square or octagonal flue terminals when measured between opposite parallel sides;

c) the internal width and breadth in millimetres of the cross section of rectangular flue terminals.

3.2
nominal height
numerical designation of the height in millimetres of a flue terminal which is a convenient round number approximately equal to the overall height of the flue terminal including any decoration

3.3
open-topped terminal
terminal designed for fitting directly to the outlet of an open flue system (see Figure 1) or covered terminal with outlets twice the cross-sectional area of the outlet flue. The hydraulic diameter remains constant throughout the height of the terminal

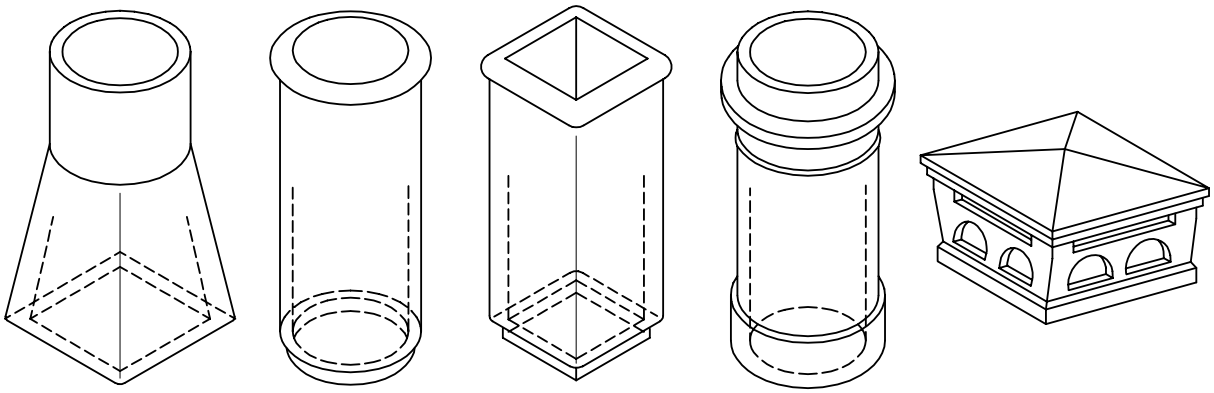


Figure 1 — Examples of open-topped flue terminals

3.4
ridge terminal
restricted terminal designed for fitting at the ridge of a building (see Figure 2).

NOTE Ridge terminals are used only with gas appliances.

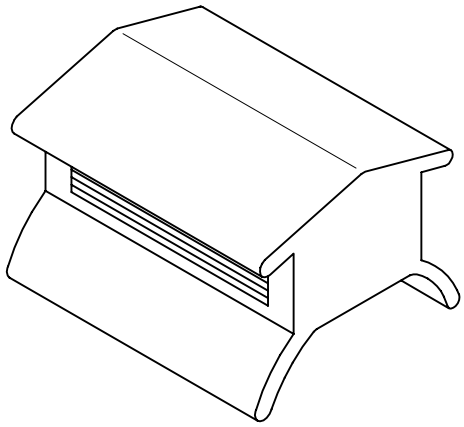


Figure 2 — Example of ridge terminal

3.5
restricted flue terminal
terminal designed with outlets having a total opening area less than twice the cross-sectional area of the outlet flue (see Figure 3)

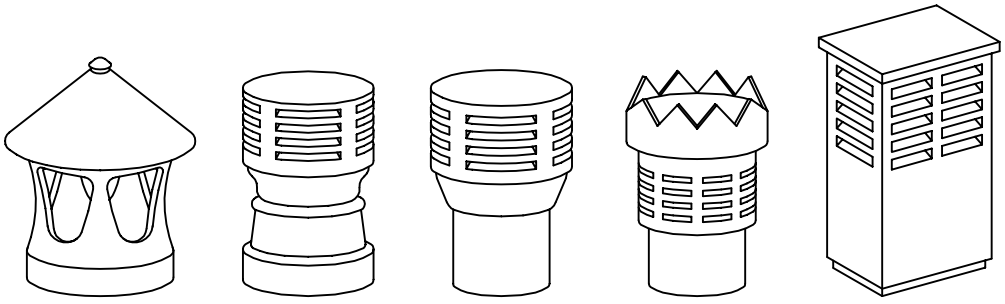


Figure 3 — Examples of restricted flue terminals

4 Product shape

Flue terminals shall be parallel sided or tapered with outlets not specified but adequate to disperse products of combustion and have a base end which shall be either:

a) circular in cross-section with or without parallel ends; or

b) square, rectangular or octagonal in cross-section with rounded internal and external corners and with or without parallel ends.

5 Materials

Flue terminals shall be manufactured from suitable clay/ceramic material which when fired meet the performance requirements given in this standard.

Flue terminals shall be unglazed or glazed on the interior and/or exterior. When glazed, they need not be glazed on the jointing surfaces.

6 Tolerances on dimensions

6.1 Size

When tested in accordance with 12.1, the internal diameter of circular flue terminals measured on any diameter shall not deviate by more than 5 % of the manufacturer's stated nominal internal diameter.

The internal length of a side of square, rectangular or octagonal section flue terminals shall not deviate by more than 5 % of the manufacturer's stated nominal internal length of the side.

6.2 Height

When tested in accordance with 12.2, the height of flue terminals shall not deviate more than -2 % +5 % of the manufacturer's stated nominal height.

6.3 Squareness of base end of parallel sided flue terminals

When tested in accordance with 12.3, the permissible deviation from square of the base end of flue terminals shall be not greater than an angle of slope 30 mm/m.

7 Acid resistance

When tested in accordance with 12.4, the mass loss from any test piece shall not exceed 5,0 %.

8 Freeze/ thaw resistance

The manufacturer shall declare the freeze-thaw resistance of his product expressed in terms of lamination, cracking or flaking.

When tested in accordance with 12.5.2 (Spray test), a terminal shall pass the test if significant lamination, cracking or flaking has not occurred.

9 Flow resistance

The manufacturer shall declare the flow resistance of his product expressed as flow resistance factor.

When tested in accordance with 12.6, a flue terminal shall have a flow resistance factor not greater than the manufacturer's declared flow resistance factor value.

10 Aerodynamic behaviour

10.1 General

The smallest dimension of any opening in a restricted flue terminal shall be greater than 10 mm.

10.2 Ridge terminals

When tested in accordance with 12.8 ridge terminals shall have a resistance factor, K, not greater than 15.

10.3 Type 0 restricted flue terminals

Type 0 restricted flue terminals shall not be tested for aerodynamic behaviour.

10.4 Type 1 restricted flue terminals

When tested in accordance with 12.7 with a wind pressure angles between +90º and –45º, Type 1 restricted flue terminals shall have a static pressure not greater than: -

$$P_R = 0{,}2 \times V_w^2 \times \text{Pa}$$

where

P_R is the manufacturer's declared pressure difference in Pascals (Pa) between flue terminal and the test room at an internal flow velocity of 2 m/s

V_w is the wind speed in metres per second (m/s)

For negative pressure chimneys the maximum value of ΔP_R shall be 2 Pa.

10.5 Type 2 restricted flue terminals

When tested in accordance with 12.8, Type 2 restricted flue terminals shall have a resistance factor, K, not greater than 5.

11 Evaluation of conformity

11.1 Initial type testing

Type tests for the required characteristics given in Table 1 shall be performed at the beginning of the production. One test shall be carried for each requirement.

11.2 Further type tests

Type tests shall be performed also when a change is made either in material composition, processing technique or to the design or method of manufacture of the flue terminal (see Table 1).

NOTE These tests can be performed more frequently by incorporation into a plan for monitoring the consistency of manufacture.

Table 1 — Factory production control and type tests

Item	Relevant test clauses	
	Factory production control 11.3	Type tests 11.1 and 11.2
Flue terminal	6.1, 6.2 and 6.3	7, 8, 9 and 10
NOTE The tests carried out during FPC are intended to verify that the performance requirements assessed through the initial type testing are maintained.		

11.3 Factory production control

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

Factory production control tests are carried out following manufacture to monitor the quality of product (see Table 1).

Sampling and testing of any batch shall be completed prior to removal from the factory and shall be in accordance with ISO 2859-1 at an AQL of 10 % and inspection level S2. Isolated batches of units shall be assessed in accordance with tightened inspection procedures, with a maximum batch size of 1 200 (see annex A).

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

12 Test methods

12.1 Internal transverse dimensions

The maximum and minimum diameters or width/breadth as appropriate of clay/ceramic flue terminals shall be those calculated from the tolerances given in 6.1. If direct measurement is to be carried out, take two measurements at the observed maximum and minimum internal transverse dimensions.

For circular section flue terminals, the test also may be carried out using two gauges whose diameters are set at the minimum and maximum diameters. The minimum gauge shall be able to be turned through 360° within the ends of the flue. The maximum gauge shall not be able to enter the flue when tested through a rotation of 360°.

For square, rectangular and octagonal flue terminals, the internal cross-section dimensions shall be measured between the mid-points of opposite sides of the flue terminals.

12.2 Height

The maximum and minimum internal height of a clay/ceramic flue terminal shall be those calculated from the tolerances given in 6.2. If direct measurement is to be carried out, take two measurements at the observed maximum and minimum heights.

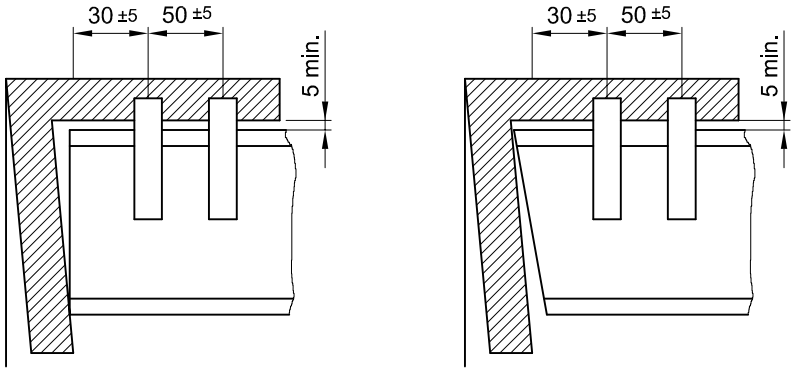
The test also may be carried out by using two gauges whose heights are set at the minimum and maximum internal heights. The minimum gauges shall be not able to fit over the internal height of the flue terminal. The maximum gauge shall be able to fit over the internal height of the flue terminal.

12.3 Squareness of base end of parallel sided flue terminals

The test gauge as shown in Figure 4 with one arm set at a slope of 30 mm/m to the other shall be provided with two pairs of supports at (50 5) mm centres. The end support shall be positioned so that there is a recess of (30 5) mm from the inside of the angled arm. The slope of the supports shall be such as to provide a clearance of at least 5 mm under the test gauge. The angled arm shall be of such a length as to span the outside diameter/width of the flue terminal.

Place the gauge on the base of the flue terminal, at the line of the longest external measurement of the flue terminal and where the terminal has parallel sides. Check the slope of the end against that of the gauge.

Dimensions in millimetres



Longitudinal section of a gauge — Flue terminal passing test

Cross section of gauge — Flue terminal failing test

Figure 4 — Test gauge for squareness of ends test

12.4 Acid resistance

12.4.1 Test specimens

The test specimens shall be six freshly broken pieces of flue terminal or the inner wall of a flue terminal with vertical perforations about [50 10^3] mm^3 ± [10 10^3] mm^3 in volume free from cracks or shattered edges.

The thickness (E) of the test specimen shall be measured first (correct to ±1,0 mm).

The plan area of test specimen shall equal approximately $\frac{50000}{E}$ mm^2

The length of side for a square sided specimen shall equal approximately $\sqrt{\frac{50000}{E}}$ mm

Example:- Wall thickness of flue terminal = 12 mm

Plan area $\frac{50000}{12}$ mm^2 = 4 167 mm^2

Length of side $\sqrt{4167}$ mm = approximately 65 mm

12.4.2 Test equipment

12.4.2.1 Ventilated oven capable of maintaining a temperature of 110 °C ± 5 °C.

12.4.2.2 Balance with an accuracy of ± 0,01 g when loaded with 200 g.

12.4.2.3 Water boiling bath.

12.4.2.4 2 l beaker.

12.4.2.5 Supply of de-ionized water.

12.4.2.6 Sulfuric acid solution, c[H_2SO_4] = 70 % by mass [density at 20 °C =1,610 kg/m^3].

12.4.2.7 Barium chloride drops [concentration 50 g/l].

12.4.3 Test procedure

Clean the test specimens in de-ionized water using a soft brush to remove any loose particles and dry them at a temperature of (110 ± 5) °C until no further loss of mass ± 0,01 g is noted on successive weighings at 24 h intervals. Record the dry weight of the specimen in grams (M_1).

Place the dried test specimens in a 2 l beaker and immerse for (6 ± 0,1) h in 1,5 l of sulfuric acid solution. Cover the beaker by a watch glass to limit evaporation of the acid and stand the beaker in a bath of gently boiling water.

On removal from the acid solution, place each specimen in a separate beaker and wash by immersion in de-ionized water for 30 min, heat the water to boiling in 15 min and hold at boiling for a further 15 min.

Test for the presence of sulfate on a test-tube sample taken from the rinsing bath. Add several drops of a barium chloride solution in de-ionized water at the rate of 50 g per litre.

Repeat the washing cycle, changing the rinsing water after each cycle, until the water no longer becomes turbid when a few drops of barium chloride are added or a maximum of 100 washing cycles (approximately 50 hrs of rinsing).

After washing, dry the test specimens at a temperature of (110 ± 5) °C until no further loss of mass ± 0,01 g is noted on successive weighings at 24 h intervals. Record the final dry weight of the specimen in grams (M_2).

12.4.4 Expression of results

The loss of acid soluble matter in each of the test pieces shall be calculated as a percentage of the dry mass as follows:

percentage loss in dry mass = $\frac{(M_1 - M_2).100}{M_1}$

12.5 Freeze/thaw

12.5.1 Vacuum test (alternative test method)

A test terminal shall be made using the same materials and methods of manufacture as the flue terminal. It shall be not less than 150 mm high and of such a nominal size and wall thickness as to be typical of the range of flue terminals produced.

Examine the test terminal prior to the test, and mark any defects which are already present.

Place the test terminal in an airtight box and evacuate to 300 mm 10 mm of mercury, taking care to place it in such a position as to permit gradual immersion during the next operation.

Maintain the vacuum for at least 2 h. Introduce water into the box by suction in such a way that complete immersion of the terminal is obtained in about 30 min. Relax the vacuum and leave test terminal immersed for 2 hrs 15 min.

Subject the test terminal to the following sequence of freezing and thawing.

(a) Place the test terminal a tank filled with water which is itself located in the centre of a refrigerator and cooled to a temperature of not greater than 5 °C.

(b) Draw out the water and continue the freezing until the test terminal reaches a temperature of (-15 5) °C. During this stage the air in the surrounding refrigerator shall be agitated by fans.

(c) Introduce water into the tank at a temperature of (15 5) °C until the test terminal is completely immersed. Keep the terminal for not less than 30 min in the water maintained at this temperature by heating and stirring so that the temperature in the test terminal reaches (15 5) °C at the end of the period.

Repeat the freezing and thawing operation 25 times. Remove the test terminal and examine for evidence of lamination, cracking or flaking.

12.5.2 Spray test (reference test method)

The terminal to be tested shall be fully immersed in water at ambient temperature for at least 7 days prior to testing to ensure complete saturation.

Place the saturated terminal upright on the base of a freezer test chamber containing both a heater unit and a water spray unit. The terminal shall be in such a position as to allow the water spray to be directed to impinge within 100 mm of the top of the terminal and then allowed to run down the outer face.

NOTE Terminals which are more than 1 m high can have their top section removed by saw cut.

Place the control thermocouple inside the terminal at the centre line and touching the inner skin on the side facing the heater.

The refrigeration unit shall be capable of lowering the temperature at the control thermocouple position to at least -2 °C at the end of the specified thawing period.

The capacity of the heater unit shall ensure that the temperature at the control thermocouple position shall rise to at least +3 °C by the end of the specified spraying periods.

Drainage shall be provided to the chamber to remove the sprayed water.

Cover the top of the terminal with a loose fitting cap of thin sheet metal or foil in order to maintain substantially still air conditions within the terminal during circulation of the cold air.

Subject the terminal to 100 cycles of freezing and thawing. Each cycle shall consist of (150 1) min at –15 °C air temperature, approximately 20 min of radiant heat, (10 1) min of water spray of at least 8 l/min, (2 1) min to drain the chamber.

Examine the terminal for evidence of lamination, cracking or flaking.

12.6 Flow resistance

12.6.1 Apparatus

The apparatus for testing flue terminal, which shall have a fan, shall have a range of throughputs variable between 15 m^3/h and 120 m^3/h to an accuracy of ± 5 %. The orifice plate to measure the flow shall be sized accordingly.

12.6.2 Procedure for restricted flue terminals

Connect the flue terminal to a flue liner with the same nominal internal diameter. The length of straight rigid flue liner below the flue terminal shall be at least six times the nominal internal diameter. Place pitot tubes in the flue liner at a distance of approximately three times the nominal internal diameter from the terminal. At least three pitot tubes 1 mm diameter shall be evenly distributed around the circumference of the flue liner, in a plane perpendicular to the flue liner axis. The pitot tubes shall have smooth openings into the inside of the flue liner. The pitot tubes shall be used to determine the average static pressure within the flue liner.

Deliver air by means of the fan at a nominal velocity in the flue of 2 m/s ± 2,5 %.

Measure the pressure difference between the static pressure in the flue liner and the pressure in the test room. The pressure difference shall be measured with an accuracy of ± 1,0 Pa.

The flow resistance factor shall be calculated from the following formula:

$$= \frac{}{\frac{1}{2} \quad w^2_{nom}}$$

where

is the zeta = friction factor

is the measured friction in Pascals

is the density of air = 1,202 kg/m^2

w_{nom} is the nominal velocity in metres per second

12.6.3 Results

Record the results.

12.7 Aerodynamic behaviour for Type 1 restricted flue terminals

12.7.1 Apparatus

12.7.1.1 General

The apparatus for testing restricted flue terminal, which shall have a fan, shall have a range of throughputs variable between 15 m^3/h and 120 m^3/h to an accuracy of ± 5 %. One suitable method for determining the air flow rate is by the use of orifice plates.

12.7.1.2 Wind generator, capable of delivering a minimum wind front of 5 times the projected cross section of the terminal to be tested but not less than 1 m^2. The overall wind velocity distribution shall be within 0,25 m/s at velocities up to 10 m/s at the terminal test position.

12.7.2 Procedure

Connect the flue terminal to a flue liner with the same nominal internal diameter. The length of straight rigid flue liner below the flue terminal shall be at least 6 times the nominal internal diameter. Place pitot tubes in the flue liner at a distance of approximately 3 times the nominal internal diameter from the terminal. At least three pitot tubes 1 mm diameter shall be evenly distributed around the circumference of the flue liner, in a plane perpendicular to the flue liner axis. The pitot tubes shall have smooth openings into the inside of the flue liner. The pitot tubes shall be used to determine the average static pressure within the flue liner.

Deliver air by means of the fan at a nominal velocity in the flue of 2 m/s ± 2,5 %.

Rotate the flue terminal in front of the wind system in such a way that the wind pressure angles relative to the flue terminal range from downward wind (+ 90°) to an upward wind (- 45°) in maximum steps of 7,5 °.

Determine the pressure characteristics through wind influences of the flue terminal under the following conditions:

- a nominal velocity of 2 m/s in the flue liner

- wind speeds of 3, 6, 9, 12 m/s in combination with wind direction angles ranging from – 45° to + 90°.

Measure the pressure difference between the static pressure in the flue liner and the pressure in the test room. The pressure difference is measured with an accuracy of ± 0,2 Pa.

12.7.3 Results

Record the pressure characteristics.

12.8 Aerodynamic behaviour for Type 2 restricted flue and ridge terminals

12.8.1 Apparatus

The apparatus for testing restricted flue or ridge terminals shall be as shown in Figure 5 or Figure 6 respectively. The wind generator shall be capable of delivering a wind front of approximately 1 m^2 at speeds up to at least 10 m/s. The fan shall have a range of throughputs variable between 40 m^3/h and 120 m^3/h and the orifice plate to measure the flow shall be sized accordingly.

The length of straight rigid flue pipe below the flue terminal shall be at least 1 m and of the same material as the flue terminal. A pitot tube shall be used to measure the static pressure 0,5 m below the terminal.

12.8.2 Procedure for restricted flue terminals and ridge terminals under wind-free conditions

Measure the static pressure in millibars within the flue 0,5 m below the terminal for a range of flue flows between 40 m^3/h and 80 m^3/h, for 125 mm terminals, or between 60 m^3/h and 120 m^3/h, for 150 mm terminals.

Plot a graph of static pressure in millibars against the square of the flue flow in m^3/h.

NOTE This graph should be a straight line passing through the origin.

Record the maximum static pressure in millibars.

12.8.3 Calculation of the resistance factor for open-topped terminals

Calculate the resistance factor, K, of the flue terminal using the following equation:

K = slope of graph x C

where

C = 3,43 10^5 for a 125 mm internal diameter flue pipe or 7,11 10^5 for a 150 mm internal diameter flue pipe.

12.8.4 Procedure for testing restricted flue terminals under wind conditions

Position the terminal symmetrically about the vertical axis and in the centre of the wind front.

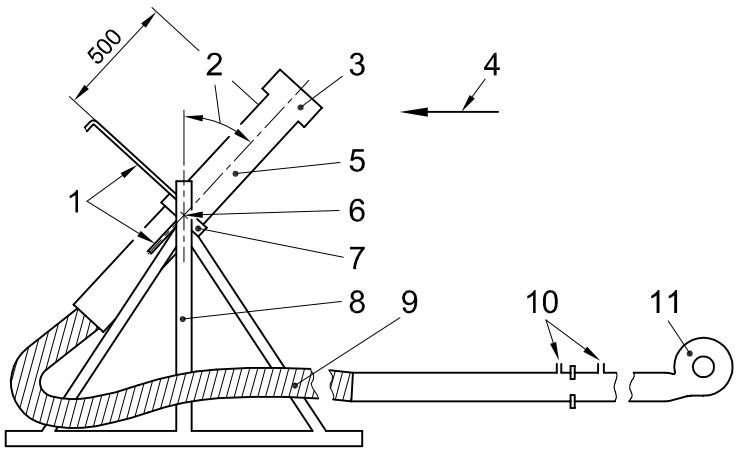
Use two wind approach angles measured in the horizontal plane, one with the wind blowing in between supports and the other with the wind blowing at the support (see Figure 5).

Use three wind approach angles measured in the vertical plane, one with the wind plunging at 30º to the horizontal plane, one in the horizontal plane and one with the wind ascending at 30º to the horizontal.

Use three wind speeds, 3 m/s, 6 m/s and 10 m/s.

For all combinations of variables, i.e. horizontal approach angle, vertical approach angle and wind speed, follow the procedure described in 12.6.2 to establish the flow resistance to the two flows which represent the lower and upper limits of the flue pipes being used.

Dimensions in millimetres



Key

1 Pitot static tubes

2 Angle of tilt

3 Terminal

4 Applied wind front

5 125 or 150 nominal diameter flue pipe

6 Pivot

7 Pipe clamp

8 Height adjustable section

9 Flexible tube

10 Orifice plate with D and D/2 pressure tappings

11 Fan

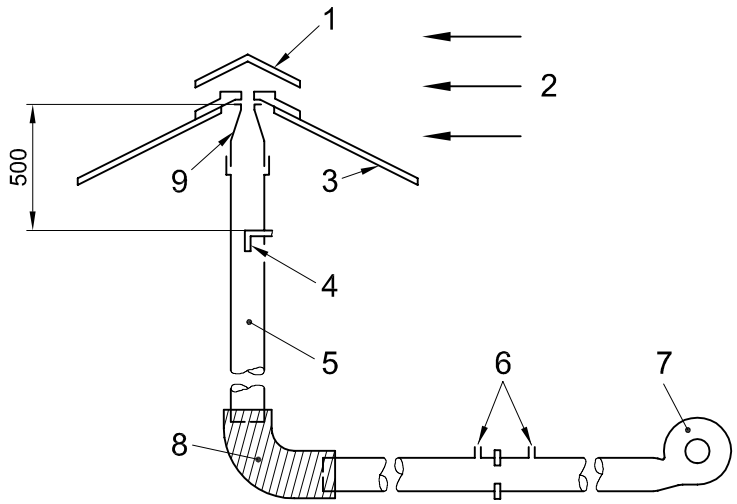
Figure 5 — Test apparatus for measuring aerodynamic behaviour of terminals

12.8.5 Procedure for ridge terminals under wind conditions

Fit the ridge terminal into a test roof having a pitch angle of 42½ º (see Figure 6), using the ridge type adapter recommended by the manufacturer.

Apply wind fronts of velocity 3 m/s, 6 m/s and 10 m/s horizontally, and rotate the roof in 30º steps such that the angle of approach is 0º, 30º, 60º, 90º, 120º, 150º, and 180º (see Figure 6).

Dimensions in millimetres



Key

1 Ridge terminal

2 Applied wind front

3 Test roof

4 Pitot static tube

5 Flue pipe

6 Orifice plate with D and D/2 pressure tappings

7 Flue flow fan with controlled throughput

8 Flexible tubing

9 Ridge terminal (R-type) adaptor

Figure 6 — Apparatus for testing aerodynamic behaviour of ridge terminals under wind conditions

12.8.6 Calculation of the resistance factor for ridge terminals

Calculate the flow resistance of the terminal as described in 12.3 for the maximum and minimum flue flows under all test winds and at all angles.

13 Designation

The following shall be used for the designation of flue terminals:

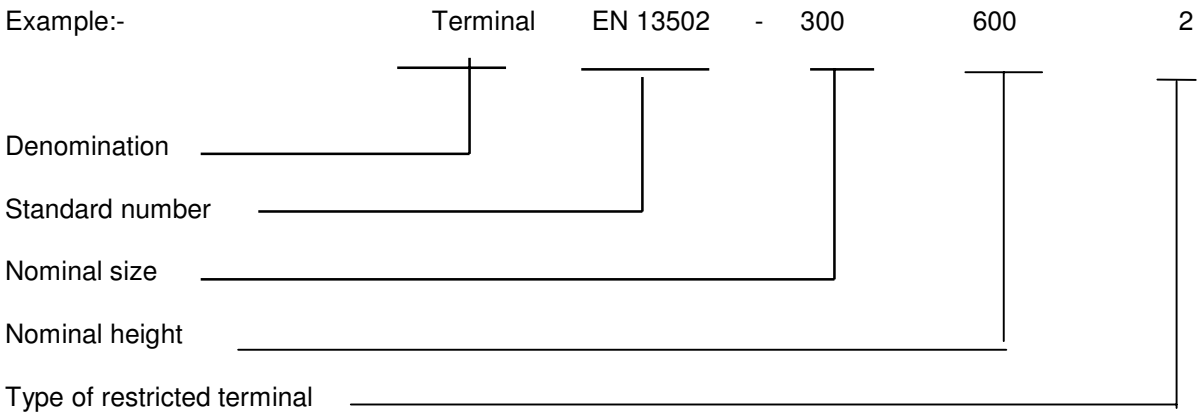
Denomination

Standard number

Nominal size

Nominal height

Type of terminal



14 Marking

All flue terminals shall be marked with the following information:

- EN 13502
- manufacturer's identification and date of manufacture
- nominal size
- nominal height
- type of restricted terminal (if appropriate)

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

Annex A
(normative)

Sampling procedures for an AQL of 10 % and Inspection Level S2

A.1 Acceptability determination

Single or double sampling shall be used.

A.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 has been reached or exceeded, the batch shall be rejected and normal inspection reinstated.

A.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.

A.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 A.1. Sample units shall be selected at random.

Table A.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 size	Accept number	Reject number
2 to 1200	5	1	2	3	0	2	3	1	2
1201 to 20 000	8	2	3	5	0	3	5	3	4

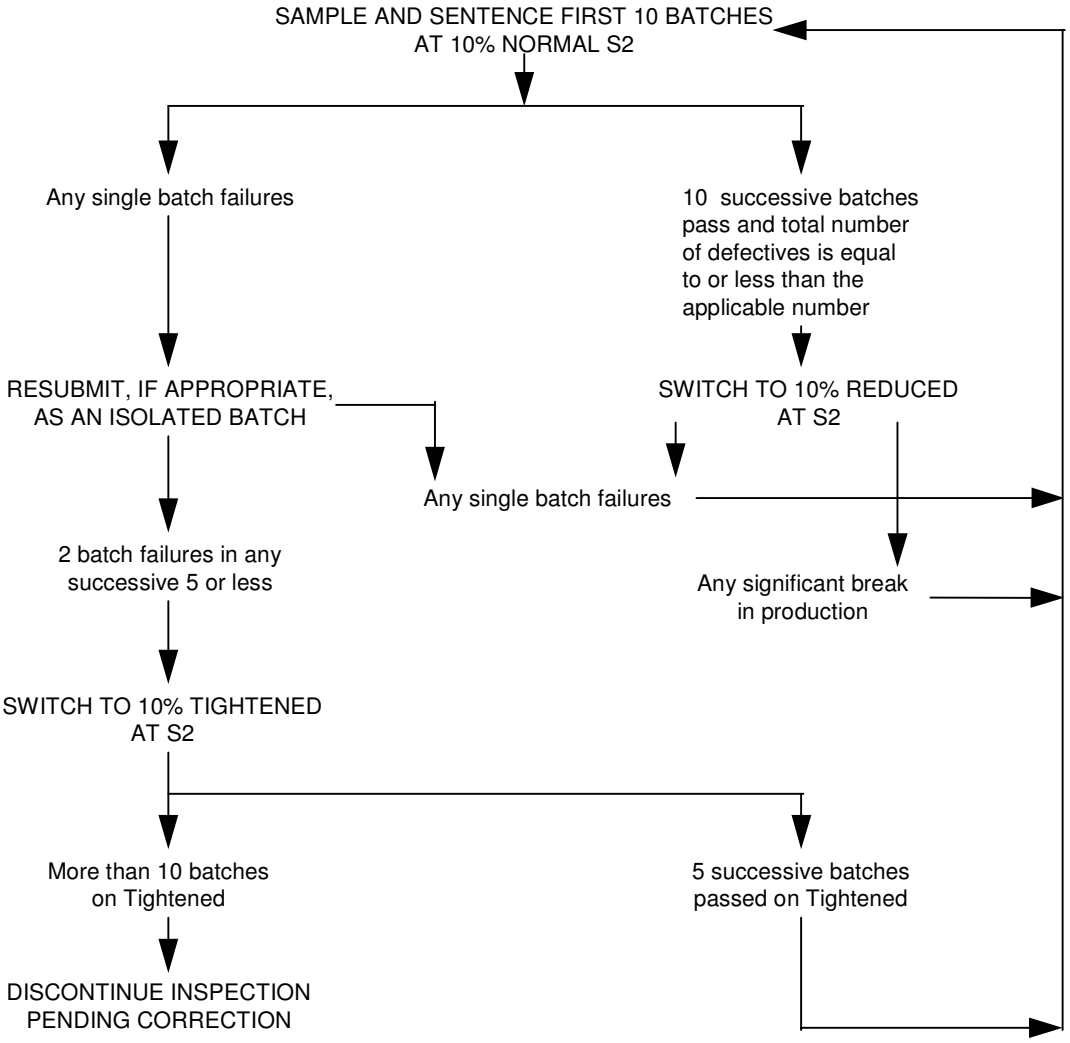


Figure A.1 - Summary of Sampling Procedures for Continuous Batches

A.3 Normal to reduced inspection

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

(a)

the 10 preceding batches have been on normal inspection, and none has 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 A3) is equal to or less than the limit number given in Table A.3.

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

Table A.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 size	Accept number	Reject number
2 to 1200	2	0	2	not applicable					
1201 to 20 000	3	1	3	2	0	3	2	0	4

Table A.3 - Limit number of defectives for normal to reduced inspection

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

A.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 A.1.1 and A.1.2).

A.5 Tightened inspection

Tightened inspection as shown in Table A.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 A.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 size	Accept number	Reject number
8 to 20 000	8	1	2	5	0	2	5	1	2

A.6 Tightened to normal inspection

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

A.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 ZA
(informative)

Clauses of this European standard addressing the provisions of the EU Construction Products Directive

ZA.1 Scope and relevant characteristics

This European Standard has been prepared under the mandate M/105 "Chimneys", as amended, given to CEN by the European Commission and the European Free Trade Association.

The clauses of this European standard shown in this Annex meet the requirements of the Mandate M/105 "Chimneys", as amended, given under the EU Construction Products Directive (89/106/EEC).

Compliance with these clauses confers a presumption of fitness of the flue liners and fittings covered by this European standard for their intended use indicated herein; reference shall be made to the information accompanying the CE marking.

WARNING: Other requirements and other EU Directives, not affecting the fitness for intended use, can be applicable to the construction products falling within the scope of this European Standard.

NOTE In addition to any specific clauses relating to dangerous substances contained in this European Standard, there can be other requirements applicable to the products falling within its scope (e.g. transposed European legislation and national laws, regulations and administrative provisions). In order to meet the provisions of the EU Construction Products Directive, these requirements need also to be complied with, when and where they apply. An informative database of European and national provisions on dangerous substances is available at the Construction web site on EUROPA (CREATE, accessed through http://europa.eu.int/comm/enterprise/construction/internal/hygiene.htm).

Table ZA.1 – Scope and relevant clauses

Construction product : clay/ceramic flue terminals as covered in clause 1 of this standard Intended uses: Chimneys as established in clause 1 of this standard				
Performance characteristic	**Requirement clauses in this standard**		**Levels and/or classes**	**Notes**
Flow resistance	9	Flow resistance	---	Declared value expressed as a flow resistance factor
Durability: freeze/thaw	8	Freeze/thaw resistance	---	Pass/fail
Dangerous substances	ZA.1	(see note above)	---	ZA:3 as indicated in text after Figure ZA.2

The requirement of a certain characteristic is not applicable in those Member States (MSs) where there are no regulatory requirements on that characteristic for intended use of the product. In this case, as placing their products on the market of these MSs are not obliged to determine nor declare the performance of their products with regard to this characteristic and the option "No performance determined" (NPD) in the information accompanying the CE marking (see Clause ZA:3) may be used. The NPD option may not be used, however, where the characteristic is subject to a threshold level.

ZA.2 Procedure of attestation of conformity of clay/ceramic flue liners

ZA.2.1 System of attestation of conformity

The system of attestation of conformity for clay/ceramic flue liners of chimneys indicated in Table ZA.2, in accordance with the decision of the Commission 95/467/EC as amended, as given in Annex III of the mandate M/105 'Chimneys', as amended, is shown in Table ZA.2 for the indicated intended use.

Table ZA.2 - Attestation of conformity system

Product	Intended use	Level or class *(Reaction to fire)*	Attestation of conformity system
Flue terminals	Chimneys	Any	**4**
System 4: See CPD Annex III.2.(ii), third possibility			

The evaluation of conformity of the products in Table ZA.1 shall be based on the evaluation of conformity procedure resulting from the clauses of this EN indicated in Table ZA.3.

Table ZA.3 - Assignation of evaluation of conformity tasks

Tasks		Content of the task	Clauses to apply
Tasks for the manufacturer	Factory production control (F.P.C)	Parameters correlated to all characteristics of Table ZA.1	11.3
	Initial type testing	All characteristics of Table ZA.1	11.1 and 11.2

ZA.2.2 EC Certificate and Declaration of conformity

When compliance with the conditions of this Annex is achieved, the manufacturer or his agent established in the EEA shall prepare and retain a declaration of conformity, which entitles the manufacturer to affix the CE marking. This declaration shall include:

- name and address of the manufacturer, or his authorised representative established in the EEA, and the place of production;
- description of the product (type, identification, use, ...), and a copy of the information accompanying the CE marking;
- provisions to which the product conforms (annex ZA of prEN 13502:2002);
- particular conditions applicable to the use of the product (e.g. provisions for use under certain conditions, etc);
- name of, and position held by, the person empowered to sign the declaration on behalf of the manufacturer or his authorised representative.

The above mentioned declaration shall be presented in the official language or languages of the Member State in which the product is to be used.

ZA.3 CE Marking and labelling

The manufacturer or his authorised representative established within the EU or EFTA is responsible for the affixing of the CE marking.

The CE conformity symbol to affix shall be in accordance with Directive 93/68/EC and together with the identification number of the notified body, as well as the name or identifying mark of the producer and the product designation, shall be shown on [at least 20 % of] the flue terminals [in each consignment].

In addition, the CE marking shall appear on the packaging and/or on the accompanying commercial documents, together with the following information:

- name or identifying mark of the producer;

- the last two digits of the year in which the marking is affixed;

- reference to this European Standard;

- description of the product: Product type (e.g. open-topped terminal);

- information on the relevant essential characteristics in Table ZA.1:

  - values and, where relevant, level to declare for each essential characteristic as indicated in “Notes” in Table ZA.1; or

  - the “No performance determined” (NPD) option, when relevant.

The “No performance determined” (NPD) option may not be used where the characteristic is subject to a threshold level. Otherwise, the NPD option may be used when and where the characteristic, for a given intended use, is not subject to regulatory requirements.

Figures ZA.1 and ZA.2 give examples of the information to be given on the product, packaging and/or accompanying documents.

Figure ZA.1 - Example CE marking on the product

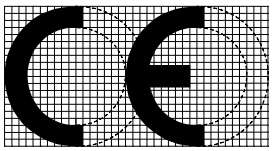
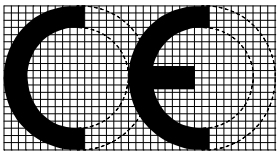
	CE conformity marking consisting of the 'CE' symbol given in directive 93/68/EC

Figure ZA.2 - Example CE marking information in the accompanying documents

	CE conformity marking consisting of the 'CE' symbol given in directive 93/68/EC
02	Last two digits of year of affixing of CE marking
AnyCo Ltd, P.O. Box 21, B – 1050	Name or identifying mark and registered address of the producer
EN 13502	Number of European Standard
Clay/ceramic flue terminal Restricted Type 1 Flow resistance…….....……flow resistance factor Durability: freeze/thaw .....NPD	Definition of the product Information on mandated characteristic

In addition to any specific information relating to dangerous substances shown above, the product should also be accompanied, when and where required and in the appropriate form, by documentation listing any other legislation on dangerous substances for which compliance is claimed, together with any information required by that legislation.

NOTE European legislation without national derogations need not to be mentioned.

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