



**SLOVENSKI STANDARD**  
**SIST EN 13216-1:2004**

**01-oktober-2004**

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**Dimniki – Preskusne metode za sistemske dimnike – 1. del: Splošne preskusne metode**

**TC:**

**Dimovodne naprave - Preskusne metode za sistemske dimovodne naprave - 1. del: Splošne preskusne metode**

Chimneys - Test methods for system chimneys - Part 1: General test methods

Abgasanlagen - Prüfverfahren für System-Abgasanlagen - Teil 1: Allgemeine Prüfverfahren

Conduits de fumée - Méthodes d'essai des conduits systèmes de fumée - Partie 1: Méthodes d'essai générales

**Ta slovenski standard je istoveten z: EN 13216-1:2004**

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91.060.40      Dimniki, jaški, kanali      Chimneys, shafts, ducts

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## Chimneys - Test methods for system chimneys - Part 1: General test methods

Conduits de fumée - Méthodes d'essai pour les systèmes de conduits de fumée - Partie 1: Méthodes d'essai générales

Abgasanlagen - Prüfverfahren für System-Abgasanlagen - Teil 1: Allgemeine Prüfverfahren

This European Standard was approved by CEN on 1 April 2004.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

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## Contents

	page
Foreword.....	5
Introduction.....	6
1 Scope .....	7
2 Normative references .....	7
3 Terms and definitions .....	7
4 Test environment and measurement parameters .....	8
4.1 Location of test chimneys (see Figure 1).....	8
4.2 Test environment.....	8
4.3 Location for the measurement of ambient air condition (see Figure 1).....	8
4.4 Accuracy of measurement.....	8
5 Performance tests for system chimneys, material independent.....	9
5.1 General.....	9
5.2 Abrasion resistance test.....	9
5.2.1 Test apparatus .....	9
5.2.2 Test sample .....	9
5.2.3 Measuring parameters .....	10
5.2.4 Test procedure .....	10
5.2.5 Test results.....	10
5.3 Relative movement of the flue liner in multi-wall system chimneys.....	10
5.3.1 Test apparatus .....	10
5.3.2 Test sample .....	10
5.3.3 Measuring parameters .....	10
5.3.4 Test procedure .....	10
5.3.5 Test results.....	10
5.4 Gas tightness test.....	11
5.4.1 Test apparatus .....	11
5.4.2 Test sample .....	11
5.4.3 Measuring parameters .....	11
5.4.4 Test procedure .....	11
5.4.5 Test results.....	11
5.5 Condensate resistance test.....	12
5.5.1 Test apparatus .....	12
5.5.2 Test sample .....	12
5.5.3 Measuring parameters .....	12
5.5.4 Test procedure .....	13
5.5.5 Test results.....	13
5.6 Vapour and condensate resistance test.....	13
5.6.1 Test apparatus .....	13
5.6.2 Test sample .....	14
5.6.3 Measuring parameters .....	14
5.6.4 Test procedure .....	15
5.6.5 Test results.....	15
5.7 Thermal performance test.....	16
5.7.1 General.....	16
5.7.2 Test apparatus and test structure for thermal and thermal shock tests .....	16
5.7.3 Test sample .....	17
5.7.4 Measuring parameters .....	18
5.7.5 Test procedure .....	20
5.7.6 Test results.....	21
5.8 Thermal resistance test.....	21

5.8.1	Test apparatus (see Figures 15 and 16) .....	21
5.8.2	Test sample .....	22
5.8.3	Measuring parameters .....	22
5.8.4	Test procedure .....	22
5.8.5	Test results .....	23
5.9	Terminal flow resistance .....	23
5.9.1	Test apparatus .....	23
5.9.2	Test sample .....	24
5.9.3	Measuring parameters .....	24
5.9.4	Test procedure .....	24
5.9.5	Test results .....	24
5.10	Aerodynamic behaviour of terminal under wind conditions .....	25
5.10.1	Test apparatus .....	25
5.10.2	Test sample .....	25
5.10.3	Measuring parameters .....	25
5.10.4	Test procedure .....	25
5.10.5	Test results .....	25
5.11	Flow resistance of the test chimney, of fittings or liners .....	26
5.11.1	Test apparatus .....	26
5.11.2	Test sample .....	26
5.11.3	Measuring parameter .....	26
5.11.4	Test procedure .....	26
5.11.5	Test results .....	27
5.12	Rainwater resistance for chimney sections .....	28
5.12.1	Test apparatus .....	28
5.12.2	Test sample .....	28
5.12.3	Test procedure .....	28
5.12.4	Measuring parameters .....	29
5.12.5	Test results .....	29
5.13	Rainwater resistance for terminals .....	29
5.13.1	Test apparatus .....	29
5.13.2	Test sample .....	29
5.13.3	Test procedure .....	29
5.13.4	Measuring parameters .....	29
5.13.5	Test results .....	29
5.14	Test report .....	29
Annex A (informative) Recommended test sequence .....		52
Annex B (normative) Calculation method to predict condensation in multi-wall chimneys for different ambient air temperatures others than the test ambient air temperature .....		53
B.1	Dimensions of the chimney structure type .....	53
B.2	Calculation of the flue gas and inner wall temperatures .....	53
B.2.1	Calculation without taking account of condensation heat .....	53
B.2.2	Calculation with taking account of condensation heat .....	53
B.3	Calculation of layer temperatures .....	53
B.4	Thermal resistance, test chimney .....	54
B.5	Multi-wall chimney, back ventilated .....	54
B.5.1	General requirement .....	54
B.5.2	Removed moisture flow .....	54
B.5.3	Penetrating moisture flow .....	54
B.5.4	Maximum moisture flow .....	54
B.5.5	Layer temperatures .....	55
B.5.6	Calculation of the frictional and form resistance of the ventilation ducts, from a test chimney .....	55
B.5.7	Moisture flow at test chimney .....	55
B.5.8	Expression of results .....	55
B.6	Multi-wall chimneys without back-ventilation, designated W .....	55
B.6.1	General requirement .....	55
B.6.2	Partial pressures .....	55
B.6.3	Variations in partial pressure in critical planes .....	55
B.6.4	Penetrating moisture flow .....	55
B.6.5	Condensation water penetration .....	56
B.6.6	Layer temperatures .....	56

**EN 13216-1:2004 (E)**

<b>B.6.7</b>	<b>Calculation of the variations in partial pressure in the chimney structure, height-dependent.....</b>	<b>56</b>
<b>B.6.8</b>	<b>Expression of results .....</b>	<b>56</b>
<b>Annex C (informative)</b>	<b>Methods of determining the effects of extract and air supply provisions .....</b>	<b>57</b>
<b>Annex D (normative)</b>	<b>Method of measuring the hot gas temperature.....</b>	<b>58</b>
<b>Annex E (informative)</b>	<b>Hot gas mass flow, heat capacity of the flue gas, example of air velocity for natural gas combustion .....</b>	<b>59</b>
<b>Annex F (informative)</b>	<b>Example of a test report.....</b>	<b>65</b>
<b>Bibliography</b>	<b>.....</b>	<b>66</b>

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## Foreword

This document (EN 13216-1:2004) has been prepared by Technical Committee CEN/TC 166 "Chimneys", the secretariat of which is held by UNI.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association.

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 March 2005, and conflicting national standards shall be withdrawn at the latest by March 2005.

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.

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**EN 13216-1:2004 (E)****Introduction**

CEN/TC 166 intends to publish the test methods for system chimneys as separate parts of a series of standards.

The first part of the series of EN 13216 includes material-independent test methods for system chimneys.

For the purpose of this document, system chimneys are considered as kits in the meaning of Guidance Paper C (see Bibliography).

Further parts of the multi-part standard include material-specific test methods, each material used for the inner wall being decisive. The material-specific test methods are based on the general material-independent test methods. Considering the various characteristics, the material tests can be carried out on deviating specimens or can include other test procedures which however have correlation to those given in this standard.

It is intended to prepare further parts if further material-specific standards are published.

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## 1 Scope

This document specifies material-independent general test methods for system 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 1443:2003, *Chimneys – General requirements*.

EN 10088-1, *Stainless steels – Part 1: List of stainless steels*.

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

EN 60529, *Degrees of protection provided by enclosures (IP Code) (IEC 60529:1989)*.

BS 1042-2.1, *Measurement of fluid flow in closed conduits – Velocity area method – Method using Pitot static tubes*.

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## 3 Terms and definitions

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

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### 3.1

#### **test chimney**

assembly of representative chimney components necessary to enable the system chimney to be assessed for the performance criteria

### 3.2

#### **test assembly**

complete assembly of all parts necessary to enable the specific performance criteria (thermal performance and others) to be assessed, comprising test chimney, test structures, and measuring equipment

### 3.3

#### **test sample**

assembly of chimney components necessary to enable the system chimney to be assessed as defined for specific performance criteria

### 3.4

#### **test structure**

assembly of the additional materials (non-chimney components) to enable the test sample to be assessed for the specific performance criteria

### 3.5

#### **thermal shock test**

method to assess the sootfire resistance characteristics of the system chimney (internal to external)

### 3.6

#### **thermal test**

method to assess the temperature characteristics of the system chimney

### 3.7

#### **vapour and condensate resistance test**

method to assess the system chimney's resistance to vapour and condensate

**EN 13216-1:2004 (E)****3.8****condensate resistance test**

method to assess the components or sub assemblies of system chimney's resistance to condensate

**3.9****thermocouple rake**

assembly of thermocouples used to measure the temperature distribution across a flue

**3.10****accuracy**

ability of the measuring instruments to give response in the specified range from the true value

**3.11****uncertainty of measurement**

combination of all parameters (i.e. accuracy, human parameter, environmental parameters) to give response in the specified range from the true result

**3.12****tolerance**

range in which a parameter has to be met without respects to accuracy an uncertainty of measurement

**4 Test environment and measurement parameters****4.1 Location of test chimneys (see Figure 1)**

The minimum distance between the test chimneys and building structures (i.e. walls etc.) shall be 1,0 m.

**4.2 Test environment**

The ambient air temperature in the test room shall not vary during tests by more than 5 °C and shall remain in the temperature range of 15 °C up to 30 °C.

The test room shall consist of a ventilated space not subject to air movement greater than 0,5 m/s measured at the ambient thermocouple positions.

**4.3 Location for the measurement of ambient air condition (see Figure 1)**

The ambient air temperature and velocity shall be measured at a position:

- 1,5 m  $\pm$  0,1 m above the test rig floor;
- 1,5 m  $\pm$  0,5 m from any walls of test chimneys;
- at least 1,0 m from any other structures.

The ambient air temperature shall be measured for a test chimney, corner installation, enclosed, see 5.7.3.1.3 additional 0,3 m  $\pm$  0,1 m below the ceiling of zone B.

**4.4 Accuracy of measurement**

The ambient air temperature shall be measured with an accuracy of  $\pm$  0,5 °C.

The velocity of the ambient air shall be measured with an accuracy of  $\pm$  0,1 m/s.

## 5 Performance tests for system chimneys, material independent

### 5.1 General

NOTE Annex A gives a recommended test sequence.

### 5.2 Abrasion resistance test

#### 5.2.1 Test apparatus

A tight fitting metal sleeve attached to a guide funnel shall be fitted into the top opening of the flue of the test chimney (see Figure 2). The alternative test sample from components may be tested as shown in Figure 3. A tight fitting metal sleeve attached to a plate which has an opening matching the area of the opening to the flue shall be fitted into the bottom opening of this test sample.

A bottom plate supported directly over a collection box is positioned to collect any material which is dislodged during the test, and which is sufficiently deep to allow the brush to pass through the complete length of the test sample.

The brush shall be attached either to a rod or to a sweeping equipment as shown in Figure 4.

Use a sweeping brush having flat spring-steel bristles of stainless steel in accordance with EN 10088-1, grade X 10 Cr Ni 18-8, steel number 1.4310, with a cross section of  $(2,0 \pm 0,2)$  mm x  $(0,25 \pm 0,05)$  mm with the ends cut square. The bristles shall be arranged so that there are 5 per 10 mm length of the perimeter of the plan area of the brush. The brush may be a combination of single brushes.

The over-all dimension of the brush shall be  $(25 \pm 5)$  mm greater than the internal dimension of a round flue or the corresponding dimension of a flue with square or rectangular cross section (see Figure 4). The brush shall be held securely between plates having a plan dimension  $(100 \pm 5)$  mm less than the internal dimension of the flue.

The balance to weigh the deposit shall have an accuracy of 1,0 g.

#### 5.2.2 Test sample

The test sample shall be the test chimney used for the thermal performance tests, see Figure 2 or the alternative test sample, see Figure 3, thermally conditioned to the test temperature according to the designation given in EN 1443. The test sample shall be assembled as specified in the product standards.

**EN 13216-1:2004 (E)****5.2.3 Measuring parameters**

Measure the weight of material dislodged from the inner surface of the test assembly after 100 cycles with an accuracy of 1,0 g.

The area for the inner surface of the test sample, exposed to abrasion shall be calculated.

**5.2.4 Test procedure**

The brush shall be pushed down and up through the total length of the test sample with a maximum speed of 2 m/s and this represents one cycle.

A test number of 100 cycles shall be completed.

Record the weight of material dislodged and the dimensions of the inner surface.

**5.2.5 Test results**

The recorded mass of material abraded from the inner surface of the test sample over 100 sweeping cycles shall be expressed in terms of kilograms per square meter of the total exposed area of the inner surface of the flue.

**5.3 Relative movement of the flue liner in multi-wall system chimneys****5.3.1 Test apparatus**

A test apparatus which allows the measurement of deviations in the differential movement between the flue liner and the outer wall of multi-wall-system chimneys.

The accuracy shall be  $\pm 0,001$  m.

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**5.3.2 Test sample**

The test sample shall be the test chimney used for the thermal performance tests, thermally conditioned according to the designation given in EN 1443. The test sample shall be assembled as specified in product standards. When the manufacturer claims for an opening, it shall be installed in Zone C (see Figure 1).

**5.3.3 Measuring parameters**

Measure the surface temperature of the test chimney according to 5.7.

Measure the change in position of the flue liner relative to the outer wall at the top of the test sample before and after the thermal performance tests.

**5.3.4 Test procedure**

All measurements shall be made before and after the thermal performance test appropriate to the designation.

Record the difference in length between the flue liner and the outer wall when all thermocouples have reached ambient air temperature within 5 °C.

**5.3.5 Test results**

The results are expressed by the change in position of the flue liner relative to the outer wall after the test sample has cooled down to room temperature.

## 5.4 Gas tightness test

### 5.4.1 Test apparatus

Provide an air supply capable of delivering air at a rate sufficient to achieve and maintain the required test pressure at the leakage rate appropriate to the designation.

Seal the flue inlet and the flue outlet of the test chimney with an air tight seal in a typical manner (see Figure 5).

For measurement of pressure use:

- for chimneys designated N a device with the pressure to an accuracy of  $\pm 1$  Pa;
- for chimneys designated P a device with the pressure to an accuracy of  $\pm 5$  Pa;
- for chimneys designated H a device with the pressure to an accuracy of  $\pm 50$  Pa.

For measurement of the gas leakage for negative and for positive pressure chimneys in accordance with EN 1443 use a device with an accuracy of  $\pm 5$  %.

### 5.4.2 Test sample

The test sample shall be the test chimney used for the thermal performance tests, thermally conditioned according to the designation given in EN 1443. The test sample shall be assembled as specified in system chimney standards, (i.e. with an opening where appropriate) (see Figure 5).

Where the products are not required to be thermally conditioned, the test sample (i.e. with an opening where appropriate) shall consist of at least two chimney sections or fittings with one joint where applicable.

### 5.4.3 Measuring parameters

Measure and record:

- gas leakage and the pressure maintained during the test in accordance with EN 1443;
- inner dimensions of the test sample.

Calculate the inner surface area.

Record the air flow rate, the pressure and the inner dimensions of the test sample.

### 5.4.4 Test procedure

Deliver air from the air supply to the flue at a rate necessary to achieve and maintain the required test pressure given in EN 1443. Measure the gas leakage at ambient temperature.

Subject the test sample to thermal conditions appropriate to the designation or as stated in the product standards.

Measure the gas leakage again at ambient temperature.

### 5.4.5 Test results

The results are expressed by the leakage rate related to the inner surface area of the test sample.

**EN 13216-1:2004 (E)****5.5 Condensate resistance test****5.5.1 Test apparatus**

A test apparatus which allows to spray (coloured) water into the flue, in accordance with Figure 6. The test apparatus shall consist of a tank, a water heater, a gate valve, an air supply where required for the apparatus, a peristaltic pump and a spray equipment capable of giving even distribution of the spray.

The balance to weigh components of the test sample shall have an accuracy of  $\pm 1$  g up to 10 kg and  $\pm 2$  g for more than 10 kg. The balance shall be capable of weighing at least two flue liners or two chimney sections.

**5.5.2 Test sample**

The test sample shall consist of minimum two sections or fittings with at least one joint. If the test chimney of the thermal performance test is to be used as a test sample, take only the two top sections for weighing.

**5.5.3 Measuring parameters**

Measure:

- spray temperature and the spray volume;
- appearance of water on the outside the test sample of fittings or chimney sections of the test chimney;
- change in weight of the test sample.

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### 5.5.4 Test procedure

Dry and weigh the test sample used before spraying water.

Spray (coloured) water on the inner surface at the outlet of the flue liner:

- with a temperature of  $50\text{ °C} \pm 5\text{ °C}$ ;
- with a pressure of a maximum of 3 bar;
- with a water volume related to the diameter (at  $0,040\cdot\text{m}^3\cdot\text{h}^{-1}\cdot\text{m}^{-1} \pm 0,008\text{ m}^3\cdot\text{h}^{-1}\cdot\text{m}^{-1}$ )

during 4 h or until water appears on the outside of the test sample.

Dry and weigh the test samples. When components of the test chimney are weighed, they have to be dried and then re-weighed.

Record:

- spray temperature and the spray volume;
- detection of (coloured) water outside of fittings or chimney sections;
- change in weight of the test sample after spraying water in comparison to the dried sample.

### 5.5.5 Test results

Record:

- location of any appearance of water on the outside of any fitting or chimney section of the test samples, and
- any change in weight of the test sample or components.

## 5.6 Vapour and condensate resistance test

### 5.6.1 Test apparatus

A test apparatus which allows to deliver water vapour saturated air at a temperature of  $52\text{ °C} \pm 2\text{ °C}$  and a velocity of  $1\text{ m/s} \pm 0,2\text{ m/s}$ , consisting of a fan, a heater, a vapour steam vessel, and a flow rectifier (see Figure 7).

Use a measurement equipment:

- for flue gas temperature with an accuracy of  $\pm 1,5\text{ °C}$ ,
- for layer temperature with an accuracy of  $\pm 0,5\text{ °C}$  and
- for humidity with an accuracy of  $\pm 2\%$  in the range of 0 % to 80 % and of  $\pm 3\%$  in the range of 80 % to 100 %.

The balance to weigh components of the test sample shall have an accuracy of  $\pm 1\text{ g}$  up to 10 kg and  $\pm 2\text{ g}$  for more than 10 kg. The balance shall be capable of weighing at least two flue liners or two chimney sections.

For measurement of chimney draught use a device with an accuracy of  $\pm 1\text{ Pa}$ .

For measurement of flue gas velocity use a device with an accuracy of  $\pm 0,1\text{ m/s}$ .

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