SLOVENSKI STANDARD
oSIST prEN 15665:2025

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Prezračevanje stavb - Prezračevalni sistemi v stanovanjskih stavbah - Projektiranje

Ventilation for buildings - Ventilation systems in residential buildings - Design

Lüftung von Gebäuden - Lüftungssysteme in Wohngebäuden - Design

Ventilation des bâtiments - Systèmes de ventilation dans les bâtiments résidentiels - Conception

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91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning systems

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English Version

Ventilation for buildings - Ventilation systems in residential buildings - Design

Ventilation des bâtiments - Systèmes de ventilation dans les bâtiments résidentiels - Conception

Lüftung von Gebäuden - Lüftungssysteme in Wohngebäuden - Design

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

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

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European foreword

This document (prEN 15665:2024) 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.

This document will supersede EN 15665:2009 and CEN/TR 14788:2006.

In addition to a number of editorial revisions, the following main changes have been made:

— a distinction between “prescriptive approach” and “performance-based approach” (based on the performance assessment method) has been made;

— a (normative) National Annex A, with open templates for the prescriptive approach and performance-based approach has been added.

Introduction

The main role of ventilation is to replace the air in order to ensure an acceptable indoor air quality. It also helps to maintain the integrity of the building and improve the comfort of its occupants by controlling the humidity to avoid too low and too high humidity. But this document only focuses on indoor air quality.

Ventilation dilutes natural background pollutants such as substances emitted by furnishings, building materials and cleaning products used in the building, odours, metabolic CO_2 and water vapour. Ventilation also dilutes specific pollutants from identifiable local sources such as toilet odours, water vapour from the kitchen or bathroom.

Design of ventilation systems commonly considers other aspects like energy use, acoustics, draught, outdoor pollutants and cleaning and maintenance, though these are not covered in detail in this document.

There are both risks for the occupants and the building in terms of IAQ, specifically of relative humidity (one indicator for indoor air quality and thermal comfort).

IAQ can be controlled by the following means: source control, ventilation, and potentially air filtration or air cleaning.

This document is intended to support any regulation or standard at national level by giving guidance to those with responsibility for producing requirements and standards for residential ventilation systems. It includes a national annex template for fixing choices and setting primary ventilation requirements at national level. A filled in national annex, is directly usable by the designer for precise requirements on design of a ventilation system.

This document has a link to EN 16798-1 and EN 16798-7, in which basic information on possible indoor air quality requirements can be found, and gives information on how to calculate air flow rates in buildings.

1 Scope

This document provides guidance for the design of ventilation systems for basic ventilation in residential buildings to achieve an acceptable indoor air quality. It gives two approaches:

— prescriptive approach;

— performance-based approach.

This document establishes guidelines for the usage of both the prescriptive and performance-based approaches. This document specifies performance indicators that can be used with the performance-based approach.

This document partly covers intensive ventilation for indoor air quality purposes.

This document concerns residential buildings but primarily focuses on dwellings (flats, apartments, and houses) and is also applicable to parts of other types of residential buildings.

This document is applicable to, but not limited to:

— mechanical ventilation;

— natural ventilation;

— hybrid ventilation.

This document does not apply to:

— dilution of tobacco smoke or radon and other soil gases;

— ventilation of garages, roof voids, sub-floor voids, wall cavities and other spaces in the structure, under, over or around the living space;

— providing air for combustion appliances;

— air cleaning (e.g. portable stand-alone air cleaners to clean the indoor air);

— air humidification or de-humidification;

— thermal comfort in regard to overheating aspects.

This document does not deal with the assessment of energy performance of buildings.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

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

ISO and IEC maintain terminological databases for the use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
ventilation
air replacement by purpose-provided means

Note 1 to entry: "purpose-provided means" implies design and characterizes knowledge of main characteristics allowing assessment so that requirements on ventilation are fulfilled.

Note 2 to entry: Ventilation can be combined with air treatment.

3.2
basic ventilation
ventilation to achieve primary ventilation requirements under normal circumstances

3.3
intensive ventilation
ventilation at increased air replacement rate for a specific purpose limited in time

3.4
natural ventilation
ventilation whose operating principle is based solely on the effect of wind and the stack effect

Note 1 to entry: Open windows can be used for natural ventilation, if they are purpose-provided.

3.5
mechanical ventilation
ventilation whose operating principle is based solely on the operation of fans

3.6
hybrid ventilation
ventilation whose operating principle is based on the combination or alternation of natural ventilation and mechanical ventilation

3.7
airing
air replacement by means that are not purpose-provided

Note 1 to entry: Usually done through manual opening of doors or windows or both.

3.8
stack effect
pressure difference caused by the difference in density between indoor air and outdoor air due to their temperature difference

Note 1 to entry: With increased height difference between openings and temperature difference between indoor and outdoor air, the stack effect flow increases.

3.9
habitable room
main room
room dedicated to living, sleeping or dining purpose

EXAMPLE living room, bedroom, dining room, home office

3.10
service room
wet room
room dedicated to cooking, washing, defecating or urinating purpose

EXAMPLE kitchen, bathroom, laundry, toilet

3.11
circulation room
room with no specific allocation except circulation within the building

EXAMPLE corridor, hall, stairwell

3.12
vent
opening in the building shell intended for passage of air

EXAMPLE externally mounted air transfer device, intake air terminal device, roof outlet or window designed for the purpose of air replacement

3.13
intake vent
vent through which air is taken from outside the building

3.14
exhaust vent
vent through which air is discharged to outside the building

3.15
residential
relating to where people live

3.16
primary ventilation requirement
requirement aiming to quantify a level of indoor air quality to be achieved or an amount of air replacement to be achieved

3.17
descriptive requirement
requirement in the form of a specified technical solution

EXAMPLE minimum opening area

3.18
performance-based requirement
requirement in the form of a goal to be achieved

3.19
IAQ parameter
quantity that enables the characterization of indoor air quality, in whole or in part

EXAMPLE CO_2 concentration

3.20
performance indicator
quantity that indicates a performance

EXAMPLE Number of hours under or above a humidity threshold.

3.21
supply air
air from a ventilation installation or air conditioning installation entering a room

3.22
transferred air
air which passes from a room to another room

Note 1 to entry: Transferred air is extract air from one room and supply air for the other room.

3.23
extract air
air from a room entering a ventilation installation or air conditioning installation

3.24
ventilation system
combination of a ventilation installation and the enclosure it serves

3.25
package
group of objects, plans, or arrangements that are related and offered as a unit

3.26
ventilation system package
ventilation installation package
package intended for the realisation of a ventilation installation

Note 1 to entry: An installation ready package.

3.27
exposure
concentration of a given substance a person is exposed to

3.28
cumulative exposure
exposure that a specific person experiences over a given period of time

4 Abbreviated terms

For the purposes of this document, the abbreviations given in Table 1 apply.

Table 1 — Abbreviated terms

Abbreviated terms	Designation
ACH	Air Change Rate
BAC	Building Automation and Control
CO_2	Carbon dioxide

Abbreviated terms	Designation
EMATD	Externally Mounted Air Transfer Devices
EN	European Standard
IAQ	Indoor Air Quality
PM	Particulate Matter
RH	Relative Humidity
STR	Ventilation strategy
SVOC's	Semi-Volatile Organic Compounds
VOC's	Volatile organic compounds

5 Limitation of the use of options and technical solutions

This document describes various options and technical solutions. Limitations of the use of these options and technical solutions may be provided in a national annex. If a national annex is created it shall be done in accordance with the template given in Annex A.

Examples of filled in templates are given in Annex B.

NOTE The reason for this possible limitation is that not all options and technical solutions are relevant for all national conditions (e.g. climatic conditions).

These options and technical solutions concern:

— the ventilation strategies, operating principles and controlling equipment (see Clause 7);

— the primary ventilation requirements (see Clause 8);

— the choice of the performance-based approach (see Clause 8 and Clause 9) or the prescriptive approach (see Clause 8 and Clause 10) or both approaches;

— the performance assessment method (see Clause 11).

6 Main purpose and other design aspects of ventilation

6.1 Main purpose of ventilation

The main purpose of ventilation is to achieve an acceptable indoor air quality (basic ventilation) with relevant IAQ parameters (e.g. CO_2, VOC's, water vapour).

Ventilation is also an important mean of controlling humidity in a building in order to reduce the risk of condensation on building walls and materials.

Basic ventilation covers normal circumstances. Ventilation can sometimes be increased for a specific purpose for a given period of time (intensive ventilation). This can be done whatever the operating principle (mechanical ventilation, natural ventilation or hybrid ventilation).

Airing is another possible option to supplement a ventilation system for such increase of the air replacement rate.

However, ventilation can have consequences, possibly negative, such as energy use or unwanted draught. The main possible consequences of ventilation are listed in 6.2 and are not further detailed in this

document. The design of a ventilation system should take these consequences into account to minimize their possible negative effects.

6.2 Other design aspects related to ventilation

6.2.1 Energy use

During the design of the ventilation system, the following possible aspects of energy use related to ventilation should be considered:

— the energy use for heating and cooling;

— the energy use for the transport of the ventilation air (fan electrical energy);

— the energy use for the control equipment;

— the energy use for humidification or de-humidification.

When designing a ventilation system, IAQ should be considered together with the energy implications, although the assessment of energy performance of buildings is not dealt with in this document.

NOTE EN 16798-5-1, EN 16798-5-2 and CEN/TR 16798-6 are about calculation of energy requirements for mechanical and air-conditioning systems.

Some aspects of the energy use due to ventilation can also be an output of the performance assessment method (see Clause 11).

6.2.2 Acoustics

During the design of the ventilation system, the following possible aspects of acoustics should be considered:

— the noise from the inside environment;

— the noise from the outside environment;

— the noise generated indoors and outdoors by the ventilation system itself (e.g. fans, dampers, air flows and actuators).

The noise caused by the ventilation system can cause nuisance to the occupants and hence influence their use of the ventilation system.

NOTE EN 16798-1 provides basic information on possible acoustic criteria, but acoustic criteria can also be found, e.g. in national legislation.

6.2.3 Draught

During the design of the ventilation system, unwanted draught possibly caused by ventilation air flows should be considered.

This draught can cause nuisance to the occupants and hence influence their use of the ventilation system.

NOTE EN ISO 7730 and EN 16798-1 provides basic information on possible criteria on draught.

6.2.4 Outdoor pollutants

During the design of the ventilation system, the outdoor air quality should be considered.

Technical solutions to handle outdoor pollutants include, for example, proper placement of intake vents, filtration, demand controlled ventilation based on outdoor air quality or air cleaning.

NOTE For mechanical ventilation systems, information on filtration and its classification is available in EN 16798-3.

6.2.5 Operation, maintenance and cleaning

Cleaning and maintenance of the ventilation installation are necessary to maintain the performance of the ventilation system over time.

During the design of the ventilation system, the following aspects should be considered:

— accessibility to the components to be replaced (e.g. filters);

— accessibility to the components to be cleaned (e.g. ducts, fans, air transfer devices or air terminal devices);

The use of filters can also help to protect the ventilation system against fouling.

NOTE 1 Information about requirements for ductwork components to facilitate maintenance of ductwork systems is available in EN 12097.

NOTE 2 Information about cleanliness of ventilation system is available in EN 15780.

NOTE 3 For design and operation it is possible that the relevant usage of the rooms, and the requirements, in particular, are done in writing in a usage agreement. Such a usage agreement is often between the building owner, designer and user. An example of a usage agreement during operation is given in Annex J.

7 Technical aspects of a ventilation system

7.1 General

Ventilation strategy, controlling system and operating principle are technical aspects that can be used to define a ventilation system. These aspects are combined together during the design of the ventilation system (see Clause 9 and Clause 10).

7.2 Ventilation strategy (ventilation organization plan)

The ventilation strategy is a detailed plan that defines the path of air within a building.

The ventilation strategy is usually based on a distinction between habitable rooms, circulation rooms and service rooms. It may however also include other rooms. These other rooms are treated like habitable rooms or service rooms or treated separately depending on the expected generated indoor pollution. Examples of other rooms are storage room, dressing room, home gym room and garage.

One of the main principles of a good ventilation strategy is to avoid spreading of pollutants within the building. Air from service rooms is therefore not suitable for recirculation or transfer to other rooms.

Different ventilation strategies can have different impact on the energy use (see 6.2.1); transferring air from one room to another is therefore often considered.

Examples of ventilation strategies are given in Table 2 and Figures 1 to 7. Additional ventilation strategies may be defined in a national Annex A.