DRAFT WORKING DOCUMENT ON

Ecodesign Requirements for Ventilation Units (Review EU1253/2014)

DRAFT TEXT REVIEWED ECODESIGN REGULATION

Contents

COMMISSION REGULATION (EU) …/…

of xx.yy.zzzz

laying down ecodesign requirements for ventilation units pursuant to Directive 2009/125/EC of the European Parliament and of the Council

and repealing Commission Regulation (EC) No 1253/2014

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to Article 114 of the Treaty on the Functioning of the European Union,

Having regard to 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[1], and in particular Article 15(1) thereof,

Whereas:

(1) Pursuant to Directive 2009/125/EC the Commission should set ecodesign requirements for energy-related products which account for significant volumes of sales and trade in the Union and which have a significant environmental impact and presenting significant potential for improvement through design in terms of their environmental impact, without entailing excessive costs.

(2) The Communication from the Commission COM(2016)773[2] (ecodesign working plan) established by the Commission in application of Article 16(1) of Directive 2009/125/EC 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 and eventual adoption of implementing measures, as well as the review of Commission Regulation (EC) No 1253/2014[3] and Commission Delegated Regulation (EU) No 1254/2014[4].

(3) Measures from the ecodesign working plan have an estimated potential to deliver a 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

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1 OJ L 285, 31.10.2009, p. 10.

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

3 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).

4 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).

tonnes per year in 2030. Ventilation units are one of the product groups listed in the ecodesign working plan.

(4) The Commission established ecodesign requirements for ventilation units in Commission Regulation (EC) No 1253/2014[3] and pursuant to that Regulation, the Commission should regularly review the Regulation in the light of technological progress.

(5) The Commission has reviewed Regulation (EC) No 1253/2014 and analysed the technical, environmental and economic aspects of 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 18 of Directive 2009/125/EC.

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

(7) The environmental aspects of the ventilation units in the scope of this Regulation that have been identified as significant for the purposes of this Regulation primarily relate to the energy consumption in the use phase, which represents over 95% of the total GHC-emissions.
Primary function of the ventilation units in the scope of this Regulation is to achieve acceptable indoor air quality levels in order to safeguard human health and to prevent humidity problems in buildings. The continuously ongoing improvements of the airtightness and insulation levels of building shells reduce natural infiltration airflows and further enforce the importance of mechanical ventilation. Explicit attention is needed to the actual ventilation performance of the ventilation units under scope to maintain acceptable indoor air quality levels and prevent further impacts on human health and their performance levels. For the same reasons, filters are more prominently addressed in this revised regulation.
In the renovation market, non-ducted local ventilation units are gaining ground due to their ease of installation. For that reason they are included in this revised Regulation. The number of multifunctional residential bidirectional ventilation units (MFR-BVU) is also slowly growing, though the sales are still low. For these reasons, it is proposed to add the MFR-BVUs in scope to this Regulation for information requirements only.

(8) The review study shows both the need and the benefit of a further assessment of the ventilation performance. Specifically, it shows that the energy performance assessment of ventilation units preferably is to be based on a reference ventilation performance. Since ventilation performance to a large extent is determined by the options related to flow control and ventilation demand control, the control options have been further expanded in the energy efficiency assessment. For non-residential ventilation units (NRVUs) the energy consumption of filters is specifically addressed, by introducing minimum requirements. Minimum requirements are also introduced as regards the internal leakages in bidirectional ventilation units. Finally, the option of humidity recovery is included in the energy efficiency assessment, making the regulation more suitable for warmer climate zones.

(9) The Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the

Regions COM(2015)0614 final[5] (circular economy action plan) and the ecodesign working plan underline the importance of using the ecodesign framework to support the move towards a more resource efficient and circular economy. Directive 2012/19/EU of the European Parliament and of the Council[6] refers to Directive 2009/125/EC and indicates that ecodesign requirements should facilitate the re-use, dismantling and recovery of waste electrical and electronic equipment (WEEE) by tackling the issues upstream. This Regulation should therefore lay down appropriate requirements for this.

(10) The relevant product parameters should be measured 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 Council[7].

(11) In accordance with Article 8 of Directive 2009/125/EC, this Regulation should specify the applicable conformity assessment procedures.

(12) To facilitate compliance checks, manufacturers, importers or authorised representatives should provide information in the technical documentation referred to in Annexes IV and V to Directive 2009/125/EC in so far as that information relates to the requirements laid down in this Regulation.

(13) For market surveillance purposes, manufacturers, importers or authorised representatives should be allowed to refer to the product database if the technical documentation as per Commission Delegated Regulation (EU) 20XX/XXX[8] *[OP – Revised EL RVUs]* contains the same information.

(14) To improve the effectiveness of this Regulation and to protect consumers, products that automatically alter their performance in test conditions to improve the declared parameters should be prohibited.

(15) In addition to the legally binding requirements laid down in this Regulation, indicative benchmarks for best available technologies should be identified to make information on the products' environmental performance over their life cycle subject to this Regulation widely available and easily accessible, in accordance with Directive 2009/125/EC, Annex I, part 3, point (2).

(16) A review of this Regulation should assess the appropriateness and effectiveness of its provisions in achieving its goals. The timing of the review should allow for all provisions to be implemented and show an effect on the market.

(17) Regulation (EC) No 1253/2014 should therefore be repealed.

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5 Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions. Closing the loop - An EU action plan for the circular economy, COM/2015/0614 final, 02.12/2015.

6 Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on waste electrical and electronic equipment (WEEE) (OJ L 197, 24.7.2012, p. 38).

7 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).

8 Commission Delegated Regulation (EU) 2019/XXX *[OP – please enter the full OJ-L references of Regulation Revised EL RVUs]*

(18) The measures provided for in this Regulation are in accordance with the opinion of the Committee established by Article 19(1) of Directive 2009/125/EC.

HAS ADOPTED THIS REGULATION:

Article 1
Subject matter and scope

1. This Regulation establishes ecodesign requirements for the placing on the market of or the putting into service of 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, and do not have the technical possibility to continuously ventilate these spaces, except for information requirements;

   (b) are axial or centrifugal fans only equipped with a housing in terms of Regulation 327/2011;

   (c) are exclusively specified as operating in a potentially explosive atmosphere as defined in Directive 94/9/EC of the European Parliament and of the Council[9];

   (d) 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 Council[10];

   (e) 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

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[9] 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).

[10] 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).

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 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;

(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) use both a passive energy recovery system and a heat pump for the recovery of energy between the supply and exhaust ventilation airflows, except for information requirements;

(h) 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 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 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 building;

(7) *'multifunctional ducted residential bidirectional ventilation unit (MFR-BVU)'* means a centralised bidirectional ventilation unit equipped with at least, within one or more casings, a motor, supply and exhaust air fans, air filters, a common control system, and one or more of the additional components:

(a) an air-to-water heat pump;

(b) an air-to-air heat pump;

(c) an air-to-air heat exchanger,

that - next to ventilation – has least one of the following additional functionalities:

(a) hydronic heating or air heating,

(b) hydronic cooling or air cooling;

(c) hot water production.

(8) *'non-ducted (local) unidirectional ventilation unit (L-UVU)'* means a room-based ventilation unit producing an air flow in a specific room of a 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;

(9) *'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 building;

(10) *'exhaust spaces (ES)'* (or wet spaces) are spaces in a 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;

(11) *'habitable spaces (HS)'* are spaces in a building primarily intended for longer occupation of its inhabitants; typical habitable spaces are living room, bedroom, dining, study, office; typical pollutants are bio-effluents, interior products and interior material emissions, emissions from human activities;

(12) *'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

(13) *'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;

(14) '*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);

(15) '*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

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

Article 3

Ecodesign requirements

The ecodesign requirements set out in Annex II, Annex III, Annex IV and Annex V shall apply from the dates indicated therein.

Article 4

Conformity assessment

1. The conformity assessment procedure referred to in Article 8 of Directive 2009/125/EC shall be the internal design control system set out in Annex IV to that Directive or the management system set out in Annex V to that Directive.

2. For the purposes of conformity assessment pursuant to Article 8 of Directive 2009/125/EC, the technical documentation shall contain a copy of the product information provided in accordance with Annexes IV and V to this Regulation, and the details and the results of the calculations set out in Annex VI and VII to this Regulation.

3. 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.

   The technical documentation shall include a list of all equivalent models, including the model identifiers.

4. The technical documentation shall include the information in the order and as set out in Annex V and VI of Regulation (EU) 20YY/XXX *[Revised EL RVUs]*. For market surveillance purposes, manufacturers, importers or authorised representatives may, without prejudice to Annex IV, point 2(g) of Directive 2009/125/EC, refer to the technical documentation uploaded to the product database which contains the same information laid down in Regulation (EU) 20YY/XXX *[Revised EL RVUs]*.

Article 5

Verification procedure for market surveillance purposes

Member States shall apply the verification procedure laid down in Annex VIII when performing the market surveillance checks referred to in point 2 of Article 3 of Directive 2009/125/EC.

Article 6
Circumvention

The manufacturer, importer or authorised representative shall not place on the market products designed to be able to detect they are being tested (e.g. by recognising the test conditions or test cycle), and to react specifically by automatically altering their performance during the test with the aim of reaching a more favourable level for any of the parameters declared by the manufacturer, importer or authorised representative in the technical documentation or included in any documentation provided.

The energy consumption of the product and any of the other declared parameters shall not deteriorate after a software or firmware update when measured with the same test standard originally used for the declaration of conformity, except with explicit consent of the end-user prior to update. No performance change shall occur as a result of rejecting the update.

A software update shall never have the effect of changing the product's performance in a way that makes it non-compliant with the ecodesign requirements applicable for the declaration of conformity.

Article 7
Indicative benchmarks

The indicative benchmarks for the best-performing products and technologies available on the market at the time of adopting this Regulation are set out in Annex IX.

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, to the Consultation Forum by *[OP please insert date – 6 years after its entry into force]*.

This review shall in particular assess:

(a) the appropriateness to set specific ecodesign requirements on the ventilation performance of residential ventilation units as set out in Annex IV of Regulation (EU) 20YY/XXX *[Revised EL RVUs]* ;

(b) the appropriateness to update the table with control factors for residential ventilation units;

(c) the appropriateness to set specific ecodesign requirements for MFR-BVUs;

(d) the appropriateness to set a further tier with tightened ecodesign requirements for residential ventilation units as regards minimum SEC-values and L_{WA} values;

(e) the appropriateness to set minimum requirements on the annual energy consumption (AEC) for filters used in RVUs;

(f) the appropriateness to set specific ecodesign requirements on non residential BVUs having both a heat exchanger and a heat pump;

(g) the appropriateness to set a further tier of limit values on the annual energy consumption (AEC) for the various filter classes for NRVUs;

(h) the appropriateness to set a further tier with tightened ecodesign requirements for NRVUs as regards fan efficiency, $SFP_{int\text{-}limit}$ and energy recovery.

(i) the level of the verification tolerances set out in Annex XX;

Article 9
Repeal

Commission Regulation (EC) No 1253/2014 shall be repealed with effect from xx/yy/zz.

Article 10
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/yy/zz. However, Article 6 shall apply from *[OP – please insert the day of entry into force of this Regulation]*.

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

Done at Brussels, xx.yy.zzzz

For the Commission
The President
Ursula VON DER LEYEN

ANNEX I

Definitions applicable for the annexes

The following definitions shall apply:

(1) *'specific energy consumption (SEC)'* (expressed in kWh/(m^2.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;

(2) *'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;

(3) *'multi-speed drive'* means a fan motor that can be operated at three or more fixed speeds plus zero ('off');

(4) *'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 motor complies with this description;

(5) *'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;

(6) *'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;

(7) *'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 extract airflow for storing the thermal energy, or the cold supply airflow for releasing the thermal energy (e.g. a rotary heat exchanger).

(8) *'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;

(9) *'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.

(10) '*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;

(11) *'internal leakage rate of a residential BVU'* means the fraction of extract air present in the supply air of ventilation units with ERS as a result of leakage

between extract 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;

(12) *'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.

(13) *'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;

(14) *'indoor mixing rate of a 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;

(15) *'outdoor mixing rate of a 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;

(16) *'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);

(17) *'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);

(18) *'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;

(19) *'reference flow rate of a RVU'* (expressed in m³/h) 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;

(20) *'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)

(21) *'manual control'* means any control type using any kind of switch that requires manual operation;

(22) *'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;

(23) *'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;

(24) *'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.

(25) *'ventilation demand control for habitable spaces (VDC-HS)'* mean ventilation demand controls measuring one or more of the following parameters : carbon dioxide (CO_2), occupancy detection of any kind (preferably including number of occupants) and optionally TVOC as additional parameter;

(26) *'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 2 of Annex VI; the CTRL-factor represents the reduction factor for the reference airflow that is needed to achieve a reference ventilation performance[11] with a reference manually controlled UVU-system;

(27) *'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;

(28) *'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;

(29) *'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

(30) *'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 rooms.

(31) *'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.

(32) *'central ventilation demand control (central VDC)'* means a demand control device that determines the actual ventilation demand on the basis of a measurement at a central level in a dwelling (e.g. in the central exhaust duct of a central RVU.;

(33) *'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, were a zone is defined as a part of a dwelling covering at least two separate rooms.

(34) *'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.

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[11] 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.

(35) *'static pressure (p_{sf})'* means the total pressure minus the fan dynamic pressure;

(36) *'total pressure (p_f)'* means the difference between the stagnation pressure at the fan outlet and that at the fan inlet.

(37) *'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.

(38) *'dynamic pressure'* means the pressure calculated from the mass flow rate and the average gas density at the outlet and the unit outlet area;

(39) *'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.

(40) *'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;

(41) *'dual use unit'* means a ventilation unit designed for ventilation purposes as well as fire or smoke extraction, complying with the basic requirements for construction works with regard to safety in case of fire as set out in Regulation (EU) No 305/2011;

(42) '*thermal by-pass facility*' means any solution that circumvents the heat exchanger or controls automatically or manually its heat recovery performance, without necessarily requiring a physical airflow bypass (for example: summer box, rotor speed control, control of air flow);

(43) *'reference configuration of a RVU'* means a ventilation unit that is configured according to the manufacturer instructions; 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;

(44) '*declared values*' means the values provided by the manufacturer, importer or authorised representative for the stated, calculated or measured technical parameters in accordance with Article 4, for the verification of compliance by the Member State authorities;

Specific definitions for NRVUs:

(1) *'nominal electric power input* (P)' (expressed in kW) means the effective electric power input of the fan drives, including any motor control equipment, at the nominal external pressure and the nominal airflow;

(2) *'fan efficiency* (η_{fan})' means the static efficiency including motor and drive efficiency of the individual fan(s) in the ventilation unit (reference configuration) determined at nominal air flow and nominal external pressure drop;

(3) *'reference configuration of a BVU'* means a product configured with a casing, at least two fans with variable speed or multi-speed drives, an ERS, and the filters according to the manufacturer instructions;

(4) *'reference configuration of an UVU'* means a product configured with a casing and at least one fan with variable speed or multi-speed drive, and the filter according to the manufacturer instructions;

(5) *'minimum fan efficiency* (η_{vu})' is the specific minimum efficiency requirement for VUs within the scope of this Regulation;

(6) *'nominal flow rate* (q_{nom})'(expressed in m^3/s) means the declared design flow rate of an NRVU distributed to and/or extracted from the building, including any leakages or any pressure balancing flow at standard air conditions 20 °C and

101325 Pa, whereby the unit is installed complete (for example, including filters) and according to the manufacturer instructions; in case the design flow rate is not known, 'nominal flow rate' refers to the range of design flowrates and related external pressure (Q/ΔP-values) for which the minimum requirements are met, and has to be indicated with at least five Q/ΔP-points for which nominal flow rate, ΔP_{ext}, SFPint, η_{vu} (if applicable), $\Delta P_{s,ext}$ and L_{wa} are given.

(7) '*nominal external pressure* ($\Delta p_{s,\ ext}$)' in (expressed in Pa) means the declared design external static pressure difference at nominal flow rate;

(8) '*maximum rated fan speed* (v_{fan_rated})' (expressed in rounds per minute – rpm) is the fan speed at nominal flow rate and nominal external pressure;

(9) '*internal pressure drop of ventilation components* ($\Delta p_{s,int}$)' (expressed in Pa) means the sum of the static pressure drops of a reference configuration of a BVU or an UVU at nominal flow rate;

(10) '*internal pressure drop of additional non-ventilation components* ($\Delta p_{s,add}$)' (expressed in Pa) means the remainder of the sum of all internal static pressure drops at nominal flow rate and nominal external pressure after subtraction of the internal pressure drop of ventilation components ($\Delta p_{s,int}$);

(11) '*temperature ratio of a non-residential ERS (η_{t_nrvu})*' means the ratio between supply air temperature gain and the extract air temperature minus outdoor air temperature, measured under dry reference conditions, with balanced mass flow at nominal airflow rate, an indoor-outdoor air temperature difference of 20 K, excluding thermal heat gain from fan motors and from internal leakages;

(12) '*humidity ratio of a non-residential ERS (η_{x_nrvu})*' 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 summer air conditions, with balanced mass flow at nominal airflow rate.

(13) '*efficiency of the total recovered energy of a NRVU (η_{e_nrvu})*' means the aggregation of the efficiency of the humidity recovery for cooling conditions and of the thermal efficiency, determined according to the formula in Annex VII;

(14) '*external leakage rate of a non-residential BVU*' means the leakage to or from the inside of the casing of a ventilation unit to or from the surrounding air, measured at static over pressure and under pressure according to Table 7 of Annex VII.

(15) '*static internal leakage of a non-residential BVU*' means the leakage between extract and supply airflows paths inside the casing measured at static over pressure and under pressure according to Table 7 of Annex VII.

(16) '*exhaust air transfer ratio (EATR) of a non-residential BVU*' means the percentage of exhaust air that is present in the supply air, due to internal leakages within the BVU, measured at the supply air outlet duct when the units operates at nominal flowrate

(17) '*outdoor air correction factor (OACF) of a non-residential BVU*' means the ratio of the outdoor airflow measured at the ~~the~~ outdoor air inlet duct to the supply airflow measured at the supply air outlet duct when the units operates at nominal flowrate;

(18) '*internal specific fan power of ventilation components* (SFP_{int})' (expressed in W/(m³/s)) is the ratio between the internal pressure drop of ventilation components and the fan efficiency, determined for the reference configuration;

(19) *'maximum internal specific fan power of ventilation components* ($SFP_{int\text{-}limit}$)' (expressed in W/(m³/s)) is the specific efficiency requirement for SFP_{int} for VUs within the scope of this Regulation;

(20) *'run-around ERS'* is a heat recovery system where the heat recovery device on the exhaust side and the device supplying the recovered heat to the air stream on the supply side of a ventilated space are connected through a heat transfer system where the two sides of the ERS can be freely positioned in different parts of a building;

(21) *'face velocity'* (expressed in m/s) is the larger of supply and extract air velocity. The velocities are the air velocities in the VU based on the inside unit area for supply respectively extract air flow of the VU. The velocity is based on the area of the filter section of the respective unit, or if no filter is installed, based on the area of the fan section;

(22) *'efficiency bonus (E)'* is a correction factor taking account of the fact that more efficient heat recovery causes more pressure drops requiring more specific fan power;

(23) *'supply filter correction (F_{sup})'* (expressed in Pa) is a correction value to be applied to take into account the presence of the filter on the supply side;

(24) *'exhaust filter correction (F_{exh})'* (expressed in Pa) is a correction value to be applied to take into account the presence of the filter on the exhaust side;

(25) *'filter efficiency'* means the average ratio between the dust fraction captured and the amount fed into the filter, under the conditions described for fine and medium filters in Annex IX*;*

(26) *'control bonus (C)'* means the correction factor for smart controls to be used as multiplier to the maximum internal specific fan power of ventilation components ($SFP_{int\text{-}limit}$), determined according to Table 6 of Annex VII.

ANNEX II
Specific ecodesign requirements for RVUs

From xx yy zz:

- SEC for ducted residential UVUs, calculated for average climate, shall be no more than -12 kWh/(m^2.a).
- SEC for ducted residential BVUs, calculated for average climate, shall be no more than -35 kWh/(m^2.a).
- SEC for non-ducted residential UVU-ES, calculated for average climate, shall be no more than -2 kWh/(m^2.a).
- SEC for non-ducted residential BVU-ES, calculated for average climate, shall be no more than -15 kWh/(m^2.a).
- SEC for non-ducted residential UVU-HS, calculated for average climate, shall be no more than -10 kWh/(m^2.a).
- SEC for non-ducted residential BVU-HS, calculated for average climate, shall be no more than -20 kWh/(m^2.a).
- Non-ducted RVUs, including ventilation units intended to be equipped with one duct connection on either supply or extract air side shall have a maximum L_{WA} of 35 dB.
- The maximum internal and external leakage rates (%) for ducted BVUs shall be less than 7% when the pressurization test is used, less than 4% when the in-duct tracer gas test is used, and less than 6% when the chamber tracer gas method is used;
- The maximum internal, external leakage and mixing rates (%) for non-ducted *L*-BVUs shall be less than 7%
- All VUs, except dual use units, shall be equipped with a multi-speed drive or variable speed drive.
- All BVUs shall have a thermal by-pass facility.
- Ventilation units with a filter shall be equipped with a visual filter change warning signal.

ANNEX III
Specific ecodesign requirements for NRVUs

From xx yy zz:

Requirements for all NRVUs

- All ventilation units, except dual use units, shall be equipped with a multi-speed drive or a variable speed drive.
- All BVUs shall have a ERS.
- The ERS shall have a thermal by-pass facility.
- If a filter unit is part of the configuration the product shall be equipped with a visual signalling or an alarm in the control system which shall be activated if the filter pressure drop exceeds the maximum allowable final pressure drop.
- The minimum fan efficiency (η_{vu}) is
    - 6,2 % * ln(P) + 42,0 % if P ≤ 30 kW and
    - 63,1 % if P > 30 kW.

Requirements for non-residential BVUs for which the place of installation is not known

- For BVUs having an ERS equipped with a heat exchanger designed for thermal energy recovery only, except for run-around ERS
    - The minimum temperature ratio $\eta_{t\ nrvu}$ shall be 73 % ;
    - The maximum internal specific fan power (SFP_{int_limit}) in W/(m³/s) is

      $460*E*C + F_{sup} + F_{exh}$ if $q_{nom} \geq 2$ m³/s and

      $760*E*C - 300*q_{nom}/2 + F_{sup} + F_{exh}$ if $q_{nom} < 2$ m³/s,

      where
      E = 1 if η_{t_nrvu} *=73%; if* $\eta_{t\ nrvu}$ *>73%,* $E = 0.3698*\eta_{t\ nrvu}/(1-\eta_{t\ nrvu})$
- For BVUs having a run-around ERS
    - The minimum temperature ratio $\eta_{t\ nrvu}$ shall be 68 % ;
    - The maximum internal specific fan power (SFP_{int_limit}) in W/(m³/s) is

      $960*E*C + F_{sup} + F_{exh}$ if $q_{nom} \geq 2$ m³/s and

      $1260*E*C - 300*q_{nom}/2 + F_{sup} + F_{exh}$ if $q_{nom} < 2$ m³/s,

      where
      E=1 if η_{t_nrvu} *= 68 to73%;if* $\eta_{t\ nrvu}$ *>73%,* $E = 0.3698*\eta_{t\ nrvu}/(1-\eta_{t\ nrvu}$
- For BVUs having an ERS equipped with a heat exchanger designed for thermal energy recovery and moisture recovery,
    - The minimum total ERS-efficiency $\eta_{e\ nrvu}$ shall be 75 % ;
    - The maximum internal specific fan power (SFP_{int_limit}) in W/(m³/s) is

      $460*E*C + F_{sup} + F_{exh}$ if $q_{nom} \geq 2$ m³/s and

      $760*E*C - 300*q_{nom}/2 + F_{sup} + F_{exh}$ if $q_{nom} < 2$ m³/s,

      where
      E=1 if η_{e_nrvu} *=73%; if* $\eta_{e\ nrvu}$ *>73%,* $E = 0.3698*\eta_{e\ nrvu}/(1-\eta_{e\ nrvu})$

And where

C = control bonus, determined according to Table 6 of Annex VII

F_{sup} = the *supply filter correction* value for the required filter-class supply filter in Pa as indicated in Table 5 of Annex VII

F_{exh} = the *exhaust filter correction* value for the required filter-class exhaust filter in Pa as indicated in Table 5 of Annex VII

Requirements for non-residential BVUs for which the place of installation is known

- The minimum required energy recovery ratio $\eta_{e\_nrvu\_min}$ is:

$\eta_{e\_nrvu\text{-}min}$ = -1,02302*ODA -0,05813*ODA^2 – 0,00134 ODA^3 + $\eta_{e\_nrvu\text{-}base}$

Where

ODA is the design winter outdoor temperature at the installation site, with the valid range : -14°C to 2,5 °C. For cases where higher or lower ODA values are applicable the limit values of -14 °C and + 2.5 °C are to be used.

$\eta_{e\_nrvu\text{-}base}$ is the base energy recovery ratio figure and depends on the ERS-type having the following default values:

- run around ERS : 61,44%
- thermal ERS : 66,44%
- thermal and moisture ERS : 68,44%

– The maximum internal specific fan power (SFP_{int_limit}) in W/(m³/s) is

  - for a BVU with run-around ERS

    SFP_{ERS}*2.6*E*C – 300*q_{nom}/2 + F_{sup} + F_{exh} if q_{nom} < 2 m³/s and

    SFP_{ERS}*2.0*E*C + F_{sup} + F_{exh} if q_{nom} ≥ 2 m³/s;

  - for a BVU with other ERS

    SFP_{ERS}*1.6*E*C – 300*q_{nom}/2 + F_{sup} + F_{exh} if q_{nom} < 2 m³/s and

    SFP_{ERS}*E*C + F_{sup} + F_{exh} if q_{nom} ≥ 2 m³/s;

Where

SFP_{ERS} = -15,423*ODA - 0,90772*ODA^2 - 0,03227*ODA^3 + 261

ODA is the design winter outdoor temperature at the installation site, with the valid range : -14°C to 2,5 °C. For cases where higher or lower ODA values are applicable the limit values of -14 °C and + 2.5 °C are to be used.

E-factor

  - *If* $\eta_{e\_nrvu} = \eta_{e\_nrvu\_min}$ *: E = 1*

- *If $\eta_{e\ nrvu} > \eta_{e\_nrvu\_min}$: $E = \eta_{e\ nrvu} /(1- \eta_{e\ nrvu}) / \eta_{e\_nrvu\_min} *(1- \eta_{e\_nrvu\_min})$*

C = control bonus, determined according to Table 6 of Annex VII

F_{sup} is the default SFP_{filter} value for the required filter-class supply filter in W/(m³/s) as indicated in Table 5 of Annex VII.

F_{exh} is the default SFP_{filter} value for the required filter-class axhaust filter in W/(m³/s) as indicated in Table 5 of Annex VII.

Requirements for non-residential UVUs

$SFP_{int\text{-}limit}$ for UVUs intended to be used with a supply filter = F_{sup}

Requirements as regards filters

– The maximum annual energy consumption (AEC) of any filters in the NRVU at nominal flowrate, determined according to the method described in Annex VII is:

Filter class	Limit values AEC filters in kWh/y		
	ePM1 and ePM1, min ≥ 50%	ePM2.5 and ePM2.5, min ≥ 50%	ePM10 ≥ 50%
50% & 55%	1400	1300	750
60% & 65%	1450	1350	850
70% & 75%	1550	1400	900
80% & 85%	1800	1500	1000
> 90%	1900	1600	1400

Requirements as regards leakages in non-residential BVUs

– The maximum external leakage when tested using static pressure differences according to Table 7 in Annex VII is:

- For NRVUs with negative pressure: 1,32 l/s/m^2
- For NRVUs with positive pressure: 1,90 l/s/m^2

– The maximum EATR at nominal flow and nominal pressure is 5%, except for NRVUs with recuperative heat exchangers with maximum static internal leakage not higher than 3%, when tested using static pressure differences according to Table 7 in Annex VII;

– The OACF at nominal flow and nominal pressure must be within 0.90 and 1.10, except for NRVUs with recuperative heat exchangers with maximum static

internal leakage not higher than 3%, when tested using static pressure differences according to Table 7 in Annex VII .

Requirements as regards material efficiency

- (a) Availability of spare parts: Manufacturers, importers or authorised representatives of NRVUs shall make available to the customer a list of spare parts and the procedure for ordering them, for a minimum period of 7 years after placing the unit on the market
- (b) Maximum delivery time of spare parts: During the period mentioned under point (a), the manufacturer, importer or authorised representatives shall ensure the delivery of the spare parts for NRVUs within 8 weeks after having received the order.
- (c) Access to repair and maintenance information: from the placing on the market of the NRVU, and until the end of the period mentioned under (a), the manufacturer, importer or authorised representative shall provide the customer and the professional repairers with access to the following appliance repair and maintenance information:

  – a disassembly map or exploded view;

  – technical manual of instructions for repair;

  – list of necessary repair and test equipment;

  – component and diagnosis information (such as minimum and maximum theoretical values for measurements);

  – wiring and connection diagrams;

  – diagnostic fault and error codes (including manufacturer-specific codes, on request after diagnosis);

  – instructions for installation of relevant software and firmware including reset software, on request after diagnosis);

  – information on how to access data records of reported failure incidents stored on the product (on request after diagnosis).

ANNEX IV
Information requirements for RVUs and for MFR-BVUs

From xx yy zz, instruction manuals for installers and end-users, and free access websites of manufacturers, importers or authorised representatives shall include the following information:

1. Information requirements for RVUs

(a) supplier's name or trade mark;

(b) supplier's model identifier i.e. the code, usually alphanumeric, used to distinguish a specific residential ventilation unit model from other models with the same trade mark or supplier's name;

(c) specific energy consumption (SEC) in kWh/(m^2.a) for each applicable climate zone;

(d) declared typology in accordance with Article 2 of this Regulation (RVU or NRVU, supply or exhaust central unidirectional (UVU), central bidirectional (BVU), room-based L-UVU-HS or L-UVU-ES, room-based LBVU-HS, multi-functional bidirectional (MFR-BVU);

(e) type of drive installed or intended to be installed (multi-speed drive or variable speed drive);

(f) type of heat recovery system (recuperative, regenerative, with or without humidity recovery, none);

(g) thermal efficiency of heat recovery (in % or 'not applicable' if the product has no heat recovery system);

(h) maximum flow rate in m^3/h;

(i) electric power input of the reference configuration of the ventilation unit, including any control equipment, at maximum flow rate (W);

(j) sound power level (L_{WA}), rounded to the nearest integer;

(k) reference flow rate in m^3/s

(l) reference pressure difference in Pa;

(m) SPI in $W/(m^3/h)$;

(n) Type of airflow control (central, zonal, local);
Type of VDC devices (manual, clock, central/zonal/local VDC-ES, central/zonal/local VDS-HS);
Control factor and related ventilation performance index (all in accordance with the relevant definitions and classification in Table 2);

(o) declared maximum internal leakage rates (%) for bidirectional ventilation units

(p) declared maximum external leakage rates (%) for bidirectional ventilation units

(q) declared internal and external mixing of non-ducted bidirectional ventilation units

(r) for non-ducted ventilation units only: the airflow sensitivity to pressure variations at +20Pa and -20 Pa;

(s) for non-ducted ventilation units only: the indoor/outdoor air tightness in m^3/h;

(t) filter(s) class, filter(s) velocity, clean pressure drop(s), final pressure drop(s) and related expected filter change intervals and power consumption of used/full filters in case they are not exchanged, of the filters installed in the model;

(u) 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;

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

(w) for BVUs equipped with a defrosting system: the type of the applied frost protection strategy as well as its suitability for colder climates and its energy impact;

(x) detailed instructions inter alia identifying the required tools for the manual disassembly of permanent magnet motors, and of electronics parts (printed wiring boards/printed circuit boards and displays >10 g or > 10 cm²), batteries and larger plastic parts (>100 g) for the purpose of efficient materials recycling, except for models of which less than 5 units per year are produced;

(y) instruction on how to find the model information in the product database, as defined in Regulation (EU) 20XX/XXX *[OP – Revised EL RVUs]* by means of a weblink that links to the model information as stored in the product database or a link to the product database and information on how to find the model identifier on the product.

2. Information requirements for MFR-BVUs

From xx yy zz, instruction manuals for installers and end-users, and free access website of manufacturers, importers or authorised representatives shall include the following information:

(a) supplier's name or trade mark;

(b) supplier's model identifier i.e. the code, usually alphanumeric, used to distinguish a specific residential ventilation unit model from other models with the same trade mark or supplier's name;

(c) declared typology and schematic of the product model;

(d) type of the included heat pump, heat source and heat sink;

(e) type of installed ventilation fan drive (multi-speed drive or variable speed drive);

(f) type of heat recovery system (recuperative, regenerative), where relevant

(g) thermal efficiency of heat recovery with heat pump off at reference conditions (in % or 'not applicable' if the product has no heat recovery system);

(h) the following performance data shall be provided depending on the functions of the unit (mandatory at reference outdoor air volume flow, optional at maximum outdoor air volume flow)

a) Domestic hot water production

(1) The declared load profile, expressed by the appropriate letter

(2) Domestic hot water performance COPWH or COPD (if the unit provides DHW simultaneously with hydronic space heating and/or air heating)

(3) Maximum volume of usable hot water, Vmax

(4) Air volume flows assigned to the data (i to iii) q_V, fresh air, q_V, RCA, q_V, OEA

b) Hydronic space heating and/or cooling

Space heating and/or cooling performance shall be given for both low and medium temperatures, unless the heat pump is a low temperature heat pump. For multifunctional units providing both space heating and domestic hot water, declaration of low temperature performance is optional.

(1) Hydronic heating performance COP_{HH} under test point n°1

(2) Hydronic cooling performance EER_{HC} under test point n°1

(3) Hydronic heating capacity P_{HH} under test point n°1

(4) Hydronic cooling capacity P_{HC} under test point n°1

(5) Air volume flows assigned to the data (i to iii) q_V, fresh air, q_V, RCA, q_V, OEA

c) Air heating and/or cooling

(1) Air heating performance COP_{AH} under test point n°1

(2) Air cooling performance EER_{AC} under test point n°1

(3) Air heating capacity P_{AH} under test point n°1

(4) Air heating capacity P_{AC} under test point n°1

(5) Air volume flows assigned to the data (i to iii) q_V, fresh air, q_V, RCA, q_V, OEA

d) Both hydronic and air heating and/or cooling

Space heating and/or cooling performance shall be given for both low and medium temperatures, unless the heat pump is a low temperature heat pump. For multifunctional units providing both space heating and domestic hot water, declaration of low temperature performance is optional.

(1) Heating performance COP_H under test point n°1

(2) Cooling performance EER_H under test point n°1

(3) Air and hydronic heating capacity P_{AH} P_{HH} under test point n°1

(4) Air and hydronic cooling capacity P_{AC} P_{HC} under test point n°1

(5) Air volume flows assigned to the data (i to iii) q_V, fresh air, q_V, RCA, q_V, OEA

(i) maximum air volume flow rate in m^3/h of the ventilation system;

(j) electric power input of the fan drive, including any motor control equipment, at maximum air volume flow rate (W);

(k) l) sound power level (LWA), for ventilation function only at reference air volume flow;

(l) m) sound power level (LWA), while heat pump is operating at reference flow.

When the unit can provide space heating (hydronic and/or air heating), then, the sound power level shall be measured while the unit is operating in heating mode. Note that the unit may also provide domestic hot water in addition to space heating.

(m) reference outdoor air volume flow q_V, ref, fresh in m^3/s;

(n) reference pressure difference in Pa;

(o) reference recirculation air and outdoor to exhaust air volume when applicable in m^3/s

(p) SPI with heat pump off at reference conditions in W/(m3/h);

(q) The CTRL Factor for the ventilation function alone in analogy with ventilation units at reference outdoor air volume flow

(r) A description of the controls strategy, if the multifunctional ventilation unit is operating with an additional outdoor air flow at the evaporator (heating mode)/condenser (cooling mode) or if the multifunctional ventilation unit is operating with an additional recirculation air flow at the condenser (heating mode)/evaporator (cooling mode) side.

(s) declared maximum internal and external leakage rates (%) or carry over (for regenerative heat exchangers only), and external leakage rates (%) at reference outdoor air volume flow;

(t) 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;

(u) internet address for disassembly instructions as referred to in point 3;

(v) any specific precautions that shall be taken when the multifunctional unit is assembled, installed or maintained;

ANNEX V
Information requirements for NRVUs with passive ERS

From xx yy zz, instruction manuals for installers and end-users, and free access website of manufacturers, importers or authorised representatives shall include the following information:

(a) manufacturer's name or trade mark;

(b) manufacturer's model identifier, i.e. the code, usually alphanumeric, used to distinguish a specific non-residential ventilation unit model from other models with the same trade mark or supplier's name;

(c) declared typology in accordance with Article 2 (RVU or NRVU, UVU or BVU);

(d) type of drive installed or intended to be installed (multi-speed drive or variable speed drive);

(e) type of ERS (run-around, other, none);

(f) thermal efficiency of heat recovery (in % or not applicable' if the product has no heat recovery system)

(g) nominal NRVU flow rate in m^3/s;

(h) effective electric power input (kW);

(i) SFP_{int} in $W/(m^3/s)$;

(j) Type of smart control options included as regards VDC-readiness and as regards monitoring functions in accordance with table 6 of Annex VII;

(k) face velocity in m/s at design flow rate;

(l) nominal external pressure ($\Delta p_{s,\ ext}$) in Pa;

(m) internal pressure drop of ventilation components ($\Delta p_{s,int}$) in Pa;

(n) optional: internal pressure drop of non-ventilation components ($\Delta p_{s,add}$) in Pa;

(o) static efficiency of fans used in accordance with Regulation (EU) No 327/2011;

(p) declared maximum external leakage rate (%) of the casing of ventilation units;

(q) declared static internal leakage rate (%) of bidirectional ventilation units with recuperative heat exchangers

(r) outdoor air correction factor (OACF) and exhaust air transfer ratio (EATR) of BVUs equipped with regenerative heat exchangers and of BVUs equipped with recuperative heat exchangers, the latter when the static internal leakage is higher than3%)

(s) filter(s) class, clean pressure drop(s), final pressure drop(s) and related expected filter change intervals of the filters installed in the model

(t) power consumption of used/full filters in case they are not exchanged or energy performance (declared information about the calculated annual energy consumption) of the filters installed in the model;

(u) design winter outdoor temperature at the installation site, for non-residential BVUs for which the place of installation is known;

(v) description of visual filter warning for NRVUs intended for use with filters, including text pointing out the importance of regular filter changes for performance and energy efficiency of the unit;

(w) in the case of NRVUs specified for use indoors, the casing sound power level (L_{WA}), rounded to the nearest integer;

(x) detailed instructions inter alia identifying the required tools for the manual pre-/dis-assembly of permanent magnet motors, and of electronics parts (printed wiring boards/printed circuit boards and displays >10 g or > 10 cm²), batteries and larger plastic parts (>100 g) for the purpose of efficient materials recycling, except for models of which less than 5 units per year are produced.

Information requirements for NRVUs with ERS and HP

(NRVUs using both passive ERS and HP for the recovery of energy between the supply- and exhaust ventilation airflows)

From xx yy zz, instruction manuals for installers and end-users, and free access website of manufacturers, importers or authorised representatives shall include the following additional information:

(a) temperature ratio of the total heat recovery system (ERS including HP) in [%] defined here as the ratio of the supply temperature rise due to passive ERS and condenser coil and the difference between the temperature of exhaust air inlet and the temperature of supply air inlet (equals 15K) (Reference test standard: EN 308)

(b) internal pressure drop of ventilation components for SUP and ETA in [Pa]

(c) internal specific system power SSP_{int} expressed in both KJ/kg_{dryair} and $W/m^3/s$, where SSP_{int} $[W/m^3/s]$ = SSP_{int} $[kJ/kg_{dryair}]$ *1.204*1000

ANNEX VI

Measurement methods and calculations for RVUs

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 or other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art, shall be used.

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

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

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];
- pef 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 5;
- 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).

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 $m^3/h/m^2$*	**Non-ducted* RVU-HS** *in $m^3/h/m^2$*	**Ducted RVU ES&HS** *in $m^3/h/m^2$*
reference 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
SHARE		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
BVUs with constant flow control and internal leakages ≤3%									
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
L-UVU 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 ES only		1.00**fs*	0.95**fs*	N/A	N/A	N/A	N/A	0.65**fs*	0.85**fs*
L-UVU 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 HS only		0.95**fs*	0.90**fs*	N/A	N/A	N/A	N/A	0.80**fs*	0.70**fs*
L-BVUs with constant flow control and internal leakages ≤3%									
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*

Explanation:
BVU1 is a ducted BVU with mechanical extraction in the ES and mechanical supply in the HS
BVU2 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:

a) For *L*- RVUs with periodically operating basic ventilation: $fs = 1+(v+q_{vio})/2$
b) 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/m²/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	*Measured at massflow balance variation ≤ 3%*	
Internal leakage rate in [%]	w	$\eta_1 = \eta_0 \times (1 - 0{,}7 \times (\boldsymbol{w} - 0{,}02))$	$\eta_1 = \eta_0 \times (1 - 0{,}7 \times (\boldsymbol{w} - 0{,}02))$
Outdoor mixing rate in [%]	o	$\eta_2 = \eta_1 \times (1 - (\boldsymbol{o}\text{-}0{,}02))$	$\eta_2 = \eta_1$[a]
Indoor mixing rate in [%]	y	$\eta_3 = \eta_2 \times (1 - (\boldsymbol{y}\text{-}0{,}02))$	$\eta_3 = \eta_2$[a]
External leakage rate in [%]	z	$\eta_4 = \eta_3$[b]	$\eta_4 = \eta_3$[b]
Airflow sensitivity in [%]	v	$\eta_5 = \eta_4 \times (1 - (\boldsymbol{v}\text{-}0{,}02))^{0,4}$	$\eta_5 = \eta_4 \times (1 - (\boldsymbol{v}\text{-}0{,}02))^{0,4}$
Temperature ratio BVU	η_t	$= \eta_5$	$= \eta_5$
Humidity ratio on supply air side [%]	η_x	*Measured at mass flow balance variation ≤ 3%*	
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).

ANNEX VIa

Transitional Methods

Table.

References and qualifying notes

Parameter	Source	Reference Test Method / Title	Notes
Internal and external leakage rate of ducted BVUs	CEN	FprEN 13141-7-2019	For regenerative ERS the leakage test shall be performed with tracer gas, using either the chamber method or the duct method
internal, external leakage and mixing rates of non-ducted L-BVUs	CEN	FprEN 13141-8-2019	
Declared typology, schematic of the product model and information requirements for	CEN	EN 16573	

MFR-BVUs			

ANNEX VII

Measurement methods and calculations for NRVUs

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 VIIa or other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art, shall be used.

NRVUs shall be tested and calculated using a 'reference configuration' of the product. Dual use units shall be tested and calculated in the ventilation mode.

a) Temperature ratio of a non-residential energy recovery system

The *temperature ratio* of a non-residential energy recovery system is defined as

$$\eta_{t\_nrvu} = (t_{22} - t_{21})/(t_{11} - t_{21})$$

Measured at nominal airflow rate with balanced mass flow at an indoor/outdoor air temperature difference of 20 K, excluding gains from fan motors and internal leakages

where

- η_{t_nrvu} is the temperature ratio of the ERS [-];
- t_{22} is temperature of the supply air leaving the ERS and entering the room [°C];
- t_{21} is temperature of the outside air [°C];
- t_{11} is temperature of exhaust air, leaving the room and entering ERS [°C].

b) Humidity ratio of a non-residential energy recovery system

The *humidity ratio* of a non-residential energy recovery system is defined as

$$\eta_{x\_nrvu} = (x_{22} - x_{21})/(x_{11} - x_{21})$$

Measured at nominal airflow rate with balanced mass flow using summer air conditions (t_{21} = 35°C / 24°C (dry bulb / wet bulb temp.) and t_{11} = 25°C / 18°C (dry bulb / wet bulb temp.)).

where

- η_{x_nrvu} is the humidity ratio of the ERS [-];
- x_{22} is humidity of the supply air leaving the ERS and entering the room [°C];
- x_{21} is humidity of the outside air [°C];

– x_{11} is humidity of exhaust air, leaving the room and entering the ERS [°C].

c) Efficiency of the total recovered energy of a NRVU

The efficiency of the total recovered energy of a non-residential BVU is defined as

$$\eta_{e\_nrvu} = \eta_{t\_nrvu} + 0{,}08 \cdot \eta_{x\_nrvu}$$

d) Filter correction factors F

Depending on the filter class(es) used in the NRVUs, the following filter correction factors 'F' are to be used when calculating the SFP. The F factor for supply filters is indicated as F_{sup}; for exhaust filters the indicator is F_{exh}.

Table 5.
Filter correction factors 'F'

Filter class							
ISO ePM1		ISO ePM2,5		ISO ePM10		ISO Coarse	
class	*F*	*class*	*F*	*class*	*F*	*class*	*F*
≥ 50%	**150**	≥ 50%	**135**	≥ 50%	**120**	≥ 60%	**70**
≥ 70%	**185**						
≥ 80%	**210**						

e) Control bonus

Depending on the type of controls that are co-purchased and co-delivered with the NRVU, the following values for the control bonus are applicable.

Table 6.
Control bonus '*C*'

Smart control options included in NRVU-package		***C = C1*C2***
Regarding controls and VDC-readiness		***C1***
1	Interface for allowing VDC-devices	1,05
2	Time or presence related ventilation controls	1,10
3	Ventilation Demand Control -devices	1,15
Regarding monitoring functions		***C2***
4	Monitoring of flowrates, electrical power, electricity consumption, supply air temperature, filter pressure drop, interface for downloading monitoring data	1.1

f) Test pressure for determining NRVU-leakages

The following static pressure difference shall be applied for determining the internal and external leakages of

Table 7.
Test pressure for determining NRVU-leakages

For measuring external leakage	**Static ΔP**
NRVUs with nominal static pressures < - 400 Pa	-400 Pa
NRVUs with nominal static pressures ≥ - 400 Pa	nominal pressure
NRVUs with nominal static pressures > +700 Pa	700 Pa
NRVUs with nominal static pressures ≤ +700 Pa	nominal pressure
For measuring static internal leakage	**Static ΔP**
Recuperative NRVUs	+250 and -250 Pa

ANNEX VIIa

Transitional Methods

Table.

References and qualifying notes

Parameter	Source	Reference Test Method / Title	Notes
Humidity ratio of a non-residential ERS (ηx_nrvu)	CEN	prEN 308:2019	
Exhaust air transfer ratio (EATR) of a non-residential BVU	CEN	prEN 308:2019	
Outdoor air correction factor (OACF) of a non-residential BVU	CEN	prEN 308:2019	
Internal pressure drop of ventilation components of NRVUs with ERS and HP	CEN	EN 13053, EN ISO 16890, EN 1216	
Filter class	CEN	EN ISO 16890	
Annual energy consumption (AEC) of filters	Eurovent	Eurovent Industry Recommendation 4/21-2019. .	The procedure requires that the filter manufacturer indicates for each filter at which volume flowrate the minimum AEC-requirements are achieved; the NRVU-manufacturer states that the nominal flowrate is not higher that this volume flowrate

ANNEX VIII
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 manufacturer, importer or authorised representative 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.

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.

As part of verifying the compliance of a product model with the requirements laid down in this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, the authorities of the Member States shall apply the following procedure for the requirements referred to in Annex II and Annex III:

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 point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer, importer or authorised representative than the results of the corresponding measurements carried out pursuant to point (g) thereof; and

(b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer, importer or authorised representative does not contain values that are more favourable for the manufacturer, importer or authorised representative than the declared values; and

(c) when the Member State authorities check the unit of the model, they check whether the manufacturer, importer or authorised representative has put in place a system that complies with the requirements in the second paragraph of Article 6; and

(d) when the Member State authorities check the unit of the model, it complies with the requirements in Annex II, III, IV and V; and

(e) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as set out in Table 4.

3. If the results referred to in point 2(a), (b), (c) or (d) 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(e) is not achieved, and the model is produced in quantities of 5 or more per year 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 arithmetical mean of the determined values complies with the respective verification tolerances set out in Table 4.

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 VI and VII.

The Member State authorities shall only apply the verification tolerances that are set out in Table 4 and shall use only the procedure described in points 1 to 7 for the requirements set out in this Annex. For the parameters in Table 4, no other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

Table 4

Parameter	Verification tolerances
SPI	The measured value shall be no more than 1.10 times the maximum declared value.
Thermal efficiency RVU and NRVU	The measured value shall be no less than 0.93 times the minimum declared value.
SFP_{int}	The measured value shall be no more than 1.07 times the maximum declared value.
Fan efficiency UVU, non-residential	The measured value shall be no less than 0.90 times the minimum declared value.
Sound power level RVU	The measured value shall be no more than the maximum declared value plus 3 dB.
Sound power level NRVU	The measured value shall be no more than the maximum declared value plus 5 dB.

ANNEX IX

Benchmarks

At the time of entry into force of this Regulation, the best available technology on the market for ventilation units was identified as follows.

Residential ventilation units:

(a) SEC for average climate:

- For ducted UVUs: -39 kWh/(m^2.a)
- For ducted BVUs: -59 kWh/(m^2.a)
- For non-ducted UVU-ES: -12 kWh/(m^2.a)
- For non-ducted UVU-HS: -23 kWh/(m^2.a)
- For non-ducted BVU-ES: -21 kWh/(m^2.a)
- For non-ducted BVU-HS: -31 kWh/(m^2.a)

Non-residential ventilation units:

(a) SFP_{int}: 150 W/(m^3/s) below the Tier 2 limit for NRVUs with flow rate ≥2 m^3/s, and 250 W/(m^3/s) below the Tier 2 limit for NRVUs with flow rate <2 m^3/s

(b) Heat recovery η_{t_nrvu}: 85%**,** and with run-around heat recovery systems 80%.