



SLOVENSKI STANDARD
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Oprema za komercialne kuhinje - Sestavni deli za prezračevanje v komercialnih kuhinjah - 2. del: Kuhinjske prezračevalne nape - Projektiranje in varnostne zahteve

Equipment for commercial kitchens - Components for ventilation in commercial kitchens - Part 5: Air duct; Design and dimensioning

Großküchengeräte - Einrichtungen zur Be- und Entlüftung von gewerblichen Küchen - Teil 5: Luftleitungen; Gestaltung und Dimensionierung

Équipement pour cuisines professionnelles - Éléments de ventilation pour cuisines professionnelles - Partie 5: Conduit d'air - Conception et dimensionnement

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Equipment for commercial kitchens - Components for ventilation in commercial kitchens - Part 5: Air duct; Design and dimensioning

Équipement pour cuisines professionnelles - Éléments de
ventilation pour cuisines professionnelles - Partie 5: Conduit
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Großküchengeräte - Einrichtungen zur Be- und Entlüftung
von gewerblichen Küchen - Teil 5: Luftleitungen; Gestaltung
und Dimensionierung

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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Foreword

This document (prEN 16282-5:2014) 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.

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:

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

- *Part 1: General requirements including calculation method*
- *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*

prEN 16282-5:2014 (E)**1 Scope**

This European Standard specifies requirements for the design, construction and operation of the air duct, including 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, where tableware and equipment is washed, cleaned and food is stored.

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

A method of verification of each requirement is also specified.

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.

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.

EN 13779, *Ventilation for non-residential buildings - Performance requirements for ventilation and room-conditioning systems*

EN 13501-- 3, *Fire classification of construction products and building elements - Part 3: Classification using data from fire resistance tests on products and elements used in building service installations: fire resisting ducts and fire dampers*

EN 1363-1, *Fire resistance tests - Part 1: General requirements*

EN 1366 -1, *Fire resistance test for service installations-Part 1: Ducts*

EN 1507, *Ventilation for buildings. Sheet metal air ducts with rectangular section. Requirements for strength and leakage*

EN 15882-1, *Extended application of results from fire resistance tests for service installations - Part 1: Ducts*

EN 779:2012, *Particulate air filters for general ventilation - Determination of the filtration performance*

EN 933-4, *Tests for geometrical properties of aggregates - Part 4: Determination of particle shape; shape index*

EN 10088-1, *Stainless steels - Part 1: List of stainless steels*

EN 12237, *Ventilation for buildings - Ductwork - Strength and leakage of circular sheet metal ducts*

EN 12599, *Ventilation for buildings - Test procedures and measuring methods to hand over air conditioning and ventilation systems*

3 Terms and definitions

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

3.1**kitchen exhaust air****ETA**

air discharged out of the kitchen (line with negative pressure)

3.2**fire spread shut-off device**

device limiting the spread of fire and/or fumes through air ducts, alone or together with other elements, for a specified period of time

EXAMPLE Other elements that are used together with the device could be detaching devices.

3.3**outside air****AU**

air sucked in from the outside

3.4**air leakage class**

measure for the air leakage of an air duct system, defined by the upper limit of the air leakage rate

Note 1 to entry: The air leakage of air ducts is classified in accordance with EN 12237 as class A, B or C.

3.5**fire resistance period**

minimum time in minutes for which an element of the ventilation air ducts meets the specified requirements

3.6**fire resistance classification**

classification for an element of a ventilation duct on the basis of its fire resistance period

3.7**outlet air****FO**

air discharged to the outside (line with positive pressure)

3.8**air leakage factor**

air leakage rate per air duct casing unit area

Note 1 to entry: The air leakage factor is given in $\text{m}^3 \cdot \text{s}^{-1} \cdot \text{m}^{-2}$

3.9**air leakage rate**

leakage of air duct when exposed to air pressure

3.10**air duct / ventilation duct**

fire protection equipment> conduit for transporting air, used to transport air into and out of rooms

3.11**volumetric air flow rate**

quotient of air volume and time

3.12**components**

elements installed in air ducts

EXAMPLE Fans, silencers, sensors, filters, flaps are all examples of components.

prEN 16282-5:2014 (E)**3.13****kitchen**

part of a building where cooking processes are carried out, their connecting floors and distribution corridors, ancillary rooms such as food stores, cold rooms, food preparation areas and appliances are being cleaned

3.14**kitchen supply air****ZU**

air supplied to the kitchen

3.15**flexible air duct**

air duct which can be, by hand and in longitudinal direction, compressed or decompressed as well as bent, without any lasting damage to the cross sectional area

4 Construction and function**4.1 General remarks**

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

4.2 Functional requirements**4.2.1 General**

Air ducts shall be planned and constructed in such a way to ensure low energy consumption, low leakage, low heat losses and favourable sanitary conditions during their operation.

Any adverse hygienic effects of the food shall be excluded with due care.

The stability of the air ducts, their connection and mounting elements shall be dimensioned appropriately to ensure that it will permanently withstand the stress and load caused by operation.

Flexible supply air ducts shall be avoided as far as possible due to difficulty cleaning.

4.2.2 Design and loss of pressure

Air ducts shall be designed in such a way to ensure minimum loss of pressure.

This may be achieved by:

- longitudinal and cross-connections which are flush at the inside,
- stiffening elements that are placed on the outside to avoid high air resistance,
- air rerouting without sharp edges, inner radius at least 100 mm, junctions preferably with guiding elements,
- no sudden changes in cross section,
- in the case of changes in the cross-sectional angle of inclination less than 45°, smooth internal walls.

4.2.3 Special requirements for exhaust and outlet air ducts

Exhaust and outlet air ducts and their connections shall be aerosolate-proof and no visible escape of aerosolate is permitted.

Soldered/brazed or welded connections or connections with permanently elastic and aerosolate-resistant sealing materials are deemed appropriate and may be used.

The use of flexible air ducts is not permitted.

Chinamans hat type exhaust air outlets shall not be used.

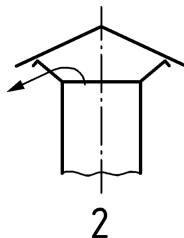


Figure 1 - Chinamans hat type air outlet

4.2.4 Air leakage

Outside and supply air ducts with round and rectangular cross section shall meet at least the requirements of EN 12237 or EN 1507, air leakage class B.

Exhaust and outlet air ducts with round and rectangular cross section shall conform to the requirements of EN 12237 or EN 1507, air leakage class C. Exhaust and outlet air ducts with round and rectangular cross section shall conform to the requirements of EN 12237, air leakage class B.

4.2.5 Silencers

Only materials which are harmless for health and which cannot become a culture medium for micro-organisms shall be used for the fabrication of silencers.

In operating state, silencer materials shall not release any harmful substances, parts of fibres or gases.

Their surface shall be abrasion-proof, in exhaust and outlet air ducts: smooth, water-resistant, easy to clean, aerosolate and stable.

To avoid any contamination of the silencers they shall be packaged appropriately for transport and storage.

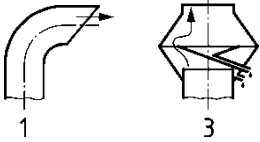
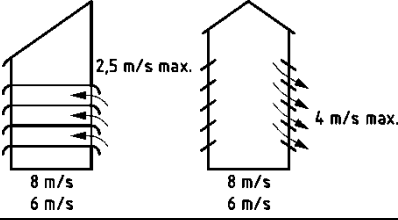
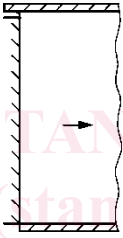
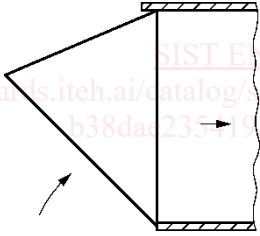
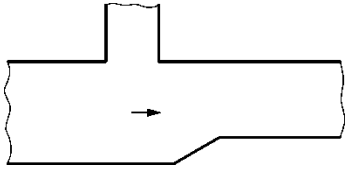
It shall be possible to dismantle silencers using basic tools.

4.2.6 Dimensioning of air ducts

4.2.6.1 Flow velocity guide values

For dimensioning of air ducts, the flow velocity guide values as shown in Table 1 shall be used, subject to the permissible sound pressure and pressure loss.

Table 1 — Flow velocity guide values

Element of the ventilation and air-conditioning system		Velocity of flow m/s width	
		suction side ^a	pressure side ^a
Extractor hood	 <p>1 3</p> <p>outlet air bend deflector cap</p>	4	6 to 8
Outside and outlet air towers	 <p>2,5 m/s max. 4 m/s max.</p> <p>8 m/s 8 m/s</p> <p>6 m/s 6 m/s</p>	6 to 8 (in the cross section) 2.5 (at the fins)	6 to 8 (in the cross section) 4 (at the fins)
Air passage		2.5	4
Hood		4.5	6
Main air duct		4 to 6	
Side air duct		3 to 4	
^a It can be necessary (for instance to avoid condensation at the outlet, to keep contaminated flows of exhaust air intentionally away from parts of buildings etc. or to avoid air short-circuiting) to blow out with a higher velocity (complying nevertheless with the flow noise).			

4.2.6.2 Sound pressure level

For purposes of acoustic calculations for the ventilation and air-conditioning system a sound pressure level of 50 dB with a mean reverberation period of 1.5 sec. shall be used. This value may be exceeded by 5 dB in the area for washing up crockery, pots and pans. Measurements shall be carried out in the working area at a high of 1.7 m above the floor.

4.2.7 System adjustment

The system shall be adjusted to ensure that the volumetric air flow rates during contractual operation conform to the planned values.

Volumetric air flow rates shall be measured and documented in accordance with EN 12599. Departing from EN 12599 is permitted as long as the overall uncertainty of measurement does not exceed 10 %. Departure from this uncertainty of measurement is permitted in individual cases if there is evidence that there are only unfavourable measuring points in the system.

4.2.8 Insulation

Air ducts used for the transport of heated or cooled supply air shall be insulated to maintain energy efficiency.

Insulation measures shall be taken for air ducts where the temperature could fall below the dew point.

4.3 Materials

Any of the materials specified in Table 2 shall be used.

Table 2 — Materials

Component element/ part	Material	Surface
Outside air ducts	chrome-nickel steel sheet steel synthetic ^a concrete	galvanized
Supply air ducts	chrome-nickel steel sheet steel synthetic ^a	galvanized
Exhaust and outlet air ducts	chrome-nickel steel sheet steel concrete	galvanized see below this Table
Exhaust air ducts from washing-up kitchens up to the point of mixing with the exhaust air from other parts of the kitchen and/or the outlet into the open air	chrome-nickel steel synthetic ^a	-
^a the material shall be self extinguishing		

Use a grade of stainless steel that conforms to EN 10088-1.

Concrete air ducts shall be constructed with a smooth surface that is easy to clean.

The concrete surface of exhaust and outlet air ducts shall also be coated with an appropriate protective layer (e.g. epoxy resin) to protect the concrete surface against aerosolate and to make it fire resistant.

4.4 Mounting elements

Suspension, support and mounting structures shall be made of galvanized steel with a sound-insulating intermediate layer. For threaded rods, at least M10 shall be used. Smaller sizes are permissible if a static calculation is provided taking into account the load of cleaning equipment.

Additional loads for air ducts caused by other installations are not permissible without appropriate static calculation.