SLOVENSKI STANDARD
oSIST prEN 16282-9:2014

01-december-2014

Oprema za komercialne kuhinje - Sestavni deli za prezračevanje v komercialnih kuhinjah - 9. del: Pridobitev in obvladovanje uspešnosti pridobivanja sistemov - Preskusne metode

Equipment for commercial kitchens - Components for ventilation in commercial kitchens - Part 9: Capture and containment performance of extraction systems - Test methods

Großküchengeräte - Einrichtungen zur Be- und Entlüftung von gewerblichen Küchen - Teil 9: Erfassung, Abführungsverhalten und Effizienz - Prüfverfahren

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Équipement pour cuisines professionnelles - Éléments de ventilation pour cuisines professionnelles - Partie 9: Efficacité de captage et de retenue des systèmes d'extraction - Méthodes d'essai

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Ta slovenski standard je istoveten z: **prEN 16282-9**

ICS:

91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning
97.040.99	Druga kuhinjska oprema	Other kitchen equipment

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 16282-9

October 2014

ICS 97.040.99

English Version

Equipment for commercial kitchens - Components for ventilation in commercial kitchens - Part 9: Capture and containment performance of extraction systems - Test methods

Équipement pour cuisines professionnelles - Éléments de ventilation pour cuisines professionnelles - Partie 9: Efficacité de captage et de retenue des systèmes d'extraction - Méthodes d'essai

Großküchengeräte - Einrichtungen zur Be- und Entlüftung von gewerblichen Küchen - Teil 9: Erfassung, Abführungsverhalten und Effizienz - Prüfverfahren

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 156.

If this draft becomes a European Standard, 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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (prEN 16282-9:2014) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

Basic intention of this document is to evaluate extraction system components with regards to the calculation given in prEN 16282 – 1. A factor e_{eff} should be added to the formula (8) in 10.3 of prEN 16282–1. This factor is to be set at 1,0 default factor used in order to ensure the safety of even a badly designed system if a manufacturer of components chose not to carry out the tests of this standard prEN 16282–9. With the test in this Part 9 it can be shown that an extraction system is able to work properly with the airflow calculated in accordance with prEN 16282–1 or better. Clause 9.1 of this part contains the calculation of the above described factor e_{eff} .

The document is drafted for extraction systems in general. Special information/tests for hoods, ceilings or other extraction systems can be added in annexes. The activities of CEN/TC 156/WG 14, cover the calculation of the air volume and the design and testing of major components of ventilation equipment for commercial kitchens.

The structure of the standard series is as follows:

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prEN 16282 *Equipment for commercial kitchens – Components for ventilation in commercial kitchens*

— *Part 1: General requirements including calculation method*

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— *Part 2: Kitchen ventilation hoods – Design and safety requirements*

— *Part 3: Kitchen ventilation ceilings – Design and safety requirements*

— *Part 4: Air inlets and outlets – Design and safety requirements*

— *Part 5: Air duct – Design and dimensioning*

— *Part 6: Aerosol separators – Design and safety requirements*

— *Part 7: Installation and use of fixed fire suppression systems*

— *Part 8: Installations for treatment of cooking fumes – Requirements and testing*

— *Part 9: Capture and containment performance of extraction systems – Test methods*

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1 Scope

This European Standard specifies the requirements for the test methods for the capture and containment performance of extraction systems in commercial kitchens, including the technical safety, ergonomic and hygienic features.

This European Standard is applicable to ventilation systems in commercial kitchens, associated areas and other installations processing foodstuffs intended for commercial use. Kitchens and associated areas are special rooms in which meals are prepared, and where tableware and equipment is washed and cleaned and food is stored.

This European Standard is not applicable to kitchen ventilation systems that are used in domestic kitchens.

Unless otherwise specified, the requirements of this standard shall be checked by way of inspection and/or measurement.

NOTE Please note the possible existence of additional or alternative local national regulations on installation, appliance requirements and inspection, maintenance and operation.

The test method in accordance with this standard describes flow visualization techniques that are used to determine the threshold of capture and containment for non-cooking and specified heavy cooking conditions. The threshold of capture and containment can be used to estimate minimum flow rates for hood/appliance systems.

This European standard does not address safety concerns, if any, associated with its use.

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2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

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prEN 16282-1, *Equipment for commercial kitchens – Components for ventilation in commercial kitchens – Part 1: General requirements including calculation method*

prEN 16282-2, *Equipment for commercial kitchens – Components for ventilation in commercial kitchens – Part 2: Kitchen ventilation hoods – Design and safety requirements*

prEN 16282-3, *Equipment for commercial kitchens – Components for ventilation in commercial kitchens – Part 3: Kitchen ventilation ceilings – Design and safety requirements*

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

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

ISO 5167-3, *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 5167-4, *Measurement of fluid flow by means of pressure differential devices inserted in circular cross-section conduits running full - Part 4: Venturi tubes*

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3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1
aspect ratio
ratio of length to width of an opening or grill

3.2
energy rate
average rate at which an appliance consumes energy during a specified condition

Note 1 to entry: For example, non-cooking or cooking.

3.3
cooking energy consumption rate
average rate of energy consumed by the appliance(s) during cooking

3.4
fan and control energy rate
average rate of energy consumed by fans, controls, or other accessories associated with cooking appliance(s)

Note 1 to entry: This energy rate is an average during preheat, non-cooking, and cooking tests.

3.5
product performance: Capture and containment
ability of the ventilation system to capture and contain grease-laden cooking vapours, convective heat, and other products of cooking processes

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Note 1 to entry: The exhaust system capture refers to the products getting into the extraction system reservoir from the area under the extraction system while containment refers to the products staying in the extraction system reservoir.

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3.6
energy consumption rate
average rate at which an appliance consumes energy while it is non-cooking, holding, or ready-to-cook, at a temperature

3.7
measured energy input rate
maximum or peak rate at which an appliance consumes energy measured during appliance preheat, that is, measured during the period of operation when all gas burners or electric heating elements are set to the highest setting

3.8
rated energy input rate
maximum or peak rate at which an appliance consumes energy as rated by the manufacturer and specified on the appliance nameplate

3.9
compensating air
air deliberately supplied into the space (test room), and to the exhaust hood to compensate for the air, vapour, and contaminants being expelled

Note 1 to entry: This can be dedicated make-up air directed locally in the vicinity of the hood, transfer air, or a combination.

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3.10
make-up air
part of compensating air which is supplied through the hood, generally in the front face which does not include airflows supplied directly into the hood for capitation purpose

3.10.1 Integrated hood plenums

3.10.1.1
air curtain supply
compensating air that is introduced vertically downward, typically from the front edge of the hood

3.10.1.2
backwall supply
compensating air delivered behind and below the cooking appliance line, typically through a ducted wall plenum

Note 1 to entry: This is sometimes referred to as rear supply.

3.10.1.3
front face supply
compensating air that is introduced into the kitchen space through the front face of the hood

3.10.1.4
internal supply
compensating air delivered directly to the interior of an exhaust hood such that it is exhausted without entering the occupied space

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Note 1 to entry: This is sometimes referred to as short-circuit supply.

3.11
threshold of capture and containment
conditions of hood operation in which minimum flow rates are just sufficient to capture and contain the products generated by the appliance(s)

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Note 1 to entry: In this context, two minimum capture and containment points can be determined, one for appliance non-cooking condition, and the other for heavy-load cooking condition.

3.12
simulated thermal plume challenge
an appliance plume that duplicates the actual cooking effluent and/or thermal plume from an appliance or line of appliances

3.13
walk-by
person walk by 45 cm away from appliance at 1 m/s

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4 Calibration

Calibrate the instrumentation and data acquisition system in accordance with device requirements to ensure accuracy of measurements.

The relative humidity (RH) accuracy shall be within ± 5 % at 40 % RH and at 95 % RH.

Calibrate all temperature sensors in the temperature measurements systems upon receipt to within ± 0.5 °C over the range of expected measurements.

5 Equipment

5.1 Introduction

The general configurations and devices necessary to perform this test method include an airtight room as shown schematically in Figure 2. The minimum volume of the room shall be 170 m^3. The method of airflow measurement differs between the types of room used.

The exhaust hood under test is hung and connected to an exhaust duct and fan. The terminal devices of the compensating air configuration, if applicable, are ducted and connected to a compensating air fan. The test facility includes different devices described in 5.3. In any case they use a flow enhancement visualization system described in 5.2.

Tests shall be made with a representative production model of installed appliances for performance testing in accordance with Clause 7, Table 2.

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5.2 Flow Enhancement Visualization Systems

5.2.1 Optical Systems

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Optical systems, such as schlieren visualization, see Figure 1, and shadowgraph should be used.

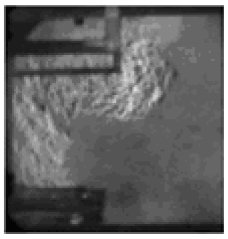	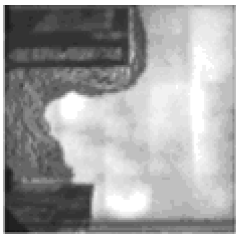	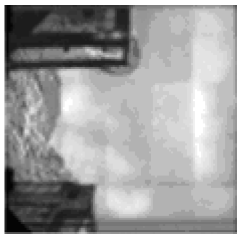	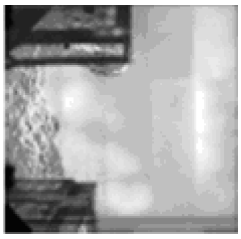
Spill at 1360 Nm^3/h	Spill at 2550 Nm^3/h	Spill at 3060 Nm^3/h	Spill at 3230 Nm^3/h

Figure 1 — Example of schlieren flow visualization for gas griddles under a canopy hood

5.2.2 Illumination

Illumination methods such as high-intensity, focused lighting shall be used.

NOTE A 300 W halogen lamp with a lens or a 1000 W Fresnel equipped theatre spotlight and a dark backdrop in place aids in visualizing seeded effluent plume.

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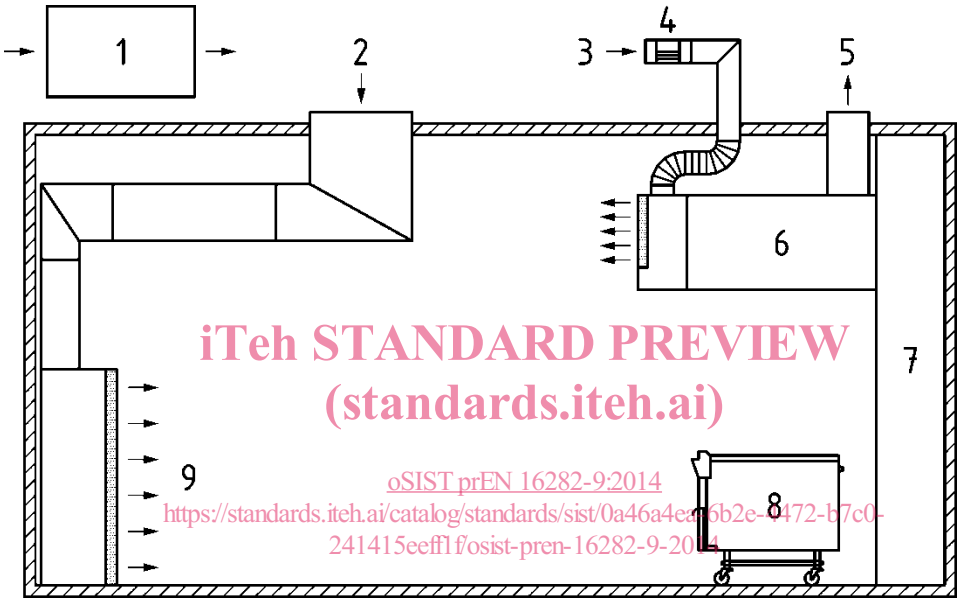
5.3 Configuration for airtight room

The airtight room shall have sealable access door(s), to contain the exhaust hood and make-up air configuration to be tested, with specified cooking appliance(s) to be placed under the hood. The room air leakage shall not exceed 30 m^3/h at 10 Pa. Complementary compensating air fans shall be controlled to balance the exhaust rate, thereby maintaining a negligible static pressure difference between the inside and outside of the test room. See Figure 2.

NOTE Because of potential problems with measurement in the hot, possibly grease-laden exhaust air stream, exhaust air flow rate can be determined by measuring the compensating air flow rate on the supply side. This requires the design of an airtight test facility that ensures the compensating air rate equals the exhaust rate since air leakage outside the system boundary, that is, all components between supply and exhaust blowers making up the system, is negligible.



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Key

1 Nozzle flow measurement station
2 Compensating air
3 Make-up airflow
4 Laminar flow element measurement station
5 Exhaust air flow
6 Canopy hood with integrated front face make-up air plenum
7 Back wall
8 Appliance
9 Air wall displacement

Figure 2 — Configuration for an airtight test space