SLOVENSKI STANDARD
SIST EN 13063-2:2005

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Dimniki ï Sistemski dimniki s keramiļnimi tuljavami ï 2. del: Zahteve in preskusne metode za delovanje v vlaģnih razmerah

Chimneys - System chimneys with clay/ceramic flue liners - Part 2: Requirements and test methods under wet conditions

Abgasanlagen - System-Abgasanlagen mit Keramikinnenrohren - Teil 2: Anforderungen und Prüfungen für feuchte Betriebsweise

Conduits de cheminées - Conduits de cheminées résistant aux feux de cheminées a paroi intérieure en terre cuite/céramique - Partie 2 : Exigences et méthodes d'essai en conditions humides

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Chimneys - System chimneys with clay/ceramic flue liners - Part 2: Requirements and test methods under wet conditions

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This European Standard was approved by CEN on 1 April 2005.

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Foreword

This European Standard (EN 13063-2:2005) 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of an identical text or by endorsement, at the latest by November 2005, and conflicting national standards shall be withdrawn at the latest by November 2005.

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

For relationship with EU Directive(s), see informative Annex ZA, which is an integral part of this document.

This document is part 2 of a series of standards for system chimneys with clay/ceramic flue liners.

Part 1 is for chimneys with sootfire resistance and part 3 is for system air flue chimneys.

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

1 Scope

This European Standard specifies the requirements and test methods for multiwall system chimneys working under wet conditions (in the following expressed as “wet chimney”) with pressure type N1, N2 or P1 according to EN 1443 and a working temperature below or equal T600 according to prEN 13063-1, in which the products of combustion are conveyed to the atmosphere through clay/ceramic flue liners. Marking and inspection are also covered by this document.

This European Standard does not apply to structurally independent (free standing or self-supporting) system chimneys.

The wet chimney may comprise the following appropriate components:

— clay/ceramic flue liners;

— insulation layer;

— outer walls;

— acid resistant mortar for jointing flue liners or elastomeric sealant;

— mortar for jointing outer walls;

— terminal;

— chimney base;

— condensate collector;

— condensate outlet;

— cladding;

— opening section;

— cleaning and inspection door;

— distance piece;

— reinforcement.

The wet system chimney covers a combination of compatible chimney components, obtained or specified from one manufacturing source with product responsibility for the whole system chimney.

NOTE This document does not cover soot fire resistance chimneys.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 998-2:2003, *Specification for mortar masonry – Part 2: Masonry mortar*

EN 1366-8, *Fire resistance tests for service installations – Part 8: Smooth extraction ducts*

EN 1443:2003, *Chimneys – General requirements*

EN 1457:1999, *Chimneys – Clay/ceramic flue liners – Requirements and test methods*

EN 12446:2003, *Chimneys – Components – Concrete outer wall elements*

prEN 13063-1:2002, *Chimneys – System chimneys with clay/ceramic flue liners – Part 1: Requirements and test methods for sootfire resistance*

prEN 13069:1997, *Chimneys – Clay/ceramic outer walls for system chimneys – Requirements and test methods*

EN 13162:2001, *Thermal insulation products for buildings – Factory made mineral wool (MW) products – Specification*

EN 13216-1:2004, *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*

prEN 14241-1, *Chimneys – Elastomeric seals and elastomeric sealants – Material requirements and test methods - Part 1: Seals in flue liners*

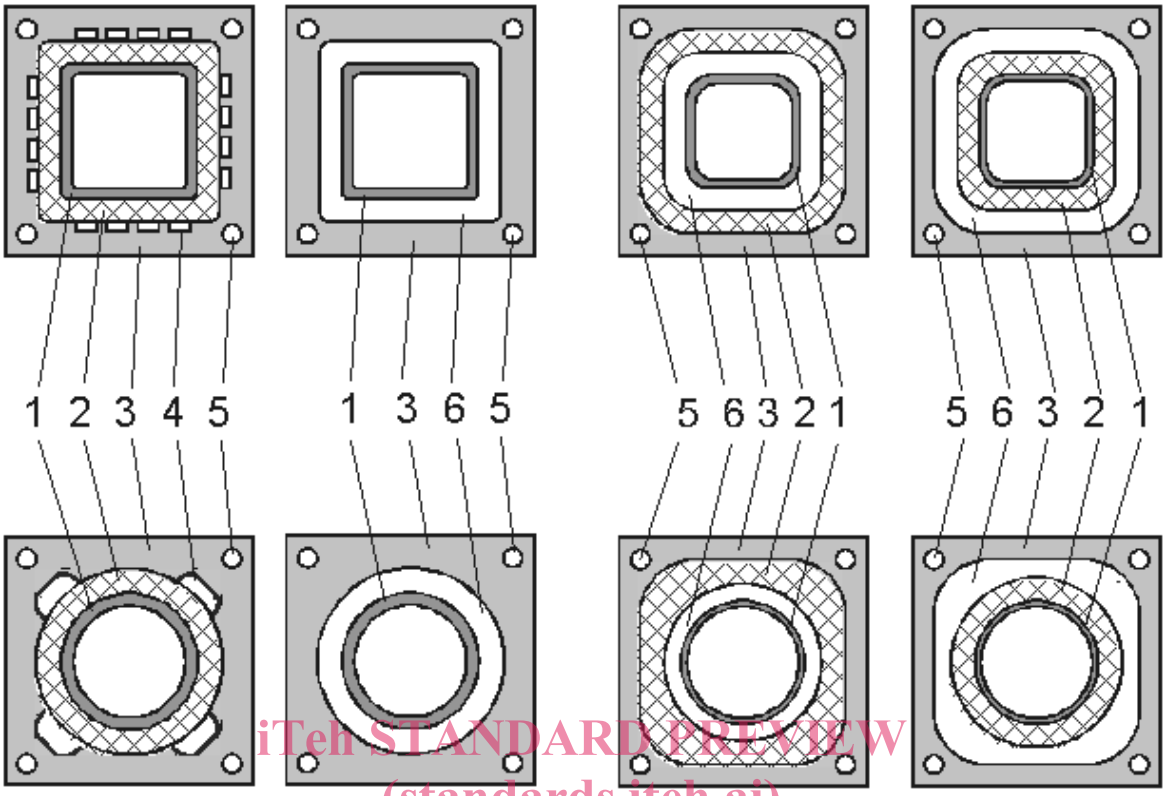
EN 14297:2004, *Chimneys – Freeze-thaw resistance test method for chimney products*

ISO 2859-1:1999, *Sampling procedures for inspection by attributes – Part 1: Sampling schemes indexed by acceptable 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 1443:2003, EN 13216-1:2004, prEN 13063-1:2002 and the following apply.

3.1
system chimney under wet conditions
system chimney is a multiwall construction, consisting mainly of an outer wall, an insulation layer and the inner clay/ceramic flue liner that can work under wet conditions (see Figure 1)



Key

1 flue liner
2 insulation layer
3 outer wall
4 back ventilation
5 cavities for structural reinforcement
6 non ventilated air gap

Figure 1 — Examples of construction of a chimney for wet conditions

3.2
wet operating conditions
conditions when the chimney is designed to operate normally with the temperature of the inner surface of the flue liner at and below the water dew point

3.3
condensate collector
flue liner base unit for collecting the condensates with an opening for discharging the condensates

3.4
condensate outlet
drain to ensure the discharge of the condensates from the condensates collector

3.5
jointing materials for flue liners

3.5.1
prefabricated elastomeric seals
prefabricated element made of elastomeric material, which ensures a gastight seal in a joint

3.5.2
on site applied elastomeric sealant
sealing material which is applied on site to ensure the gas tightness

3.5.3
acid resistant mortar
jointing material made with acid resistant mortar

4 Shapes, dimensions and tolerances

4.1 Flue liners

4.1.1 General

Flue liners shall meet the requirements on size and tolerance of dimensions given in EN 1457:1999, 7.1, 7.2, 7.3, 7.4, 7.5, 7.6 and 7.7.

4.1.2 External diameter of flue liner

When tested in accordance with A.2.6, the external diameter of circular flue liners measured on any diameter shall not deviate more than ± 3 % of the manufacturer's stated nominal external diameter.

4.2 Insulation

The insulation layer shall meet the requirements on tolerances of dimension given in EN 13162:2001, 4.2.2 (length and width) and 4.2.3 (thickness class T3).

4.3 Outer wall elements

Outer wall elements shall fulfil the requirements on shapes and tolerances on dimensions given in:

— concrete outer wall elements: EN 12446:2003, Clause 7;

— clay/ceramic outer walls: prEN 13069:1997, Clause 6;

— metal outer walls: prEN 13063-1:2002, Annex B.

4.4 Cleaning and inspection doors

Dimensions and tolerances shall be declared by the manufacturers.

5 Material requirements

5.1 General requirements for components

5.1.1 Flue liners

Flue liners shall meet the requirements of EN 14571999 8.1, 9.1, 9.2, Clauses 10, 11, 12 and 13. If the requirement of EN 1457:1999 13.1 "Water vapour permeability" is not fulfilled, the flue liner may be used for wet chimneys, if the system test for system chimneys under wet conditions according to EN 13216-1:2004, 5.5, is passed according to the requirements in.

5.1.2 Maximum load for opening sections

When tested as described in A.2.3, components shall withstand a load (F) of at least five times the manufacturer's declared design load ($H \times G$).

$$F = \frac{\chi \times H \times G}{100} \quad (1)$$

where

F is the minimum load, expressed in kilonewton (kN);

χ is the safety factor equal to 5;

H is the height of the chimney, is expressed in meter (m);

G is expressed in kilogram per meter (kg/m).

NOTE The limiting factor of the maximum height of system chimneys is the compressive strength of the opening section.

5.1.3 Jointing material for flue liners

5.1.3.1 Acid resistant mortar

5.1.3.1.1 Density

The density of jointing material shall not vary more than ± 10 % of the manufacturer's declared value when tested in accordance with A.2.2.2.

5.1.3.1.2 Compressive strength

The compressive strength shall be tested after a 24 h preconditioning under water in accordance with A.2.2.3.The compressive strength shall be at least 10 N/mm².

5.1.3.1.3 Water resistance

Acid resistant mortar for jointing the components in system chimneys stated for use in wet conditions shall be tested in accordance with A.2.2.4 and the mass loss from any sample shall not exceed 3 %.

5.1.3.1.4 Acid resistance

When tested in accordance with A.2.2.5, the mass loss from any sample shall not exceed 2 %.

5.1.3.2 Prefabricated elastomeric seals

The elastomeric seals shall comply with prEN 14241-1.

5.1.4 Insulation

5.1.4.1 General

The insulation shall be to the manufacturer’s specifications and shall be prefabricated and have an independent, permanent shape before and after being exposed to heat (e.g. blocks or bonded loose material).

5.1.4.2 Durability under normal operating conditions

When tested in accordance with A.2.1 at test temperature related to the temperature class (see Table 1), the change in the outside surface temperature of the test sample after the fourth cycle of heating shall not exceed 10 % of the maximum outside surface temperature of the sample of the first cycle.

Table 1 — Test temperatures

Temperature class	T 80	T 100	T 120	T 140	T 160	T 200	T 250	T 300	T 400	T 450	T 600
Test temperature (°C)	100	120	150	170	190	250	300	350	500	550	700

5.1.5 Outer wall elements

Outer wall elements shall fulfil EN 12446 for concrete outer wall elements, prEN 13069 for clay/ceramic outer wall or Annex B of prEN 13063-1:2002 for metal outer walls.

5.1.6 Jointing material for outer wall elements

Jointing materials used for jointing outer walls according to EN 12446 for concrete outer wall elements and prEN 13069 for clay/ceramic outer walls, where supplied with the system chimney, shall comply with the system chimney manufacturer's declared specification and shall be at least M2,5 according to EN 998-2:2003, 5.3.1, Table 1.

5.1.7 Wind load

The freestanding part of the chimney above the last lateral support of the system chimney shall withstand a wind load of 1,5 kN/m^2. The maximum permissible height of a chimney outside the building of a system chimney shall be calculated according to calculation methods applicable in the place of use of the chimney, taking into account the tilt momentum of the outer wall element. Alternatively the tilt momentum of the complete construction can be taken into account. A test method to evaluate the tilt momentum is given in A.2.4.

5.2 Safety in use

5.2.1 Thermal shock resistance

The wet chimney shall be tested at the normal operating conditions in accordance with the heat stress test method described in EN 13216-1:2004, 5.7.5.1, for the required temperature types according to Table 1.

5.2.2 Distance to combustible materials

5.2.2.1 General

The distance to combustible materials shall be tested at the normal operating condition in accordance with EN 13216-1:2004, 5.7.5.1, the test assembly shall be the corner installation. The distance between the outer surface of the chimney and the adjacent combustible material shall be declared as O(xx), where (xx) is the minimum distance in mm.

5.2.2.2 Normal operating conditions

The wet chimney shall be tested in accordance with the heat stress test method described in EN 13216-1:2004, 5.7.5.1 for the required temperature types according to Table 1. The maximum surface temperature of combustible materials adjacent to the test wet chimney shall not be greater than 85 °C, when related to an ambient temperature of 20 °C.

NOTE 1 This requirement is declared fulfilled when chimneys, where combustibles are at least 50 mm from the outer walls and the space ventilated, are tested in a free standing open room test assembly at the test-temperatures 500 °C (for T400) or 700 °C (for T600) and the temperature of the outer wall does not exceed 100 °C at an ambient temperature of 20 °C. For this case the distance is designated as O50.

NOTE 2 If the wet chimney has already been tested according to prEN 13063-1:2002, 5.2.1.1, the results can be used.

5.2.3 Relative movement between flue liner and outer wall

After thermal testing (normal operating conditions) in accordance with EN 13216-1:2004, 5.3, the final position after cooling down to room temperature of the upper flue liner shall be ± 5 mm to the original position when tested according to EN 13216-1:2004, 5.2.

5.2.4 Thermal resistance

The thermal resistance value of the system chimney declared by the manufacturer shall be verified by testing according to the test method of EN 13216-1:2004, 5.8 (as the reference test method) or calculation in accordance with Annex B, both with inner surface temperature of the flue liner at 200 °C.

The designation of the thermal resistance shall be given as Ryy, where yy is the value in square metres Kelvin per Watt multiplied by 100, rounded to the nearest integer (e.g.: R22 is R=0,22 m^2K/W).

5.2.5 Resistance to fire external to external

The resistance to fire external to external shall be tested according to EN 1366-8 for shafts and ducts. The performance criteria of integrity and insulation shall be declared by the manufacturer as EI xxx for the exposure outside to outside.

Examples are given in Table 2.

NOTE For fire classification see EN 13501-2.

Table 2 — Fire resistance performance classes

Fire resistance performance classes	Duration in min
EI 000	0 ≤ EI 000 < 30
EI 030	30 ≤ EI 030 < 60
EI 060	60 ≤ EI 060 < 90
EI 090	90 ≤ EI 090 < 120
EI 120	120 ≤ EI 120

5.3 Hygiene, health and environment

5.3.1 Gas tightness

When a chimney is tested according to the test methods described in EN 13216-1:2004, 5.3, the leakage rate shall not be greater than that given in Table 3, both before and after the thermal performance test.

Table 3 — Leakage rate

Pressure type	Test pressure (Pa)	Leakage rate/ flue surface area ($m^3/s/m^2$)
N1	40	2×10^{-3}
N2	20	3×10^{-3}
P1	200	$0{,}006 \times 10^{-3}$

5.3.2 Durability

5.3.2.1 Condensate resistance

Wet chimneys shall have either clay/ceramic flue liners which are designated W according to EN 1457:1999 Clause 13, or clay/ceramic flue liners which are designated D according to EN 1457:1999 if the chimney, when tested according to EN 13216-1:2004, 5.5, shows no water vapour saturation in any part of the system chimney.

Prefabricated elastomeric seals and on site applied elastomeric sealant shall comply with prEN 14241-1 condensate class W at the designated temperature class of the wet chimney

5.3.2.2 Corrosion resistance of flue liners and jointing material

The mass loss of clay/ceramic flue liners shall not exceed 2 % when tested according to EN 1457:1999, 16.9. Prefabricated elastomeric seals and on site applied elastomeric sealant shall comply with prEN 14241-1 corrosion class 1 or 2 at the designated temperature class of the wet chimney.

5.3.3 Flow resistance of flue liners and fittings

The flow resistance shall be measured according to EN 13216-1:2004, 5.11. The friction coefficient ζ and the mean roughness r shall be calculated according to EN 13216-1.

NOTE For clay/ceramic flue liners the roughness value r = 0,001 5 m and the friction coefficient ζ for typical fittings can be taken from EN 13384-1.

5.4 Cleaning and inspection doors

The increase of the surface temperature of the outer surface of the cleaning and inspection doors shall not exceed 140 K during thermal testing, the test shall be carried out in accordance with EN 13216-1:2004, 5.7.5.1.

NOTE It is recommended that the distance to combustible materials should not be less than 400 mm from cleaning and inspection doors.

When tested in accordance with EN 13216-1, the complete system with cleaning and inspection doors shall not have a leakage rate greater than the values given in Table 3.

The inspection opening shall not hinder the relative movement of the flue liner and no water shall occur at the outside of the cleaning and inspection doors.

5.5 Cladding and accessory exposed to freeze/thaw

The freeze/thaw resistance of the flue liner and the outer wall of the system chimney shall be tested according to EN 14297. The product shall not present any damage of types 7, 8, 9 and 10 in accordance with EN 14297:2004, Table 1.