BS EN 13142:2013

BSI Standards Publication

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

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## National foreword

This British Standard is the UK implementation of EN 13142:2013. It supersedes BS EN 13142:2004 which is withdrawn.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 secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.



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**Compliance with a British Standard cannot confer immunity from legal obligations.**

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

# EN 13142

March 2013

ICS 91.140.30

Supersedes EN 13142:2004

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 22 December 2012.

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This European Standard exists 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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# Contents

Page

# Foreword

This document (EN 13142:2013) 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of an identical text or by endorsement, at the latest by September 2013, and conflicting national standards shall be withdrawn at the latest by September 2013.

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

This document supersedes EN 13142:2004.

In comparison to EN 13142:2004 the following changes have been made:

— references to EN 13141-1 to 10 has been updated;

— reference to humidity controlled air transfer devices (EN 13141-9 and EN 13141-10) has been added;

— un-ducted mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for a single room (EN 13141-8) added in 4.10;

— creation of new classification and codification system for mechanical supply and exhaust ventilation units (EN 13141-7 and EN 1341-8), described in 4.9 and 4.10 and in Annex A;

— declaration of filters and materials used in the units has been added in 7.3;

— an example for a possible national annex has been added in Annex C.

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, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, 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.

There are many possible arrangements of balanced ventilation units with heat exchanger intended for a single family dwelling (EN 13141-7) or a single room (EN 13141-8). Additionally all kinds of units might have a heat exchanger, a heat pump or both.

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 European Standard 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.

**Table 1 — List of the type of 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 | — | — |
| Fans in residential ventilation systems | X | — | — |
| Cowls and roof outlet terminals | X | — | — |
| Exhaust ventilation system packages | X | — | — |
| Mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for single family dwellings | X | X | X |
| Un-ducted mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for a single room | X | X | X |

This European Standard (EN 13142:2013) 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 standard in the field of the mechanical building services is shown in Figure 1.

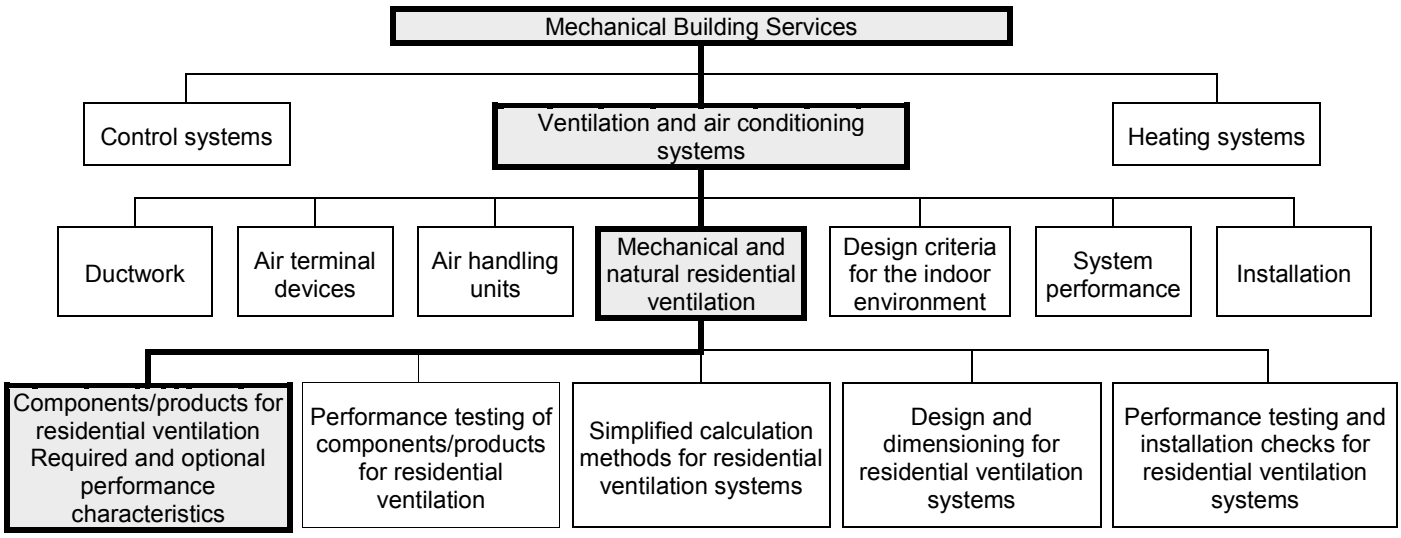



**Figure 1 — Position of EN 13142 in the field of the mechanical building services**

## 1 Scope

This European Standard specifies and classifies the component/product performance characteristics which may be necessary for the design and dimensioning of residential ventilation systems to provide the predetermined 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 national regulations.

The codification part in Annex A and the classification part in Clause 4 apply to the following products:

— mechanical supply and exhaust ventilation units for single dwellings according to EN 13141-7;

— un-ducted mechanical supply and exhaust ventilation units for a single room according to EN 13141-8.

This European Standard 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 European Standard does not cover requirements raised by European Directives, for example: low voltage directive, EMC directive and other requirements such as corrosion, resistance and snow penetration.

## 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 779, *Particulate air filters for general ventilation — Determination of the filtration performance*

EN 12097, *Ventilation for buildings — Ductwork — Requirements for ductwork components to facilitate maintenance of ductwork systems*

EN 12792:2003, *Ventilation for buildings — Symbols, terminology and graphical symbols*

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

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

EN 13141-3, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 3: Range hoods for residential use*

EN 13141-4, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 4: Fans used in residential ventilation systems*

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

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

EN 13141-7:2010, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 7: Performance testing of mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for single family dwellings*

EN 13141-8, *Ventilation for buildings — Performance testing of components/products for residential ventilation — Part 8: Performance testing of un-ducted mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for a single room*

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

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

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

EN 60355-2-31, *Household and similar electrical appliances — Safety — Part 2-31: Particular requirements for range hoods and other cooking fume extractors*

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 10140-3, *Acoustics — Laboratory measurement of sound insulation of building elements — Part 3: Measurement of impact sound insulation (ISO 10140-3)*

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

# 3 Terms, definitions and abbreviated terms

## 3.1 Terms and definitions

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

**3.1.1**
**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]

**3.1.2**
**internally mounted air transfer device**
device designed to allow the passage of air between two internal spaces

[SOURCE: EN 12792:2003, definition 232]

**3.1.3**
**exhaust air terminal device**
device through which air leaves the treated space

**3.1.4**
**supply air terminal device**
device through which air enters the treated space

Note 1 to entry: Adapted from EN 12792:2003, definition 349.

**3.1.5**
**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]

**3.1.6**
**cowl**
air terminal device, with or without moving components, which is intended to use the wind to create negative pressures above the roof in order to avoid reverse flow in the duct

Note 1 to entry: Adapted from EN 12792:2003, definition 92.

**3.1.7**
**roof outlet**
air terminal device used for mechanical ventilation systems

Note 1 to entry: Roof outlet terminals are not primarily intended to use the wind to create negative pressures above the roof.

Note 2 to entry: Adapted from EN 12792:2003, definition 314.

**3.1.8**
**ventilation system package (for a single dwelling)**
combination of compatible components which are tested, delivered and installed as specified by the manufacturer, 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.

**3.1.9**
**humidity control air device**
device designed to allow the passage of air, with moving parts which interact with a change in local humidity conditions

## 3.2 Abbreviated terms

For the purposes of this document, the following abbreviated terms apply.

| | |
|---|---|
| AEQ | Codification of Additional Equipment |
| DIU | Declared Intended Use |
| HRS | Humidity Ratio on Supply air side |
| LWC | Casing sound power level |
| MFB | Mass Flow Balance |
| NTPF | Nominal Temperature Performance Factor |
| POM | Power input in Operable Mode |

PES Primary Energy Saving

PSM Power input in Standby Mode

TRE Temperature Ratio on the Exhaust air side

TRS Temperature Ratio on Supply air side

VUE Ventilation Unit Efficiency

# 4 Performance characteristics for residential ventilation components/products

## 4.1 General

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

## 4.2 Externally mounted air transfer devices

### 4.2.1 Aerodynamic characteristics

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

### 4.2.2 Equivalent area

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

### 4.2.3 Free area

The free area shall be calculated according to EN 13141-1 and EN 13141-9 with the product in the fully open position and installed according to the manufacturer's instruction.

### 4.2.4 Controls

The manufacturer 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 when fully closed shall be stated under the same test conditions as for the fully open 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.

### 4.2.5 Air diffusion

These characteristics shall be measured and the results presented in accordance with EN 13141-1 and EN 13141-9.

#### 4.2.6 Acoustic characteristics

These characteristics shall be measured and the results presented in accordance with EN 13141-1 and EN 13141-9.

#### 4.2.7 Water penetration

Products shall be tested when closed in accordance with EN 13141-1 and EN 13141-9.

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

### 4.3 Internally mounted air transfer devices

#### 4.3.1 Aerodynamic characteristics

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

#### 4.3.2 Equivalent area

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

#### 4.3.3 Free area

The free area shall be calculated according to EN 13141-1 with the product installed according to the manufacturer's instructions.

#### 4.3.4 Acoustic characteristics

These characteristics shall be measured and the results presented in accordance with EN 13141-1.

### 4.4 Exhaust and supply air terminal devices

#### 4.4.1 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 and EN 13141-10.

#### 4.4.2 Acoustic characteristics

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

#### 4.4.3 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.

#### 4.4.4 Air diffusion characteristics

For supply air terminal devices, the air diffusion characteristics shall be measured and the results presented in accordance with EN 13341-2 and EN 13141-10.

### 4.5 Range hoods

#### 4.5.1 Aerodynamic characteristics

The air flow/pressure characteristics of range hoods which incorporate a fan shall be measured according to EN 13141-3.

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 13141-2.

#### 4.5.2 Acoustic characteristics

The sound power levels produced at the inlet of range hoods incorporating a fan shall be measured according to EN 13141-3.

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 13141-2.

#### 4.5.3 Efficiency of grease absorption

The efficiency of absorption by the grease filter shall be measured and the results presented according to EN 13141-3.

#### 4.5.4 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.

#### 4.5.5 Electrical power

If a fan is fitted, the electrical power of the motor shall be measured, and the power per unit air volume flow rate calculated, in accordance with EN 13141-3.

#### 4.5.6 Controllability

The manufacturer shall indicate the function of the controls either on the range hood or in accompanying literature.

### 4.6 Fans used in residential ventilation systems

#### 4.6.1 Aerodynamic characteristics

The pressure/flow rate characteristic shall be measured and the results presented according to EN 13141-4.

#### 4.6.2 Acoustic characteristics

The sound power levels produced by fans shall be measured and the results presented according to EN 13141-4.

#### 4.6.3 Electrical power

The power supply of the fan shall be measured according to EN 13141-4 at full and/or part load. The following parameters can be calculated with the results obtained by the test:

— $EEw$ as described in EN 13141-4, i.e.

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

where

$EEw$ is the weighted energy efficiency;

$q_{vref}$ is the reference air volume flow, in $m^3.s^{-1}$;

$\Delta p_{ref}$ is the total reference pressure, in Pa;

$x_i$ is the value of part load of reference air volume flow;

$F_i$ is the value of occurrence frequency for part load weighting;

$P_i$ is the electrical power measured at $qv_i = x_i \times qv_{ref}$, in W.

— Weighted specific power input calculated according to the formula below with the parameters defined and measured according to EN 13141-4:

$$SPI_W = \frac{1}{q_{vref}} \sum \frac{F_i \times P_i}{x_i}$$

where

$SPIw$ is the weighted specific power input part load;

$q_{vref}$ is the reference air volume flow, in $m^3.s^{-1}$;

$x_i$ is the value of part load of reference air volume flow;

$F_i$ is the value of occurrence frequency for part load weighting;

$P_i$ is the electrical power measured at $qv_i = x_i \times qv_{ref}$, in W.

## 4.7 Cowls and roof outlet terminals

### 4.7.1 Pressure drop

Pressure drop characteristic shall be measured and the results presented in accordance with EN 13141-5.

### 4.7.2 Free area

The free area of the device shall be determined and the results presented in accordance with EN 13141-5.

### 4.7.3 Suction effect

Suction effect characteristic shall be measured and the results presented in accordance with EN 13141-5.

### 4.7.4 Acoustic characteristics

Fan assisted cowl shall be tested as fan (see 4.6) when the fan is running and as cowl when the fan is not running.

## 4.8 Exhaust ventilation system packages used in a single dwelling

### 4.8.1 General

An exhaust ventilation system package shall contain at least a fan, ducts, duct fittings (bends, branches, reducers, etc.), exhaust air terminals, an outlet terminal and control devices.

The manufacturer shall state the intended application of the package and give written installation instructions stating the performance limits of the installed system.

### 4.8.2 Characteristics

#### 4.8.2.1 Aerodynamic characteristics

The aerodynamic characteristics of the assembled system shall be measured according to EN 13141-6.

#### 4.8.2.2 Acoustic characteristics

The acoustic characteristics of the assembled system shall be measured according to EN 13141-6.

#### 4.8.2.3 Electrical power

For each configuration the electrical power of the fan motor shall be measured and the motor power per unit air volume flow rate calculated in accordance with EN 13141-6.

## 4.9 Mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for single family dwellings

### 4.9.1 Declaration of Intended Use

The manufacturer shall declare the intended use of the units (DIU) which includes the aspects given in Table 2.

**Table 2 — Declaration of intended use (DIU)**

| Option [a] | Characteristic | Declaration |
|---|---|---|
| 1 | Total pressure at maximum air volume flow | Maximum total pressure according to EN 13141-7<br>If less, maximum shall be declared |
| 2 | Maximum air volume flow | Deduction from air flow/pressure curves according to EN 13141-7 |
| 3 | Reference air volume flow<br>(mass flow balanced unit through the heat exchanger, closed bypass) | Reference air volume flow is deducted at 50 Pa from fan curves(approx. 70 % of maximum air volume flow) |
| 4 | Minimum air volume flow | Declaration of manufacturer |
| 5 | Suitability for cold climates | Cold climate test - 15 °C according to EN 13141-7 |
| 6 | Nominal disbalance of the flows<br>(in case the unit is designed for disbalanced use) | Percentage of supply air volume flow to extract air volume flow at reference air volume flow |
| 7 | Fire resistance | Declaration of manufacturer |
| [a] More than one option is possible. | | |

### 4.9.2 General on classification

This subclause provides a classification scheme, which leads to a full definition of product properties based on the test methods described in EN 13141-7.

In a national annex (example in Annex C), member states shall be entitled to define the minimum or optional characteristic based on the scheme defines in this subclause.

It is applicable for mechanical supply and exhaust ventilation units including heat recovery for mechanical ventilation systems intended for a single family dwelling.

### 4.9.3 Aerodynamic characteristics

#### 4.9.3.1 General

The aerodynamic characteristics (including declared maximum air volume flow, air flow/pressure curve, external leakage, internal leakage, leakage class) shall be measured and the results presented according to EN 13141-7.

#### 4.9.3.2 Classification of leakage rates

Leakage rates according to EN 13141-7 at maximum declared air volume flow shall be reported according to Table 3, Table 4 or Table 5 depending on the selected method.

**Table 3 — Leakage classification – Pressure method EN 13141-7**

| **Class** [a] | **Pressurization test** | | |
|---|---|---|---|
| | **Internal leakage** (at 100 Pa) % | **and/or** | **External leakage** (at 250 Pa) % |
| A1 | ≤ 2 | and | ≤ 2 |
| A2 | ≤ 5 | and | ≤ 5 |
| A3 | ≤ 10 | and | ≤ 10 |
| Not classified | > 10 | or | > 10 |
| [a] Only one class is applicable. | | | |

**Table 4 — Leakage classification – Chamber tracer gas method EN 13141-7**

| **Class** [a] | **Total recirculated fraction in supply air** $R_{s,tot}$ % |
|---|---|
| B1 | ≤ 1 |
| B2 | ≤ 2 |
| B3 | ≤ 6 |
| Not classified | > 6 |
| [a] Only one class is applicable. | |

**Table 5 — Leakage classification – In-duct tracer gas method EN 13141-7**

| Class [a] | Tracer gas test | and/or | Pressurisation test |
|---|---|---|---|
| | **Internal recirculated fraction in supply air** $R_{s,int}$ % | | **External leakage** (at 250 Pa) % |
| C1 | ≤ 0,5 | and | ≤ 2 |
| C2 | ≤ 2 | and | ≤ 2 |
| C3 | ≤ 4 | and | ≤ 2 |
| Not classified | > 4 | or | > 2 |
| [a] Only one class is applicable. | | | |

Where tests with different methods on a single unit result in different classes, the product shall receive the higher/worst classification. According to this, the unit has only one of the alternative leakage classes.

The tests for air flow/pressure curve and thermal performances shall not be made if the unit is not classified because of measurement uncertainty.

#### 4.9.3.3 Classification of Mass Flow Balance

During test procedures according to EN 13141-7, the balance of the units (MFB) shall be measured and the disbalance shall be calculated using the following formula and classified according to Table 6.

Disbalance:

$$DIS = \frac{q_{m22} - q_{m11}}{q_{m22}} \times 100\ \%$$

where

$DIS$ is the disbalance of the unit, in %;

$q_m$ is the mass air flow rate for supply air (22) or extract air (11), in kg.s$^{-1}$.

**Table 6 — Classification of mass flow balance (MFB)**

| Type | Class [a] | Disbalance of exhaust mass flow<br>*DIS*<br>% |
|---|---|---|
| Balanced | 1 | ± 3 |
| Unbalanced Systems | 2 | ± 6 |
| | 3 | ± 10 |
| | 4 | ± 20 |
| | 5 | ± 30 |
| | 6 | ± 50 |
| | Not classified | > 50 |
| [a] Only one option is possible. | | |

### 4.9.4 Thermal characteristics

#### 4.9.4.1 General

The thermal characteristics (including temperature ratios, cold climate performances) shall be measured and the results presented according to EN 13141-7.

#### 4.9.4.2 Classification of Temperature Ratio

The Temperature Ratio on Supply air side (TRS) shall be classified. The classification of Temperature Ratio on the Exhaust air side (TRE) is optional.

The value of temperature ratios shall be documented at reference air volume flow according to EN 13141-7 and the classification determined according to Table 7.

**Table 7 — Classification of temperature ratio at reference air volume flow**

| Type | Class | Temperature Ratio<br>% |
|---|---|---|
| **TRS** - Supply air Side<br>**TRE** - Exhaust air side | 1 | ≥ 90 |
| | 2 | 80 - 89 |
| | 3 | 70 - 79 |
| | 4 | 60 - 69 |
| | 5 | 50 - 59 |
| | Not classified | < 50 |

#### 4.9.4.3 Classification of humidity ratio

The humidity ratio shall be classified only if humidity recovery occurs.

The Humidity Ratio on Supply air side (HRS) shall be classified. The classification of Humidity Ratio on the Exhaust air side (HRE) is optional. The classification of humidity ratio is given in Table 8.

**Table 8 — Classification of humidity ratio**

| Type | Class | Humidity ratio % |
|---|---|---|
| **HRS** - Supply air Side<br>**HRE** - Exhaust air side | I | ≥ 90 |
| | II | 80 - 89 |
| | III | 70 - 79 |
| | IV | 60 - 69 |
| | V | 50 - 59 |
| | Not classified | < 50 |

### 4.9.5 Energy

#### 4.9.5.1 Specific Power Input and classification

The Specific Power Input shall be measured and reported according to EN 13141-7.

The Specific Power Input (SPI) for units suited for moderate climates includes electrical demand for fans and controls (including remote control and heat pump if installed, not including defrosting, pre-heating and after-heating). SPI is calculated at nominal air volume flow (also named reference air volume flow) at mandatory air measurement point 1 from $P_E$.(EN 13141-7) using the following formulae.

$$SPI = \frac{P_E}{q_{v,averageSU}}$$

where

$SPI$ is the specific power input, in W/(m$^3$.s$^{-1}$);

$P_E$ is the effective power input, in W;

$q_{v,averageSU}$ is the average volume flow rate on supply air side, in m$^3$.s$^{-1}$.

$$q_{v,averageSU} = \frac{(q_{vn11} + q_{vn22})}{2}$$

where

$q_{v,averageSU}$ is the average volume flow rate on supply air side, in m$^3$.s$^{-1}$;

$q_{vn}$ is the nominal air volume flow for supply air (22) or extract air (11), in m$^3$.s$^{-1}$.

$SPI$ shall be classified according to Table 9.

**Table 9 — Classification of specific power input (SPI)**

| Class [a] | Specific power input | |
|---|---|---|
| | $W/(m^3.s^{-1})$ | $W/(m^3/h)$ |
| 1 | ≤ 900 | ≤ 0,25 |
| 2 | ≤ 1 260 | ≤ 0,35 |
| 3 | ≤ 1 620 | ≤ 0,45 |
| 4 | ≤ 1 980 | ≤ 0,55 |
| 5 | ≤ 2 340 | ≤ 0,65 |
| 6 | ≤ 2 700 | ≤ 0,75 |
| Not classified | > 2 700 | > 0,75 |
| [a] Only one option is applicable. | | |

#### 4.9.5.2 Electrical Power in Operable Mode and classification

The Power input in Operable Mode (POM) shall be classified according to Table 10.

Operable mode means a mode in which the fans are not operating and controls components are still active (necessary for function of the unit internal or external) according to EN 13141-7:2010, 6.5.

**Table 10 — Classification of power in operable mode (POM)**

| Class [a] | Power in operable mode<br>W |
|---|---|
| 1 | ≤ 2 |
| 2 | ≤ 5 |
| 3 | ≤ 10 |
| 4 | ≤ 15 |
| Not classified | > 15 |
| [a] Only one option is applicable. | |

#### 4.9.5.3 Electrical Power in Standby Mode and classification

The Power input in Standby Mode (PSM) shall be classified according to Table 11.

Standby Mode means a mode manually switched off with a switch inside the unit or with any remote control system and if the end of this mode is also given by a manual action according to EN 13141-7:2010, 6.5.

**Table 11 — Classification of Power in standby Mode (PSM)**

| Class [a] | Power in standby mode<br>W |
|---|---|
| 1 | ≤ 0,5 |
| 2 | ≤ 1 |
| 3 | ≤ 2 |
| 4 | ≤ 5 |
| Not classified | > 5 |
| [a] Only one option is applicable. | |

#### 4.9.5.4 Nominal Temperature Performance Factor and classification

The Nominal Temperature Performance Factor at reference air volume flow (NTPF) shall be calculated using the following formula and classified according to Table 12.

$$NTPF = \frac{\eta_{\Theta,su} \times \rho \times c_p \times \Delta\theta}{SPI}$$

where

$NTPF$ is the Nominal Temperature Performance Factor at reference air volume flow;

$\eta_{\Theta,su}$ is the temperature ratio according to EN 13141-7;

$\rho$ is the air density, 1,2 kg/m$^3$;

$C_p$ is the heat capacity, 1 007 J/kg K;

$\Delta\theta$ is the nominal temperature difference (EN 13141-7:2010, mandatory point, Table 6, no. 1), 13 K;

$SPI$ is the specific power input, W/(m$^3$.s$^{-1}$).

**Table 12 — Classification of Nominal Temperature Performance Factor (NTPF)**

| Class [a] | Temperature performance factor |
|---|---|
| 1 | ≥ 15 |
| 2 | ≥ 12 |
| 3 | ≥ 10 |
| 4 | ≥ 8 |
| 5 | ≥ 5 |
| Not classified | < 5 |
| [a] Only one option is possible. | |

### 4.9.6 Acoustic characteristics

#### 4.9.6.1 Introduction

The acoustic characteristics shall be measured and the results presented according to EN 13141-7.

#### 4.9.6.2 General

Sound power level for classification shall be given at declared maximum air volume flow according to EN 13141-7. For units according to EN 13141-7 with heat pump, the sound power lever shall be measured at mandatory point no. 1, EN 13141-7:2010, Table 6.

#### 4.9.6.3 Classification of noise emitted through the casing of the unit

The noise emitted through the casing shall be tested according to EN 13141-7 and classified according to Table 13.

**Table 13 — Classification of Casing sound power level of single dwelling unit (LWC)**

| **Class** [a] | $L_{WA}$ dB(A) |
|---|---|
| 1 | < 35 |
| 2 | 35 - 40 |
| 3 | 40 - 45 |
| 4 | 45 - 55 |
| 5 | 55 - 65 |
| Not classified | > 65 |
| [a] Only one option is possible. | |

#### 4.9.6.4 Classification of in-duct connection sound power level

The noise emitted in the duct shall be tested according to EN 13141-7 and classified according to Table 14.

**Table 14 — Classification of in-duct connection sound power level (LWD)**

| **Class** [a] | **Supply air** SUP | **Extract air** ETA | **Outdoor air** ODA | **Exhaust air** EHA |
|---|---|---|---|---|
| | $L_{WA}$ dB(A) | | | |
| 1 | < 35 | | | |
| 2 | 35 - 40 | | | |
| 3 | 40 - 45 | | | |
| 4 | 45 - 55 | | | |
| 5 | 55 - 65 | | | |
| Not classified | > 65 | | | |
| [a] Only one option is possible. | | | | |

## 4.10 Un-ducted mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for a single room

### 4.10.1 Declaration of Intended Use

The manufacturer shall declare the intended use of the units (DIU) which includes the aspects given in Table 15.

**Table 15 — Declaration of intended use (DIU)**

| Option [a] | Characteristic | Requirement |
|---|---|---|
| 1 | Static pressure at Maximum air volume flow | — |
| 2 | Maximum air volume flow | Declaration |
| 3 | Reference air volume flow (mass flow balanced unit through the heat exchanger, closed bypass) | Reference is 70 % from maximum (or closest to 70 %) |
| 4 | Minimum air volume flow | Declaration of manufacturer |
| 5 | Suitability for cold climates | Cold climate test - 15 °C |
| 6 | Nominal disbalance of the unit (in case the unit is designed for disbalanced use) | Percentage of disbalance at reference air volume flow |
| 7 | Fire resistance | Declaration of manufacturer |
| [a] More than one option is possible. | | |

### 4.10.2 General on classification

This subclause provides a classification scheme, which leads to a full definition of product properties based on the test methods described in EN 13141-8. In a national annex (example in Annex C), member states shall be entitled to define the minimum or optional characteristic based on the scheme defined in this subclause.

It is applicable for unducted mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for a single room.

### 4.10.3 Aerodynamic characteristics

#### 4.10.3.1 General

The aerodynamic characteristics (including declared maximum air volume flow, air flow/pressure curve, external leakage, internal leakage, leakage class) shall be measured and the results presented according to EN 13141-8.

#### 4.10.3.2 Classification of leakage rates

Leakage rates according to EN 13141-8 at maximum declared air volume flows shall be reported according to Table 16.

**Table 16 — Leakage classification for single room units**

| Class | Internal leakage<br>% | | Outdoor mixing<br>% | | Indoor mixing<br>% | | External leakage at 50 Pa<br>% |
|---|---|---|---|---|---|---|---|
| U1 | ≤ 2 | and | ≤ 2 | and | ≤ 2 | and | ≤ 2 |
| U2 | ≤ 5 | and | ≤ 5 | and | ≤ 5 | and | ≤ 5 |
| U3 | ≤ 10 | and | ≤ 10 | and | ≤ 10 | and | ≤ 10 |
| not classified | >10 | or | >10 | or | >10 | or | >10 |

#### 4.10.3.3 Classification of Mass Flow Balance

During test procedures according to EN 13141-8, the balance of the units (MFB) shall be measured and the disbalance (DIS) shall be calculated using the following formula and classified according to Table 17.

Disbalance:

$$DIS = \frac{q_{m22} - q_{m11}}{q_{m22}} \times 100 \ \ \%$$

where

$DIS$ is the disbalance of the unit, in %;

$q_m$ is the mass air flow rate for supply air (22) or extract air (11), in kg.s$^{-1}$.

**Table 17 — Classification of mass flow balance (MFB)**

| Type | Class [a] | Disbalance of exhaust mass flow<br>$DIS$<br>% |
|---|---|---|
| Balanced | 1 | ± 3 |
| Unbalanced Systems | 2 | ± 6 |
| | 3 | ± 10 |
| | 4 | ± 20 |
| | 5 | ± 30 |
| | 6 | ± 50 |
| | Not classified | > 50 |

[a] Only one option is possible.

### 4.10.4 Thermal characteristics

#### 4.10.4.1 General

The thermal characteristics (including temperature ratios, cold climate performances) shall be measured and the results presented according to EN 13141-8.

#### 4.10.4.2 Classification of Temperature ratio

The Temperature Ratio on Supply air side (TRS) shall be classified. The classification of Temperature Ratio on the Exhaust air side (TRE) is optional. The classification of temperature ratio at reference air volume flow is given in Table 18.

**Table 18 — Classification of temperature ratio at reference air volume flow**

| Type | Class | Temperature Ratio % |
|---|---|---|
| **TRS** - Supply air Side<br>**TRE** - Exhaust air side | 1 | ≥ 90 |
| | 2 | 80 - 89 |
| | 3 | 70 - 79 |
| | 4 | 60 - 69 |
| | 5 | 50 - 59 |
| | Not classified | < 50 |

#### 4.10.4.3 Classification of humidity ratio

The humidity ratio shall be classified only if humidity recovery occurs.

The Humidity Ratio on Supply air side (HRS) shall be classified. The classification of Humidity Ratio on the Exhaust air side (HRE) is optional. The classification of humidity ratio is given in Table 19.

**Table 19 — Classification of humidity ratio**

| Type | Class | Humidity ratio % |
|---|---|---|
| **HRS** - Supply air Side<br>**HRE** - Exhaust air side | I | ≥ 90 |
| | II | 80 - 89 |
| | III | 70 - 79 |
| | IV | 60 - 69 |
| | V | 50 - 59 |
| | Not classified | < 50 |

### 4.10.5 Energy

#### 4.10.5.1 Specific Power Input and classification

The specific power input shall be measured and reported according to EN 13141-8.

The Specific Power Input (SPI) for units suited for moderate climates includes electrical demand for fans and controls (including remote control and heat pump if installed, not including defrosting, pre-heating and after-heating). SPI is calculated at reference air volume flow from $P_E$ (EN 13141-8) using the following formulae.

$$SPI = \frac{P_E}{q_{v,averageSU}}$$

where

$SPI$ is the specific power input, in W/($m^3.s^{-1}$);

$PE$ is the effective power input, in W;

$q_{v,averageSU}$ is the average volume flow rate on supply air side, in $m^3.s^{-1}$.

$$q_{v,averageSU} = \frac{(q_{vn11} + q_{vn22})}{2}$$

where

$q_{v,averageSU}$ is the average volume flow rate on supply air side, in $m^3.s^{-1}$;

$q_{vn}$ is the nominal air volume flow for supply air (22) or extract air (11), in $m^3.s^{-1}$.

SPI shall be classified according to Table 20.

**Table 20 — Classification of specific power input (SPI)**

| Class [a] | Specific power input | |
|---|---|---|
| | W/($m^3.s^{-1}$) | W/($m^3$/h) |
| 1 | ≤ 900 | ≤ 0,25 |
| 2 | ≤ 1 260 | ≤ 0,35 |
| 3 | ≤ 1 620 | ≤ 0,45 |
| 4 | ≤ 1 980 | ≤ 0,55 |
| 5 | ≤ 2 340 | ≤ 0,65 |
| 6 | ≤ 2 700 | ≤ 0,75 |
| Not classified | > 2 700 | > 0,75 |
| [a] Only one option is applicable. | | |

#### 4.10.5.2 Electrical Power in Operable Mode and classification

The Power input in Operable Mode (POM) shall be classified according to Table 21.

Operable mode means a mode in which the fans are not operating and controls components are still active (necessary for function of the unit internal or external) while fulfilling the entire chosen method as described in EN 13141-7:2010, 6.5.

**Table 21 — Classification of power in operable mode (POM)**

| Class [a] | Power in operable mode W |
|---|---|
| 1 | ≤ 2 |
| 2 | ≤ 5 |
| 3 | ≤ 10 |
| 4 | ≤ 15 |
| Not classified | > 15 |
| [a] Only one option is applicable. | |

#### 4.10.5.3 Electrical Power in Standby mode and classification

The Power input in Standby Mode (PSM) shall be classified according to Table 22.

Standby Mode means a mode manually switched off with a switch inside the unit or with any remote control system and if the end of this mode is also given by a manual action while fulfilling the entire chosen method as described in EN 13141-7:2010, 6.5.

**Table 22 — Classification of Power in standby Mode (PSM)**

| Class [a] | Power in standby mode W |
|---|---|
| 1 | ≤ 0,5 |
| 2 | ≤ 1 |
| 3 | ≤ 2 |
| 4 | ≤ 5 |
| Not classified | > 5 |
| [a] Only one option is applicable. | |

#### 4.10.5.4 Nominal Temperature Performance Factor and classification

The Nominal Temperature Performance Factor at reference air volume flow (NTPF) shall be calculated using the following formula and classified according to Table 23.

$$NTPF = \frac{\eta_{\Theta,su} \times \rho \times c_p \times \Delta\theta}{SPI}$$

where

$NTPF$ is the Nominal Temperature Performance Factor at reference air volume flow;

$\eta_{\Theta,su}$ is the temperature ratio according to EN 13141-8;

$\rho$ is the air density, 1,2 kg/m$^3$;

$C_p$ is the heat capacity, 1 007 J/kg K;

$\Delta\theta$ is the nominal temperature difference (in analogy to EN 13141-7:2010, mandatory point, Table 6, no. 1), 13 K;

$SPI$ is the specific power input, in W/($m^3$.$s^{-1}$).

**Table 23 — Classification Nominal Temperature Performance Factor (NTPF)**

| Class [a] | Temperature performance factor |
|---|---|
| 1 | ≥ 15 |
| 2 | ≥ 12 |
| 3 | ≥ 10 |
| 4 | ≥ 8 |
| 5 | ≥ 5 |
| Not classified | < 5 |
| [a] Only one option is possible. | |

### 4.10.6 Acoustics

#### 4.10.6.1 Introduction

The acoustic characteristics shall be measured and the results presented according to EN 13141-8.

#### 4.10.6.2 General

The acoustic characteristics for classification shall be measured and given at reference air volume flow according to EN 13141-8.

#### 4.10.6.3 Noise emitted from the unit

The noise emitted from the unit shall be tested according to EN 13141-8 and classified according to Table 24.

**Table 24 — Classification of sound power level emitted from the single room unit (LWC)**

| Class [a] | $L_{WA}$ dB(A) |
|---|---|
| 1 | <30 |
| 2 | 30 – 34 |
| 3 | 35 – 39 |
| 4 | 40 – 44 |
| 5 | 45 – 54 |
| Not classified | ≥ 55 or not measured |
| [a] Only one option is possible. | |

#### 4.10.6.4 Sound transmitting resistance and classification

The sound transmitting resistance $D_{n,e,w} + C_{tr}$ for single room units shall be measured according to EN ISO 10140-1, EN ISO 10140-2, EN ISO 10140-3 and EN ISO 10140-5 and classified according to Table 25.

Boundary conditions for measurement:

— unit operating at reference air volume flow;

— installation according declaration of the manufacturer. In case there are different ways of installation and accessory, the values shall be given for each.

**Table 25 — Classification of sound transmitting resistance (STR)**

| Class [a] | Sound transmitting resistance |
|---|---|
| | $D_{n,e,w} + C_{tr}$ dB |
| 1 | ≥ 50 |
| 2 | ≥ 45 |
| 3 | ≥ 40 |
| 4 | ≥ 35 |
| Not classified | < 35 or not measured |
| [a] Only one option is possible. | |

## 5 Manual, cleaning and maintenance

### 5.1 Manual

The manufacturer shall provide the guidelines and the description of the intended use unit especially taking into account the following aspects:

— outdoor air quality;

— hygienic;

— energy impact.

The following elements shall also be provided for the unit:

— lay-out drawings;

— dimensions;

— weight.

### 5.2 Cleaning and maintenance

The following aspects of cleaning and maintenance shall be documented:

a) facilities for cleaning of ductwork components (see EN 12097);

b) ease of removal of filters for cleaning (e.g. a grease filter in a range hood);

c) ease of removal, for cleaning, of those parts of exhaust air terminal devices which affect the aerodynamic performance of the product. The removal method shall be such that any air flow setting and other characteristics are not disturbed when the part is removed and replaced. This also applies to terminal fans;

d) ease of access to those parts of fans which require cleaning to maintain the aerodynamic characteristics;

e) measures to avoid the blockage of cowls and roof outlets by leaves or nesting material and to prevent the entry of rodents. This also applies to terminal fans;

f) resistance to weather (e.g. rain or snow entry, corrosion and the effects of ultra violet light) for products mounted on the outside of the building.

### 5.3 Check of maintenance criteria

The ease of use and an easy maintenance of the unit is an important product property and shall be documented according to all following criteria:

a) air stream surfaces of the unit accessible;

b) air stream surfaces accessible for wet cleaning;

c) easy filter change without the need of tools;

d) availability of maintenance manual;

e) components easy to clean or to replace.

## 6 Marking, labelling and product information

The method of marking shall enable the identification of the product for handling by the installer and user.

Each product shall be marked with its characteristic parameters and the following information:

— manufacturer's or supplier's trade mark or identification mark;

— model or type number;

— voltage and maximum electrical power consumption where appropriate.

The following additional characteristic values when given for individual products shall be indicated (they may be in accompanying literature, instructions, packaging, etc.).

Characteristics shall be determined as defined in Clause 5.

a) Externally mounted air transfer devices, internally mounted air transfer devices and exhaust air terminals:

   1) free area;

   2) nominal air flow rate and corresponding pressure difference;

   3) whether closable or non-closable or pressure controlled;

   4) acoustic performances.

NOTE The nominal air flow rate and the corresponding pressure difference, or free area, may also be marked on the product.

b) Range hoods:

1) marked in accordance with EN 60355-2-31;

2) nominal air flow rate;

3) all parameters of integral filters;

4) acoustic performance.

c) Fans:

1) air flow rate/pressure performance;

2) acoustic performance.

d) Cowls and roof outlet terminals:

1) pressure drop;

2) free area;

3) suction effect;

4) performance of fan assisted cowls.

e) Ventilation system packages

Individual components shall be marked as if they were supplied as individual item. The following marking relates only to the package and shall appear only on labelling, manufacturer's literature and packaging.

1) air flow rate/pressure performance;

2) acoustic performance;

3) exhaust and supply air terminal device.

f) Mechanical exhaust and supply unit:

1) leakage class, internal and external leakage;

2) airflow rate/pressure performances;

3) filter bypass leakage;

4) temperature ratios;

5) performance at low outdoor air temperature (cold climate test EN 13141-7:2010, Table 6);

6) acoustic performance.

g) Balanced ventilation for single room

1) leakage class, internal and external leakage;

2) airflow rate/pressure performances;

3) filter bypass leakage;

4) temperature ratios;

5) performance at low outdoor air temperature;

6) acoustic performance.

# 7 Declaration and codification of mechanical supply and exhaust ventilation units

## 7.1 General

This clause provides a codification scheme, which leads to a full definition of product properties based on declarations and validity check. Examples are given in Annex B and Table B.1.

The declaration and codification is valid for:

— centralised balanced ventilation units with heat recovery for a single dwelling SDHR defined in the scope of EN 13141-7;

— unducted balanced ventilation units with heat recovery for a single room SRHR defined in the scope of EN 13141-8.

## 7.2 Filter

All the filters that are part of the unit shall be declared.

The filter classes for both exhaust and supply air stream shall be declared according to EN 779 (that means G2, G3, F7, etc.).

NOTE A test method for assessing the performance of adsorbent filters is currently under development and referenced prEN ISO 10121-1 and prEN ISO 10121-2.

The units have to be equipped with the declared filters during the test procedures according to EN 13141-7 and EN 13141-8.

## 7.3 Materials

### 7.3.1 Fire resistance

Provided that there is no conflict with the member states local fire regulations, the material and components (heat recovery, casing, controls) classified according to EN 13501-1 classes shall be accepted without any restriction in all European Member States.

If the fire resistance of the components is declared, the materials and components of ventilation units SRHR and SDHR shall be classified according to the requirements of EN 13501-1 or local fire regulations.

The fire resistance class of the materials for the components specified in Table 26 shall be documented.

**Table 26 — Component list – Fire resistance class**

| Component |
|---|
| Heat exchanger |
| Casing |
| Fan |
| Inner surface casing in airstream |
| Filters |
| Important internal arrangements |

### 7.3.2 Hygiene and health

Materials in airstream shall have a non porous surface (that does not mean functional surfaces like humidity recovery systems) and shall not release particles in the supply air stream.

A security data sheet of the material for the components of the unit listed in Table 27 shall be provided.

**Table 27 — Component list – Security data sheet of the material**

| Component |
|---|
| Heat recovery |
| Heat exchanger |
| Fan |
| Inner surface casing in airstream |
| Filters |
| Sealings |

# Annex A
(informative)

# Additional check list for declaration and codification for supply and exhaust units

## A.1 Filter bypass leakage (not applicable to filter classes G1 to G4)

Due to the fact that filter bypass leakage measurement in small units is a difficult test to perform, it is possible to declare a visual inspection of design details (FBL 1) given in Table A.1.

**Table A.1 — Codification of filter bypass leakage only for single dwelling units**

| Option | Properties | Proof |
|---|---|---|
| FBL 1 | EN 13141-7<br>1 Design and construction of the air filters and frames shall allow an easy assembly and ensuring a tight fit.<br>2 Tight fit shall not be affected by the impact of humidity (that means materials shall not be affected from humidity and water, for example a metal, plastic or impregnated cardboard frame). | Visual inspection |
| — | Not classified | Not classified |

## A.2 Design criteria

The design criteria given in Table A.2, which have an impact on hygiene and on further functional range could be checked and classified.

**Table A.2 — Codification of design criteria**

| Design elements | Grading | Characteristics | Proof | Valid for unit | |
|---|---|---|---|---|---|
| | | | | SDHR centralised | SRHR single room |
| **DM-** [a] Design Materials | W | Surface in the airstream designed for wet cleaning | Visual inspection | X | X |
| | S | Non porous sealings in wet areas | Visual inspection | X | X |
| | — | Not checked | — | — | — |
| **DC-** [a] Design Construction | D | No areas in the airstream of dust deposit (for example no dead corners, etc.) | Visual inspection | X | X |
| | I | Suitable insulation to prevent condensing | Visual inspection | X | X |
| | C | Suitable condensate system<br>Is condensate separated from air stream?<br>Can condensate collector easily be cleaned? | Visual inspection | X | X |
| | — | Not checked | — | — | — |
| **DH-** [b] Design Heat recovery unit | PS | Plate without humidity exchange | Declaration | X | X |
| | PH | Plate with humidity exchange | Declaration | | |
| | RE | Enthalpy Rotor (micoporose surface) | Declaration | | |
| | RC | Condensing Rotor | Declaration | | |
| | RS | Sorption Rotor (sorptive coating like silicagel, etc.) | Declaration | | |
| | PI | Heat pipe | Declaration | | |
| | HP | Heat pump | — | | |
| | — | Others | — | | |
| | — | Not declared | — | | |

a More than one option is possible.

b Only one option is possible.

## A.3 Controls

The following controls criteria, which have an impact on hygiene and on further functional range should be inspected and classified according to Table A.3.

**Table A.3 — Declaration of controls equipment (1 of 2)**

| Criteria | Grading | Properties | Proof | Valid for unit | |
|---|---|---|---|---|---|
| | | | | SDHR centralised | SRHR single room |
| **DFV- [a] Flow rate variation** | F | Fixed flow | Declaration | X | X |
| | M | Multiple preset flow rates | Declaration | X total amount | X total amount |
| | V | Variable flow | Declaration | X | X |
| | — | Not declared | — | — | — |
| **DFC- Flow rate control** | N | None | Declaration | X | X |
| | M | Manual | Declaration | X | X |
| | T | Time controlled | Declaration | X | X |
| | O | Occupancy or presence control | Declaration | X | X |
| | I | IAQ sensor (CO2, VOC, humidity, etc.) | Declaration | X | X |
| | — | Not declared | — | — | — |
| **DFB- [a] Flow balance** | N | None | Declaration | X | X |
| | M | Manual | Declaration | X | X |
| | F | Fan speed controlled | Declaration | X | X |
| | D | Dynamic flow control (for example VAV box, measurement and controller) | Declaration | X | X |
| | — | Not declared | — | — | — |
| **DBF- [a] Bypass options exchanger** | N | None | Declaration | X | X |
| | O | On/off | Declaration | X | X |
| | S | Partly in steps | Declaration | X | X |
| | V | Variable | Declaration | X | X |
| | — | Not declared | — | — | — |
| **DBC- [a] Bypass options flow rate control** | N | None | Declaration | X | X |
| | M | Manual | Declaration | X | X |
| | TI | Time controlled | Declaration | X | X |
| | TE | Temperature controlled | Declaration | X | X |
| | HU | Humidity controlled | Declaration | X | X |
| | — | Not declared | — | — | — |

**Table A.3 — Declaration of controls equipment** *(2 of 2)*

| Criteria | Grading | Properties | Proof | Valid for unit | |
|---|---|---|---|---|---|
| | | | | SDHR centralised | SRHR single room |
| **DFP- [a] Frost protection** | N | None | Declaration | X | x |
| | E | Electric preheating | Declaration | X | X |
| | M | Mixing air | Declaration | X | X |
| | L | Lowering supply air flow rate (or shut off) | Declaration | X | X |
| | I | Increasing exhaust air flow rate | Declaration | X | X |
| | B | Bypass for defrosting | Declaration | X | X |
| | S | No freezing risk (some heat exchanger do not have a risk of freezing like rotary heat exchanger) | Declaration | x | X |
| | — | Not declared | — | — | — |
| **CRF Room air dependant fire places** | **Combination with room air dependant fire places Declaration of the system taking into account the national and local building regulations and combustion regulations** | | | | |
| **DFI- [a] Filter indicator** | T | Time controlled | Declaration | X | X |
| | P | Pressure controlled | Declaration | X | X |
| | O | Optical controlled | Declaration | X | X |
| | V | Air volume flow controlled | Declaration | X | X |
| | A | Any other | Declaration | X | X |
| | — | Not declared | — | — | — |
| [a] Only one option is possible. | | | | | |

## A.4 Additional equipment

The following criteria for additional equipment could be declared according to Table A.4 and declared from the manufacturer.

**Table A.4 — Codification of Additional Equipment (AEQ)**

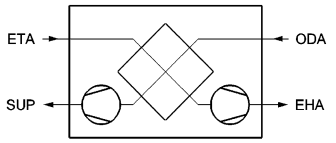
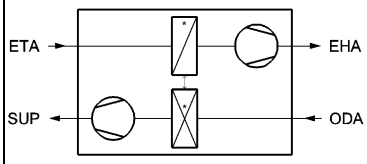
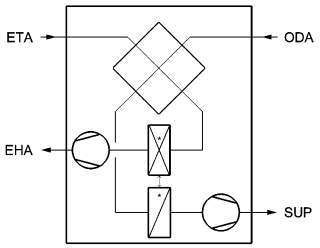
| Grading [a] | Additional equipment | Proof | Valid for unit | |
|---|---|---|---|---|
| | | | SDHR centralised | SRHR single room |
| SPB | Summer by-pass | Visual inspection | X | X |
| EHC | Heating coil – electric heater | Declaration | X | X |
| SAT | Attenuators | Declaration | X | X |
| NCO | Night cooling option | Declaration | X | X |
| — | Other | Declaration and description | X | X |
| [a] More than one option is possible. | | | | |

# Annex B
(informative)

# Schematics for classification and codification of balanced units and relevant test standards

Table B.1 gives an overview of possible arrangements and the relevant standards for testing, classification and codification.

**Table B.1 — Schematic of units and relevant test standards**

| | 1 | | 2 | 3 |
|---|---|---|---|---|
| **Description** | Air to Air Heat Exchanger | | Air to Air Heat Pump | Air to Air Heat Exchanger plus Air to Air Heat Pump |
| **Function scheme** |  | |  |  |
| | Single room | Single dwelling | — | — |
| **Test standard** | EN 13141-7 | EN 13141-8 | EN 13141-7 | EN 13141-7 |
| **Classification** | 4.9 | 4.10 | 4.9 | 4.9 |
| **Codification** | Annex A | Annex A | Annex A | Annex A |

# Annex C
(informative)

# Items to be considered in a national annex

## C.1 Mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for single family dwellings

### C.1.1 Classification of centralized units SDHR based on tests (EN 13141-7)

The classes and parameters should be chosen among the list defined in Table C.1.

**Table C.1 — Classification of centralized units SDHR based on tests (EN 13141-7)**

| Subclause | Parameter |
|---|---|
| 4.9.3.2 | Leakage rates |
| 4.9.4.2 | Temperature ratio |
| 4.9.4.3 | Humidity ratio |
| 4.9.5.1 | Specific power input |
| 4.9.5.2 | Electrical Power in operable Mode |
| 4.9.5.3 | Electrical Power in Standby Mode |
| 4.9.5.4 | Nominal Temperature Performance Factor |
| 4.9.3.3 | Mass flow balance |
| 4.9.6.3 | Casing sound power level |
| 4.9.6.4 | In duct connection sound power level |

National standards may enclose a national annex proposing an extrapolation method for the determination of the "new" point of measure according to EN 13142:2012 from the "old" point of measure obtained with EN 13142:2004 in order to avoid doing again the measurement on old product.

### C.1.2 Codification of Centralized units SDHR based on declaration and visual inspection

The parameters of the units defined in Table C.2 should be codified if applicable.

**Table C.2 — Codification of centralized units SDHR based on declaration and visual inspection**

| Subclause | Parameter |
|---|---|
| 4.9.1 | Declaration of intended use |
| 7.2 | Filter |
| A.1 | Filter bypass leakage |
| 7.3.1 | Fire resistance |
| 7.3.2 | Hygiene |
| A.2 | Design criteria Materials |
| | Design Construction |
| | Design Heat recovery |
| 5.2 | Maintenance |
| A.3 | Flow rate variation |
| | Flow rate control |
| | Flow balance |
| | Bypass options |
| | Bypass controls |
| | Frost protection |
| | Room dependant fire places |
| | Filter |
| A.4 | Additional Equipment |
| 5.1 | Manual |

## C.2 Un-ducted mechanical supply and exhaust ventilation units (including heat recovery) for mechanical ventilation systems intended for a single room

### C.2.1 Classification of single room units SRHR based on tests (EN 13141-8)

The classes and parameters should be chosen among the list defined in Table C.3.

**Table C.3 — Classification of single room units SRHR based on tests (EN 13141-8)**

| Subclause | Parameter |
|---|---|
| 4.10.3.1 | Leakage rates |
| 4.10.4.2 | Temperature ratio |
| 4.10.4.3 | Humidity ratio |
| 4.10.5.1 | Specific power input |
| 4.10.5.2 | Electrical Power in operable Mode |
| 4.10.5.3 | Electrical Power in Standby Mode |
| 4.10.5.4 | Nominal Temperature Performance Factor |
| 4.10.3.2 | Mass flow balance |
| 4.10.6.3 | Noise emitted from the unit |
| 4.10.6.4 | Sound transmitting resistance and classification |

National standards may enclose a national annex proposing an extrapolation method for the determination of the "new" point of measure according to EN 13142:2012 from the "old" point of measure obtained with EN 13142:2004 in order to avoid doing again the measurement on old product.

### C.2.2 Codification of single room units SRHR based on declaration and visual inspection

The parameters of the units defined in Table C.4 should be codified if applicable.

**Table C.4 — Codification of single room units SRHR based on declaration and visual inspection**

| Subclause | Parameter |
|---|---|
| 4.10.1 | Declaration of intended use |
| 7.2 | Filter |
| A.1 | Filter bypass leakage |
| 7.3.1 | Fire resistance |
| 7.3.2 | Hygiene and health |
| A.2 | Design criteria Materials |
| | Design Construction |
| | Design Heat recovery |
| 5.2 | Maintenance |
| A.3 | Flow rate variation |
| | Flow rate control |
| | Flow balance |
| | Bypass options |
| | Bypass controls |
| | Frost protection |
| | Room dependant fire places |
| | Filter |
| A.4 | Additional Equipment |
| 5.1 | Manual |

## C.3 Parameters for the evaluation of energy saving for units with heat recovery (SDHR)

### C.3.1 General

During the design of a ventilation system, it can be useful to investigate the behaviour of the considered unit in the actual case of application or compare different units to make a choice.

The parameters defined here below can be useful for this purpose:

— PES: Primary Energy Saving;

— VUE: Ventilation Unit Efficiency.

### C.3.2 Primary Energy Saving (PES)

$PES$ is defined as the specific average net reduction of primary energy consumption due to the heat recovery action of the ventilation unit. It is calculated with the following formula:

$$PES = \frac{\eta_{\Theta,su} \times \rho \times c_p \times \Delta\theta}{\eta_g} - \frac{SPI}{f_c}$$

where

$PES$ is the Primary Energy Saving, in kJ/m$^3$, W/(m$^3$.s$^{-1}$) or W/(m$^3$/h);

$f_c$ is the conversion factor between electrical and primary energy, usually fixed and periodically updated by nominated authority at national level;

$\eta_g$ is the overall efficiency of the heating system, assumed for the case considered or calculated according to relevant standards;

$\eta_{\Theta,su} \times \rho \times c_p \times \Delta\theta$ is the average heat recovered per unit volume of air, in kJ/m$^3$, W/(m$^3$.s$^{-1}$) or W/(m$^3$/h);

$SPI$ is the Specific Power Input, in W/(m$^3$/h) or W/(m$^3$/s).

$PES$ is expressed in kJ/m$^3$ or Wh/m$^3$ and, multiplied by the total air flow (m$^3$), gives the total reference primary energy saved during the heating season.

### C.3.3 Ventilation Unit Efficiency (VUE)

$VUE$ is dimensionless and represents the percentage of saved energy with respect to the maximum possible, corresponding to $\eta_{\Theta,su} = 1$ and $SPI = 0$ W/(m$^3$/h).

$VUE$ is expressed as:

$$VUE = \left( \frac{\eta_{\Theta,su} \times \rho \times c_p \times \Delta\theta}{\eta_g} - \frac{SPI}{f_c} \right) \times \frac{\eta_g}{\rho \times c_p \times \Delta\theta} \times 100$$

where

$VUE$ is the Ventilation Unit Efficiency;

$f_c$ is the conversion factor between electrical and primary energy, usually fixed and periodically updated by nominated authority at national level;

$\eta_g$ is the overall efficiency of the heating system, assumed for the case considered or calculated according to relevant standards;

$\eta_{\Theta,su} \times \rho \times c_p \times \Delta\theta$ is the average heat recovered per unit volume of air;

$SPI$ is the Specific Power Input as defined in this standard, in W/(m$^3$/s) or W/(m$^3$/h).

### C.3.4 Examples

#### C.3.4.1 EXAMPLE 1 – Calculation of *PES* and *VUE* in presence of a heating system based on a boiler

Two ventilation units, having the characteristics shown here below, are compared to be included in a dwelling where the heating system has an overall efficiency estimated to be $\eta_g = 0{,}90$; the conversion factor for electricity is $f_c = 0{,}41$.

**Table C.5 — Example 1 – Results**

| Unit | Temperature ratio | SPI<br>W/(m$^3$/h) | SPI Class | NTPF | NTPF Class |
|---|---|---|---|---|---|
| A | 0,86 | 0,31 | 2 | 11,94 | 3 |
| B | 0,55 | 0,15 | 1 | 16,00 | 1 |

The energy efficiency parameters can therefore be calculated as follows:

For unit A: $PES$ = 12,18 kJ/m$^3$

$VUE$ = 69 %

For unit B: $PES$ = 8,25 kJ/m$^3$

$VUE$ = 47 %

It appears that unit A has a higher energy saving potential although $SPI$ and $NTPF$ values are better for unit B.

### C.3.4.2 EXEMPLE 2 – Calculation of *PES* and *VUE* in presence of a heating system based on a heat pump

For the same units as in the previous example the comparison is made considering the possible presence of a heating system for which the overall efficiency has been estimated to be 1,5, and the conversion factor is again 0,41. The value 1,5 can correspond to an overall efficiency of a system with a heat pump having $COP$ approximately equal to 4.

The primary energy efficiency parameters can therefore be calculated as follows:

For unit A: $PES$ = 6,18 kJ/m$^3$

$VUE$ = 58 %

For Unit B: $PES$ = 4,41 kJ/m$^3$

$VUE$ = 42 %

It appears again that unit A has a higher energy saving potential although $SPI$ and $NTPF$ values are better for unit B.

# Bibliography

[1] prEN ISO 10121-1, *Test method for assessing the performance of gas-phase air cleaning media and devices for general ventilation — Part 1: Gas-phase air cleaning media*

[2] prEN ISO 10121-2, *Test methods for assessing the performance of gas-phase air cleaning media and devices for general ventilation — Part 2: Gas-phase air cleaning devices (GPACD) (ISO/DIS 10121-2)*

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