



SLOVENSKI STANDARD SIST EN 14277:2007

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Ventilation for buildings - Air terminal devices - Method for airflow measurement by calibrated sensors in or close to ATD/plenum boxes

Lüftung von Gebäuden - Luftdurchlässe - Verfahren zur Messung des Luftstroms durch kalibrierte Fühler in oder in der Nähe von Luftdurchlässen/Überdruckkammern

Systemes de ventilation pour les bâtiments - Bouches d'air - Méthode de mesure du débit d'air a l'aide de capteurs étalonnés dans ou a proximité des boîtes type bouche/plénum

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Ta slovenski standard je istoveten z: EN 14277:2006

ICS:

91.140.30 Ú!^: !æ^çæ} á| ä æ\ ã Ventilation and air-conditioning
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ICS 91.140.30

English Version

Ventilation for buildings - Air terminal devices - Method for
airflow measurement by calibrated sensors in or close to
ATD/plenum boxes

Systèmes de ventilation pour les bâtiments - Bouches d'air
- Méthode de mesure du débit d'air à l'aide de capteurs
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Messung des Luftstroms durch kalibrierte Fühler in oder in
der Nähe von Luftdurchlässen/Überdruckkammern

This European Standard was approved by CEN on 7 July 2006.

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 Central Secretariat 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 Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, 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

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Foreword

This document (EN 14277:2006) 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 March 2007, and conflicting national standards shall be withdrawn at the latest by March 2007.

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, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

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1 Scope

This European Standard specifies methods for the laboratory aerodynamic testing and rating of the air flow rate measurement accuracy of fixed air flow rate measurement devices, including supply and exhaust air terminal devices (ATD) and in-duct measurement stations (IMS) and the sensitivity of such devices to flow disturbance. A general overview of different test configurations is shown in Figure 1.

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 12238, *Ventilation for buildings — Air terminal devices — Aerodynamic testing and rating for mixed flow application*

EN 12792:2003, *Ventilation for buildings — Symbols, terminology and graphical symbols*

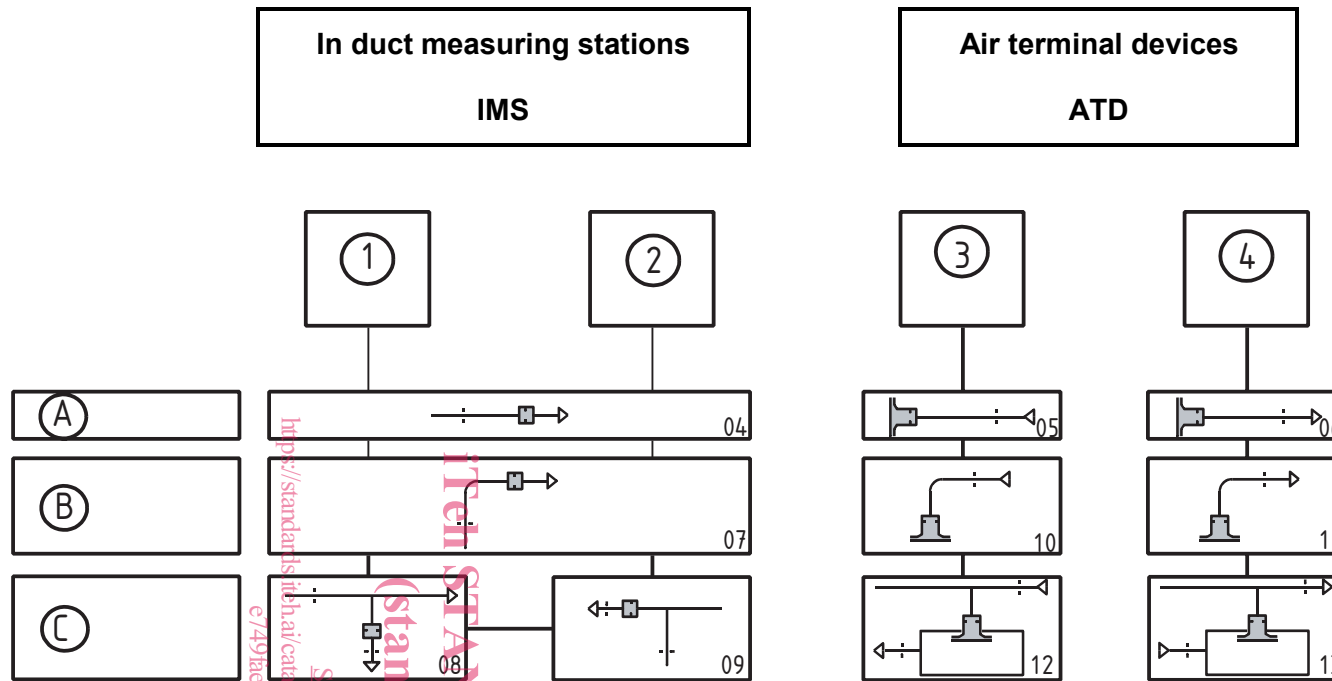
EN ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 1: General principles and requirements (ISO 5167-1:2003)*

EN ISO 5167-2, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 2: Orifice plates (ISO 5167-2:2003)*

EN ISO 5167-3, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 3: Nozzles and Venturi nozzles (ISO 5167-3:2003)*

EN ISO 5167-4, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full — Part 4: Venturi tubes (ISO 5167-4:2003)*

ISO 5221, *Air distribution and air diffusion — Rules to methods of measuring air flow rate in an air-handling duct*



Key

A	Undisturbed situation	1	Supply air	04	See Figure 4	09	See Figure 9
B	90 ° bend	2	Return air	05	See Figure 5	10	See Figure 10
C	T - piece	3	Supply air	06	See Figure 6	11	See Figure 11
		4	Return air	07	See Figure 7	12	See Figure 12
				08	See Figure 8	13	See Figure 13

Figure 1 — Test configurations indicating test devices and test situations

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12792:2003 and the following apply.

3.1.1

air terminal device [ATD]

component of an installation which is designed for the purpose of achieving the predetermined movement of air into or from a treated space

3.1.2

in-duct measurement station [IMS]

measurement device installed in the ductwork between two pieces of duct

3.1.3

characteristic length

definitive dimension referring to the diameter of a circular duct or to the dimensions L_{c1} or L_{c2} of a rectangular duct (see Figures 2 and 3)

3.1.4

5 % calibration length [L_5]

distance from the device under test in a disturbed situation within which the measurement error stays within 5 % compared to the calibration curve. This length [L_5] depends on the type of the disturbance and is specified as a function of the characteristic length for all designated types of disturbances defined for each consecutive case

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3.1.5

10% calibration length [L_{10}]

distance from the device under test in a disturbed situation, within which the measurement error stays within 10 % compared to the calibration curve. This length [L_{10}] depends on the type of the disturbance and is specified as a function of the characteristic length for all designated types of disturbances defined for each consecutive case

3.1.6

zero-pressure difference method

method to compensate for the effect of the air flow measurement apparatus when measuring air flow rate of induction air or supply/exhaust air

NOTE The method is normally used when it is difficult to measure the air flow rate with sufficient accuracy by other methods due for example to low duct velocity. The method is described in Annex A.

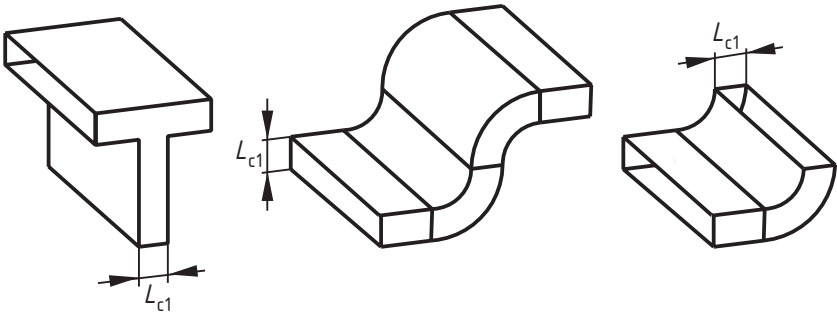
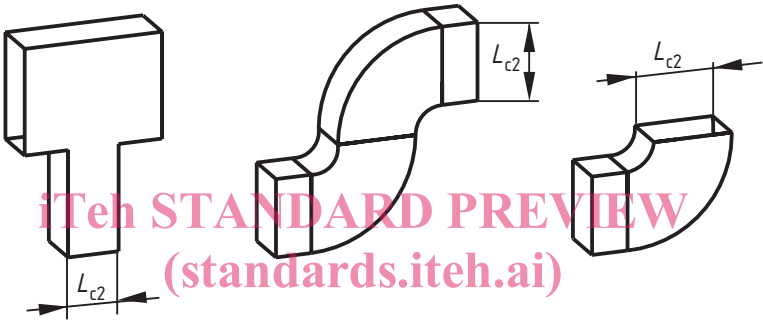


Figure 2 — Rectangular duct disturbances with the characteristic length L_{c1}



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Figure 3 — Rectangular duct disturbances with the characteristic length L_{c2}

3.2 Symbols

For the purposes of this document, the symbols and the suffixes given in Table 1 apply.

Table 1 — Symbols

Symbol	Quantity	Unit
A	Area	m^2
A_D	Cross sectional area of the ATD	m^2
A_{PC}	Cross sectional area of the pressure chamber	m^2
D_e	Equivalent diameter	m
E	Relative error	%
k	Coefficient	-
L	Length	m
L_{c1}	Characteristic length of a rectangular duct	m
L_{c2}	Characteristic length of a rectangular duct	m
n	Exponent	-
p_a	Atmospheric pressure	Pa
p_s	Static gauge pressure	Pa
p_{s1}	Static pressure upstream of the device under test	Pa
p_{s2}	Static pressure downstream of the device under test	Pa
p_{sa}	Absolute static pressure	Pa
Δp	Pressure difference	Pa
Δp_M	Measurement pressure difference	Pa
Δp_s	Static pressure drop over the device under test	Pa
q_v	Measured air flow rate	$l \cdot s^{-1}$
v_x	Air velocity in main duct upstream of T-piece	$m \cdot s^{-1}$
v_y	Air velocity in side branch of T-piece	$m \cdot s^{-1}$
v_z	Air velocity in main duct downstream of T-piece	$m \cdot s^{-1}$
β	Output signal	-
ρ_M	Air density during measurement	$kg \cdot m^{-3}$

4 Instrumentation

4.1 Air flow rate measurement

4.1.1 The air flow rate shall be measured using instruments in accordance with EN ISO 5167 parts 1 to 4, ISO 5221 or other instruments which will have equivalent calibrated performance.

4.1.2 Air flow meters shall have a minimum calibration accuracy of $\pm 2,5$ % over the whole range.

4.1.3 Flow meters shall be checked at intervals as appropriate but not exceeding 12 months. This check can take the form of one of the following:

- a) a dimensional check for all flow meters not requiring calibration;
- b) a calibration over their full range using the original method employed for the initial calibration of meters calibrated in situ;
- c) a check against a flow meter which meets flow meter specifications according to ISO 5221 and EN ISO 5167 parts 1 to 4 as appropriate.

4.2 Pressure measurement

4.2.1 Pressure in the duct shall be measured by means of a liquid filled, calibrated manometer or any other device conforming to 4.2.2

4.2.2 The resolution shall not be greater than the characteristics listed for the accompanying range of manometers, given in Table 2.

Table 2 — Resolution for the ranges of manometers

Range Pa	Resolution Pa
Up to and including 50	0,1
From 50 to 250	1
From 250 to 500	5,0
Above 500	25,0

4.2.3 The measured value of differential pressure should be greater than 10 % of the range of the measurement device used.

NOTE Example: with a micromanometer in the range 0...1 000 Pa the minimum differential pressure to be measured is 100 Pa.

4.2.4 The uncertainty of calibration standards shall be:

- a) for instruments with the range up to 100 Pa, equal or better than $\pm 0,5$ Pa;
- b) for instruments with the range over 100 Pa, equal or better than $\pm 0,5$ % of reading.

4.3 Temperature measurement

4.3.1 Measurement of temperature shall be, for example, by means of mercury-in-glass thermometers, resistance thermometers or thermo-couples. Instruments shall have a resolution better than 0,5 K and be calibrated to an accuracy of $\pm 0,25$ K.