

DRAFT WORKING DOCUMENT ON

Energy Labelling of Residential Ventilation Units (Review EU1254/2014)

DRAFT TEXT REVIEWED DELEGATED REGULATION EU1254/2014

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COMMISSION DELEGATED REGULATION (EU) .../...

of xx.yy.zzzz

supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of residential ventilation units

and repealing Commission Delegated Regulation (EU) No 1254/2014

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU¹, and in particular Article 11(5) and Article 16(1) thereof,

Whereas:

- (1) Regulation (EU) 2017/1369 empowers the Commission to adopt delegated acts as regards the labelling or re-scaling of the labelling of product groups representing significant potential for energy savings and, where relevant, other resources.
- (2) Provisions on the energy labelling of residential ventilation units were established by Commission Delegated Regulation (EU) No 1254/2014².
- (3) The Communication from the Commission COM(2016)773³ (ecodesign working plan) established by the Commission in application of Article 16(1) of Directive 2009/125/EC of the European Parliament and of the Council⁴ sets out the working priorities under the ecodesign and energy labelling framework for the period 2016-2019. The ecodesign working plan identifies the energy-related product groups to be considered as priorities for the undertaking of preparatory studies

¹ OJ L 198, 28.7.2017, p. 1.

² Commission Delegated Regulation (EU) No 1254/2014 of 11 July 2014 supplementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of residential ventilation units (OJ L 337, 25.11.2014, p. 27).

³ Communication from the Commission. Ecodesign working plan 2016-2019 COM(2016)773 final, 30.11.2016.

⁴ Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (OJ L 285, 31.10.2009, p. 10).

and eventual adoption of implementing measures, as well as the review of Commission Regulation (EC) No 1253/2014⁵ and Regulation (EU) No 1254/2014.

- (4) Measures from the ecodesign working plan have an estimated potential to deliver in total in excess of 260 TWh of annual final energy savings in 2030, which is equivalent to reducing greenhouse gas emissions by approximately 100 million tonnes per year in 2030. Residential ventilation units is one of the product groups listed in the ecodesign working plan.
- (5) The Commission has reviewed Regulation (EU) No 1254/2014 as required by its Article 7 and analysed the technical, environmental and economic aspects of residential ventilation units. The review was carried out in close cooperation with stakeholders and interested parties from the Union and third countries. The results of the review were made public and presented to the Consultation Forum established by Article 14 of Regulation (EU) 2017/1369.
- (6) The review concluded that there was a need to introduce revised energy labelling requirements for residential ventilation units.
- (7) The review study concluded that not just the energy use of products subject to this Regulation can be further reduced, but also the ventilation performance can significantly be improved by implementing revised energy label measures for residential ventilation units.
- (8) Residential ventilation units that are displayed at trade fairs should bear the energy label if the first unit of the model has already been placed on the market or is placed on the market at the trade fair.
- (9) The electricity used by residential ventilation units is growing rapidly, as is the space heating energy related to the air exchanges induced by them. The total primary energy consumed by residential ventilation systems accounts for a significant share of total household electricity demand in the Union. In addition to the energy efficiency improvements already achieved, the scope for further reducing the energy consumption of residential ventilation units is substantial.
- (10) The review has shown that apart from reducing the primary energy consumption of products subject to this Regulation, the revised energy label measures can play a significant role in further improving the ventilation performance, resulting in improved indoor air quality levels. The continuously ongoing improvements of the airtightness and insulation levels of buildings (EPBD-legislation), result in a significant drop of natural infiltration airflows. Specific attention to ventilation performance is required to safeguard IAQ-levels and their impact on human health. Implementing revised energy label measures focusing on both energy efficiency and ventilation performance can help end-users making an informed decision. In addition, information on airborne acoustical noise and filter quality should be included.
- (11) The annual electricity consumption of products subject to this Regulation in the EU27 was estimated at around 42 TWh in 2020. The space heating energy loss related to the air exchanges induced by the ventilation units in that year was 236 TWh. In total the ventilation units consumed 341 TWh of primary energy in 2020. Without a review of the regulation, these values will increase to 371 TWh of primary energy in 2040 and 406 TWh in 2050. The combined effect of the revised ecodesign and energy labelling regulation is expected to limit this 2050 value to 368 TWh, saving around 10% on the primary energy consumption of ventilation units and in total 378 TWh when compared to natural ventilation. In addition, the

⁵ Commission Regulation (EU) No 1253/2014 of 7 July 2014 implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for ventilation units (OJ L 337, 25.11.2014, p. 8).

revision will result in an increase of the ventilation performance in the residential sector.

- (12) 'Category II ventilation performance' refers to the airflow rates that are required in habitable spaces and exhaust spaces during presence and absence, to achieve Category II ventilation performance (representing the medium level of expectation) as described in EN 16798-1, Annex B;
- (13) The relevant product parameters should be measured or calculated using reliable, accurate and reproducible methods. Those methods should take into account recognised state-of-the-art measurement methods including, where available, harmonised standards adopted by the European standardisation bodies, as listed in Annex I to Regulation (EU) No 1025/2012 of the European Parliament and of the Council⁶.
- (14) To improve the effectiveness and credibility of this Regulation and to protect consumers, products that automatically alter their performance in test conditions with the objective of reaching a more favourable level for any of the parameters specified in this Regulation should not be allowed to be placed on the market.
- (15) Technical documentation should be sufficient to allow market surveillance authorities to check the values published on the label and in the product information sheet. In accordance with Article 12 of Regulation 2017/1369, values for the measured and calculated parameters of the model should be entered into the product database.
- (16) Recognising the growth of sales of energy-related products through internet hosting platforms, rather than directly from suppliers' websites, it should be clarified that internet sales platforms should be responsible for enabling the displaying of the label provided by the supplier in proximity to the price. They should inform the supplier of that obligation, but should not be responsible for the accuracy or content of the label and the product information sheet provided. However, in application of Article 14(1)(b) of Directive 2000/31/EC on electronic commerce, such internet hosting platforms should act expeditiously to remove or to disable access to information about the product in question if they are aware of the non-compliance (e.g. missing, incomplete or incorrect label or product information sheet) for example if informed by the market surveillance authority. A supplier selling directly to end-users via its own website is covered by dealers' distance selling obligations referred to in Article 5 of Regulation (EU) 2017/1369.
- (17) The measures provided for in this Regulation were discussed by the Consultation Forum and the Member State experts in accordance Article 14 of Regulation (EU) 2017/1369.
- (18) Regulation (EU) No 1254/2014 should therefore be repealed,

⁶ Regulation (EU) No 1025/2012 of the European Parliament and of the Council of 25 October 2012 on European standardization, amending Council Directives 89/686/EEC and 93/15/EEC and Directives 94/9/EC, 94/25/EC, 95/16/EC, 97/23/EC, 98/34/EC, 2004/22/EC, 2007/23/EC, 2009/23/EC and 2009/105/EC of the European Parliament and of the Council and repealing Council Decision 87/95/EEC and Decision No 1673/2006/EC of the European Parliament and of the Council (OJ L 316, 14.11.2012, p. 12).

HAS ADOPTED THIS REGULATION:

Article 1

Subject matter and scope

1. This Regulation establishes requirements for the labelling of, and the provision of supplementary product information on residential ventilation units.
2. This Regulation shall not apply to ventilation units which:
 - (a) are single room exhaust UVUs with an electric power input of less than 30 W, that are exclusively specified as operating occasionally to ventilate either one bathroom or one toilet by means of an external switch (for example light switch) or a built-in motion sensor and/or timer, and do not have the technical possibility to continuously ventilate these spaces either by applying constant or intermittent flows (i.e. single room exhaust UVUs are always switched off after a certain period);
 - (b) are exclusively specified as operating in a potentially explosive atmosphere as defined in Directive 94/9/EC of the European Parliament and of the Council⁷;
 - (c) are exclusively specified as operating for emergency use, for short periods of time, and which comply with the basic requirements for construction works with regard to safety in case of fire as set out in Regulation (EU) No 305/2011 of the European Parliament and of the Council⁸;
 - (d) are exclusively specified as operating:
 - (i) where operating temperatures of the air being moved exceed 100 °C;
 - (ii) where the operating ambient temperature for the motor, if located outside the air stream, driving the fan exceeds 65 °C;
 - (iii) where the temperature of the air being moved or the operating ambient temperature for the motor, if located outside the air stream, are lower than -40 °C;
 - (iv) where the supply voltage exceeds 1 000 V AC or 1 500 V DC;
 - (v) in toxic, highly corrosive or flammable environments or in environments with abrasive substances and are exclusively designed for extraction of air from such an environment without any purpose of ventilation (such as, but not limited to, an extract air unit for a laboratory fume hood or a technical extraction system of a machinery);
 - (vi) in a building officially protected as part of a designated environment or because of its special architectural or historical merit, in so far as

⁷ Directive 94/9/EC of the European Parliament and the Council of 23 March 1994 on the approximation of the laws of the Member States concerning equipment and protective systems intended for use in potentially explosive atmospheres (OJ L 100, 19.4.1994, p. 1).

⁸ Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC (OJ L 88, 4.4.2011, p. 5).

the installation of a ventilation unit compliant with this Regulation would unacceptably alter the building's character or appearance;

- (vii) for dehumidification and/or dechlorination of spaces that are not designed for human occupancy;
- (e) include a heat exchanger and a heat pump for heat recovery, or allowing heat transfer or extraction being additional to that of the heat recovery system, except heat transfer for frost protection or defrosting;
- (f) are classified as range hoods covered by Commission Regulation (EU) No 66/2014 on kitchen appliances, or are exclusively specified as operating in the range hood of a commercial or a professional kitchen;
- (g) are primarily used for air heating and/or cooling, having also a connection to the outdoor (i.e. a ventilation function) with a supply/exhaust air flow rate in regular heating operation (whenever using heat recovery) below 10% of the total declared air flow rate.

Article 2
Definitions

For the purpose of this Regulation, the following definitions shall apply:

- (2) '*ventilation unit (VU)*' means an electricity driven appliance equipped with at least one impeller, one motor and a casing and intended to continuously replace indoor air by outdoor air, in order to extract and dilute indoor air that is utilized/polluted due to presence of human beings and their use of the building, and due to emissions coming from building materials, decorative and interior products and equipment;
- (3) '*residential ventilation unit*' (RVU) means a ventilation unit where:
 - (a) the maximum flow rate does not exceed 250 m³/h;
 - (b) the maximum flow rate is between 250 and 1 000 m³/h, and the manufacturer declares its intended use as being exclusively for a residential ventilation application;
- (4) '*non-residential ventilation unit (NRVU)*' means a ventilation unit where the maximum flow rate of the ventilation unit exceeds 250 m³/h, and, where the maximum flow rate is between 250 and 1 000 m³/h, the manufacturer has not declared its intended use as being exclusively for a residential ventilation application;
- (5) '*ducted unidirectional ventilation unit (UVU)*' means a centralised ventilation unit equipped with one fan, using ducts to generate air flows in certain spaces of a residential building in one direction only, either from indoors to outdoors (exhaust) or from outdoors to indoors (supply), where the mechanically produced air flow is balanced by natural air supply or exhaust;
- (6) '*ducted bidirectional ventilation unit (BVU)*' means a centralised ventilation unit equipped with a supply and an exhaust fan, using ducts to generate supply air flows and exhaust airflows in certain spaces of a residential building;
- (7) '*non-ducted (local) unidirectional ventilation unit (L-UVU)*' means a room-based ventilation unit producing an air flow in a specific room of a residential building in one direction only, either from indoors to outdoors (exhaust) or from outdoors to indoors (supply), where the mechanically produced air flow is balanced by natural air supply or exhaust;
- (8) '*non-ducted (local) bidirectional ventilation unit (L-BVU)*' means a room-based ventilation unit which produces a supply airflow (outdoors to indoors) and an exhaust airflow (indoors to outdoors) in a specific room of a residential building;
- (9) '*exhaust spaces (ES)*' (or wet spaces) are spaces in a residential building where pollutants are produced that (according to building codes) are preferably directly extracted from that space to outdoors; typical exhaust spaces are kitchen, bathroom, toilet, utility; typical pollutants are humidity, odours, cooking fumes;
- (10) '*habitable spaces (HS)*' are spaces in a residential building primarily intended for longer occupation of its inhabitants; typical habitable spaces are living room, bedroom, dining room, study; typical pollutants are bio-effluents, interior products and interior material emissions, emissions from human activities;
- (11) '*non-ducted residential ventilation unit for ES (L-UVU-ES and L-BVU-ES)*' is a local ventilation unit that is installed in an exhaust space;
- (12) '*non-ducted residential ventilation unit for HS (L-UVU-HS and L-BVU-HS)*' is a local ventilation unit that is installed in a habitable space;
- (13) '*maximum flow rate*' is the declared maximum air volume flow rate of a ventilation unit that can be achieved at standard air conditions (20 °C) and 101 325 Pa, where the unit is installed complete (e.g. including clean filters) and according to the manufacturer's instructions, for ducted RVUs the maximum flow

is related to the air flow at 100 Pa of external static pressure difference, and for non-ducted RVUs to the air flow at the lowest achievable total pressure difference to be chosen from a set of values of 10 (minimum)-20-50-100-150-200-250 Pa, whichever is equal or just below the measured pressure difference value);

- (14) '*equivalent ventilation unit model*' means a ventilation unit with the same technical characteristics according to the applicable product information requirements, but placed on the market as a different ventilation unit model by the same manufacturer, authorized representative or importer
- (15) '*point of sale*' means a location where residential ventilation units are displayed or offered for sale, hire or hire-purchase.

For the purposes of the Annexes, additional definitions are set out in Annex I.

Article 3

Obligations of suppliers

1. Suppliers shall ensure that:
 - (a) each ventilation unit is supplied with a printed label in the format as set out in Annex III;
 - (b) the values of the parameters of the product information sheet, set out in Annex V, are entered into the product database;
 - (c) if specifically requested by the dealer, the product information sheet shall be made available in printed form;
 - (d) the content of the technical documentation, set out in Annex VI, is entered into the product database;
 - (e) any visual advertisement for a specific model of residential ventilation units contains the energy efficiency class and the range of energy efficiency classes available on the label in accordance with Annex VII and Annex VIII;
 - (f) any technical promotional material concerning a specific model of residential ventilation units, including technical promotional material on the internet, which describes its specific technical parameters includes the energy efficiency class of that model and the range of energy efficiency classes available on the label, in accordance with Annex VII;
 - (g) an electronic label in the format and containing the information, as set out in Annex III, is made available to dealers for each residential ventilation unit model;
 - (h) an electronic product information sheet, as set out in Annex V, is made available to dealers for each residential ventilation unit model.

2. The energy efficiency class shall be based on the energy efficiency index calculated in accordance with Annex II.

Article 4
Obligations of dealers

Dealers shall ensure that:

- (a) each residential ventilation unit, at the point of sale, including at trade fairs, bears the label provided by suppliers in accordance with point 1(a) of Article 3, with the label being displayed in such a way as to be clearly visible on the outside of the front or top of the residential ventilation unit;
- (b) in the event of distance selling, the label and product information sheet are provided in accordance with Annexes VII and VIII;
- (c) any visual advertisement for a specific model of residential ventilation unit, including on the internet, contains the energy efficiency class and the range of energy efficiency classes available on the label, in accordance with Annex VII;
- (d) any technical promotional material concerning a specific model of residential ventilation unit, including technical promotional material on the internet, which describes its specific technical parameters includes the energy efficiency class of that model and the range of energy efficiency classes available on the label, in accordance with Annex VII.

Article 5
Obligations of internet hosting platforms

Where a hosting service provider as referred to in Article 14 of Directive 2000/31/EC of the European Parliament and of the Council⁹ allows the direct selling of residential ventilation units through its internet site, the service provider shall enable the showing of the electronic label and electronic product information sheet provided by the dealer on the display mechanism in accordance with the provisions of Annex VIII and shall inform the dealer of the obligation to display them.

Article 6
Measurement methods

The information to be provided pursuant to Articles 3 and 4 shall be obtained by reliable, accurate and reproducible measurement and calculation methods, which take into account the recognised state-of-the-art measurement and calculation methods set out in Annex IV.

Article 7
Verification procedure for market surveillance purposes

Member States shall apply the verification procedure laid down in Annex IX when performing the market surveillance checks referred to in paragraph 3 of Article 8 of Regulation (EU) 2017/1369.

⁹ Directive 2000/31/EC of the European Parliament and of the Council of 8 June 2000 on certain legal aspects of information society services, in particular electronic commerce, in the Internal Market (Directive on electronic commerce) (OJ L 178 , 17.07.2000, p. 1).

Article 8

Review

The Commission shall review this Regulation in the light of technological progress and present the results of this assessment, including, if appropriate, a draft revision proposal, of this review to the Consultation Forum no later *[OP – please insert date: X years after the entry into force of the present Regulation]*. This review shall, among other matters, assess the possibility to:

- (a) the appropriateness to set specific minimum requirements on the ventilation performance of residential ventilation units;
- (b) the level of the verification tolerances set out in Annex IX;
- (c) the appropriateness to adjust the table with control factors

Article 9

Repeal

Regulation (EU) No 1254/2014 is repealed as of *xx month yyyy*.

Article 10

Transitional measures

As from *[OP – please insert the day of entry into force of this Regulation]* until *xx month yyyy minus 1*, the product fiche required under point 1(b) of Article 3 of Regulation (EU) No 1254/2014 may be made available through the product database instead of being provided in printed form with the product. In that case the supplier shall ensure that if specifically requested by the dealer, the product fiche shall be made available in printed form.

Article 11

Entry into force and application

This Regulation shall enter into force on the twentieth day following that of its publication in the *Official Journal of the European Union*.

It shall apply from *xx month yyyy*. However, Article 10 shall apply from *[OP – please insert the day of entry into force of this Regulation]* and point 1(a), (b) and (c) of Article 3 shall apply from *4 months before xx month yyyy*.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, xx.yy.zzz

For the Commission
The President
Ursula VON DER LEYEN

ANNEX I

Definitions applicable for the annexes

In case of discrepancies with the same definitions given in Annex I of the (draft revised) Ecodesign Regulation on ventilation units, definitions given under Ecodesign are the correct ones.

The following definitions shall apply:

- (1) '*declared values*' means the values provided by the supplier for the stated, calculated or measured technical parameters, pursuant to Article 3(3) of Regulation (EU) 2017/1369 and in accordance with Article 3(1)(d) and Annex VI of this Regulation, for the verification of compliance by the Member State authorities;
- (2) '*specific energy consumption (SEC)*' (expressed in kWh/(m².a)) means a numerical indicator to express the energy savings for mechanical ventilation per m² heated floor area of a dwelling or building compared to a fully naturally ventilated dwelling or residential buildings, calculated for RVUs in accordance with Annex VI;
- (3) '*sound power level (L_{WA})*' means the casing-radiated A-weighted sound power level expressed in decibels (dB) with reference to the sound power of one picowatt (1pW), transmitted by the air at reference airflow;
- (4) '*multi-speed drive*' means a fan motor that can be operated at three or more fixed speeds plus zero ('off');
- (5) '*variable speed drive (VSD)*' means an electronic controller, integrated or functioning as one system or as a separate delivery with the motor and the fan, which continuously adapts the electrical power supplied to the motor in order to control the flow rate; an electronically commutated (EC) motor complies with this description;
- (6) '*energy recovery system (ERS)*' means the part of a bidirectional ventilation unit equipped with a heat exchanger designed to transfer thermal energy between the two airflows (exhaust and supply airflow) and, optionally, to also transfer the humidity content between the two airflows;
- (7) '*recuperative heat exchanger*' means a heat exchanger intended to transfer sensible thermal energy - and optionally also humidity - from one air stream to another without moving parts, such as a plate or tubular heat exchanger with parallel flow, cross flow or counter flow, or a combination of these, or a plate or tubular heat exchanger with vapour diffusion;
- (8) '*regenerative heat exchanger*' means a heat exchanger that alternately stores and releases thermal energy in and from a thermal storage medium; this is accomplished by changing the airflow that is in contact with the heat storage medium, which is alternately either the warm exhaust airflow for storing the thermal energy, or the cold supply airflow for releasing the thermal energy (e.g. a rotary heat exchanger). Depending on the storage medium that is used, varying degrees of humidity transfer can be achieved.
- (9) '*temperature ratio of a residential ERS (η_t)*' means the ratio between supply air temperature gain and exhaust air temperature loss, both relative to the outdoor temperature, measured under dry conditions of the ERS, and standard air conditions, with balanced mass flow, at reference airflow rate, an indoor-outdoor temperature difference of 13 K, no correction for thermal heat gain from fan motors but corrected for internal and external leakages, indoor and outdoor mixing and airflow sensitivity;
- (10) '*humidity ratio of a residential ERS (η_x)*' means the ratio between the change in humidity content of the supply air and the change in humidity content of the

exhaust air, both relative to the humidity content of the outdoor air, measured at standard air conditions, with balanced mass flow at reference airflow rate, at indoor-outdoor temperature difference of 13 K.

- (11) '*efficiency of the total recovered energy of a RVU (η_e)*' means the aggregation of the temperature ratio and the humidity ratio, determined according to Table 5 in Annex IV;
- (12) '*internal leakage rate of a residential BVU*' means the fraction of exhaust air present in the supply air of ventilation units with ERS as a result of leakage between exhaust and supply airflows inside the casing measured under test conditions and referenced to the reference airflow rate; for recuperative ERS the leakage test shall be performed at 100 Pa and measured at the ducts; for regenerative ERS the leakage test shall be performed with tracer gas, using either the chamber method or the duct method;
- (13) '*external leakage rate of a residential VU*' means the leakage fraction of the reference air volume flow to or from the inside of the casing of a unit to or from the surrounding air, measured at an over and under pressure of 250 Pa and referenced to the reference airflow rate.
- (14) '*mixing of a L-BVU*' means the immediate recirculation or short-circuiting of airflows between discharge and intake ports at both the indoor and outdoor terminals so that they do not contribute to the effective ventilation of a building space, when the unit is operated at reference air volume rate;
- (15) '*indoor mixing rate of L-BVU*' means the fraction of supply airflow, as part of the total reference air volume, that recirculates between discharge and intake ports at the indoor terminals and thus does not contribute to the effective ventilation of a building space, when the unit is operated at reference air volume
- (16) '*outdoor mixing rate of L-BVU*' means the fraction of exhaust airflow, as part of the total reference air volume, that recirculates between discharge and intake ports at the outdoor terminals and thus does not contribute to the effective ventilation of a building space, when the unit is operated at reference air volume
- (17) '*effective power input*' (expressed in W) means the electric power input of a RVU in its reference configuration at reference flow rate and corresponding external total pressure difference and includes the electrical demand for fans, controls (including remote controls) and the heat pump (if integrated);
- (18) '*specific power input (SPI)*' (expressed in W/(m³/h)) means the ratio between the effective power input (in W) and the reference flow rate (in m³/h);
- (19) '*flow rate/pressure diagram*' means a set of curves for flow rate (horizontal axis) and pressure difference of a unidirectional RVU or the supply side of a bidirectional RVU, where each curve represents one fan speed with at least eight equidistant test-points and the number of curves is given by the number of discrete fan speed options (one, two or three) or, in the case of a variable fan speed drive, includes at least a minimum, maximum and appropriate intermediate curve close to the reference air volume and pressure difference for SPI testing;
- (20) '*reference flow rate of a RVU*' (expressed in m³/s) is the abscissa value to a point on a curve in the flow rate/pressure diagram which is on or closest to a reference point at 70 % at least of the maximum flow rate at reference external pressure difference of 50 Pa for ducted units and at a minimum pressure for non-ducted units determined in its reference configuration. For bidirectional ventilation units, the reference air volume flow rate applies to the air supply outlet in reference configuration;
- (21) '*ventilation controls*' means control devices that are part of the RVU-package offered by the manufacturer and purchased together with the RVU and are

intended to control the ventilation airflow rates; they include devices that improve the level of flow rate control (zonal or local controllable valves) and devices that help determining the actual ventilation need (manual controls, clock controls and ventilation demand controls (VDC))

- (22) '*manual control*' means any control type using any kind of switch that requires manual operation;
- (23) '*clock control*' means a clocked (daytime-controlled) human interface to control the fan speed/flow rate of the ventilation unit, with at least seven weekday manual settings of the adjustable flow rate for at least two setback periods, i.e. periods in which a reduced flow rate applies;
- (24) '*ventilation demand control (VDC)*' means a device that measures one or more parameters that are representative for the ventilation demand in a specific room type and use the result to automatically control the airflow rate of the RVU or section of the RVU;
- (25) '*ventilation demand control for exhaust spaces (VDC-ES)*' mean ventilation demand controls measuring one or more of the following parameters: humidity, various volatile organic compounds (TVOC), motion sensors.
- (26) '*ventilation demand control for habitable spaces (VDC-HS)*' mean ventilation demand controls measuring one or more of the following parameters : carbon dioxide (CO₂), occupancy detection of any kind (including number of occupants) and optionally TVOC as additional parameter;
- (27) '*control factor (CTRL)*' means a correction factor that is to be used in the SEC calculation and depends on the type of ventilation controls that are part of the RVU-package, according to the description in Table 4 of Annex IV; the CTRL-factor represents the reduction factor for the reference airflow that is needed to achieve a reference ventilation performance¹⁰ with a reference manually controlled UVU-system;
- (28) '*ducted unit*' means a ventilation unit intended to ventilate one or more rooms or enclosed spaces in a building through the use of air ducts, intended to be equipped with duct connections;
- (29) '*non-ducted unit*' means a single room ventilation unit intended to ventilate a single room or enclosed space in a building, and not intended to be equipped with duct connections;
- (30) '*central airflow control strategy*' refers to the capability of a central ducted RVU to regulate the flow rates only at a central level in the dwelling by changing the fan speed(s) in the central RVU
- (31) '*zonal airflow control strategy*' refers to the capability of a central ducted RVU to regulate its flow rates at a zonal level in the dwelling, by applying and controlling adjustable valves that – combined with fan speed(s) control in the central RVU – facilitates airflow control per zone, were a zone is defined as a part of a dwelling covering at least two separate spaces.
- (32) '*local airflow control strategy*' refers to the capability of a central ducted RVU to regulate its flow rates in the dwelling at room level, by applying and controlling adjustable valves per individual room that – combined with fan speed(s) control in the central RVU – facilitates airflow control per room.
- (33) '*central ventilation demand control (central VDC)*' means a demand control device that determines the actual ventilation demand on the basis of a

¹⁰ Reference ventilation performance is based on the airflow rates that are needed in habitable spaces and wet spaces, during presence and absence for a Category II performance as described in Annex B of EN 16798-1. Category II represents the Medium level of expectation.

measurement at a central level in a dwelling (e.g. in the central exhaust duct of a central RVU.;

- (34) '*zonal ventilation demand control (zonal VDC)*' means a demand control device that determines the actual ventilation demand on the basis of a measurement at zonal level in a dwelling, where a zone is defined as a part of a dwelling covering at least two separate rooms.
- (35) '*local ventilation demand control (local VDC)*' means a demand control device that determines the actual ventilation demand on the basis of a measurement at room level.
- (36) '*static pressure (p_{sf})*' means the total pressure minus the fan dynamic pressure;
- (37) '*total pressure (p_t)*' means the difference between the stagnation pressure at the fan outlet and that at the fan inlet.
- (38) '*stagnation pressure*' means the pressure measured at a point in a flowing gas if it were to be brought to rest by means of an isentropic process.
- (39) '*dynamic pressure*' means the pressure calculated from the mass flow rate and the average gas density at the outlet and the unit outlet area;
- (40) '*airflow sensitivity to pressure variation, (v)*' of a non-ducted RVU is the maximum relative deviation from the maximum air volume flow of the RVU due to static pressure difference of +20 Pa and -20 Pa, expressed as percentage.
- (41) '*indoor/outdoor air tightness, (q_{vio})*' of a non-ducted RVU is the ratio of the maximum air volume flow rate measured between indoors and outdoors due to static pressure difference of +20 Pa and -20 Pa when the fan(s) is(are) switched off and all shutters are closed, and the maximum air volume flow of the RVU;
- (42) '*reference configuration of a RVU*' means a ventilation unit that is configured according to the manufacturer instructions, i.e. when the RVU is to be used with filters, these filters are included and mounted according to the manufacturer instructions; in lack of them, the product cannot be tested;

ANNEX II
Energy Efficiency Classes

The energy efficiency class of residential ventilation units shall be determined on the basis of the specific energy consumption (SEC) as set out in Table 1.

Table 1
Energy efficiency classes of ducted and non-ducted RVUs

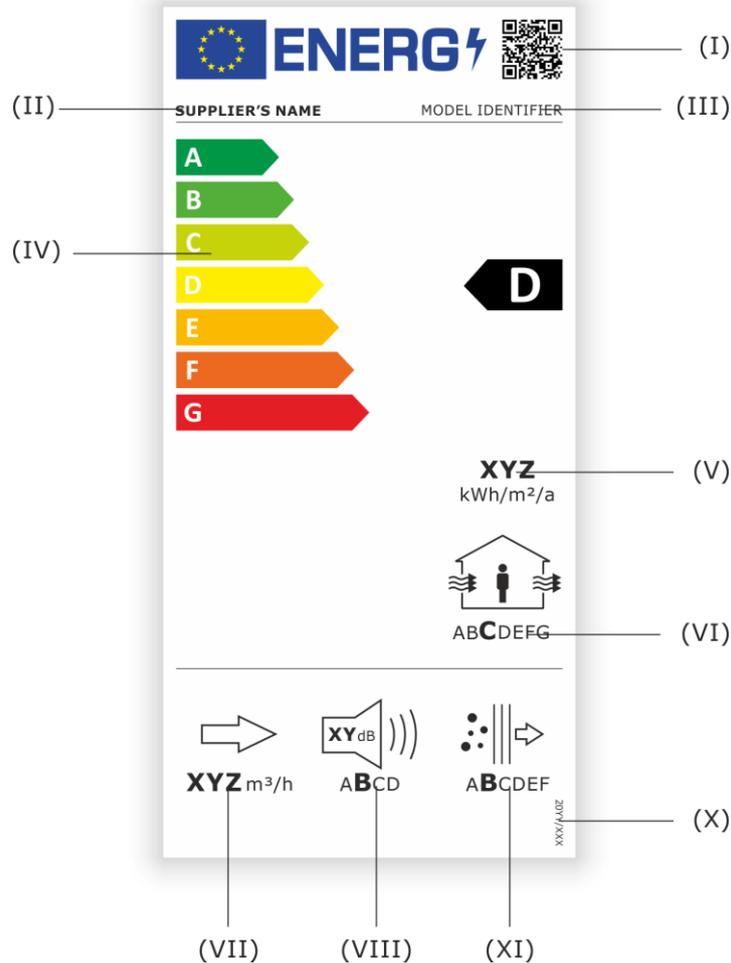
SEC-EL in kWh/a.m ²			
Energy Efficiency Class	Warm climate	Average climate	Cold climate
A	SEC < -20	SEC < -60	SEC < -105
B	-20 ≤ SEC < -17	-60 ≤ SEC < -52	-100 ≤ SEC < -93
C	-17 ≤ SEC < -14	-52 ≤ SEC < -44	-89 ≤ SEC < -81
D	-14 ≤ SEC < -11	-44 ≤ SEC < -36	-78 ≤ SEC < -69
E	-11 ≤ SEC < -8	-36 ≤ SEC < -28	-67 ≤ SEC < -57
F	-8 ≤ SEC < -5	-28 ≤ SEC < -20	-56 ≤ SEC < -45
G	-5 ≤ SEC < -2	-20 ≤ SEC < -12	-45 ≤ SEC < -33

The SEC of a residential ventilation unit shall be determined in accordance with Annex IV.

ANNEX III
Label for residential ventilation units

1. LABEL FOR ducted UVUs

1.1. Label:

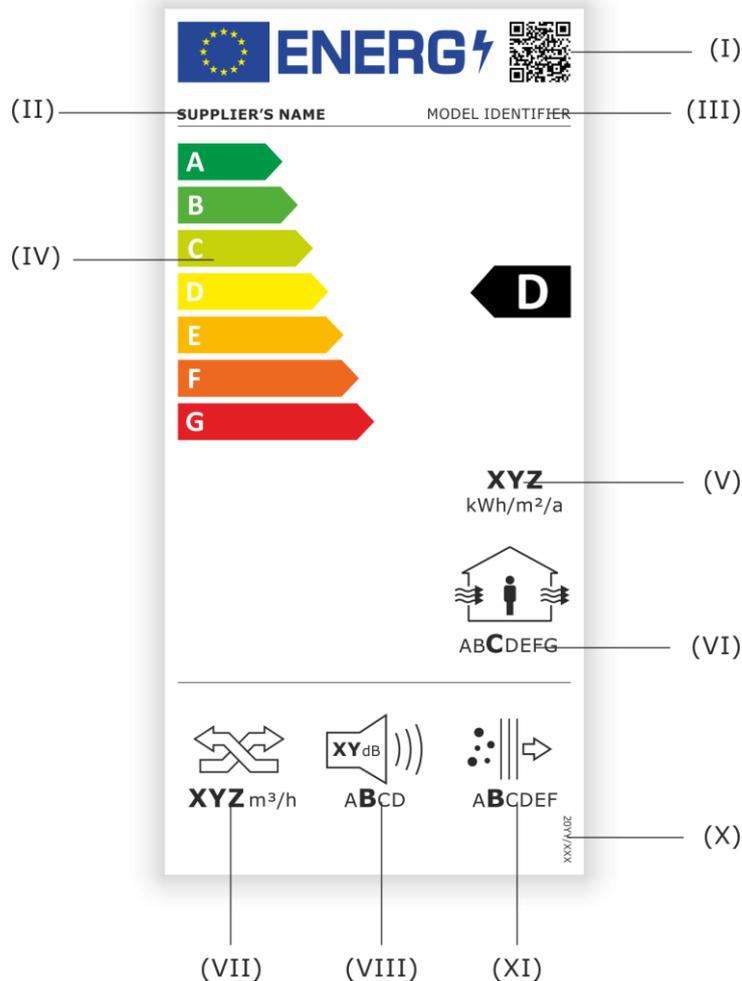


1.2 The following information shall be included in the label:

- I. QR code;
- II. supplier's name or trade mark;
- III. supplier's model identifier;
- IV. scale of energy efficiency classes from A to G;
- V. energy consumption expressed in kWh/a per square meter of heated space;
- VI. ventilation performance class;
- VII. maximum flow rate in m³/h rounded to the nearest integer, accompanied by one arrow representing UVUs;
- VIII. sound power level (LWA) in dB at the reference flowrate rounded to the nearest integer;
- IX. filter performance class;
- X. the number of this Regulation, that is '20YY/XXX' [PO- please insert the number of this Regulation in this point and in the right bottom corner of the label].

2. LABEL FOR ducted BVUs

2.1. Label:

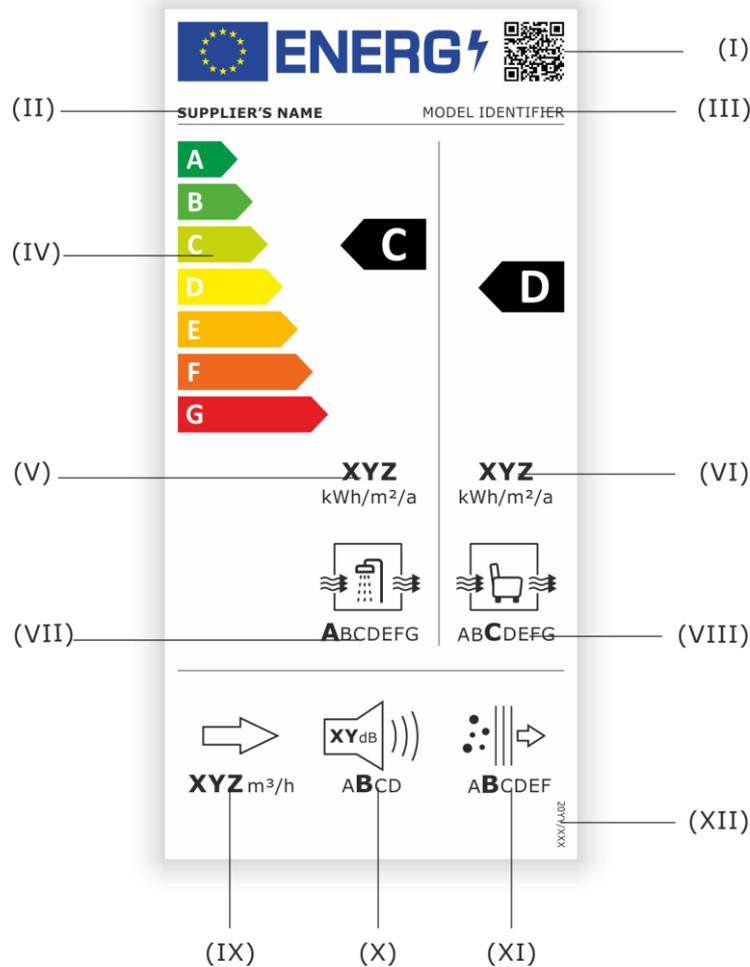


2.2. The following information shall be included in the label:

- I. QR code;
- II. supplier's name or trade mark;
- III. supplier's model identifier;
- IV. scale of energy efficiency classes from A to G;
- V. energy consumption expressed in kWh/a per square meter of heated space;
- VI. ventilation performance class;
- VII. maximum flow rate in m³/h rounded to the nearest integer, accompanied by two arrows representing BVUs;
- VIII. sound power level (LWA) in dB at the reference flowrate rounded to the nearest integer;
- IX. filter performance class;
- X. the number of this Regulation, that is '20YY/XXX' [PO- please insert the number of this Regulation in this point and in the right bottom corner of the label].

3. LABEL FOR non-ducted UVUs

3.1. Label:

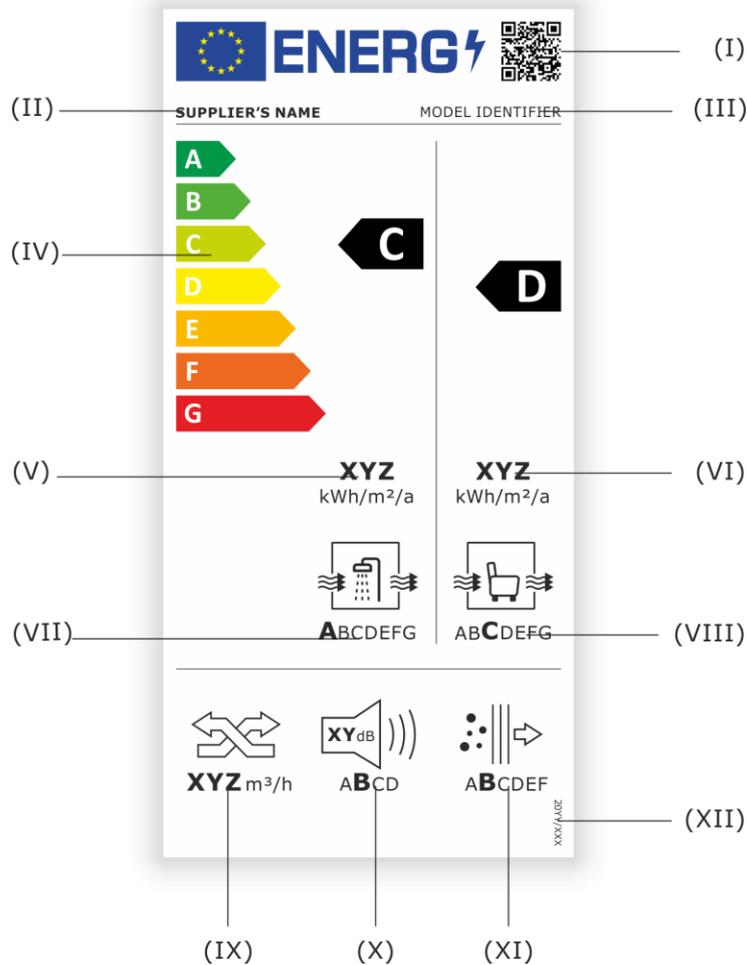


3.2. The following information shall be included in the label:

- I. QR code
- II. Supplier's name or trademark
- III. Supplier's model identifier
- IV. Scale of energy efficiency classes from A to G for ES and HS
- V. Energy consumption in kWh/a per m² heated surface for ventilating ES
- VI. Energy consumption in kWh/a per m² heated surface for ventilating HS
- VII. Ventilation performance class for the ES
- VIII. Ventilation performance class for the HS
- IX. Maximum flowrate in m³/h rounded to the nearest integer accompanied by one arrow representing UVUs;
- X. Sound power level (LWA) in dB at the reference flowrate rounded to the nearest integer
- XI. Filter performance class
- XII. The number of the Regulation '20YY/XXX'

4. LABEL FOR non-ducted BVUs

4.1. Label:

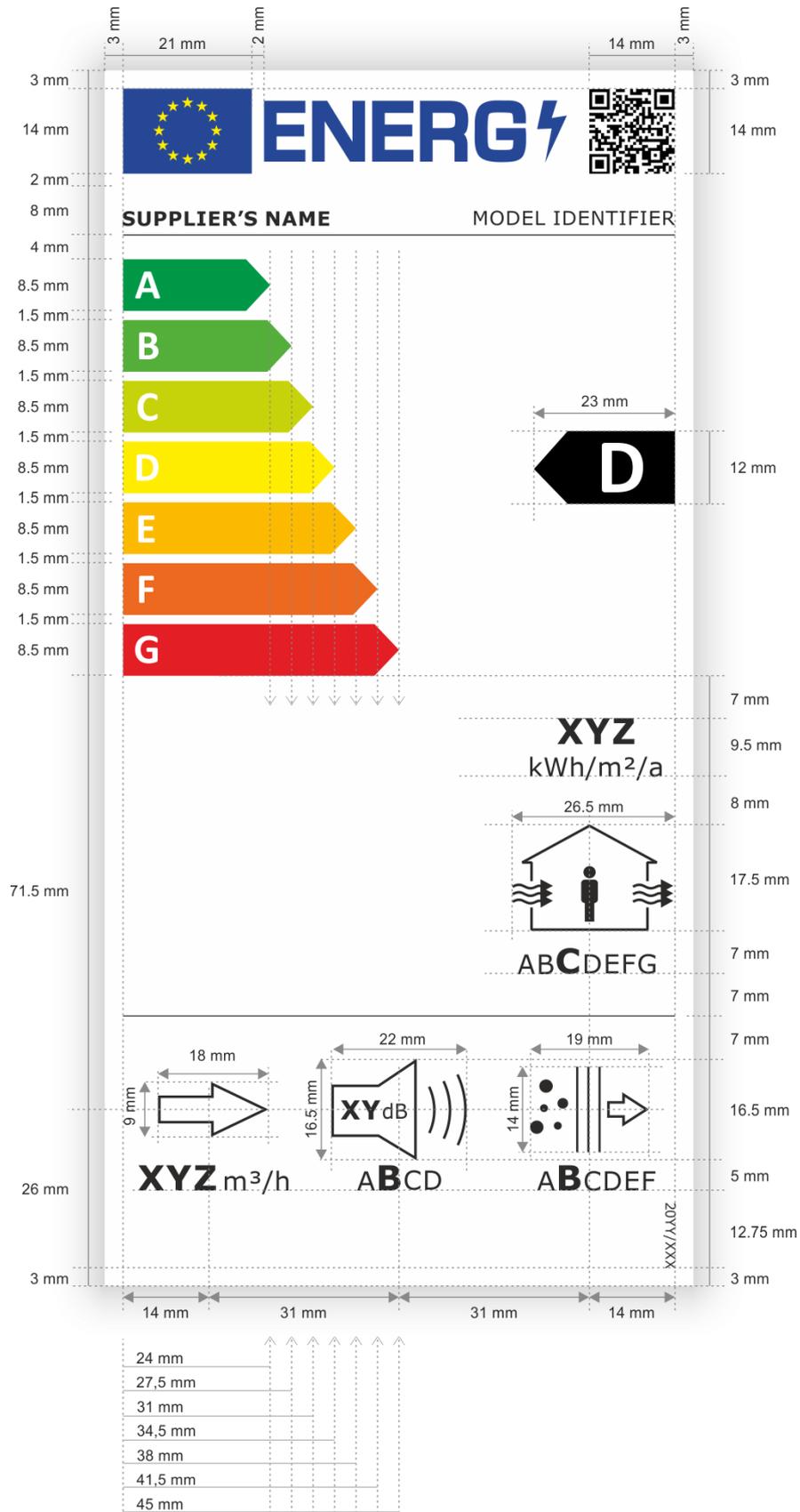


4.2. The following information shall be included in the label:

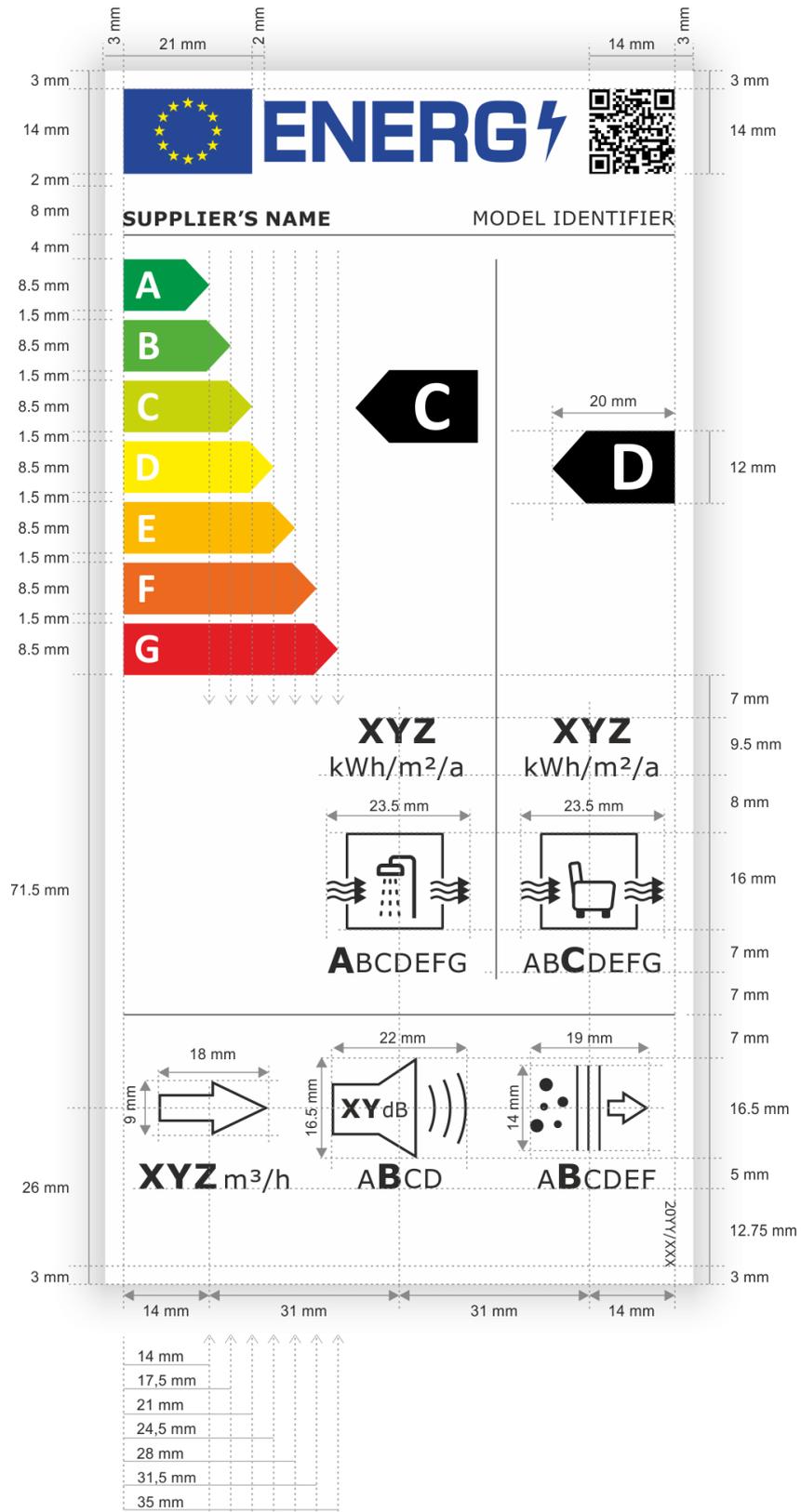
- I. QR code;
- II. Supplier's name or trademark
- III. Supplier's model identifier
- IV. Scale of energy efficiency classes from A to G for ES and HS
- V. Energy consumption in kWh/a per m2 heated surface for ventilating ES
- VI. Energy consumption in kWh/a per m2 heated surface for ventilating HS
- VII. Ventilation performance class for the ES
- VIII. Ventilation performance class for the HS
- IX. Maximum flowrate in m³/h rounded to the nearest integer accompanied by two arrows representing BVUs;
- X. Sound power level (LWA) in dB at the reference flowrate rounded to the nearest integer
- XI. Filter performance class
- XII. The number of the Regulation '20YY/XXX'

5. LABEL DESIGNS

5.1. Label design ducted RVUs



5.2. Label design non- ducted RVUs



5.3. Whereby:

- (a) The labels shall be at least 96 mm wide and 192 mm high. Where the label is printed in a larger format, its content shall nevertheless remain proportionate to the specifications above.
- (b) The background of the label shall be 100 % white.
- (c) The typefaces shall be Verdana and Calibri.
- (d) The dimensions and specifications of the elements constituting the label shall be as indicated in the label designs for UVUs and for BVUs.
- (e) Colours shall be CMYK – cyan, magenta, yellow and black, following this example: 0,70,100,0: 0 % cyan, 70 % magenta, 100 % yellow, 0 % black.
- (f) The label shall fulfil all the following requirements (numbers refer to the figures above):
 - ① the colours of the EU logo shall be as follows:
 - the background: 100,80,0,0;
 - the stars: 0,0,100,0;
 - ② the colour of the energy logo shall be: 100,80,0,0;
 - ③ the QR code shall be 100 % black;
 - ④ the supplier's name shall be 100 % black and in Verdana Bold, 9 pt;
 - ⑤ the model identifier shall be 100 % black and in Verdana Regular 9 pt;
 - ⑥ the A to G scale shall be as follows:
 - the letters of the energy efficiency scale shall be 100 % white and in Calibri Bold 19 pt; the letters shall be centred on an axis at 4,5 mm from the left side of the arrows;
 - the colours of the A to G scale arrows shall be as follows:
 - A-class: 100,0,100,0;
 - B-class: 70,0,100,0;
 - C-class: 30,0,100,0;
 - D-class: 0,0,100,0;
 - E-class: 0,30,100,0;
 - F-class: 0,70,100,0;
 - G-class: 0,100,100,0;
 - ⑦ the internal dividers shall have a weight of 0,5 pt and the colour shall be 100 % black;
 - ⑧ the letter of the energy efficiency class shall be 100 % white and in Calibri Bold 33 pt. The energy efficiency class arrow and the corresponding arrow in the A to G scale shall be positioned in such a way that their tips are aligned. The letter in the energy efficiency class arrow shall be positioned in the centre of the rectangular part of the arrow which shall be 100 % black;
 - ⑩ the pictograms shall be as shown as in the label designs and as follows:

- the pictograms' lines shall have a weight of 1,2 pt and they and the texts (numbers and units) shall be 100 % black;
- the text under the pictogram(s) shall be in Verdana Bold 16 pt with the unit in Verdana Regular 12 pt, and it shall be centred under the pictogram;
- the reference flow rate pictogram: the reference flow rate in m^3/h shall be in Verdana Bold 12 pt, with the unit ' m^3/h ' in Verdana Regular 9 pt;
- the sound power level pictogram: the number of decibels in the loudspeaker shall be in Verdana Bold 12 pt, with the unit ' dB ' in Verdana Regular 9 pt;

11 the number of the regulation shall be 100 % black and in Verdana Regular 6 pt.

ANNEX IV
Measurement methods and calculations

For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements and calculations shall be made using harmonised standards, or other reliable, accurate and reproducible methods, which takes into account the generally recognised state-of-the-art methods and are in line with the provisions set out below. The reference numbers of these harmonised standards have been published for this purpose in the *Official Journal of the European Union*.

In the absence of existing relevant standards and until the publication of the references of the relevant harmonised standards in the Official Journal, the transitional testing methods set out in Annex VIa to Commission Regulation (EU) xx/yy laying down ecodesign requirements for ventilation units, or other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art, shall be used

Where a parameter is declared pursuant to Article 3(3) of Regulation (EU) 2017/1369 and in accordance with Table 9 of Annex VI, its declared value shall be used by the supplier for the calculations in this Annex.

1. For calculating the specific energy consumption 'SEC' for residential ventilation units (RVUs) the following equation is used:

$$SEC = t_a \cdot p_{ef} \cdot q_{net} \cdot CTRL^x \cdot SPI - t_h \cdot \Delta T_h \cdot \eta_h^{-1} \cdot c_{air} \cdot (q_{ref} - q_{net} \cdot CTRL \cdot (1 - \eta_e)) + CTRL \cdot (1 - \eta_x) \cdot Q_{defr}$$

where

- SEC is Specific Energy Consumption-savings for ventilation per m² heated floor area of a dwelling or building [kWh/(m².a)], compared to a fully naturally ventilated residential building;
- t_a is annual operating hours [h/a];
- p_{ef} is primary energy factor for electric power generation and distribution [-];
- q_{net} is reference net mechanical ventilation rate demand per m² heated floor area for achieving category II ventilation performance [m³/h.m²];
- $CTRL$ is the ventilation control factor [-];
- x is an exponent that takes into account non-linearity between thermal energy and electricity saving, depending on motor and drive characteristics [-];
- SPI is Specific Power Input [kW/(m³/h)];
- t_h is total hours heating season [h];
- ΔT_h is the average difference in indoor (19°C) and outdoor temperature over a heating season, minus 3K correction for solar and internal gains [K];
- η_h is the average space heating efficiency [-];
- c_{air} is the specific heat capacity of air at constant pressure and density [kWh/(m³ K)];
- q_{ref} is the reference natural ventilation rate per m² heated floor area [m³/h.m²];
- η_e is the total energy recovery ratio [-], determined according to Table 6;
- η_x is the humidity recovery ratio [-];
- Q_{defr} is the annual heating energy per m² heated floor area [kWh/m².a] for frost protection with CTRL-factor =1, to be taken from Table 5 where default values for qdefr are given based on the frost protection strategy that is used in the

BVU. Q_{defr} applies only to bidirectional units with recuperative heat exchanger; for unidirectional units or units with regenerative heat exchanger is $Q_{defr} = 0$.

- t_{defr} is the duration of the defrosting period, i.e. when the outdoor temperature is below -3°C in [h/a]
- ΔT_{defr} is the average difference in K between the outdoor temperature and -3°C during defrosting period

SPI and η_t are values derived from tests and calculation methods.

For calculation of the SEC-value, the value for the default parameters are given in Table 2, Table 3 is to be used to determine the CTRL-factor, Table 4 is to be used to determine the Q_{defr} and Table 5 to determine the total energy recovery ratio η_e .

The SEC is to be calculated for all climates (average, warm cold).

2. For calculating the SEC-EL value for allocation of energy label class, the following equation is used:

$$SEC-EL = SEC / SHARE$$

Where

- $SEC-EL$ is the SEC-value for allocating the energy label class
- SEC is the SEC-value calculated according to 1.)
- $SHARE$ is the share of the total airflow in a dwelling allocated to exhaust spaces (ES) and habitable spaces (HS)

The SEC values calculated according to 1. relate to the room types that are serviced by the RVU (ES+HS, only HS or only ES). In order to be able to use Table 1 for the allocation of energy classes, the SEC-value is divided by the share of the total airflow allocated to the room types.

See Table 2 for the values to be used for the parameter 'SHARE' for the various RVU types

The SEC-EL is to be calculated for all climates (average, warm cold).

3. For calculating the annual energy consumption indicators (AEC, AHC, TAEC and AHS) for ventilation per m^2 heated floor area, the following equations are used:

$$AEC = (t_a \cdot q_{net} \cdot CTRL^x \cdot SPI + CTRL \cdot (1 - \eta_x) \cdot Q_{defr})$$

$$AHC = (t_h \cdot \Delta T_h \cdot \eta_h^{-1} \cdot c_{air} \cdot q_{net} \cdot CTRL \cdot (1 - \eta_e))$$

$$TAEC = AEC \cdot p_{ef} + AHC$$

$$AHS = t_h \cdot \Delta T_h \cdot \eta_h^{-1} \cdot c_{air} \cdot (q_{ref} - q_{net} \cdot CTRL \cdot (1 - \eta_e))$$

Where

- *AEC* is the annual electricity consumption per m² heated floor area, in kWh/a of electricity.
- *AHC* is the annual space heating energy consumption for ventilation for achieving category II ventilation performance per m² heated floor area, expressed in kWh/a gross calorific value.
- *TAEC* is the total annual primary energy consumption for ventilation for achieving category II ventilation performance per m² heated floor area, expressed in kWh/a.
- *AHS* is the annual heating energy saved, which means the annual savings in consumption of energy for space heating (in kWh fuel gross calorific value per m² floor area per year) when comparing the airflows of fully natural ventilation systems with the mechanical airflows of RVUs.

For the calculation, the definitions under point 1. and the values given in tables 2 to 5 are applicable. Calculations are to be made for each type of climate (average, warm cold).

4. For calculating the ventilation performance index (VPI), the following equation is used:

$$VPI = q_{opt} / (q_{net;VPI} \cdot CTRL)$$

where

- *VPI* is the ventilation performance index, an indicator for the ability of the RVU to exchange the right amount of air in the right place at the right time;
- *q_{net;VPI}* is reference net mechanical ventilation rate demand per m² heated floor area the RVU needs for achieving Category II ventilation performance [m³/h.m²];
- *CTRL* is the ventilation control factor;
- *q_{opt}* is the airflow the optimized RVU (optimized in terms of valves, controls, internal leakage, flow sensitivity) needs to achieve Category II ventilation performance.

For the calculation of VPI, Table 3 is to be used to determine the CTRL-factor and Table 6 is to be used for determining the *q_{opt}* value and the *q_{net;VPI}* value.

For determining the ventilation performance class, the following classification is used:

Ventilation Performance Index (VPI)	Class
> 75	A
75 ≥ VPI >65	B
65 ≥ VPI >55	C
55 ≥ VPI >45	D
45 ≥ VPI >35	E

35 ≥ VPI > 25	F
25 ≥ VPI > 15	G

5. For determining the filter performance class, the following classification is used:

Type of supply filter	Class
None	N/A
ISO ePM1 > 80% (F9)	A
ISO ePM1 > 70% (F8)	B
ISO ePM1 > 50% (F7)	C
ISO ePM2.5 > 50% (M6)	D
ISO ePM10 > 50% (M5)	E
ISO Coarse > 60% (G4)	F

Filter type indication to be done according to EN ISO 16890 (value between brackets refers to previous applicable filter standard EN799).

Table 2.

Default parameters for SEC, AEC, AHC, TAEC and AHS -calculations

Motor & drive				x-value
2-speed				1,2
multi-speed				1,5
variable speed				2,0
Climate	t_h in h	ΔT_h in K	t_{defr} in h	ΔT_{defr} in K
cold	6446	14,53	1434	5,14
average	4910	10,94	303,5	2,61
warm	3590	5,21	0	0
Reference airflows		Non-ducted* RVU-ES in m³/h/m²	Non-ducted* RVU-HS in m³/h/ m²	Ducted RVU ES&HS in m³/h/ m²
reference natural ventilation rate per m ² heated floor area, q_{ref}		1.00	1,50	2,50
reference net mechanical ventilation requirement per m ² heated floor area, q_{net}		0.79	1.18	1,97
<i>SHARE</i>		40%	60%	100%
Other default parameters				
annual operating hours, t_a in [h]				8760
primary energy factor electric power generation & distribution, pef				2,1
space heating efficiency, η_h				75%
specific heat capacity of air, c_{air} in kWh/(m ³ K)				0,000344
*for non ducted (local) units, 3 local RVUs are assumed for the ES and 3 for the HS.				

Table 3.
Control factor 'CTRL' for SEC- and VPI calculation

Depending on the type of *RVU* and its level of flow control (through controllable valves), and depending on the type of ventilation demand control (*VDC*), the *CTRL*-factor can be determined.

Type of RVU incl. level of flow control	no control	manual	clock	central VDC-ES	central VDC-HS	zonal VDC-ES	zonal VDC-HS	local VDC-ES	local VDC-HS
UVU - no valves	1.00	1.00	0.95	0.95	0.90	0.90	0.85	0.85	0.80
UVU + zonal valves	1.00	0.95	0.90	0.95	0.90	0.80	0.75	0.75	0.65
UVU + valves for all rooms	0.95	0.95	0.85	0.95	0.90	0.80	0.75	0.70	0.45
BVU1 - no valves	0.95	0.95	0.90	0.90	0.85	0.85	0.80	0.80	0.65
BVU1 + zonal valves	0.95	0.90	0.85	0.90	0.85	0.75	0.70	0.70	0.60
BVU1 + valves for all rooms	0.95	0.80	0.75	0.90	0.85	0.75	0.70	0.70	0.50
BVU2 - no valves	1.20	1.20	1.10	1.10	1.00	1.00	0.95	0.95	0.80
BVU2 + zonal valves	1.20	1.05	1.00	1.10	1.00	0.95	0.90	0.90	0.75
BVU2 + valves for all rooms	1.20	0.95	0.90	1.10	1.00	0.95	0.90	0.80	0.70
<i>BVUs with constant flow control and internal leakages ≤3%</i>									
BVU1 - no valves	0.80	0.75	0.70	0.70	0.65	0.65	0.60	0.60	0.50
BVU1 + zonal valves	0.80	0.75	0.65	0.70	0.65	0.60	0.55	0.55	0.45
BVU1 + valves for all rooms	0.80	0.65	0.60	0.70	0.65	0.60	0.55	0.55	0.35
BVU2 - no valves	1.00	1.00	0.90	0.90	0.85	0.85	0.80	0.80	0.65
BVU2 + zonal valves	1.00	0.95	0.85	0.90	0.85	0.80	0.75	0.75	0.60
BVU2 + valves for all rooms	1.00	0.90	0.80	0.90	0.85	0.80	0.75	0.65	0.50
<i>L-BVUs with constant flow control and internal leakages ≤3%</i>									
L-BVU for ES only		1.00*fs	0.95*fs	N/A	N/A	N/A	N/A	0.65*fs	0.85*fs
L-BVU for HS only		0.95*fs	0.85*fs	N/A	N/A	N/A	N/A	0.70*fs	0.45*fs
L-BVU for ES only		1.00*fs	0.95*fs	N/A	N/A	N/A	N/A	0.65*fs	0.85*fs
L-BVU for HS only		0.95*fs	0.80*fs	N/A	N/A	N/A	N/A	0.60*fs	0.50*fs
<i>Explanation:</i>									
<i>BVU1</i> is a ducted BVU with mechanical extraction in the ES and mechanical supply in the HS									
<i>BVU2</i> is a ducted BVU with mechanical extraction in the ES and HS combined with mechanical supply in the connecting spaces									
For ducted RVUs (UVU and BVU) the CTRL-factor can directly be derived from Table 3.									
For non-ducted RVUs (L-UVUs and L-BVUs) the flow sensitivity correction factor 'fs' needs to be calculated to determine the final CTRL-factor value:									
- For L- RVUs with periodically operating basic ventilation: $fs = 1 + (v + q_{vio})/2$									
- For L- RVUs with continuously operating basic ventilation: $fs = (1 + v)$									
Where									
v = airflow sensitivity L-RVU to pressure variations in %									
q_{vio} = indoor/outdoor airtightness L-RVU with fans switched off, related to ref. flowrate in %									

Table 4.

Q_{defr} for recuperative heat exchangers without humidity transfer

Depending on the frost protection strategy used in the residential BVU the following default values for Q_{defr} shall be used.

Frost protection strategy	Explanation	Q_{defr} in kWh/m ² /a		
		Cold ¹⁾	Average	Warm
E1	Electric preheating; 1 stage, controlled by outdoor temperature inlet in ventilation unit	40.40	4.95	0.00
E2	Electric preheating; 2 stage, controlled by outdoor temperature inlet in ventilation unit	22.57	2.17	0.00
E3	Electric preheating; stepless variable, controlled by outdoor temperature inlet in ventilation unit	8.64	1.10	0.00
E4	Electric preheating; stepless variable, controlled by outdoor temperature inlet in ventilation unit and additional temperature or pressure sensor in exhaust air	7.16	0.96	0.00
L1	Lowering supply air flow rate; ventilator shut off	n.a.	2.77	0.00
L2	Lowering supply air flow rate; stepless variable, controlled by outdoor temperature inlet in ventilation unit	n.a.	0.63	0.00
L3	Lowering supply air flow rate; stepless variable, controlled by outdoor temperature inlet in ventilation unit and additional temperature or pressure sensor in exhaust air	n.a.	0.58	0.00
I1	Increasing exhaust air flow rate; ventilator shut off	n.a.	2.77	0.00
I2	Increasing exhaust air flow rate; stepless variable, controlled by outdoor temperature inlet in ventilation unit	n.a.	1.50	0.00
I3	Increasing exhaust air flow rate; stepless variable, controlled by outdoor temperature inlet in ventilation unit and additional temperature or pressure sensor in exhaust air	n.a.	1.26	0.00
B1	Bypass for defrosting; Bypass full open	n.a.	2.77	0.00
B2	Bypass for defrosting; stepless variable, controlled by outdoor temperature inlet in ventilation unit	n.a.	0.63	0.00
B3	Bypass for defrosting; stepless variable, controlled by outdoor temperature inlet in ventilation unit and additional temperature or pressure sensor in exhaust air	n.a.	0.58	0.00

Climate parameters according to Table 1 are used for calculating default values

Other default values used for calculating Q_{defr} : PEF = 2.1, CTRL = 1, η_t = 0.75, q_{net} = 1,97 m³/h/m², setpoint = -3°C, x = 2

Table 5.

Calculating the total energy efficiency η_e of the ERS

Parameter	symbol	non-ducted L-BVUs	ducted BVUs
Temp. ratio on supply air side [%]	η_0	<i>Measured at massflow balance variation $\leq 3\%$</i>	
Internal leakage in [%]	w	$\eta_1 = \eta_0 \times (1 - 0,7 \times (w - 0,02))$	$\eta_1 = \eta_0 \times (1 - 0,7 \times (w - 0,02))$
Outdoor mixing rate in [%]	o	$\eta_2 = \eta_1 \times (1 - (o - 0,02))$	$\eta_2 = \eta_1^a$
Indoor mixing rate in [%]	y	$\eta_3 = \eta_2 \times (1 - (y - 0,02))$	$\eta_3 = \eta_2^a$
External leakage in [%]	z	$\eta_4 = \eta_3^b$	$\eta_4 = \eta_3^b$
Airflow sensitivity in [%]	v	$\eta_5 = \eta_4 \times (1 - (v - 0,02))^{0,4}$	$\eta_5 = \eta_4 \times (1 - (v - 0,02))^{0,4}$
Temperature ratio BVU	η_t	$= \eta_5$	$= \eta_5$
Humidity ratio on supply air side [%]	η_x	<i>Measured at mass flow balance variation $\leq 3\%$</i>	
Total energy efficiency BVU	η_e	$\eta_e = \eta_t + 0,08 * \eta_x$	$\eta_e = \eta_t + 0,08 * \eta_x$

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.

To take into account the uncertainty of measurement, the corrections given in Table 5 are applied for each individual value in percentage only if the deviation for each criterion given in Table 5 is $> 2\%$; corrections shall be made after reduction of this percentage (see formulas in table 5).

Table 6.

Default q_{opt} and $q_{net;vpi}$ values for calculating VPI

Reference airflows for achieving Category II ventilation performance	Non-ducted* RVU-ES in $m^3/h/m^2$	Non-ducted* RVU-HS in $m^3/h/m^2$	Ducted RVU ES&HS in $m^3/h/m^2$
Reference net mechanical ventilation rate for manually controlled RVU per m^2 heated floor area, $q_{net;VPI}$	0.79	1.60	1.97
Reference mechanical ventilation rate for an optimized ducted UVU and BVU1 per m^2 heated floor area, q_{opt}			0.67
Reference mechanical ventilation rate for an optimized ducted BVU2 and non-ducted RVUs per m^2 heated floor area, q_{opt}	0.38	0.62	1.00

ANNEX V
Product information sheet

Pursuant to point 1(b) of Article 3, the supplier shall enter into the product database the information as set out in Table 7.

The user manual or other literature provided with the product shall clearly indicate the link to the model in the product database as a human-readable Uniform Resource Locator (URL) or as QR code or by providing the product registration number.

Table 7: Product information sheet ducted RVUs

Supplier's name or trade mark:			
Supplier's address ^a :			
Model identifier:			
Type of residential ventilation unit: [unidirectional/bidirectional; level of airflow controls [no valves, zonal valves, local valves]].			
Type of drive installed or intended to be installed: [multi-speed drive/variable speed drive]			
Type of heat recovery system: [recuperative/regenerative/none], [thermal recovery only/thermal & humidity recovery]			
General product parameters:			
Parameter	Value	Parameter	Value
SEC – cold climate [kWh/(m ² .a)]	x,x	Energy efficiency class – cold climate	[A/B/C/D/E/F/G] _b
SEC – average climate [kWh/(m ² .a)]	x,x	Energy efficiency class – average climate	[A/B/C/D/E/F/G] _b
SEC – warm climate [kWh/(m ² .a)]	x,x	Energy efficiency class – warm climate	[A/B/C/D/E/F/G] _b
annual electricity consumption (AEC) [kWh electricity/(m ² .a)]	x,x	annual space heating energy consumed (AHC) – cold climate [kWh primary energy/(m ² .a)]	x,x
annual space heating energy consumed (AHC) – average climate [kWh primary energy/(m ² .a)]	x,x	annual space heating energy consumed (AHC) – warm climate [kWh primary energy/(m ² .a)]	x,x
Total annual primary energy consumed (TAEC) – cold climate [kWh primary energy/(m ² .a)]	x,x	Total annual primary energy consumed (TAEC) – average climate [kWh primary energy/(m ² .a)]	x,x
Total annual primary energy consumed (TAEC) – warm climate [kWh primary energy/(m ² .a)]	x,x		
annual heating saved (AHS) – cold climate [kWh primary energy/(m ² .a)]	x,x	annual heating saved (AHS) – average climate [kWh primary energy/(m ² .a)]	x,x

annual heating saved (AHS) – warm climate [kWh primary energy/(m ² .a)]	x,x	Temperature ratio of heat recovery system (in %, or 'not applicable' if the product has no heat recovery system)	x,x
Humidity ratio of heat recovery system (in %, or 'not applicable' if the product has no humidity recovery system)	x,x	Total energy recovery efficiency (in % or 'not applicable' if the product has no humidity recovery system)	x,x
Maximum flow rate (m ³ /h)	x,x	Sound power level at maximum flow rate L _{WA} (dB)	x,x
Electric power input of the RVU at maximum flow rate (W);	x,x	Reference pressure difference (Pa)	x
Reference flow rate (m ³ /h)	x	Sound power level at reference flow rate L _{WA} (dB)	x
Electric power input of the RVU at reference flow rate (W)	x,x	SPI [W/(m ³ /h)]	x,xx
If BVU: Internal leakage rate in %, otherwise N/A `	x,x	External leakage rate of the RVU in (%)	x,x

Control factor and control typology in accordance with the relevant definitions and classification in Annex IV Table 3;

Ventilation performance indicator (VPI) and ventilation performance class in accordance with the relevant definitions and classification in Annex IV;

If filters are applied: filter type, position and description of visual filter warning for RVUs intended for use with filters, including text pointing out the importance of regular filter changes for performance and energy efficiency of the unit;

For unidirectional ventilation systems, instructions to install regulated supply/exhaust grilles in the façade for natural air supply/extraction;

Additional information:

Weblink to the manufacturer's website, where the information in **point 1(x) of Annex IV** to Commission Regulation (EU) 2019/XXX¹¹ *[OP – please insert the number of Ecodesign Regulation]*^a is found:

^a changes to these items shall not be considered relevant for the purposes of point 4 of Article 4 of Regulation (EU) 2017/1369.

^b if the product database automatically generates the definitive content of this cell the supplier shall not enter these data.

¹¹ Commission Regulation (EU) 2019/XXX *[OP – please insert the OJ-L reference of Regulation C(2019)2120]*.

Table 8: Product information sheet non-ducted RVUs

Supplier's name or trade mark:			
Supplier's address ^a :			
Model identifier:			
Type of residential ventilation unit: [unidirectional/bidirectional].			
Type of drive installed or intended to be installed: [multi-speed drive/variable speed drive]			
Type of heat recovery system: [recuperative/regenerative/none], [thermal recovery only/thermal & humidity recovery]			
General product parameters:			
Parameter	Value	Parameter	Value
SEC – cold climate [kWh/(m ² .a)]	x,x	Energy efficiency class – cold climate	[A/B/C/D/E/F/G] _b
SEC – average climate [kWh/(m ² .a)]	x,x	Energy efficiency class – average climate	[A/B/C/D/E/F/G] _b
SEC – warm climate [kWh/(m ² .a)]	x,x	Energy efficiency class – warm climate	[A/B/C/D/E/F/G] _b
annual electricity consumption (AEC) [kWh electricity/(m ² .a)]	x,x	annual space heating energy consumed (AHC) – cold climate [kWh primary energy/(m ² .a)]	x,x
annual space heating energy consumed (AHC) – average climate [kWh primary energy/(m ² .a)]	x,x	annual space heating energy consumed (AHC) – warm climate [kWh primary energy/(m ² .a)]	x,x
Total annual primary energy consumed (TAEC) – cold climate [kWh primary energy/(m ² .a)]	x,x	Total annual primary energy consumed (TAEC) – average climate [kWh primary energy/(m ² .a)]	x,x
Total annual primary energy consumed (TAEC) – warm climate [kWh primary energy/(m ² .a)]	x,x		
annual heating saved (AHS) – cold climate [kWh primary energy/(m ² .a)]	x,x	annual heating saved (AHS) – average climate [kWh primary energy/(m ² .a)]	x,x
annual heating saved (AHS) – warm climate [kWh primary energy/(m ² .a)]	x,x	Temperature ratio of heat recovery system (in %, or 'not applicable' if the product has no heat recovery system)	x,x

Humidity ratio of heat recovery system (in %, or 'not applicable' if the product has no humidity recovery system)	x,x	Total energy recovery efficiency (in % or 'not applicable' if the product has no humidity recovery system)	x,x
Maximum flow rate (m ³ /h)	x,x	Sound power level at maximum flow rate L _{WA} (dB)	x,x
Electric power input of the RVU at maximum flow rate (W);	x,x	Reference pressure difference (Pa)	x
Reference flow rate (m ³ /h)	x	Sound power level at reference flow rate L _{WA} (dB)	x
Electric power input of the RVU at reference flow rate (W)	x,x	SPI [W/(m ³ /h)]	x,xx
If L-BVU: Internal leakage rate in %, otherwise N/A	x,x	External leakage rate of the RVU in (%)	x,x
If L-BVU: internal mixing rate in %	x,x	If L-BVU: external mixing rate in %	x,x
the airflow sensitivity to pressure variations at +20Pa and -20 Pa	x,x	the indoor/outdoor air tightness (m ³ /h)	x,x

Control factor (*CTRL*) and control typology in accordance with the relevant definitions and classification in Annex IV Table 3;

Ventilation performance indicator (VPI) and ventilation performance class in accordance with the relevant definitions and classification in Annex IV;

If filters are applied: filter type, position and description of visual filter warning for RVUs intended for use with filters, including text pointing out the importance of regular filter changes for performance and energy efficiency of the unit;

For unidirectional ventilation systems, instructions to install regulated supply/exhaust grilles in the façade for natural air supply/extraction;

Additional information:

Weblink to the manufacturer's website, where the information in **point 1(x) of Annex IV** to Commission Regulation (EU) 2019/XXX¹² [*OP – please insert the number of Ecodesign Regulation*]^a is found:

^a changes to these items shall not be considered relevant for the purposes of point 4 of Article 4 of Regulation (EU) 2017/1369.

^b if the product database automatically generates the definitive content of this cell the supplier shall not enter these data.

¹² Commission Regulation (EU) 2019/XXX [*OP – please insert the OJ-L reference of Regulation C(2019)2120*].

ANNEX VI
Technical documentation

1. The technical documentation referred to in point 1(d) of Article 3 shall include the following elements:
- (a) a general description of the model allowing it to be unequivocally and easily identified, including a list of all equivalent models, including model identifiers;
 - (b) references to the harmonised standards applied or other measurement standards used;
 - (c) specific precautions to be taken when the model is assembled, installed, maintained or tested;
 - (d) the values for the technical parameters set out in Table 9; these values are considered as the declared values for the purpose of the verification procedure in Annex IX;
 - (e) the details and the results of calculations performed in accordance with Annex IV, if not covered sufficiently in Table 9;
 - (f) testing conditions if not described sufficiently in point (b);

These elements shall also constitute the mandatory specific parts of the technical documentation that the supplier shall enter into the database, pursuant to article 12.5 of Regulation 2017/1369.

Table 9: Additional information to be included in the technical documentation

A general description of the residential ventilation unit, sufficient for it to be unequivocally and easily identified:			
Product specifications:			
Type of residential ventilation unit: [unidirectional/bidirectional; ducted/non-ducted]			
General product specifications:			
Parameter	Value	Parameter	Value
SEC-cold climate [kWh/(m ² .a)]	x.x	SEC-average climate [kWh/(m ² .a)]	x.x
SEC-warm climate [kWh/(m ² .a)]	x.x	Sound power level at reference flow rate L _{WA} (dB)	x.x
Overall Dimensions (millimetre)	Height	X	
	Width	X	
	Depth	x	

Where the information included in the technical documentation for a particular model has been obtained:

- (a) from a model that has the same technical characteristics relevant for the technical information to be provided but is produced by a different manufacturer; or
- (b) by calculation on the basis of design or extrapolation from another model of the same or a different manufacturer; or both.

the technical documentation shall include the details of such calculation, the assessment undertaken by the manufacturer to verify the accuracy of the calculation and, where appropriate, the declaration of identity between the models of different manufacturers.

ANNEX VII

Information to be provided in visual advertisements, in technical promotional material, in distance selling, except distance selling on the internet

1. In visual advertisements, for the purposes of ensuring conformity with the requirements laid down in point 1(e) of Article 3 and point 1(c) of Article 4, the energy efficiency class and the range of energy efficiency classes available on the label shall be shown as set out in point 4 of this Annex.
2. In technical promotional material, for the purposes of ensuring conformity with the requirements laid down in point 1(f) of Article 3 and point 1(d) of Article 4 the energy efficiency class and the range of energy efficiency classes available on the label shall be shown as set out in point 4 of this Annex.
3. Any paper-based distance selling must show the energy efficiency class and the range of energy efficiency classes available on the label as set out in point 4 of this Annex.
4. The energy efficiency class and the range of energy efficiency classes shall be shown, as indicated in Figure 1, with:
 - (c) an arrow, containing the letter of the energy efficiency class in 100 % white, Calibri Bold and in a font size at least equivalent to that of the price, when the price is shown;
 - (d) the colour of the arrow matching the colour of the energy efficiency class;
 - (e) the range of available energy efficiency classes in 100 % black; and,
 - (f) the size shall be such that the arrow is clearly visible and legible. The letter in the energy efficiency class arrow shall be positioned in the centre of the rectangular part of the arrow, with a border of 0,5 pt in 100 % black placed around the arrow and the letter of the energy efficiency class.

By way of derogation, if the visual advertisement, technical promotional material or paper-based distance selling is printed in monochrome, the arrow can be in monochrome in that visual advertisement, technical promotional material or paper-based distance selling.



Figure 1: Coloured/monochrome left/right arrow, with range of energy efficiency classes indicated

5. Telemarketing-based distance selling must specifically inform the customer of the energy efficiency class of the product and of the range of energy efficiency classes available on the label, and that the customer can access the full label and the product information sheet through a free access website, or by requesting a printed copy.
6. For all the situations mentioned in points 1 to 3 and 5, it must be possible for the customer to obtain, on request, a printed copy of the label and the product information sheet.

ANNEX VIII

Information to be provided in the case of distance selling through the Internet

1. The appropriate label made available by suppliers in accordance with point 1(g) of Article 3 shall be shown on the display mechanism in proximity to the price of the product. The size shall be such that the label is clearly visible and legible and shall be proportionate to the size specified in point 3(1) and 3(2) of Annex III for refrigerating appliances. The label may be displayed using a nested display, in which case the image used for accessing the label shall comply with the specifications laid down in point 3 of this Annex. If nested display is applied, the label shall appear on the first mouse click, mouse roll-over or tactile screen expansion on the image.
2. The image used for accessing the label in the case of nested display, as indicated in Figure 2, shall:
 - (a) be an arrow in the colour corresponding to the energy efficiency class of the product on the label;
 - (b) indicate the energy efficiency class of the product on the arrow in 100 % white, Calibri Bold and in a font size equivalent to that of the price;
 - (c) have the range of available energy efficiency classes in 100 % black; and,
 - (d) have one of the following two formats, and its size shall be such that the arrow is clearly visible and legible. The letter in the energy efficiency class arrow shall be positioned in the centre of the rectangular part of the arrow, with a visible border in 100 % black placed around the arrow and the letter of the energy efficiency class:

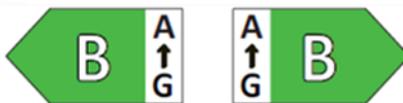


Figure 2: Coloured left/right arrow, with range of energy efficiency classes indicated

3. In the case of a nested display, the sequence of display of the label shall be as follows:
 - (a) the image referred to in point 2 of this Annex shall be shown on the display mechanism in proximity to the price of the product;
 - (b) the image shall link to the label set out in Annex III;
 - (c) the label shall be displayed after a mouse click, mouse roll-over or tactile screen expansion on the image;
 - (d) the label shall be displayed by pop up, new tab, new page or inset screen display;
 - (e) for magnification of the label on tactile screens, the device conventions for tactile magnification shall apply;
 - (f) the label shall cease to be displayed by means of a close option or other standard closing mechanism;
 - (g) the alternative text for the graphic, to be displayed on failure to display the label, shall be the energy efficiency class of the product in a font size equivalent to that of the price.

4. The electronic product information sheet made available by suppliers in accordance with point 1(b) of Article 3 shall be shown on the display mechanism in proximity to the price of the product. The size shall be such that the product

5. information sheet is clearly visible and legible. The product information sheet may be displayed using a nested display or by referring to the product database, in which case the link used for accessing the product information sheet shall clearly and legibly indicate 'Product information sheet'. If a nested display is used, the product information sheet shall appear on the first mouse click, mouse roll-over or tactile screen expansion on the link.

ANNEX IX
Verification procedure for market surveillance purposes

The verification tolerances defined in this Annex relate only to the verification by Member State authorities of the declared values and shall not be used by the supplier as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means. The values and classes published on the label or in the product information sheet shall not be more favourable for the supplier than the values declared in the technical documentation.

Where a model has been designed to be able to detect it is being tested (e.g. by recognizing the test conditions or test cycle), and to react specifically by automatically altering its performance during the test with the objective of reaching a more favourable level for any of the parameters specified in this Regulation or included in the technical documentation or included in any of the documentation provided, the model and all equivalent models shall be considered not compliant.

When verifying the compliance of a product model with the requirements laid down in this Regulation, the authorities of the Member States shall apply the following procedure:

- (1) The Member State authorities shall verify one single unit of the model.
- (2) The model shall be considered to comply with the applicable requirements if:
 - (a) the values given in the technical documentation pursuant to Article 3(3) of Regulation (EU) 2017/1369 (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the supplier than the corresponding values given in the test reports; and
 - (b) the values published on the label and in the product information sheet are not more favourable for the supplier than the declared values, and the indicated energy efficiency class and the airborne acoustical noise emission class are not more favourable for the supplier than the class determined by the declared values; and
 - (c) when the Member State authorities test the unit of the model, the determined values (that is the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as given in Table 9.
- (3) If the results referred to in points 2(a) and (b) are not achieved, the model and all equivalent models shall be considered not to comply with this Regulation.
- (4) If the result referred to in point 2(c) is not achieved, the Member State authorities shall select three additional units of the same model for testing. As an alternative, the three additional units selected may be of one or more equivalent models.
- (5) The model shall be considered to comply with the applicable requirements if for these three units the arithmetic mean of the determined values complies with the respective tolerances given in Table 9.
- (6) If the result referred to in point 5 is not achieved, the model and all equivalent models shall be considered not to comply with this Regulation.
- (7) The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay once a decision has been taken on the non-compliance of the model according to points 3, 6 or the second paragraph of this Annex

The Member State authorities shall use the measurement and calculation methods set out in Annex IV.

The Member State authorities shall only apply the verification tolerances set out in Table 9 and shall only use the procedure set out in points 1 to 7 for the requirements referred to in this Annex. For the parameters in Table 9, no other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

Table 9
Verification tolerances for measured parameters

Parameter	Verification
SPI	The determined value ^a shall not be more than 10 % higher than the declared value.
Thermal efficiency RVU	The determined value ^a shall not be more than 7 % lower than the declared value.
Sound power level	The determined value ^a shall not be more than 3 dB(A) more than the declared value.

^a in the case of three additional units tested as prescribed in point 4, the determined value means the arithmetic mean of the values determined for these three additional units.