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**Prezračevanje stavb - Preskušanje lastnosti sestavnih delov/izdelkov za prezračevanje stanovanjskih stavb - 8. del: Preskušanje lastnosti mehanskih brezkanalnih dovodnih in odvodnih prezračevalnih enot (vključno z enotami za vračanje toplote)**

Ventilation for buildings - Performance testing of components/products for residential ventilation - Part 8: Performance testing of non-ducted mechanical supply and exhaust ventilation units (including heat recovery)

**iTeh STANDARD PREVIEW**

Lüftung von Gebäuden - Leistungsprüfung von Bauteilen/Produkten für die Lüftung von Wohnungen - Teil 8: Leistungsprüfung von mechanischen Zuluft- und Ablufteinheiten ohne Luftführung (einschließlich Wärmerückgewinnung)

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Ventilation des bâtiments - Essais de performance des composants/produits pour la ventilation des logements - Partie 8 : Essais de performance des unités de ventilation double flux décentralisées (y compris la récupération de chaleur)

**Ta slovenski standard je istoveten z: prEN 13141-8**

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**ICS:**

91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning systems
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EUROPEAN STANDARD  
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**prEN 13141-8**

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**Ventilation for buildings - Performance testing of  
components/products for residential ventilation - Part 8:  
Performance testing of non-ducted mechanical supply and  
exhaust ventilation units (including heat recovery)**

Ventilation des bâtiments - Essais de performance des  
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Lüftung von Gebäuden - Leistungsprüfung von  
Bauteilen/Produkten für die Lüftung von Wohnungen -  
Teil 8: Leistungsprüfung von mechanischen Zuluft- und  
Ablufteinheiten ohne Kanalanschluss (einschließlich  
Wärmerückgewinnung)

This draft European Standard is submitted to CEN members for second 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.

This draft European Standard was established by CEN 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 CEN-CENELEC Management Centre has the same status as the official versions.

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COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels**

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**prEN 13141-8:2021 (E)****European foreword**

This document (prEN 13141-8:2021) 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 second CEN Enquiry.

This document will supersede EN 13141-8:2014.

In addition to a number of editorial revisions, the following main changes have been made with respect to EN 13141-8:2014:

- scope has been changed, and concerns now non-ducted units which ventilate more than one single room;
- terms and definitions as well as symbols and abbreviations have been updated in accordance with the parameters used in the document;
- new categories of heat exchanger have been added;
- designations in 7.2.1.4 and the Formulae (1) to (4) have been changed;
- reference of the internal and external leakage rates has been changes to the reference air volume flow;
- extrapolation of the leakage rates has been added;
- 7.2.1.3.2 concerning exhaust air transfer ratio has been added;
- 7.2.4 concerning air flow measurement has been revised;
- requirements to convert the measured values to standard conditions have been added in 7.2.4 and 7.3.2;
- 7.3.3 has been divided into two separate subclauses 7.3.3.1 for standard tests and 7.3.3.2 for cold climate tests;
- formulae to calculate the temperature ratios have been changed;
- wet bulb temperature for the cold climate test has been changed;
- the order of the specific test for alternating units including storage heat exchanges has been changed;
- deviating aspects for alternating units to determine the air flow correction, thermal performance and the exhaust air transfer ratio have been revised;
- Table 10 concerning the temperature conditions for the cooling performance test has been moved in prEN 13142.

A list of all parts in the EN 13141 series, published under the general title *Ventilation for buildings — Performance testing of components/products for residential ventilation* can be found on the CEN website.

## Introduction

This document specifies methods for the performance testing of components used in residential ventilation systems to establish the performance characteristics as identified in prEN 13142.

This document incorporates many references to other European and International Standards, especially on characteristics other than the aerodynamic characteristics, for instance on acoustic characteristics.

In most cases some additional tests or some additional conditions are given for the specific use in residential ventilation systems.

This document can be used for the following applications:

- laboratory testing;
- attestation purposes.

The position of this document in the field of standards for the mechanical building services is shown in Figure 1.

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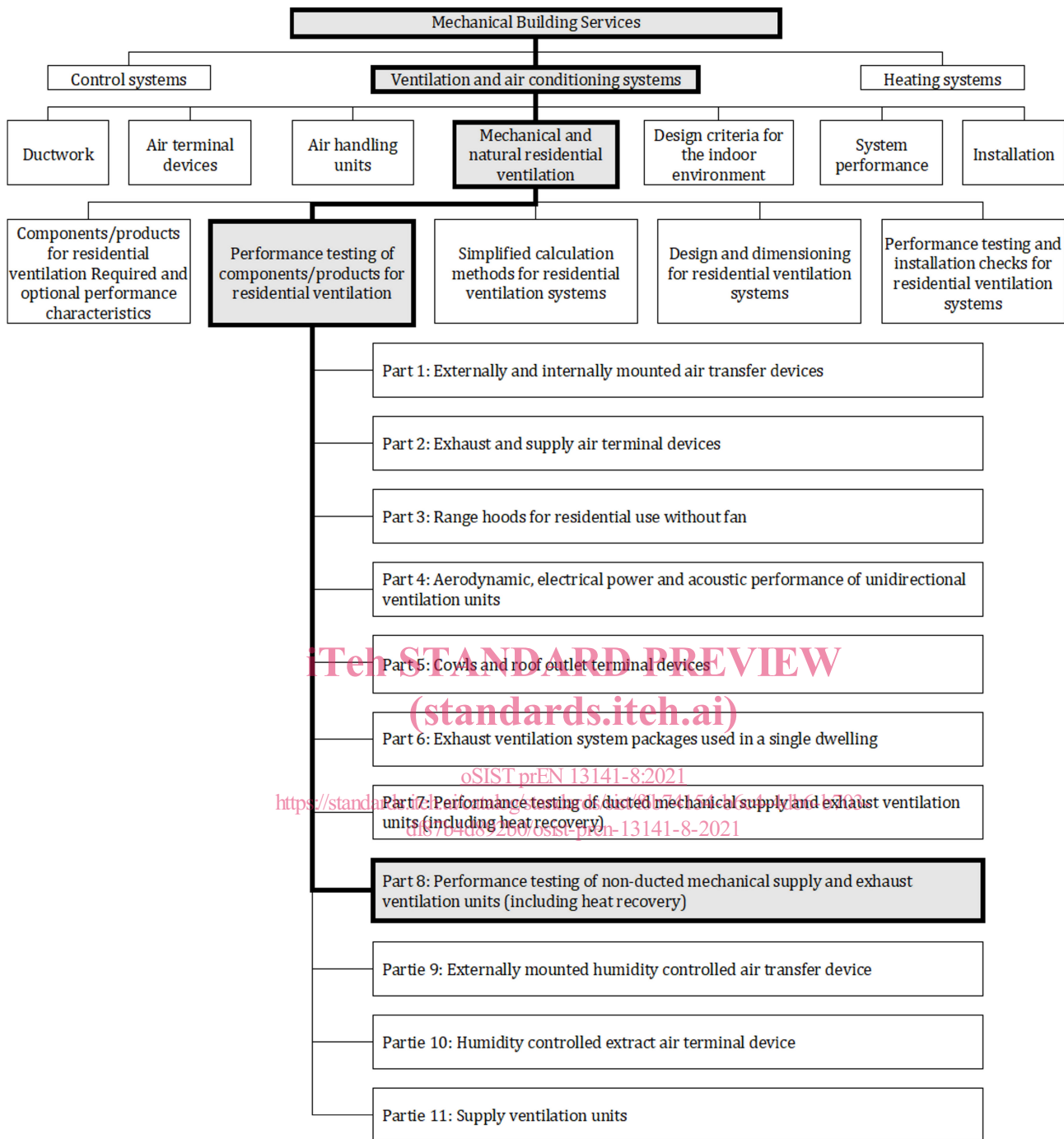


Figure 1 — Position of EN 13141-8 in the field of the mechanical building services



## 1 Scope

This document specifies the laboratory test methods and test requirements for the testing of aerodynamic, thermal, acoustic and the electrical performance characteristics of non-ducted mechanical supply and exhaust residential ventilation units used in single dwellings.

The purpose of this document is not to consider the quality of ventilation but to test the performance of the equipment.

In general, a ventilation unit contains:

- fans for mechanical supply and exhaust;
- air filters;
- air-to-air heat exchanger for heat and possibly humidity recovery;
- control system;
- inlet and outlet grilles.

Such equipment can be provided in more than one assembly, the separate assemblies of which are designed to be used together.

Such equipment can contain alternating heat exchangers which provide separate supply and exhaust air flows.

In certain cases, i.e. alternating ventilation unit, it may be declared that the equipment can be installed in such a way that it serves more than one room. For the purpose of this document, these products are assessed in a single room.

This document does not deal with ducted units which are covered by prEN 13141-7 or units with heat pumps.

Safety requirements are given in EN 60335-2-40 and EN 60335-2-80.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 12792:2003, *Ventilation for buildings — Symbols, terminology and graphical symbols*

EN ISO 717-1, *Acoustics — Rating of sound insulation in buildings and of building elements — Part 1: Airborne sound insulation (ISO 717-1)*

EN ISO 5801, *Fans — Performance testing using standardized airways (ISO 5801)*

EN ISO 10140-1, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 1: Application rules for specific products (ISO 10140-1)*

EN ISO 10140-2, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 2: Measurement of airborne sound insulation (ISO 10140-2)*

EN ISO 10140-4, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 4: Measurement procedures and requirements (ISO 10140-4)*

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EN ISO 10140-5, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 5: Requirements for test facilities and equipment (ISO 10140-5)*

EN ISO 16890 (all parts), *Air filters for general ventilation (ISO 16890 (all parts))*

ISO 13347-2, *Industrial fans — Determination of fan sound power levels under standardized laboratory conditions — Part 2: Reverberant room method*

ISO 13347-3, *Industrial fans — Determination of fan sound power levels under standardized laboratory conditions — Part 3: Enveloping surface methods*

ISO 13347-4, *Industrial fans — Determination of fan sound power levels under standardized laboratory conditions — Part 4: Sound intensity method*

**3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN 12792:2003 and the following apply.

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

— IEC Electropedia: available at <http://www.electropedia.org/>

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

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**3.1 external leakage**

$q_{ve}$   
leakage to or from the air flowing inside the casing of the ventilation unit to or from the surrounding air

[SOURCE: prEN 13141-4:2018, 3.11]

**3.2 internal leakage**

$q_{vi}$   
leakage inside the unit between the exhaust and the supply air flows

[SOURCE: prEN 13141-7:2018, 3.2]

**3.3 filter bypass leakage**  
air bypass around filter cells

[SOURCE: prEN 13141-7:2018, 3.4]

**3.4 indoor/outdoor airtightness**

$q_{vio}$   
maximum air volume flow at static pressure difference of – 20 Pa and + 20 Pa corresponding to the setting when the fans are “OFF” and all additional shutters are closed

Note 1 to entry: Indoor/outdoor airtightness is not the external leakage.

[SOURCE: prEN 13141-4:2018, 3.13, modified – Removal of “through a non-ducted ventilation unit”]

**3.5****exhaust air transfer ratio** $R_s$ 

mass transfer of the discharged air to a zone (in Figure 2, a): from key 11 (extract) to key 22 (supply) that is actually recirculated air from the same zone, due to internal leakage and external casing leakage

Note 1 to entry: The exhaust air transfer ratio,  $R_s$ , is used for units equipped with category IIa heat exchanger.

**3.6****outdoor mixing** $R_{me}$ 

mixing of the two air flows external to the equipment under test between discharge and intake ports at outdoor terminal points caused by short circuiting

**3.7****indoor mixing** $R_{mi}$ 

mixing of the two air flows external to the equipment under test between discharge and intake ports at indoor terminal points caused by short circuiting

**3.8****declared maximum air volume flow** $q_{vmax,d}$ 

declared maximum air volume flow of the unit at 0 Pa static pressure difference, between indoor and outdoor

[SOURCE: prEN 13141-4:2018, 3.6, modified – “at 0 Pa static pressure difference, between indoor and outdoor” has been added]

**3.9****maximum air volume flow** $q_{vmax}$ 

air volume flow corresponding to the maximum achievable fan curve setting of the unit at 0 Pa static pressure difference between indoor and outdoor, either declared or measured

Note 1 to entry: If the supply and exhaust air volume flows are different, then the maximum air volume flow is equal to the smaller of the two air volume flows.

[SOURCE: prEN 13141-4:2018, 3.7, modified – Note 1 to entry has been removed and Note 2 to entry became Note 1 to entry, “at the pressure  $p_{qvmax}$ ” has been replaced by “at 0 Pa static pressure difference between indoor and outdoor”]

**3.10****declared minimum air volume flow** $q_{vmin,d}$ 

minimum air volume flow of the unit declared at 0 Pa static pressure difference between indoor and outdoor

Note 1 to entry: If the supply and exhaust air volume flows are different, then the minimum air volume flow is equal to the higher of the two air volume flows.

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[SOURCE: prEN 13141-7:2018, 3.8, modified – “at the reference pressure declared” has been replaced by “at 0 Pa static pressure difference between indoor and outdoor”]

### 3.11 reference air volume flow

$q_{\text{vref}}$   
air volume flow at 70 % of the maximum air volume flow

Note 1 to entry: If the air volume flow at 70 % of the maximum air volume flow cannot be adjusted on the product itself, the closest value above is selected.

[SOURCE: prEN 13141-4:2018, 3.8, modified – Note 1 to entry "To determine reference air volume flow, see 5.2.3.4, Table 6." has been replaced by the one above]

### 3.12 unit static pressure

$p_{\text{us}}$   
pressure increase induced by the ventilation unit given as difference between the static pressure at the unit outlet and the total pressure at the unit inlet

Note 1 to entry: The parameter  $p_{\text{us}}$  for a ventilation unit is defined as the parameter  $p_{\text{is}}$  described in EN ISO 5801 for a stand alone fan.

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[SOURCE: prEN 13141-4:2018, 3.2]

### 3.13 external static pressure difference

$p_{\text{s,ext}}$   
pressure increase induced by the ventilation unit given as difference between the static pressures at the unit outlet and the unit inlet

Note 1 to entry: The external static pressure difference is used to determine the maximum air volume flow, the reference air volume flow and the minimum air volume flow.

[SOURCE: prEN 13141-4:2018, 3.2, modified – “and the minimum air volume flow” has been added in Note 1 to entry]

### 3.14 air flow sensitivity

$v$   
maximum relative deviation of the maximum air volume flow  $q_{\text{vmax}}$  due to a static pressure difference of + 20 Pa and – 20 Pa

Note 1 to entry: Unbalanced (unequal) supply and exhaust air streams influence the thermal efficiency of the ventilation unit and its air exchange capacity.

[SOURCE: prEN 13141-4:2018, 3.2, modified – “of a non-ducted ventilation unit” has been removed from the definition, Note 1 to entry has been added]

### 3.15 temperature ratio

 $\eta_{\theta}$ 

temperature difference between inlet and outlet of one of the air flows divided by the temperature difference between the inlets of both air flows

[SOURCE: prEN 13141-7:2018, 3.15]

### 3.16 humidity ratio

 $\eta_x$ 

difference of vapour mixing ratio between inlet and outlet of one of the air flows divided by the difference of vapour mixing ratio between the inlets of both air flows

[SOURCE: prEN 13141-7:2018, 3.16]

### 3.17 electrical power input

 $P_E$ 

average overall electrical power input to the equipment within a defined interval of time for standard air conditions obtained from:

- the power input of the fans;
- controller(s), compressor(s), safety devices of the equipment(s) excluding additional electrical heating devices not used for defrosting

Note 1 to entry: Electrical power consumption includes the consumption of the heating device for defrosting during the cold climate test.

[SOURCE: prEN 13141-4:2018, 3.15, modified – Note 1 to entry has been added]

### 3.18 maximum electrical power input

 $P_{E,max}$ 

electrical power input at maximum air volume flow,  $q_{vmax}$

[SOURCE: prEN 13141-4:2018, 3.17, modified – “, and its corresponding pressure,  $p_{qvmax}$ ” has been removed]

### 3.19 electrical power input at the reference air volume flow

 $P_{E,ref}$ 

electrical power input at reference air volume flow  $q_{vref}$

[SOURCE: prEN 13141-4:2018, 3.16, modified – “, and reference pressure,  $p_{ref}$ ” has been removed]

**prEN 13141-8:2021 (E)****3.20****exhaust air transfer ratio**

$R_{s(1;2)}$

mass fraction of the discharged air to a zone (see Figure 2: from key 11 (extract) to key 22 (supply)) that is actually recirculated air from the same zone, due to internal leakage, external casing leakage, short circuiting and carry back

Note 1 to entry: The exhaust air transfer ratio,  $R_{s(1;2)}$ , is used for units equipped with category IIb heat exchanger according to Table 2.

**3.21****supply air transfer ratio**

$R_e$

mass fraction of the discharged air to a zone (see Figure 2: from key 21 (outdoor) to key 12 (exhaust)) that is actually recirculated air from the same zone, due to internal leakage, external casing leakage and short circuiting

**3.22****alternating ventilation unit**

pair of mechanical ventilation devices using storage heat exchangers operating in opposite, synchronized periodically changing air flow direction incorporated in common or two separate casing(s)

**3.23****alternating mode**

operating mode in which a ventilation unit periodically changes from exhausting air to supplying air and vice versa

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**3.24****ventilation mode**

constant operating mode where the alternating devices are running in an opposite direction with no heat recovery

**3.25****indoor side**

supply and extract air side of the ventilation devices

**3.26****air path**

path of a ventilation device with equal flow direction and amount

**3.27****cycle time**

duration of a cycle in which the alternating device changes its direction and return back to the original direction

**4 Symbols and abbreviations**

For the purposes of this document, the symbols and abbreviations given in EN 12792 and in Table 1 apply.

Table 1 — Symbols

Symbol	Designation	Unit
$c$	concentration of tracer gas	ppm
$dq_{v,over}$	absolute deviation of maximum air volume flow due to over pressure of 20 Pa	—
$dq_{v,under}$	absolute deviation of maximum air volume flow due to under pressure of 20 Pa	—
$d /$	thermal resistance	K/W
$D_{n,e}$	airborne sound insulation in third octave bands	dB
$D_{n,e,w}$	global airborne sound insulation index	dB
$f_{red}$	quotient reduction factor	—
$L_W$	sound power level in third octave band	dB
$L_{WA}$	A-weighted sound power level	dB
$n$	fan speed	$\text{min}^{-1}$
$n_{vent}$	fan speed in ventilation mode	$\text{min}^{-1}$
$P_E$	electrical power input	W
$P_{E,ref}$	electrical power input at the reference air volume flow	W
$P_{E,max}$	maximum electrical power input	W
$P_{E,Te}$	electrical power input under test conditions measured at the density $\rho_{Te}$	W
$P_{el,max}$	electrical power input at the maximum air flow, $q_{vmax}$	W
$P_{el,ref}$	electrical power input at the reference air volume flow	W
$P_{el,max,vent}$	electrical power input at the maximum air flow, $q_{vmax}$ in ventilation mode	W
$P_{el,ref,vent}$	electrical power input at the reference air volume flow in ventilation mode	W
$p_s$	static pressure	Pa
$p_{s,ext}$	external static pressure difference	Pa
$p_{s,ext,Te}$	external static pressure difference under test conditions measured at the density $\rho_{Te}$	Pa
$p_{s,max}$	maximum static pressure	Pa
$p_{s,vent,D1/2,ex/su}$	maximum static pressure for each device and each direction	Pa