



SLOVENSKI STANDARD  
SIST EN 13403:2004

01-februar-2004

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Ventilation for buildings - Non-metallic ducts - Ductwork made from insulation ductboards

Lüftung von Gebäuden - Nichtmetallische Luftleitungen - Luftleitungen aus Dämmplatten

Ventilation des bâtiments - Conduits non métalliques - Réseau de conduits en panneaux isolants de conduits

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**ICS:**

91.140.30 Ú!^: !æ^çæ) ã Á|ã æ \ã Ventilation and air-conditioning  
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EUROPEAN STANDARD

**EN 13403**

NORME EUROPÉENNE

EUROPÄISCHE NORM

April 2003

ICS 91.140.30

English version

**Ventilation for buildings - Non-metallic ducts - Ductwork made  
from insulation ductboards**Ventilation des bâtiments - Conduits non métalliques -  
Réseau de conduits en panneaux isolants de conduitsLüftung von Gebäuden - Nichtmetallische Luftleitungen -  
Luftleitungen aus Dämmplatten

This European Standard was approved by CEN on 17 January 2003.

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

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

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

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EUROPÄISCHES KOMITEE FÜR NORMUNG**Management Centre: rue de Stassart, 36 B-1050 Brussels**

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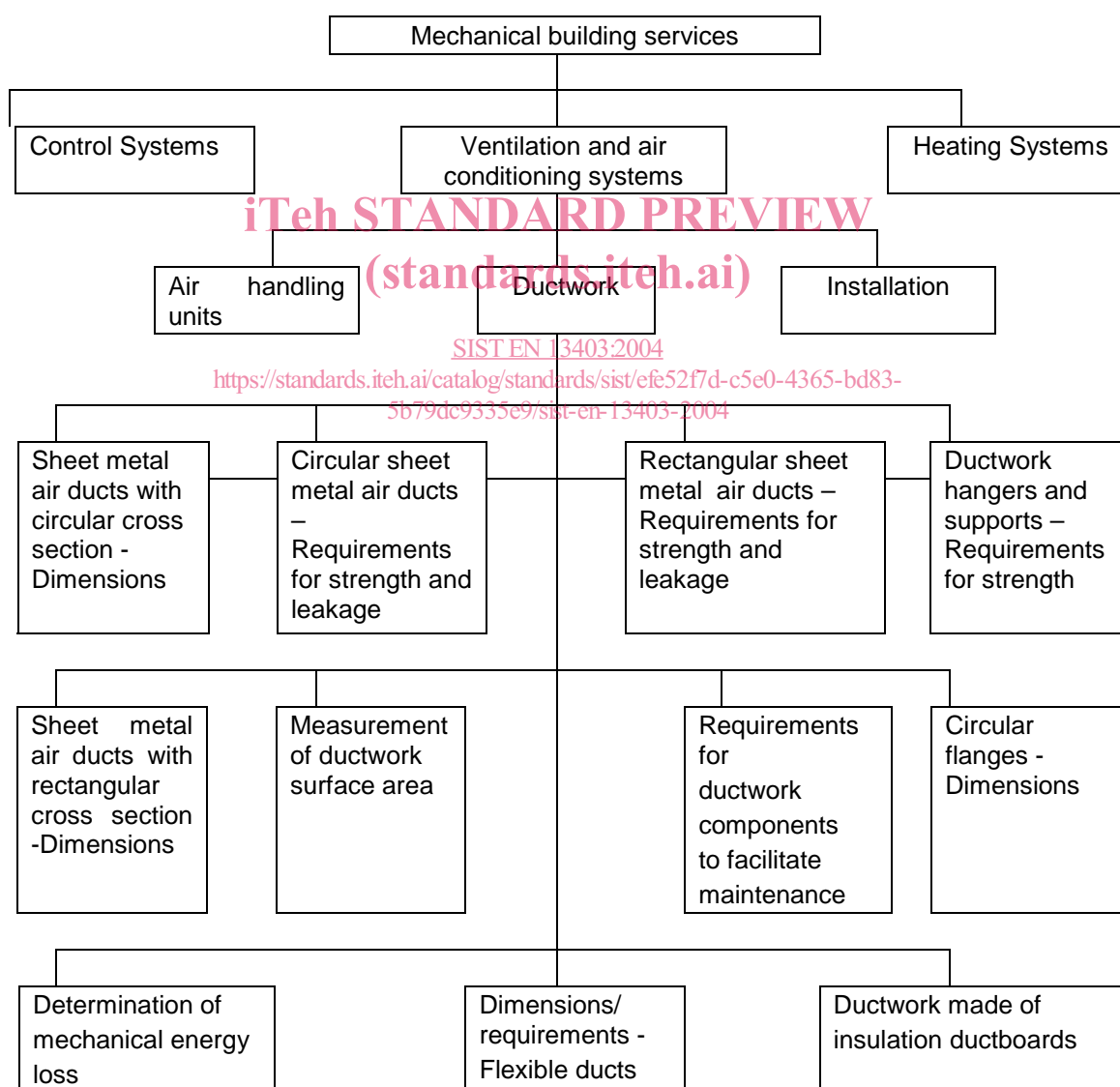
## Foreword

This document (EN 13403:2003) has been prepared by Technical Committee CEN/TC 156, "Ventilation for buildings" the secretariat of which is held by BSI.

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 October 2003, and conflicting national standards shall be withdrawn at the latest by October 2003.

This standard is a part of a series of standards for ductwork used in ventilation and air conditioning of buildings for human occupancy.

The position of this standard in the field of mechanical building services is shown in Figure 1.



**Figure 1 – Position of EN 13403 in the field of mechanical building services**

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

## EN 13403:2003 (E)

## 1 Scope

This European Standard contains the basic requirements and characteristics for ductwork made of insulation ductboards, and used in ventilation and air conditioning systems of buildings, subject to human occupancy.

## 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 822 *Thermal insulating products for building applications – Determination of length and width.*
- EN 823 *Thermal insulating products for building applications – Determination of thickness.*
- EN 12086 *Thermal insulating products for building applications - Determination of water vapour transmission properties.*
- ENV 12097 *Ventilation for buildings – Ductwork hangers and supports – Requirements for ductwork components to facilitate maintenance of ductwork systems.*
- EN 12236 *Ventilation for buildings – Ductwork hangers and supports – Requirements for strength.*
- EN 12667 *Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Products of high and medium thermal resistance.*
- EN 12939 *Thermal performance of building materials and products - Determination of thermal resistance by means of guarded hot plate and heat flow meter methods - Thick products of high and medium thermal resistance.*
- EN 13162 *Thermal insulation products for buildings - Factory made mineral wool (MW) products - Specification.*
- EN 13165 *Thermal insulation products for buildings - Factory made rigid polyurethane foam (PUR) products - Specification.*
- EN 13166 *Thermal insulation products for buildings - Factory made products of phenolic foam (PF) - Specification.*
- EN 13501-1 *Fire classification of construction products and building elements - Part 1: Classification using test data from reaction to fire tests.*
- EN ISO 11654:1997 *Acoustics - Sound absorbers for use in buildings - Rating of sound absorption (ISO 11654:1997).*
- CR 12792:1997 *Ventilation for buildings - Symbols and terminology.*

### 3 Terms and definitions, symbols and abbreviations

#### 3.1 Terms and definitions

For the purposes of this European Standard, the terms and definitions given in CR 12792:1997 and the following apply.

##### 3.1.1

##### **ductboard**

rigid board composed of insulation material body with both sides faced: the outer facing comprising a duct vapour barrier, which makes the duct tight

NOTE Ductboards are fabricated into rectangular or multisided duct sections.

#### 3.2 Symbols and abbreviations

The symbols and abbreviations are given in Table 1.

**Table 1 – Symbols and abbreviations**

Symbol	Description	Unit
MW	Mineral wool	---
PF	Phenolic foam	---
PIR	Polyisocyanurate	---
PUR	Polyurethane and Polyisocyanurate	---
$e$	Thickness	mm
$f_{\max}$	Air leakage factor	l/(sm <sup>2</sup> )
$E$	Young's modulus	N/mm <sup>2</sup>
$I$	Moment of inertia	mm <sup>4</sup>
$I_U$	Moment of inertia referred to 1 mm width.	mm <sup>4</sup>
$EI$	Flexural rigidity	N mm <sup>2</sup>
$EI_U$	Flexural rigidity referred to 1 mm width.	Nmm <sup>2</sup>
$P_s$	Pressure	Pa
$R$	Thermal resistance	(m <sup>2</sup> K)/W
$Z_v$	Water vapour resistance	m <sup>2</sup> .h.Pa/mg
$\rho$	Specific mass	kg/m <sup>3</sup>
$\alpha$	Acoustical absorption	---
$f$	Frequency	Hz
$\lambda$	Thermal conductivity	W/(m K)

### 4 Requirements

#### 4.1 Erosion and emission of particles

When tested in accordance with 7.2, at 2,5 times the maximum air speed recommended by the manufacturer of the ductboard, material from the inside surface of the ductwork shall not break away, flake off, or show evidence of delamination or erosion.

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Emission of particles shall be less than  $60 \mu\text{g}/\text{m}^3$  for particles bigger than  $0,5 \mu\text{m}$ , and no more than  $4 \mu\text{g}/\text{m}^3$  for particles bigger than  $5,0 \mu\text{m}$ .

#### 4.2 Resistance against pressure (without reinforcements)

When tested in accordance with 7.3, air ducts and connector sections with joints, assembled in accordance with the manufacturer's instructions, shall withstand without rupture an internal air pressure of 2,5 times the manufacturer's rated positive pressure, but not less than 200 Pa.

For this test rupture is considered as evidenced by breaks, tears, rips or other openings greater than 4 mm.

NOTE Plastic deformation is not considered to be a rupture

Any joining material shall remain intact to the extent that materials such as tapes do not become displaced more than a total for both edges of 4 mm from their initial position. There shall not be evidence of other damage, which would cause the sample to become unusable.

#### 4.3 Air leakage factor and air tightness class

The air leakage factor is given in Table 2 and the air leakage rates in Table 3 when tested in accordance with prEN 1507.

Table 2 – Air tightness classification and air leakage factor

Air Tightness class	Air leakage factor ( $f_{\text{max}}$ ) ( $\text{l}/(\text{s}\cdot\text{m}^2)$ )
A	$0,027 \times P_s^{0,65}$
B	$0,009 \times P_s^{0,65}$
C	$0,003 \times P_s^{0,65}$

Table 3 – Air leakage rates

Static pressure differential Pa	Maximum leakage, $\text{l}/(\text{s}\cdot\text{m}^2)$ (surface area)		
	Ductwork class		
	Class A	Class B	Class C
400	1,32	0,44	0,14
800	-	0,69	0,23
1000	-	0,80	0,27
1200	-	0,90	0,30
1500	-	1,1	0,36



#### 4.4 Bulging and/or caving, air leakage

No wall of the duct shall bulge and/or cave by more than 3 % of its width or 30 mm, whichever is the greater value.

The maximum air leakage is defined at the relevant test pressure given in Table 3 based on relevant parts of the test method described in prEN 1507.

#### 4.5 Supports and hangers

The ductwork shall fulfil the requirements specified in EN 12236.

#### 4.6 Facilities for cleaning

The ductwork shall conform to the requirements specified in ENV 12097. Different cleaning systems can be used such as contact sucking, air pressure cleaning, or brushing and air pressure cleaning.

When brushing is used brushes shall be non metallic (acrylic, nylon, etc.)

The ductboard shall resist the cleaning operations equivalent to a life span of 20 years of use (one cleaning operation per year) without any damage. When tested in accordance with 7.2, after 20 cleaning simulations have been performed, material from the inside surface of the ductwork shall not break away, flake off, or show evidence of delamination or erosion.

Emission of particles shall be less than  $60 \mu\text{g}/\text{m}^3$  for particles bigger than  $0,5 \mu\text{m}$  and no more than  $4 \mu\text{g}/\text{m}^3$  for particles bigger than  $5 \mu\text{m}$ .

#### 4.7 Requirements for ductboards

##### 4.7.1 Health and safety

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The insulation materials used in the ductboards shall not be listed in the Directive 67/548/EEC Annex 1.

MW products covered by this standard, shall be classified as non carcinogenic fulfilling the requirements specified in Article 1 of Directive 97/69/EC.

##### 4.7.2 Microbial growth

Materials used shall not facilitate (or being nutrient to) microbial growth following test method 7.4. All types of materials used as insulation ductboards shall withstand the test requirements specified in 7.4, after first having been exposed to 20 cleaning simulations.

##### 4.7.3 Board stiffness

The minimum rigidity for different classes, as specified in Table 4, shall be determined in accordance with the test method specified in 7.1. The classes are referred to a width of 1 mm.

**Table 4 – Classification for board stiffness**

Stiffness class	Flexural rigidity $[EI]$ N mm <sup>2</sup>
R 1	$\geq 55,000$
R 2	$\geq 90,000$
R 3	$\geq 160,000$
R4	$\geq 200,000$
R 5	$\geq 300,000$