SLOVENSKI STANDARD

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Digestoriji - 6. del: Digestoriji s spremenljivim volumnom zraka

Fume cupboards - Part 6: Variable air volume fume cupboards

Abzüge - Teil 6: Abzüge mit variablem Luftstrom

Sorbonnes - Partie 6 : Sorbonnes a débit d'air variable

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Fume cupboards - Part 6: Variable air volume fume cupboards

Sorbonnes - Partie 6 : Sorbonnes à débit d'air variable

Abzüge - Teil 6: Abzüge mit variablem Luftstrom

This European Standard was approved by CEN on 3 April 2006.

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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.

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Foreword

This document (EN 14175-6:2006) has been prepared by Technical Committee CEN/TC 332 “Laboratory Equipment”, the secretariat of which is held by DIN.

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of an identical text or by endorsement, at the latest by November 2006, and conflicting national standards shall be withdrawn at the latest by November 2006.

EN 14175 consists of the following parts, under the general title *Fume cupboards:*

— *Part 1: Vocabulary*

— *Part 2: Safety and performance requirements*

— *Part 3: Type test methods*

— *Part 4: On-site test methods*

— *Part 6: Variable air volume fume cupboards*

Part 5 (*Recommendations for installation and maintenance*) is in preparation and will be published as a Technical Specification CEN/TS 14175-5.

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.

Introduction

The purpose of a variable air volume (VAV) system is to control the extract volume flow rate of a fume cupboard at various sash openings.

The objective of this document is to specify test methods relevant to the assessment of the performance of variable air volume (VAV) fume cupboards (see definition in EN 14175-1, 3.5) either as a single VAV system or as a combination of fume cupboard plus VAV system.

The intention of this document is to enable a purchaser to choose his fume cupboard according to his demands and needs for containment, air exchange efficiency etc, as described in EN 14175-3. Afterwards, the purchaser can proceed with his selection of an appropriate VAV system.

1 Scope

This document specifies requirements and type test methods for VAV systems. It also specifies additional requirements to those in EN 14175-2 and additional test methods to those in EN 14175-3 and EN 14175-4 for fume cupboards with VAV systems (VAV fume cupboards).

For terms and definitions, EN 14175-1 applies. For safety and performance requirements of fume cupboards, EN 14175-2 applies. For type testing of fume cupboards with preset air volume flow, EN 14175-3 applies. For on-site test methods of fume cupboards already installed in a laboratory, EN 14175-4 applies.

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 12589:2001, *Ventilation for buildings - Air terminal units - Aerodynamic testing and rating of constant and variable rate terminal units.*

EN 14175-1:2003, *Fume cupboards - Part 1: Vocabulary.*

EN 14175-2:2003, *Fume cupboards - Part 2: Safety and performance requirements.*

EN 14175-3:2003, *Fume cupboards - Part 3: Type test methods.*

EN 14175-4:2004, *Fume cupboards - Part 4: On-site test methods.*

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).*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN 14175-1:2003 and EN 14175-3:2003 and the following apply.

3.1
VAV system
modular components enabling the control of the extract volume flow rate of a fume cupboard at various sash openings

3.2
response time
time from a change of the set value, e.g. volume flow rate or face velocity, until the actual new set value reaches and maintains a specified percentage

4 Requirements

4.1 General

Variable air volume fume cupboards shall meet the requirements specified in EN 14175-2 for general purpose fume cupboards and the following requirements in this document.

4.2 System status port

Means shall be provided to indicate the status of the VAV system, such as the position of damping/regulating devices, measured and controlled values.

NOTE For electrically operated systems, this can be done for instance by providing an easily accessible electrical socket for handheld readouts.

4.3 Air flow indicator

VAV fume cupboards shall be equipped with an air flow indicator with audible and visual alarms in accordance with EN 14175-2:2003, 8.2. The visual alarm may be, for example, a red flashing light in the visual field of the fume cupboard operator. Means should be provided to relay the alarm.

NOTE General requirements for visual danger signals are given in EN 842.

5 Type test methods

5.1 General

VAV systems and VAV fume cupboards can be tested either separately in accordance with 5.3 or in combination in accordance with 5.4.

As an alternative to the tests specified in 5.3, it is possible to test the VAV system together with a fume cupboard (1) instead of the test box. Also if the tests according to 5.3 have been done, it is possible for a purchaser, user or manufacturer to test individual fume cupboards (2) according to 5.4. In both cases (1) and (2), the test results are only valid for the particular combination of VAV system and fume cupboard used.

The type test in accordance with 5.3 or 5.4 shall be performed in addition to those type test methods specified in EN 14175-3. It is necessary to test the fume cupboard at the minimum air extract flow rate at the closed sash position and to find out the effect on containment of the fume cupboard and the effect of changing the extract volume flow rate during changing the sash position by the VAV system.

5.2 Test conditions

5.2.1 VAV fume cupboards (see 5.4)

The test room shall be in accordance with EN 14175-3:2003, Clause 4, with the additional requirement that the pressure difference between the test room and adjacent rooms varies no more than ± 5 Pa.

The air flow system of the test room should be sized so that the required changes in extract volume flow rate do not cause too large changes of the static pressure in the extract duct.

5.2.2 VAV systems (see 5.3)

In the surroundings of 1 m around the test box (see 5.3.2.2), the air conditions as specified in EN 14175-3:2003, 4.2 shall prevail.

5.3 Test of VAV systems

5.3.1 General

Type testing of VAV systems not fitted to an individual fume cupboard shall be performed in association with the test box shown in Figure 1.

NOTE Basis for this type test is EN 12589.

5.3.2 Tests for air flow rate characteristics

5.3.2.1 Principle

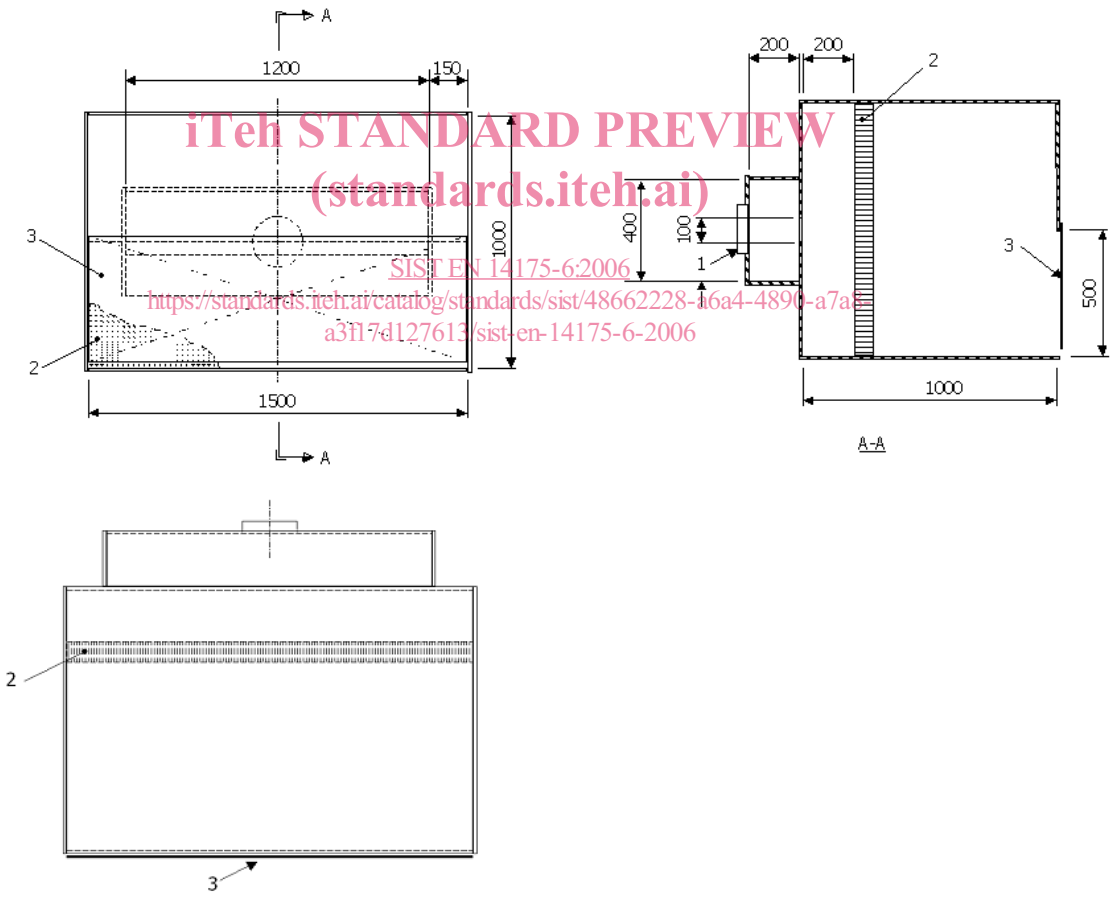
This test is to determine the changes in volume flow rate resulting from variations in the pressure difference between the surroundings and the downstream duct of the VAV, and additionally, to determine the minimum pressure difference which is necessary to reach the performance of the VAV system within the specified operating tolerances (minimum operating pressure difference).

5.3.2.2 Test equipment

Test equipment shall be in accordance with EN 12589:2001, 4.1, 4.2 and 4.3, and the test box in accordance with Figure 1. The time constants of the volume flow rate and pressure difference measuring systems shall be less than t = 0,3 s. The device for data recording shall enable a recording interval ≤ 0,1 s.

Non-uniform flow conditions in the inlet duct of the VAV system being tested can influence the flow rate control characteristics. Therefore the test box shown in Figure 1 shall be used for these tests. The thickness of wall elements should be 15 mm to 25 mm.

Dimensions in millimetres



Key

A-A Cross section A-A
1 Connection location of the VAV system's ductwork
2 Parallel flow former with openings of 5 mm to 10 mm diameter and conforming to EN ISO 5167-1
3 Movable sash with a minimum opening of 25 mm and a maximum opening of 500 mm

Figure 1 — Test box