SLOVENSKI STANDARD
SIST EN 13181:2001

01-december-2001

Prezraļevanje stavb - Enote - Preskuġanje lastnosti prezraļevalnih odprtin, izpostavljenih vplivu simulacije peska

Ventilation for buildings - Terminals - Performance testing of louvres subject to simulated sand

Lüftung von Gebäuden - Endgeräte - Leistungsprüfung von Schutzblenden unter Einwirkung von simuliertem Sand

Ventilation des bâtiments - Bouches d'air - Performances des grilles soumises a une simulation de sable

Ta slovenski standard je istoveten z: **EN 13181:2001**

ICS:

91.140.30	Prezraļevalni in klimatski sistemi	Ventilation and air-conditioning

SIST EN 13181:2001 **en**

EUROPEAN STANDARD

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EN 13181

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English version

Ventilation for buildings - Terminals - Performance testing of louvres subject to simulated sand

Ventilation des bâtiments - Bouches d'air - Performances des grilles soumises à une simulation de sable

Lüftung von Gebäuden - Endgeräte - Leistungsprüfung von Schutzblenden unter Einwirkung von simuliertem Sand

This European Standard was approved by CEN on 22 June 2001.

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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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This European Standard 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of an identical text or by endorsement, at the latest by February 2002, and conflicting national standards shall be withdrawn at the latest by February 2002.

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, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Warning

Attention is drawn to the possible risks associated with static electricity charge build-up, when using vacuum cleaners with plastic dust containers during sand trap louvre testing, in order that appropriate precautions are taken to safeguard the health of those involved.

1 Scope

This European Standard specifies a method for measuring the sand rejection efficiency of sand trap louvres subject to simulated sand and with inlet air flow through the louvre under test. The Standard considers a 1000 mm × 1000 mm section of sand trap louvre, or the nearest possible blade increment, for evaluation purposes.

The purpose of the tests incorporated in this European Standard is as follows:

a) Sand Rejection Effectiveness

To establish the sand rejection effectiveness when subjected to various air flow rates through the assembly.

b) Entry loss coefficient/Pressure requirements

To establish the air pressure loss through the sand trap louvre at various air flow rates and by calculation Discharge Loss Coefficient.

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).

CR 12792, *Ventilation for buildings — Symbols and terminology*

EN ISO 5167-1, *Measurement of fluid flow by means of pressure differential devices — Part 1 orifice plates, nozzles and venturi tubes inserted in circular cross-section conduits running full. (ISO 5167-1: 1991)*

ISO 3966, *Measurement of fluid flow in closed conduits - Velocity area method using Pitot static tubes*

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

ISO 5801, *Industrial fans - Performance testing using standardized airways*

3 Terms and definitions

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

3.1
sand trap louvre
device intended to allow the passage of supply or exhaust air while minimising the ingress of airborne sand

NOTE Sand trap louvres are air terminal devices for use in desert-like conditions or other conditions where airborne sand is present. They are usually positioned on the inlets to air distribution systems or parts of a building, to alleviate the load on the main filtration of air conditioning and similar systems.

3.2
sand trap louvre core area
product of the minimum height and minimum width of the front opening in the sand trap louvre assembly with the louvre blades removed (see Figure 5)

3.3
entry loss coefficient of a louvre
actual air flow rate divided by the theoretical air flow rate at a given pressure difference across the louvre

3.4
theoretical air flow
product of the louvre core area and the air velocity calculated using the pressure difference across the louvre as the velocity pressure, assuming $C_E = 1$ (see clause 4)

3.5
sand rejection effectiveness
quotient resulting from the total weight of sand rejected divided by the total weight of sand injected, at any velocity through the louvre

4 Symbols and subscripts

4.1 Symbols

Symbol	Quantity	Unit
A	Louvre core area	m^2
C_E	Entry Loss Coefficient	-
m_i	Sand supply to the injector	kg
m_u	Sand collected upstream of the test louvre	kg
p_{sa}	Absolute static pressure	Pa
p_a	Atmospheric pressure	Pa
p_d	Dynamic (Velocity) pressure $½ \rho \cdot v^2$	Pa
p_{ta}	Stagnation or absolute total pressure	Pa
p_s	Static gauge pressure (p_{sa} - p_a)	Pa
p_t	Total pressure (p_{ta} - p_a)	Pa
Δp	Flow meter pressure difference	Pa
Δp_t	Conventional total pressure differential for an air density of 1,2 kg m^{-3} at the inlet to the sand trap louvre under test	Pa
q_v	Volume rate or air flow at the flow meter	$m^3 s^{-1}$
v	Core Velocity	m s^{-1}
ε	Effectiveness	%
ρ	Air density	kg m^{-3}
ϑ	Temperature	°C

4.2 Subscripts

Subscript	Description
l	outlet of the sand trap louvre under test
m	measuring point at the flow meter
n	value at selected point of flow rate/static pressure curve

5 Instrumentation

5.1 Air flow rate measurement

The air flow rate shall be measured using instruments and techniques in accordance with EN ISO 5167-1, ISO 5221, and ISO 5801.

Air flow meters shall have the ranges and accuracies specified in Table 1.

Table 1 — Ranges and accuracies of flow meters

Range $m^3 s^{-1}$	Uncertainty of Measurement %
from 0,07 to 7	± 2,5
from 0,007 to 0,07	± 5

NOTE Flow meters can be calibrated in situ by means of pitot static tube traverse techniques described in ISO 3966.

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 check calibration over their full range using the original method employed for initial calibration of meters calibrated in situ;

c) a check against a flow meter which meets the flow meter specification described in ISO 5221.

5.2 Pressure measurement

5.2.1 Pressure in the duct shall be measured by means of a liquid-filled calibrated manometer, or any other device conforming to 5.2.2.

5.2.2 The maximum scale interval shall not be greater than the characteristics given in Table 2 for the appropriate range of manometers.

Table 2 — Range and scale interval for manometers

Range	Max. scale interval
Pa	Pa
≤ 25	1,0
> 25 to ≤ 250	2,5
> 250 to ≤ 500	5,0
> 500	25,0

5.2.3 For air flow measurements, the minimum pressure differential shall be:

a) 25 Pa with an inclined tube manometer or micro-manometer;

b) 500 Pa with a vertical tube manometer.

5.2.4 Calibration standards shall be as follows:

a) for instruments with the range ≤ 25 Pa, a micro-manometer accurate to ± 0,5 Pa;

b) for instruments with the range > 25 to ≤ 500 Pa, a manometer accurate to ± 2,5 Pa (hook gauge or micro-manometer);

c) for instruments with the range > 500 Pa, a manometer accurate to ± 25 Pa (vertical manometer).

5.3 Temperature measurement

Measurement of temperature shall be by means of mercury-in-glass thermometers, resistance thermometers, or thermo-couples. Instruments shall be graduated to give readings in intervals not greater than 0,5 K and calibrated to an accuracy of 0,25 K.

5.4 Weighing equipment

The mass of sand shall be measured by means of a balance or similar device which shall have an accuracy of + 0,5 % of the indicated weight.

5.5 Timers

Timers for determining sand flow rates shall have a minimum accuracy of + 0,2 s.

6 Test apparatus

6.1 Aerodynamic sand trap louvre test facility

The test facility shall be constructed from a number of separate sections as illustrated in Figure 1. It shall be capable of producing an air flow rate through the sand louvre under test over the range of 0,5 $m^3 s^{-1}$ to 3,5 $m^3 s^{-1}$, simulating blown sand, and measuring pressure losses.

The elements are described in 6.2 and 6.3

6.2 Sand injector equipment

The sand injector equipment shall consist of a fan, injector tube, main funnel, feeder cone, distribution tube and spreader plate.

The equipment shall be constructed as shown in Figures 2 and 3.

The equipment shall be positioned such that its outlet is centrally located at the top of the approach duct and 1,5 m from the sand trap louvre under test.

The injector fan shall be capable of creating an air velocity of 20 $m.s^{-1}$ to 25 $m.s^{-1}$ in the distribution tube.

The main funnel shall be capable of holding at least 2 kg of sand and be positioned directly above the feeder cone.

The sand feeder cone shall be positioned vertically and penetrate the distribution tube by approximately 1 mm. The included angle of the cone should be between 30^{o} and 45^{o}.

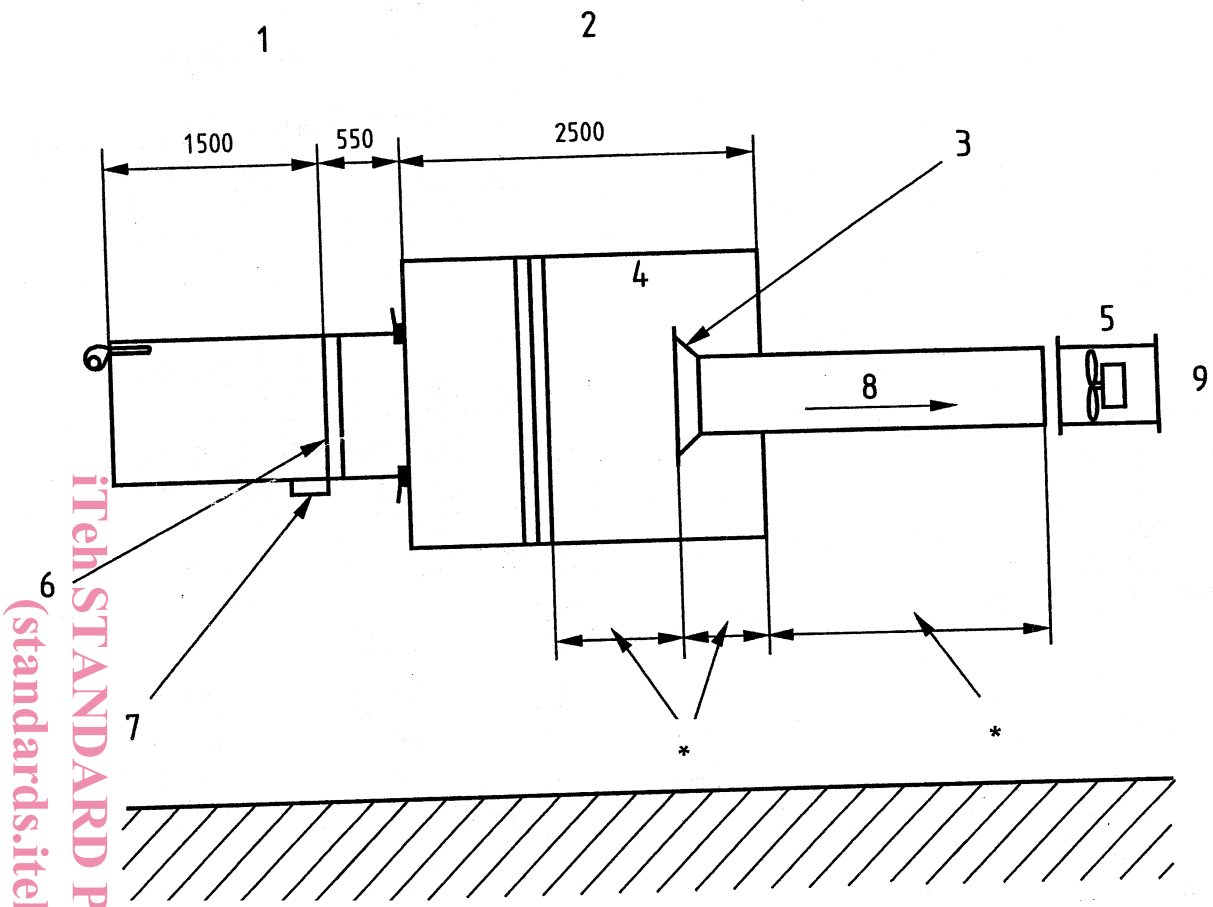
The sand feeder cones shall be calibrated for the required rate of feed.

6.3 Aerodynamic measurement section

A typical arrangement is illustrated in Figure 4.

The air flow rate shall be measured using an inlet cone or similar device positioned at the end of the discharge section. To achieve a uniform flow approaching the measurement device resistance screens should be fitted.

Dimensions in millimetres



Key
1 Sand injection section
2 Aerodynamic measurement section
3 Inlet cone or alternative air flow measuring station
4 Resistance screens
5 Mechanical Ventilation screen
6 Sand trap louvre under test
7 Sand collection trough
8 Ventilation air
9 Ventilation fan

* Dimensions determined from ISO 5221

Figure 1 — Sand trap louvre aerodynamic test facility