



BSI Standards Publication

Ventilation for buildings – Components/ products for residential ventilation – Required and optional performance characteristics

National foreword

This British Standard is the UK implementation of EN 13142:2021. It supersedes BS EN 13142:2013, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee RHE/2, Ventilation for buildings, heating and hot water services.

A list of organizations represented on this committee can be obtained on request to its committee manager.

This publication has been prepared under a mandate given to the European Standards Organizations by the European Commission and the European Free Trade Association and is intended to support essential requirements of the EU legislation detailed in the European foreword. Annex ZA/ZZ describes how the publication relates to the legislation.

For the Great Britain market (England, Scotland and Wales), if the UK Government has designated this publication for conformity with UKCA marking legislation and has not amended the essential requirements of that legislation, Annex ZA/ZZ and any references to EU law in the publication should be read in accordance with the designation as applying to UK legislation in the same way as to EU law. Further information on designated standards can be found at www.bsigroup.com/standardsandregulation.

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Date	Text affected
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English Version

Ventilation for buildings - Components/products for residential ventilation - Required and optional performance characteristics

Ventilation des bâtiments - Composants/produits pour
la ventilation des logements - Caractéristiques de
performances exigées et optionnelles

Lüftung von Gebäuden - Bauteile/Produkte für die
Lüftung von Wohnungen - Geforderte und frei
wählbare Leistungskenngrößen

This European Standard was approved by CEN on 25 January 2021.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN 13142:2021) has been prepared by Technical Committee CEN/TC 156 “Ventilation for buildings”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by October 2021, and conflicting national standards shall be withdrawn at the latest by October 2021.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13142:2013.

In addition to a number of editorial revisions, the following main changes have been made with respect to EN 13142:2013:

- a new Annex ZA considering EU 1253/2014 and a new Annex ZB considering EU 1254/2014 have been added;
- aspects of outdoor and indoor mixing have been added in 5.1;
- unidirectional ventilation units have been added in 5.6 and fans used in residential ventilation units have been removed. Clear reference to EN 13141-4:2021 to specify the aspects of eco-design regulation for UVU has been added in 5.6;
- 5.8 has been updated with classification aspects for energy and acoustics;
- 5.9 has been updated with link to EN 13141-7:2021:
 - data input, declaration, leakage in 5.9.4.2, energy in 5.9.6;
 - nominal temperature performance factor, NTPF, has been deleted;
 - classification of humidity ratio has been reviewed;
 - acoustic classification at reference volume flow;
- 5.10 has been updated with link to prEN 13141-8:2020:
 - air flow sensitivity classification;
 - classification of humidity ratio has been reviewed;
 - nominal temperature performance factor, NTPF, has been deleted;
- Annex A has been split into a normative part Annex A and informative part Annex B;
- a new informative Annex D about filter clogging compensation has been added;
- a new informative Annex E for extended SEC calculations for defrosting aspects has been added;
- a new informative Annex F for extended SEC calculation considering infiltration has been added;

- a new informative Annex G for SEC examples has been added;
- a new Annex ZA and a new Annex ZB for eco-design aspects have been added.

This document has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive.

For relationship with EU Directive, see informative Annex ZA and Annex ZB, which are integral parts of this document.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Introduction

A combination of components and/or products is required to provide ventilation. These components/products interact to achieve a renewal of the air in a dwelling.

It is important to consider each product not only individually but also as part of the whole system: for example from the outdoor canopy of an externally mounted air transfer device to the roof outlet terminal at the end of an exhaust duct. To enable good design it is essential that certain performance characteristics for each product are available in a simple and comparable form.

This document defines also a classification for balanced ventilation units which may be used for the determination of minimum and optional product characteristic in national building regulations and standards.

The structure of this document is based on the type of products that are given in Table 1 that specifies the type of information for them.

Table 1 — Type of information for products

Product	Declaration	Classification	Codification
Externally mounted air transfer devices	X	—	—
Internally mounted air transfer devices	X	—	—
Exhaust and supply air terminal devices	X	—	—
Range hoods	X	—	—
Exhaust or supply unidirectional ventilation units in residential ventilation systems	X	X	X
Cowls and roof outlet terminals	X	—	—
Unidirectional exhaust ventilation system packages	X	—	—
Ducted mechanical bidirectional ventilation units (including heat recovery)	X	X	X
Non-ducted bidirectional ventilation units (including heat recovery)	X	X	X

This document is one of a series of standard on residential ventilation. It is referring to the performance testing of the components/products for residential ventilation.

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

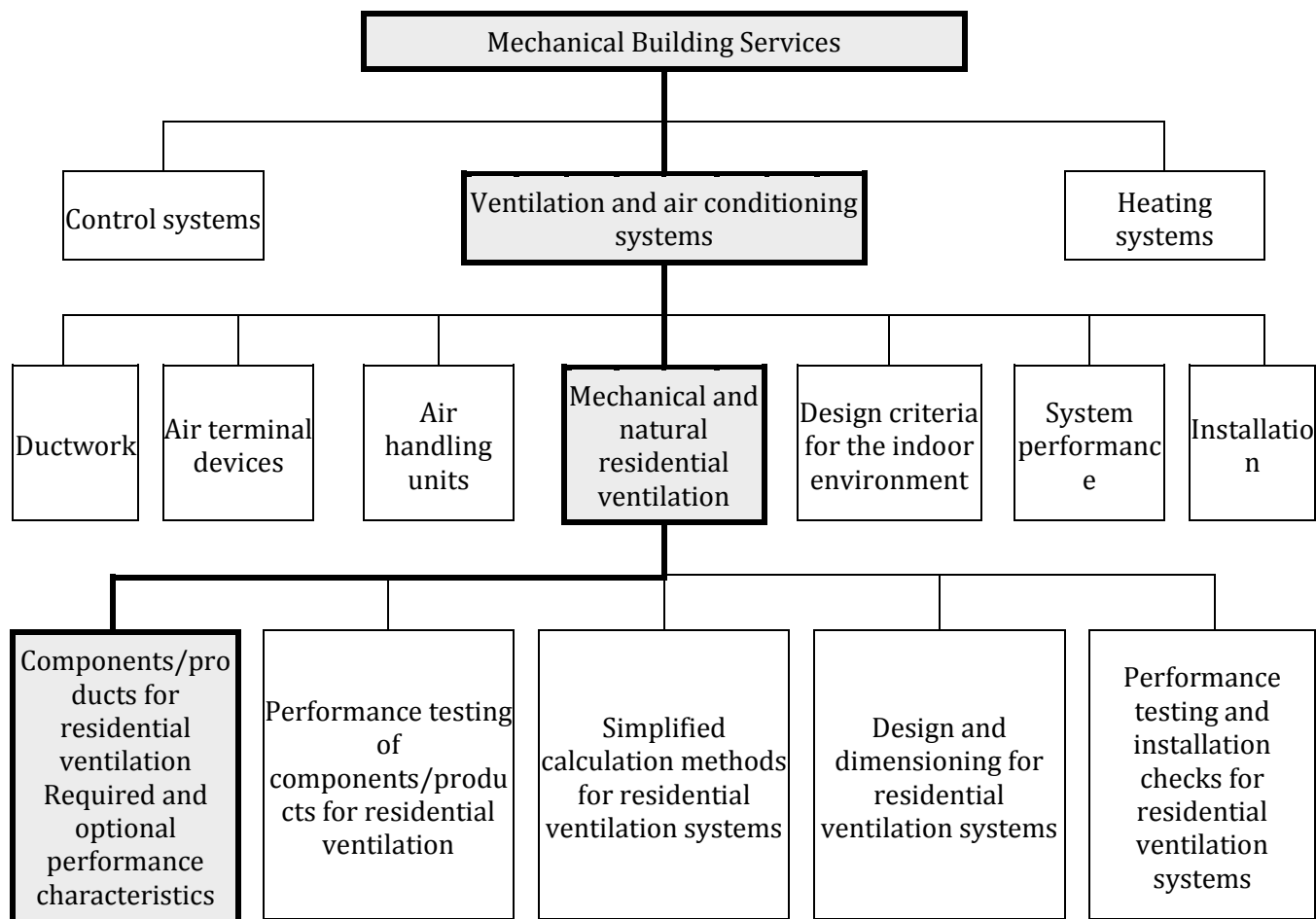


Figure 1 — Position of EN 13142 in the field of the mechanical building services

EN 13142:2013 has been revised to include new requirements according to Ecodesign requirements for ventilation units given in EU Commission Delegated Regulation No EU 1253/2014 and No EU 1254/2014.

1 Scope

This document specifies and classifies the component/product performance characteristics, which may be necessary for the design, rating and dimensioning, placing on the market of residential ventilation products and systems to provide the predetermined performance, comfort conditions of temperature, air velocity, humidity, hygiene and sound in the occupied zone.

It defines those performance characteristics (mandatory or optional) which shall be determined, measured and presented according to relevant test methods. It provides a classification scheme, which leads to a full definition of product properties based on test methods described in various EN Standards, and gives an overview of the test standards. Distinction between mandatory and optional requirement is left to each European and national regulations.

The codification part in Annex B and the classification part in Clause 8 apply to the following products:

- unidirectional mechanical supply and exhaust residential ventilation units according to EN 13141-4:2021, EN 13141-6:2014 and EN 13141-11;
- ducted mechanical bidirectional residential ventilation units according to EN 13141-7:2021;
- non-ducted mechanical bidirectional residential ventilation units according to prEN 13141-8:2020.

This document does not apply to other products such as filters, fire dampers, ducts, control devices and sound attenuators, which may also be incorporated in residential ventilation.

This document specifies in Annex ZA and Annex ZB the requirements of EU 1253/2014 and EU 1254/2014 for residential ventilation units below 1 000 m³/h air volume flow.

This document does not cover requirements raised by European Directives (e.g. low voltage directive, EMC directive) and other requirements such as corrosion, reaction to fire and snow penetration.

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 13141-1:2019, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 1: Externally and internally mounted air transfer devices*

EN 13141-2:2010, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 2: Exhaust and supply air terminal devices*

EN 13141-3:2017, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 3: Range hoods for residential use without fan*

EN 13141-4:2021, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 4: Aerodynamic, electrical power and acoustic performance of unidirectional ventilation units*

prEN 13141-5:2019, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 5: Cowls and roof outlet terminal devices*

EN 13141-6:2014, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 6: Exhaust ventilation system packages used in a single dwelling*

EN 13141-7:2021, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 7: Performance testing of ducted mechanical supply and exhaust ventilation units (including heat recovery)*

prEN 13141-8:2020, *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)*

EN 13141-9:2008, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 9: Externally mounted humidity controlled air transfer device*

EN 13141-10:2008, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 10: Humidity controlled extract air terminal device*

EN 13501-1:2018, *Fire classification of construction products and building elements — Part 1: Classification using data from reaction to fire tests*

EN 60335-2-31:2014, *Household and similar electrical appliances — Safety — Part 2-31: Particular requirements for range hoods and other cooking fume extractors (IEC 60335-2-31:2012)*

EN 61591:2019, *Household range hoods and other cooking fume extractors — Methods for measuring performance (IEC 61591:2019)*

EN ISO 5801:2017, *Fans — Performance testing using standardized airways (ISO 5801:2017)*

EN ISO 16890-1:2016, *Air filters for general ventilation — Part 1: Technical specifications, requirements and classification system based upon particulate matter efficiency (ePM) (ISO 16890-1:2016)*

EN ISO 16890-2:2016, *Air filters for general ventilation — Part 2: Measurement of fractional efficiency and air flow resistance (ISO 16890-2:2016)*

EN ISO 16890-3:2016, *Air filters for general ventilation — Part 3: Determination of the gravimetric efficiency and the air flow resistance versus the mass of test dust captured (ISO 16890-3:2016)*

EN ISO 16890-4:2016, *Air filters for general ventilation — Part 4: Conditioning method to determine the minimum fractional test efficiency (ISO 16890-4:2016)*

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 <http://www.iso.org/obp>

3.1
externally mounted air transfer device
device designed to allow the passage of air through the building envelope with the minimum ingress of rain, snow, foreign bodies, etc.

[SOURCE: EN 12792:2003, definition 144]

3.2**internally mounted air transfer device**

device designed to allow the passage of air between two internal spaces

[SOURCE: EN 12792:2003, definition 232]

3.3**exhaust air terminal device**

device through which air leaves the treated space

3.4**supply air terminal device**

device through which air enters the treated space

[SOURCE: EN 12792:2003, definition 349, modified – The second sentence has been removed]

3.5**range hood****cooker hood**

device intended to collect contaminated air from above a cooking appliance and either discharge it into the room or remove it from the room

Note 1 to entry: It may or may not incorporate one or more of the following components:

- filter (essential when the contaminated air is discharged into the room);
- fan;
- fire damper;
- non return flow damper.

[SOURCE: EN 12792:2003, definition 85]

3.6**cowl**

air terminal device with or without moving component, intended to be fitted on top of an exhaust duct, with aim, by creating negative pressure depending of the wind speed, to avoid reverse flow and to increase the extracted flow rate in presence of wind

[SOURCE: EN 12792:2003, 92, modified – reformulation of the definition in a single sentence]

3.7**roof outlet**

air terminal device without moving component, intended to be fitted on top of an exhaust duct

[SOURCE: prEN 13141-5:2019, definition 3.4]

3.8**ventilation system package**

combination of compatible components which are tested, delivered and installed as specified, to complete a residential ventilation system when sold as a single product

Note 1 to entry: It may exclude minor parts such as tapes, sealants and screws.

Note 2 to entry: This definition applies for single dwelling.

3.9

bidirectional ventilation unit

ventilation unit which produces an air flow between indoors and outdoors and is equipped with both exhaust and supply fans

3.10

unidirectional ventilation unit

ventilation unit with a fan assisted air volume flow in only one direction (either supply or exhaust)

Note 1 to entry: The balancing air volume flow is provided by air transfer devices or another mechanical unit.

4 Symbols and abbreviations

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

Symbol	Designation	Unit
c_{air}	specific heat capacity of air at constant pressure and density	kWh/(kg·K)
d_i	thickness of the layer “i”	m
COP	coefficient of performance	—
$CTRL$	ventilation control factor	—
DIS	disbalance	%
$D_{n,e,w} + C_{tr}$	airborne sound insulation	dB
E_{AEC}	annual electricity consumption	kWh/(m ² ·a)
E_{defr}	annual electricity consumption for defrosting	kWh/(m ² ·a)
$E_{\text{el,preh}}$	annual electricity consumption due to internal pressure loss during frost periods	kWh/(m ² ·a)
EE_w	weighted energy efficiency	—
E_{preh}	annual electricity consumption for an electric preheater	kWh/(m ² ·a)
$E_{\text{pump,defr}}$	annual electricity consumption use for defroster pump	kWh/(m ² ·a)
$E_{\Delta p,\text{ext,defr}}$	annual electricity consumption use due to external pressure losses of external defrosting devices	kWh/(m ² ·a)
$E_{\Delta p,\text{int,defr}}$	annual electricity consumption due to internal pressure loss during frost growing	kWh/(m ² ·a)
f_c	conversion factor between electrical and primary energy	—
$f_{\text{ctrl,defr}}$	factor of the defrosting control	—
f_{insu}	correction value for the casing insulation	—
f_{pump}	factor for the type of the defroster	—
f_0	factor for units conversion	—

Symbol	Designation	Unit
FC	filter compensation factor	—
F_i	value of occurrence frequency for part load weighting	—
L_{WA}	A-weighted sound power levels	dB(A)
$MISC$	aggregated general typology factor, incorporating factors for ventilation effectiveness, duct leakage and extra infiltration	—
pef	primary energy factor	—
p_{qvmax}	pressure at maximum air volume flow	Pa
p_{ref}	reference pressure	Pa
P_E	electrical power input	W
$P_{E,ref}$	electric power input at the reference volume flow	W
PES	primary energy saving	kJ/m ³ a
P_i	electrical power measured at q_{vi}	W
$P_{E,max}$	maximum electrical power input	W
P_{pump}	electrical power input of the defroster pump	W
q_0	measured air volume flow	m ³
q_m	mass flow rate	kg/s
q_{net}	net ventilation rate demand	m ³ /(h·m ²)
q_{ref}	reference natural ventilation	m ³ /(h·m ²)
q_{ve}	external leakage (ducted units only)	%
q_{vfc}	air flow with an additional pressure drop of 1,5 times the initial pressure drop of the filter	m ³
q_{vi}	internal leakage	%
q_{vio}	indoor/outdoor airtightness (non-ducted units only)	m ³ /s ^b
q_{vmax}	maximum air volume flow	m ³ /s
q_{vn}	nominal air volume flow	m ³ /s
q_{vref}	reference air volume flow	m ³ /s
Q_{defr}	annual energy for defrosting	kWh/(m ² ·a)
R	thermal resistance of the casing wall	m ² ·K/W
R_{mi}	indoor mixing	%
R_{mr}	outdoor mixing	%
R_s	transfer ratio of recirculated air in the supply air stream	%
$R_{s,int}$	internal transfer ratio from extract to supply air	%
$R_{s,tot}$	total transfer ratio in supply air	%
SPI	specific power input	W/(m ³ /s)

Symbol	Designation	Unit
SPI_w	weighted specific power input part load	W/(m ³ /s)
ta	annual operating hours	h/a
t_{defr}	annual operating time in defrosting mode	h/a
t_h	total hours heating season	h
v	air flow sensitivity	%
w	internal leakage	%
o	outdoor mixing	%
x	exponent that takes into account nonlinearity between thermal energy and electricity saving, depending on motor and drive characteristics	—
x_i	value of part load of rated air volume flow	—
y	indoor mixing	%
z	external leakage	%
ΔE_{AHS}	annual saving in consumption of energy	kWh/(m ² ·a)
$\Delta E_{\text{AH,defr}}$	annual heating energy consumption for defrosting	kWh/(m ² ·a)
ΔE_{by}	annual heating energy consumption for bypassing the heat recovery	kWh/(m ² ·a)
ΔE_{earth}	annual heating energy reduction by an earth to air heat exchanger	kWh/(m ² ·a)
$\Delta E_{\text{el,preh}}$	annual heating energy reduction by an electric preheater	kWh/(m ² ·a)
ΔE_{ex}	annual heating energy consumption for increasing of the exhaust air flow rate	kWh/(m ² ·a)
$\Delta E_{\text{h,preh}}$	annual heating energy consumption for preheating (by space heating generation)	kWh/(m ² ·a)
ΔE_{su}	annual heating energy consumption for lowering of the supply air flow rate	kWh/(m ² ·a)
ΔE_{vent}	annual heating energy reduction by ventilator heat	kWh/(m ² ·a)
$\Delta p_{\text{ext,defr}}$	pressure loss of the external defrosting devices	Pa
Δp_{fc}	pressure drop	Pa
Δp_{frost}	average additional internal pressure due to frost growing	Pa
$\Delta p_{\text{initial}}$	initial pressure drop of the filter	Pa
Δp_{ref}	total rated pressure	Pa
ΔT_{defr}	average difference between the outdoor temperature and the defrost mode set point during the defrosting period	K
ΔT_h	average difference in indoor and outdoor temperature over a heating season, minus correction for solar and internal gains	K

Symbol	Designation	Unit
$\Delta\theta_{g,h,avg}$	correction for solar and internal gains	°C
η_{θ}	temperature ratio	—
η_g	overall efficiency of the heating system	—
η_h	average space heating efficiency	—
η_t	thermal efficiency of heat recovery	—
$\Delta\eta_{t,by}$	difference in thermal efficiency of heat recovery with a bypass compared to balanced mass flows	—
$\Delta\eta_{t,dec}$	difference in thermal efficiency of heat recovery with an increased exhaust air flow rate compared to balanced mass flows	—
$\Delta\eta_{t,low}$	difference in thermal efficiency of heat recovery with a lowered supply air flow rate compared to balanced mass flows	—
η_{vent}	ventilator efficiency	—
η_5	corrected temperature ratio on supply air side	—
$\eta_{\theta,su}$	temperature ratio on supply air side	—
$\eta_{\theta,ex}$	temperature ratio on exhaust air side	—
$\theta_{e,h,avg}$	average outdoor temperature over a heating season	°C
$\theta_{i,avg}$	average indoor temperature over a heating season	°C
λ_i	thermal conductivity of the material of the layer “i”	W/(m·K)
^a W/(m³/s) or W/(m³/h) can be used for measurement of primary energy saving but it shall be verified that all parameters are consistent with the chosen unit. ^b l/s or m³/h can be used for measurement of air flow but it shall be verified that all parameters are consistent with the chosen unit.		

For the purposes of this document, the following abbreviations apply.

AEQ	Codification of Additional Equipment
CTRL	Control Factor
DCV	Demand Controlled Ventilation
DIS	Disbalance
DIU	Declared Intended Use
HRS	Humidity Ratio on Supply air side
LWC	Sound power level
LWD	Duct connection sound power level
MFB	Mass Flow Balance
POM	Power input in Operable Mode
PES	Primary Energy Saving
PSM	Power input in Standby Mode
SEC	Specific Energy Consumption
SEC*	Extended Specific Energy Consumption
SPI	Specific Power Input
ASI	Airborne Sound Insulation
TRE	Temperature Ratio on the Exhaust air side
TRS	Temperature Ratio on Supply air side

5 Performance characteristics for residential ventilation components/products

5.1 General

5.1.1 Generality for tests

The results of product performance tests reflect the performance that is achieved by the product in service. A product shall therefore be tested as a complete assembly with all necessary components that affect performance.

Accessories are sometimes available for a product as an option. Where accessories could affect performance, the product shall be tested both with and without those accessories.

If any insect screen, filter or similar device is intended to be fitted in the product, then it shall be in position when the product is tested.

5.1.2 Outdoor mixing (for supply and exhaust units)

5.1.2.1 Outdoor mixing of non-ducted units

Due to the small dimensions of non-ducted units the distance between the air inlets and air outlets can be very small and thus there is a risk of mixing exhaust air with outdoor air. This concerns also alternating ventilation units.

The outdoor mixing shall be measured and stated in accordance with prEN 13141-8:2020.

5.1.2.2 Outdoor mixing of ducted units

The outdoor mixing rate of ducted units shall not be considered. The impact depends on installation aspects.

5.1.3 Indoor mixing (for supply and exhaust units)

5.1.3.1 Indoor mixing of non-ducted units

Due to the small dimensions of non-ducted units the distance between the air inlets and air outlets can be very small and thus there is a risk of mixing extract air with supply air. The Indoor mixing shall be measured and stated in accordance with prEN 13141-8:2020.

5.1.3.2 Indoor mixing of ducted units

The indoor mixing rate of ducted units shall not be considered. The impact depends on installation aspects.

5.1.4 Correction of temperature ratio (for supply and exhaust units)

All the leakages, mixing and flow balance variations have an influence on the temperature ratio. Starting from the measured air flow, q_v , and the temperature ratio, $\eta_{\theta, su}$, on supply air, the temperature ratio shall be corrected depending on the value in % of:

- w of the internal leakage (see Table 19 to Table 21 or Table 32 depending on design);
- o of the outdoor mixing (see Table 32);
- y of the indoor mixing (see Table 32);
- z of the external leakage (see Table 19 to Table 21 or Table 32 depending on design);
- v of the air flow sensitivity at reference air volume flow at reference pressure ± 10 Pa, the highest value shall be taken, (for non-ducted unit according to prEN 13141-8:2020 and for ducted unit calculated from air volume flow pressure curve according to EN 13141-7:2021);

according to Table 2.

Each value of the temperature ratio shall be documented.

The Temperature Ratio on Supply air side (TRS) shall be the corrected temperature ratio η_5 .

NOTE 1 If the impact of leakage, mixing, and air flow sensitivity is considered in EPBD calculation procedures then η_0 could be documented. If this impact is not considered, then η_5 could be used.

Table 2 — Temperature ratio correction at reference air volume flow

Measure	Result	Unit	Temperature ratio correction	
			Non-ducted units	Ducted units
Temperature ratio on supply air side	$\eta_{\theta, su}$	—	—	
Internal leakage	w	—	$\eta_1 = \eta_{\theta, su} \times (1 - 0,7 \times (w - 0,03))$	
Outdoor mixing	o	—	$\eta_2 = \eta_1 \times (1 - (o-0,02))$	$\eta_2 = \eta_1^a$
Indoor mixing	y	—	$\eta_3 = \eta_2 \times (1 - (y-0,02))$	$\eta_3 = \eta_2^a$
External leakage	z	—	$\eta_4 = \eta_3^b$	
Air flow sensitivity	v	—	$\eta_5 = \eta_4 \times (1 - (v-0,02))^{0,4}$	
^a The outdoor mixing depends on the duct system and not on the unit. There is no mixing in typical installations.				
^b The impact of external leakage depends on the design of the unit. No further correction shall be done.				

NOTE 2 To take into account the uncertainty of measurement, the corrections given in Table 2 are applied for each individual value in percentage only if the deviation for each criterion given in Table 2 is bigger than 2 % for mixing and air flow sensitivity, or 3 % for internal leakage, and the correction is reduced from this percentage.

5.2 Externally mounted air transfer devices

5.2.1 Aerodynamic characteristics

The aerodynamic characteristics (pressure/flow rate curve), shall be measured and stated in accordance with EN 13141-1:2019 or EN 13141-9:2008.

5.2.2 Equivalent area

The equivalent area shall be calculated and stated in accordance with EN 13141-1:2019 or EN 13141-9:2008.

5.2.3 Free area

The free area shall be calculated according to EN 13141-1:2019 or EN 13141-9:2008 with the product in the fully open position and installed according to the declaration of instruction.

5.2.4 Controls

The declaration shall state which type of control is incorporated; e.g. manual control or automatic control according to pressure difference.

For manual control the pressure/flow rate curve, equivalent area and free area for the fully closed position shall be stated under the same test conditions as for the fully open position results. If the device is not closable then this shall be stated.

NOTE Automatic control by humidity, occupancy or other stimuli is possible, but there is no agreed test method for products with these types of control.

5.2.5 Air diffusion characteristics

The air diffusion characteristics shall be measured and the results presented in accordance with EN 13141-1:2019 or EN 13141-9:2008.

5.2.6 Acoustic characteristics

The acoustic characteristics shall be measured and the results presented in accordance with EN 13141-1:2019 or EN 13141-9:2008.

5.2.7 Water penetration

Products shall be tested when closed in accordance with EN 13141-1:2019 or EN 13141-9:2008.

NOTE In the future, further tests could be carried out to assess thermal insulation and condensation characteristics but the test methods are not yet available.

5.3 Internally mounted air transfer devices

5.3.1 Aerodynamic characteristics

The aerodynamic characteristics (pressure/flow rate curve) shall be measured and the results presented in accordance with EN 13141-1:2019.

5.3.2 Equivalent area

The equivalent area shall be calculated and stated in accordance with EN 13141-1:2019.

5.3.3 Free area

The free area shall be calculated according to EN 13141-1:2019 with the product installed according to the declaration of instruction.

5.3.4 Acoustic characteristics

The acoustic characteristics shall be measured and the results presented in accordance with EN 13141-1:2019.

5.4 Exhaust and supply air terminal devices

5.4.1 Aerodynamic characteristics

The aerodynamic characteristics (pressure/flow rate curve and pressure loss coefficient) shall be measured and the results presented in accordance with EN 13141-2:2010 or EN 13141-10:2008.

5.4.2 Acoustic characteristics

The acoustic characteristics shall be measured and the results presented in accordance with EN 13141-2:2010 or EN 13141-10:2008.

5.4.3 Controls

Manually controllable devices shall be tested for aerodynamic characteristics in both fully open and fully closed positions.

Pressure or flow controlled devices shall be tested with the control allowed to operate normally.

NOTE Automatic control by humidity, occupancy or other stimuli is possible but there is no agreed test method for products with these types of control.

5.4.4 Air diffusion characteristics

For supply air terminal devices, the air diffusion characteristics shall be measured and the results presented in accordance with EN 13141-2:2010 or EN 13141-10:2008.

5.5 Range hoods

5.5.1 Aerodynamic characteristics

The air flow/pressure characteristics of range hoods which incorporate a fan shall be measured according to EN 61591:2019.

The pressure drop characteristics of range hoods without a fan shall be measured in accordance with the aerodynamic test methods for exhaust air terminal devices specified in EN 13141-3:2017.

5.5.2 Acoustic characteristics

The sound power levels produced at the inlet of range hoods incorporating a fan shall be measured according to EN 61591:2019.

The acoustic characteristics of range hoods without a fan, both noise production and noise attenuation, shall be measured and the results presented in accordance with the acoustic test methods for exhaust air terminal devices specified in EN 13141-3:2017.

5.5.3 Efficiency of grease absorption

The efficiency of absorption by the grease filter shall be measured and the results presented according to EN 61591:2019.

5.5.4 Effectiveness of odour extraction

The effectiveness of odour extraction of the range hood shall be measured and the results presented according to EN 13141-3:2017.

5.5.5 Electrical power input

If a fan is fitted in the range hood, the electrical power input of the motor shall be measured, and the power per unit air volume flow rate calculated, in accordance with EN 61591:2019.

5.5.6 Controllability

The function of the controls shall be indicated either on the range hood or in accompanying literature.

5.6 Exhaust or supply unidirectional ventilation units

5.6.1 Data input

The data given in Table 3 shall be given from EN 13141-4:2021.

Table 3 — Data from EN 13141-4:2021

Parameter	Symbol
Maximum air volume flow	q_{vmax}
Pressure at maximum air volume flow	p_{qvmax}
Maximum electric power input	$P_{E,max}$
Reference air volume flow	q_{vref}
Reference pressure	p_{ref}
Electric power input at the reference volume flow	$P_{E,ref}$
External leakage (ducted units only)	q_{ve}
Air flow sensitivity (non-ducted units only)	v
Indoor/outdoor airtightness (non-ducted units only)	q_{vio}
Sound power level of the noise radiated through the casing at reference air volume flow/reference pressure (ducted units only)	—
Radiative sound power in the indoor or outdoor space (non-ducted units only)	—

5.6.2 Declared data

The following data of the units given in Table 4 shall be declared.

Table 4 — Declared data

Parameter	Definition
Specified operation range of the unit	Declaration of maximum and minimum volume flow
Control factor CTRL	Declaration of the control factor, see Annex A
Typology of the product	Ducted or non-ducted
Typology of drive of the product	— On/off and single speed; or — 2-speed; or — Multi-speed; or — Variable speed
Reaction to fire (optional)	Declaration

5.6.3 General on classification

Subclauses 5.6.4 to 5.6.6 provide a classification scheme, which leads to a full definition of product properties based on the test methods described in EN 13141-4:2021.

It is applicable for ducted and non-ducted exhaust or supply unidirectional ventilation units in residential ventilation systems.

5.6.4 Aerodynamic characteristics

5.6.4.1 General

The aerodynamic characteristics shall be measured and the results presented according to EN 13141-4:2021.

The aerodynamic characteristics include:

- air volume flow/pressure curve;
- external leakage;
- air volume flow sensitivity; and
- indoor/outdoor airtightness for unidirectional non-ducted units.

5.6.4.2 Classification of external leakage rates

External leakages of ventilation units can impact ventilation efficiency of the system if the extract/supply air volume flow of the building is not the intended one. The impact depends on ventilation unit category according to EN ISO 5801:2017 and the location of the unit, inside or outside the building. In EN 13141-4:2021, Table 2 and Table 3 (external leakage for unidirectional exhaust or supply ventilation unit) refer to cases where external leakages shall be measured and reported, and cases where external leakages measurements are optional because external leakages don't affect building air volume flows and are already taken into account in electrical power consumption measurements.

External leakage rates at reference air volume flow shall be classified according to Table 5.

Table 5 — External leakage classification of ducted units

Class ^a	External leakage (at 250 Pa) %
A1	≤ 3
A2	≤ 7
A3	≤ 14
Not classified	> 14
^a Only one option is applicable.	

5.6.4.3 Air volume flow sensitivity classification of non-ducted units

The air volume flow sensitivity classification is given in Table 6.

Table 6 — Classification of air volume flow sensitivity to pressure difference variations of non-ducted units

Class ^a	Maximum deviation of air volume flow compared to maximum air volume flow %	
	+ 20 Pa	- 20 Pa
S1	≤ 10	≤ 10
S2	≤ 20	≤ 20
S3	≤ 30	≤ 30
Not classified	> 30	> 30
^a Only one option is applicable.		

5.6.4.4 Indoor/outdoor airtightness of the complete unit

The indoor/outdoor airtightness test shall be reported for non-ducted ventilation unit according to EN 13141-4:2021.

5.6.5 Energy**5.6.5.1 Specific Power Input and classification**

The parameters to calculate the Specific Power Input (SPI) (i.e. effective power input, $P_{E,ref}$, and reference air volume flow, q_{vref}) shall be measured and reported according to EN 13141-4:2021.

The Specific Power Input (SPI) for units suited for moderate climates includes electrical demand for fans, controller(s), compressor(s), safety devices of the equipment(s) excluding additional electrical heating devices not used for defrosting.

For filter and additional components declared by the manufacturer included in the product during the test, the following information shall be reported in the test report with SPI:

- for filter: the filter class (see EN ISO 16890-1:2016 EN ISO 16890-2:2016, EN ISO 16890-3:2016 and EN ISO 16890-4:2016); and
- for additional components: description of these components.

The SPI is calculated at reference air volume flow using Formula (1).

$$SPI = \frac{P_{E,ref}}{q_{vref}} \quad (1)$$

where

- SPI is the specific power input, in W/(m³/s);
- $P_{E,ref}$ is the electric power input at the reference volume flow (EN 13141-4:2021), in W;
- q_{vref} is the reference air volume flow (EN 13141-4:2021), in m³/s.

SPI shall be classified according to Table 7.

Table 7 — Classification of Specific Power Input (SPI)

Class ^a	Specific power input	
	non-ducted W/(m ³ /h) ^b	ducted W/(m ³ /h)
0	≤ 0,07	≤ 0,08
1	≤ 0,09	≤ 0,10
2	≤ 0,11	≤ 0,14
3	≤ 0,14	≤ 0,18
4	≤ 0,16	≤ 0,22
5	≤ 0,18	≤ 0,26
6	≤ 0,20	≤ 0,30
Not classified	> 0,20	> 0,30
^a Only one option is applicable. ^b Limit value in W/(m ³ /s) = 3 600 × limit value in W/(m ³ /h).		

5.6.5.2 Weighted energy efficiency parameters (optional)

The power consumption of the ventilation unit shall be measured according to EN 13141-4:2021, Annex D at least at maximum declared air volume flow and rated air volume flow and optional at full and/or part load. The following parameters can be calculated with the results obtained by the test:

— EE_w as described in EN 13141-4:2021, see the following Formula (2):

$$EE_w = \frac{q_{vref} \times \Delta p_{ref} \times \sum_i (F_i \times x_i)}{\sum_i (F_i \times P_i)} \quad (2)$$

where

- EE_w is the weighted energy efficiency;
- q_{vref} is the rated reference air volume flow, in m³/s;
- Δp_{ref} is the total rated pressure, in Pa;
- x_i is the value of part load of rated air volume flow;
- F_i is the value of occurrence frequency for part load weighting;
- P_i is the electrical power input measured at $q_{vi} = x_i \times q_{vref}$, in W.

- Weighted specific power input calculated according to Formula (3) with the parameters defined and measured according to EN 13141-4:2021:

$$SPI_w = \frac{1}{q_{vref}} \sum \frac{F_i \times P_i}{x_i} \quad (3)$$

where

- SPI_w is the weighted specific power input part load, in W(m³/s);
 q_{vref} is the rated reference air volume flow, in m³/s;
 x_i is the value of part load of rated air volume flow;
 F_i is the value of occurrence frequency for part load weighting;
 P_i is the electrical power input measured at $q_{vi} = x_i \times q_{vref}$, in W.

5.6.5.3 Electrical Power input in Operable Mode (POM) and classification

The electrical Power input in Operable Mode (POM) may be reported according to EN 13141-4:2021 and classified according to Table 8.

Table 8 — Classification of electrical Power input in Operable Mode (POM)

Class ^a	Electrical power input in operable mode W
1	≤ 2
2	≤ 5
3	≤ 10
4	≤ 15
Not classified or non-measured value	> 15
^a Only one option is applicable.	

5.6.5.4 Electrical Power input in Standby Mode (PSM) and classification

The electrical Power input in Standby Mode (PSM) may be reported according to EN 13141-4:2021 and classified according to Table 9.

Table 9 — Classification of electrical Power input in Standby Mode (PSM)

Class ^a	Electrical power input in standby mode W
1	$\leq 0,5$
2	≤ 1
3	≤ 2
4	≤ 5
Not classified or non-measured value	> 5
^a Only one option is applicable.	

5.6.6 Acoustic characteristics

5.6.6.1 Introduction

The acoustic characteristics shall be measured and the results presented according to EN 13141-4:2021.

5.6.6.2 General

Sound power level for classification shall be given at declared reference air volume flow according to EN 13141-4:2021.

5.6.6.3 Classification of noise emitted through the casing of the unit (for ducted unit only)

The noise emitted through the casing shall be tested according to EN 13141-4:2021 at reference air volume flow and can be classified according to Table 10.

Table 10 — Classification of casing sound power level (LWC) of the unit at reference flow

Class ^a	L_{WA} dB(A)
0	$L_{WA} < 30$
1	$30 \leq L_{WA} < 35$
2	$35 \leq L_{WA} < 40$
3	$40 \leq L_{WA} < 45$
4	$45 \leq L_{WA} < 55$
5	$55 \leq L_{WA} < 65$
Not classified	$L_{WA} > 65$
^a Only one option is possible.	

5.6.6.4 Classification of in-duct connection sound power level (for ducted unit only)

The noise emitted in the duct shall be tested according to EN 13141-4:2021 at reference air volume flow and classified according to Table 11.

Table 11 — Classification of in-duct connection sound power level (LWD at reference flow)

Class ^a	In-duct connection sound power level at reference flow L_{WA}			
	Exhaust unit		Supply unit	
	Extract air ETA	Exhaust air EHA	Supply air SUP	Outdoor air ODA
	dB(A)			
0	$L_{WA} < 30$			
1	$L_{WA} < 35$			
2	$35 \leq L_{WA} < 40$			
3	$40 \leq L_{WA} < 45$			
4	$45 \leq L_{WA} < 55$			
5	$55 \leq L_{WA} < 65$			
Not classified	$L_{WA} > 65$			
^a Only one option is possible.				

5.6.6.5 Classification of the noise emitted from the unit (for non-ducted unit only)

Radiative sound power level in the indoor or outdoor space from the unit shall be tested according to EN 13141-4:2021 and classified according to Table 12 and Table 13.

Table 12 — Classification of the radiative sound power level in the indoor space from the unit (LWC) at reference flow

Class ^a	$L_{WA,indoor}$ dB(A)
0	$L_{WA} < 25$
1	$25 \leq L_{WA} < 30$
2	$30 \leq L_{WA} < 35$
3	$35 \leq L_{WA} < 40$
4	$40 \leq L_{WA} < 45$
5	$45 \leq L_{WA} < 55$
Not classified	$L_{WA} \geq 55$ or not measured
^a Only one option is possible.	