SLOVENSKI STANDARD
oSIST prEN 13141-4:2018

01-oktober-2018

Ventilation for buildings - Performance testing of components/products for residential ventilation - Part 4: Aerodynamic, electrical power and acoustic performance of unidirectional ventilation units

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Lüftung von Gebäuden - Leistungsprüfungen von Bauteilen/Produkten für die Lüftung von Wohnungen - Teil 4: Aerodynamische, elektrische- und akustische Leistung von unidirektionalen Lüftungsgeräten

Ventilation des bâtiments - Essais des performances des composants/produits pour la ventilation des logements - Partie 4 : Performance aéraulique, de puissance électrique et acoustique des unités de ventilation simple flux

Ta slovenski standard je istoveten z: **prEN 13141-4**

ICS:

91.140.30	Prezračevalni in klimatski sistemi	Ventilation and air-conditioning systems

oSIST prEN 13141-4:2018 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 13141-4

September 2018

ICS 91.140.30

Will supersede EN 13141-4:2011

English Version

Ventilation for buildings - Performance testing of components/products for residential ventilation - Part 4: Aerodynamic, electrical power and acoustic performance of unidirectional ventilation units

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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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Ref. No. prEN 13141-4:2018 E

Contents

Page

European foreword

This document (prEN 13141-4:2018) 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 13141-4:2011.

In addition to a number of editorial revisions, the following main changes have been made with respect to EN 13141-4:2011:

— the scope has been changed, and concerns now all unidirectional ventilation units (ducted or non-ducted units, supply or exhaust units), excluding cowls with fans (see EN 13141-5);

— the terms and definitions have been updated in accordance with the parameters used in the document;

— performance testing of aerodynamic characteristics clause includes new testing of external leakages;

— description of the connection box has been moved in a normative annex;

— determination of the maximum and reference air flow has been added;

— assessment of part load energy efficiency has been moved in an informative annex;

— tests of air flow sensitivity and indoor/outdoor airtightness have been added;

— in the energy part, the characterization of SPI has been added;

— the whole acoustic clause has been reorganized and references to acoustic standard updated;

— testing of noise radiated by the casing for ducted units has been added;

— testing of radiated sound power in the indoor or outdoor space and the airborne sound insulation of non-ducted units have been added;

— the safety clause has been deleted;

— a new clause dealing with all test results has been created.

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 European Standard specifies methods for the performance testing of components used in residential ventilation systems to establish the performance characteristics as identified in prEN 13142 [1].

This European Standard 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 European Standard can be used for the following applications:

— laboratory testing;

— attestation purposes.

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

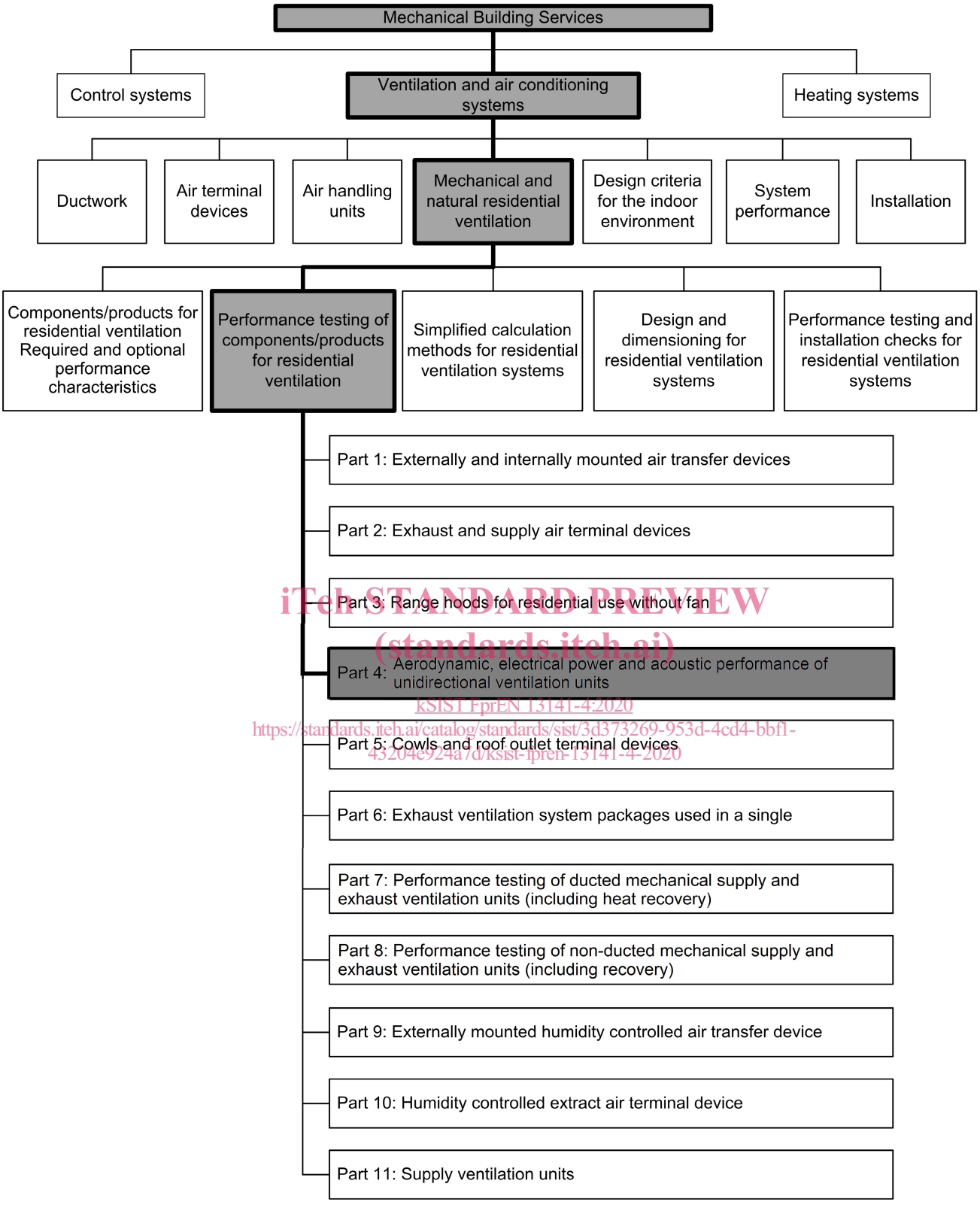

Figure 1 — Position of EN 13141-4 in the field of the mechanical building services

1 Scope

This document specifies aerodynamic, acoustic and electrical power performance test methods for unidirectional ventilation units used in residential ventilation systems.

This document is applicable to ventilation units:

— installed on a wall or in a window without any duct, A category;

— installed in the upstream of a duct, B category;

— installed in the downstream of a duct, C category;

— installed in a duct, or with duct connection upstream and downstream, D category;

— with one or several inlets/outlets;

— installed in a system with a heat pump for domestic hot water or water for cooling or heating;

— which can be used for supply or exhaust.

This document does not apply to:

— fan assisted cowls which are tested according to EN 13141-5;

— mechanical supply and exhaust units which are tested according to prEN 13141-7 or prEN 13141-8.

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 5801:2017, *Industrial fans - Performance testing using standardized airways (ISO 5801:2017)*

EN ISO 5135, *Acoustics - Determination of sound power levels of noise from air-terminal devices, air-terminal units, dampers and valves by measurement in a reverberation room (ISO 5135)*

EN ISO 5136, *Acoustics - Determination of sound power radiated into a duct by fans and other air-moving devices - In-duct method (ISO 5136)*

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 10140-5, *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, EN ISO 5801:2017 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 http://www.iso.org/obp

3.1
fan pressure
p_f
pressure increase induced by the ventilation unit given as difference between the total pressures at the unit outlet and the unit inlet

3.2
fan static pressure
p_{sf}
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

3.3
static pressure difference
$p_{s,ext}$
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 static pressure difference is used to determine the maximum air volume flow and the reference air volume flow.

3.4
maximum air volume flow at zero pressure
$q_{vmax,0}$
measured air volume flow corresponding to the maximum achievable fan curve setting of the unit, at 0 Pa static pressure difference

3.5
pressure at maximum air volume flow
p_{qvmax}
static pressure difference corresponding to the maximum air volume flow

3.6
declared maximum air volume flow
$q_{vmax,d}$
maximum air volume flow of the unit declared by the manufacturer

3.7
maximum air volume flow
q_{vmax}
air volume flow corresponding to the maximum achievable fan curve setting of the unit at the pressure p_{qvmax}, either declared or measured

Note 1 to entry: To determine maximum air volume flow, see 5.2.3.3, Table 5.

3.8
reference air volume flow
q_{vref}
air volume flow corresponding to the reference pressure

Note 1 to entry: To determine reference air volume flow, see 5.2.3.4, Table 6.

3.9
reference pressure
p_{ref}
static pressure difference corresponding to the reference air volume flow

3.10
ventilation unit
casing incorporating at least a fan, and that may include duct connections, filters, coils, electrical heating, or any other air treatment component

3.11
external leakage
q_{ve}
leakage to or from the air flowing inside the casing of the ventilation unit to or from the surrounding air

3.12
air flow sensitivity
v
maximum relative deviation of the maximum air volume flow q_{vmax} of a non-ducted ventilation unit due to a static pressure difference of + 20 Pa and – 20 Pa

3.13
indoor/outdoor airtightness
q_{vio}
maximum of air volume flow through a non-ducted ventilation unit 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 13141-8:2017, 3.1.4]

3.14
non-ducted ventilation units
ventilation unit intended to be used without external ductwork (Cat. A)

3.15
electrical power input
P_E
average over all electrical power input to the equipment within a defined interval of time 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

3.16
electrical power input at the reference air volume flow
$P_{E,ref}$
electrical power input at reference air volume flow, q_{vref}, and reference pressure, p_{ref}

3.17
maximum electrical power input
$P_{E,max}$
electrical power input at maximum air volume flow, q_{vmax}, and its corresponding pressure, p_{qvmax}

4 Symbols and abbreviations

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

Table1 — Symbols

Symbol	**Designation**	**Unit**
$D_{n,e}$	airborne sound insulation	dB
$D_{n,e,w}$ *(Ctr)*	global airborne sound insulation index	dB
L_W	sound power level	dB
L_{WA}	A-weighted sound power level	dB(A)
L_{Wc}	casing emitted sound	dB
L_{Wi}	inside emitted sound	dB
L_{Wo}	outside emitted sound	dB
p_f	fan pressure	Pa
p_{sf}	fan static pressure	Pa
p_{qvmax}	pressure at maximum air volume flow	Pa

Symbol	Designation	Unit
p_{ref}	reference pressure	Pa
$p_{s,ext}$	static pressure difference	Pa
P_E	electrical power input	W
$P_{E,max}$	maximum electrical power input	W
$P_{E,ref}$	electrical power input at the reference air volume flow	W
q_{ve}	external leakage	m^3/s or l/s or m^3/h
q_{vio}	indoor/outdoor airtightness	m^3/s or l/s or m^3/h
q_{vmax}	maximum air volume flow	m^3/s or l/s or m^3/h
$q_{vmax,0}$	maximum air volume flow at zero pressure	m^3/s or l/s or m^3/h
$q_{vmax,d}$	declared maximum air volume flow	m^3/s or l/s or m^3/h
q_{vref}	reference air volume flow	m^3/s or l/s or m^3/h
v	air flow sensitivity	%
—	test voltage	V
ρ	density of ambient air	kg/m^3

5 Performance testing of aerodynamic characteristics

5.1 External leakages

The external leakage test shall be carried out by connecting an adjustable fan to the exhaust/supply air side of the tested ventilation unit as shown in Figure 2.

The static pressure tapping is located on a blanking off plate and the tap is connected to a pressure measuring instrument. The external leakage flow rates at over and/or under pressure in the casing are established with suitable air flow measuring equipment.

The accuracy of the measured values shall be kept within ± 5 % for the flow rates and ± 3 % for the static pressures of the casing.