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Explanatory Memorandum for the Ecodesign Consultation Forum

Review of Ecodesign and Energy Labelling - Ventilation Units

1. CONTEXT OF THE PROPOSAL

1.1 Grounds for and objectives of the proposal

The Ecodesign Directive 2009/125/EC[1] establishes a framework for the setting of ecodesign requirements for energy-related products at EU level. It is a key instrument of the union policy for improving the energy and other environmental aspects of products placed on the market or put into service in the European Economic Area (EEA). It is an important instrument for achieving the EU energy savings objectives for 2020 and 2030, and its implementation is one of the priorities in the commission's Communication on Energy 2020 and Energy Efficiency Plan 2011, being reinforced by the current Ecodesign Working Plan 2016-2019[2]. It is also expected to contribute significantly to the transition towards a more circular economy, as expressed in the Circular Economy action plan 2015[3] and the Circular Economy action plan 2020. Furthermore, implementation of Directive 2009/125/EC will contribute to the EU's target of reducing greenhouse gases by at least 40% by 2030.

The revision clause (Article 8) of Regulation 1253/2014/EU and article 7 of the Delegated Regulation 1254/2014/EU states that the Commission should review the regulation in the light of the technological development no later than 6 years after its entry into force and in particular assess the verification tolerances set out in Annex VI, the possible extension of the scope to cover RVUs with an electric power consumption less than 30 watts per airstream, the SEC-calculations in relation to demand controlled ventilation classes, the appropriateness of taking into account the effects of low energy consuming filters and the need to set a further tier in ecodesign requirements.

In order to revise both the Ecodesign and Energy Label regulations, a review study[4] was launched in 2019, resulting in a final report published in July 2020. The study included active stakeholder consultation through the project website and two stakeholder meetings, one in 2019 and another in May 2020. The consultation involved over 320 stakeholders.

1.2 General context

Purpose of ventilation

The ventilation of buildings intended for human occupation (scope of this regulation) has been and will remain an important energy consuming basic function that is primarily needed to safeguard human health and to prevent humidity problems in buildings. Insufficient ventilation results in higher pollutant concentrations and humidity levels

[1] 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).
[2] Communication from the Commission on the Ecodesign Working Plan 2016-2019, COM(2016) 773 final, 30.11.2016
[3] Closing the loop - An EU action plan for the Circular Economy". COM(2015) 614 final, Brussels, 2.12.2015
[4] Ecodesign and energy label review study on Ventilation Units, available at: https://www.ecoventilation-review.eu

which impacts both human health and performance and may also impair building structures. In the EU27, poor indoor air quality plays a crucial role in the annual 500.000 premature deaths[5] and more than 2 million disability adjusted life years (DALYs)[6] attributed to air pollution.

Poor indoor air quality also negatively affects cognitive functions and productivity of office workers.[7] These 'use-phase impacts' of poor ventilation on health and productivity come with huge economic costs. Proper ventilation provisions are key in improving indoor air quality (IAQ) and reducing human exposure to pollutant concentrations that typically occur in indoor air.

Development of ventilation systems over the years

Up until today, around 60% of the total EU27 buildings stock uses natural ventilation systems with infiltration and small hopper windows and supply grids as main air supply components. In that sense, infiltration is a meaningful component in natural ventilation systems.

Over time building practices have changed and in most new building projects the ventilation provisions consist of partial mechanical or fully mechanical ventilation components. Main reasons for this change are energy savings and ventilation performance. Targeted ventilation airflows (i.e. the right airflow in the right place at the right time) are difficult to achieve with natural ventilation systems. As a result, considerable higher natural airflow rates are necessary to achieve an acceptable ventilation performance level. Combined with the fact that an energy neutral building stock needs to be accomplished by 2050, increased airtightness and insulation levels will further reduce the infiltration rates. The review study therefore recommends that future regulations regarding ventilation anticipates for a situation where the ventilation system alone is capable of achieving the required ventilation rates, without any backing from natural infiltration .

As the quality of the EU-building stock increases, natural and infiltration airflows will decline and an increase in mechanical airflow is required to safeguard IAQ-levels. Because mechanical airflows can be more accurate (higher efficacy), the sum of the two airflows is decreasing as is the energy consumption related to these airflows. The graph in Figure 1 clearly illustrates this principle. The figure also indicates however, that if the mechanical airflows are not adequately induced (in the right place at the right time) the ventilation performance is further impaired. Examples 2 and 3 in the graph represent the most frequently used RVUs (dwellings with RVUs having a simple manual control) and illustrates this effect. When RVUs with smart airflow controls and proper IAQ-sensors are used (examples 4, 5 and 6), the ventilation performance can be improved, and

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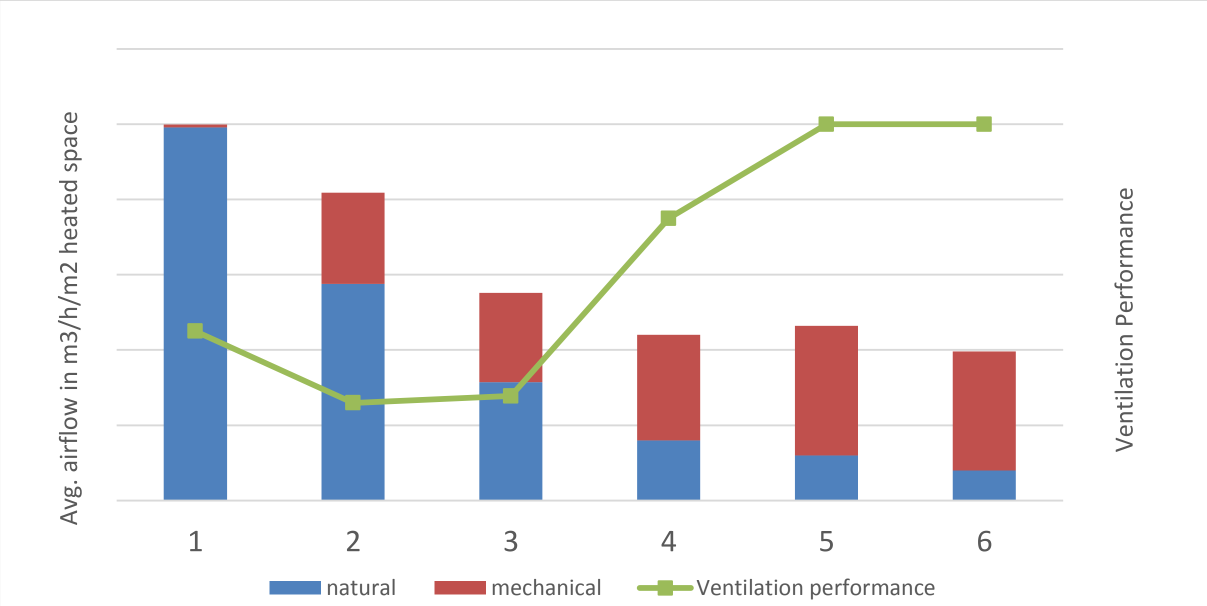
[5] EEA Report No. 10/2019, Air Quality in Europe

[6] Jantunen M., Oliveira Fernandes E., Carre P., Kephalopoulos S., Promoting actions for healthy indoor air (IAIAQ). European Commission Directorate General for Health and Consumers, Luxembourg, 2011.

[7] Allen J.G., MacNaughton P., Satish U., Santaman S.,Vallarino J., Spengler J.D., Associations of Cognitive Function Scores with Carbon Dioxide, Ventilation, and Volatile Organic Compound Exposures in Office Workers: A Controlled Exposure Study of Green and Conventional Office Environments, Environmental Health Perspectives, Volume 124, No. 6, June 2016.

infiltration airflow rates further reduced without compromising the air exchange performance and related IAQ-levels.

Figure 1. Example of infiltration and ventilation airflow rates for 6 dwellings with different airtightness and ventilation units, incl. their related Ventilation Performance.



Ventilation performance

With the main focus on energy savings of buildings, there is a risk that ventilation performance and IAQ-levels are jeopardized. The review-study shows that more and more field- and monitoring studies reveal that in many dwellings the air exchanges in habitable rooms during occupation are insufficient leading to high pollutant concentration levels. In view of the significant consequences for human health, human performance and related costs, dedicated measured are needed. The existing regulation already addressed this topic by introducing a limited number CTRL-factors that enable a differentiation between the efficacy with which mechanically induced airflows are applied.

The review-study further substantiates the need for an improved focus on ventilation performance. The proposed revised regulation includes ventilation performance as one of the assessment parameters, by looking at the technical ability of the RVU and its controls to induce the right air exchanges in the right place at the right time. Reference for this assessment are the airflows mentioned in EN16798-1, Annex B for periods of presence and absence. These airflows represent a Category II ventilation performance, expressing the medium level of expectation (CO_2 concentrations remaining below 1200 ppm).

The topic *ventilation* is specifically addressed and flagged as one of the key topics in the Amended Energy Performance of Buildings Directive (2018/844/EU), the related National Energy and Climate Plans (NECPs) and the Renovation Wave Initiative[8]. Although the

[8] https://ec.europa.eu/energy/topics/energy-efficiency/energy-efficient-buildings/renovation-wave_en

term *appropriate* and *adequate* ventilation is frequently used in these documents, no further specification is given as to what this entails. It is envisaged that the proposed revised Ecodesign and Energy Labelling Regulation for ventilation units with a greater focus on *ventilation performance* will help in guiding the transformation of the existing EU-building stock into the right direction as regards ventilation and related IAQ-levels.

In their joint industry statement of June 19th 2020[9], eight European industry associations, representing companies involved in technical building systems, affirm that:

> *'ventilation is an unescapable equipment to ensure buildings fully contribute to attaining a carbon neutral economy by 2050 and at the same time preserve the health of people living more than ever in insulated and air-tight environments. European legislative provisions should therefore be introduced asking Member States to implement both:*
> - *IAQ regulatory minimum requirements.*
> - *mandatory inspections of stand-alone ventilation systems, to ensure their optimal performance*
>
> *This will enable the major health impacts of poor indoor air to be addressed, which, according to the WHO estimates, leads to the premature death of 120 000 Europeans every year translating into an annual cost to society of 260 billion euros'.*

Energy use for ventilation

Both infiltration- and mechanical ventilation airflow rates are used in the existing building stock as air exchange principles for ventilation purposes. For that reason, the energy consumption related to ventilation is calculated for both airflows. For the years to come it is expected that these total airflow rates and related energy consumption for the EU building stock will further drop. If the mechanical ventilation units also deploy heat recovery, the energy consumption can be even further reduced beyond the reduction of the total airflow rates.

Energy use ventilation units

As regards the total energy use of mechanical ventilation units in the EU, this will increase. Mechanical ventilation units are widely used in the European Union. It is estimated that in 2015 about 23% of the residential building stock uses mechanical ventilation units, corresponding to around 17 million units, of which 85% are UVUs (primarily central UVUs) and 15% BVUs. In the non-residential building stock around 64% of the buildings use mechanical ventilation in 2015, corresponding to around 6.9 million units, of which 15% are central UVUs, 5% central balanced ventilation units (BVUs) and about 44% AHUs.

[9] https://www.ehpa.org/fileadmin/red/03._Media/Position_papers/Healthy_Buildings_for_All_-_IEQ_Gathering_Manifesto.pdf

The total EU27 primary energy consumption of the installed base[10] of ventilation units in 2015 was **330** TWh of which **108** TWh relates to the electricity consumption and **222** TWh to space heating energy loss. The total primary energy consumption for both infiltration and ventilation airflows in buildings with mechanical ventilation units in 2015 was around **507** TWh. In residential applications the average ventilation performance in 2015 is average to okay in the extract (or wet) spaces, but on average substandard in the habitable spaces.

With the airtightness and insulation levels of the building stock further improving, the penetration rate of mechanical ventilation will further increase. In the residential sector the annual sales are expected to rise from around 1.2 million RVUs in 2015 to over 6 million in 2050. Also in the non-residential sector the annual sales will increase from around 487.000 units to over 700.000 units in 2050.

With a continuation of the existing measures related to VUs, the business as usual scenario will lead to reduced ventilation airflows and unfortunately also to reduced IAQ-levels in dwellings. The total EU27 primary energy consumption of the installed base of ventilation units in 2030 will be around 337 TWh (of which 92 TWh relates to the electricity consumption VUs).
In 2050 it is expected that the energy consumption for ventilation units will further grow to around 406 TWh (of which 125 TWh relates to the electricity consumption VUs)
In residential applications, the average ventilation performance in 2050 is expected to be okay in the extract (or wet) spaces, but in the habitable spaces the improvements will be minimal.

The main reasons for <u>not</u> realizing a Category II ventilation performance[11] levels and related saving potential are the failure of the market to:

(i) properly assess the effect VUs and related controls have on the ventilation performance and related energy consumption

(ii) determine the energy performance of VUs in relation to a reference ventilation performance;

(iii) guide the market to make purchase decisions based on ventilation performance AND lifecycle cost rather than the purchase cost only

The objective of the revision of Regulation 1253/2014/EU is to trigger a change in market conditions and ventilation units that are offered on the market. With the proposed revision it is envisaged that VUs can efficiently fulfil the ventilation function, without need

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[10] Local bathroom and toilet fans are not included in these numbers because they are not considered ventilation units.

[11] EN16798-1, Annex B airflow rates, representing a Category II ventilation performance, expressing the medium level of expectation (CO_2 concentrations remaining below 1200 ppm).

for additional natural airflow rates, and thus safely support the further reduction of the total natural and mechanical air exchange rates in buildings encouraged by the EPBD, without jeopardizing ventilation performance and related IAQ-levels.

The proposed revised regulation will help guiding the market towards ventilation units that secure the ventilation performance and related IAQ-levels, despite reduced natural infiltration. A direct comparison of the total energy consumption between a business-as-usual scenario and a scenario with the proposed revised regulation in place is therefore not valid because ventilation performance is left out of the equation. A better approach would be to compare to energy consumption of ventilation units providing the same reference ventilation performance.

It is expected that in 2050 the proposed revised regulation will result in an energy consumption for ventilation units of around 368 TWh of which 103 TWh relates to the electricity consumption VUs and 264 TWh to space heating energy loss. These figures represent savings of over 10% compared to a situation where the current regulations are continued.
An important additional effect of the proposed revised regulation is that the average ventilation performance levels in 2050 are expected to vastly improve, which is considered of major importance for human wellbeing and their performance levels.

1.3 Existing regulation and standards in EU and third countries

The Ecodesign Framework Directive 2009/125/EC is an important instrument for achieving the European targets on energy efficiency and the implementation of this revised regulation is a concrete contribution to this process.

Under Mandate M537 the CEN (European Committee for Standardisation) reworked the standards for the three main product groups RVUs, NRVUs and UVUs. For product testing purposes many EU-standards were updated to meet the latest insight regarding parameters to be tested.

Inconsistencies between national regulations and EN-standards regarding ventilation capacities to be installed remain and interfere with an EU-approach. It is remarkable to see how building codes in various member states (and third countries) differ as regards the airflow rates that are needed to achieve acceptable IAQ-levels and how they vary as to how these air exchanges can be achieved (with or without the help of infiltration).

Furthermore, practically all national regulations in EU member states (and in third countries) are based on the capacity to be installed. The general assumption is that with the correct capacity installed, the inhabitant will operate all ventilation provisions as intended to achieve the correct airflows. Various countries allow the use simulation software as prove that ventilation performance of a certain VU or ventilation system complies. The review study indicates that despite simulations and despite the correctly installed capacities, the envisaged ventilation airflow rates are very often not achieved and advocates that proper controls are required to ensure ventilation performance and

IAQ-levels. These conclusions are very much in line with the recommendation given by the combined European industry associations in their joint industry statement[12] .

[12] https://www.ehpa.org/fileadmin/red/03._Media/Position_papers/Healthy_Buildings_for_All_-_IEQ_Gathering_Manifesto.pdf

2. Proposed changes in the Regulations as regards RVUs and NRVUs

The main changes that are proposed regarding residential ventilation units (RVUs) are the following:

- Energy Performance RVUs: Currently the energy performance is determined without a reference to ventilation performance. For the revised regulation it is recommended to determine the energy performance of the RVU (SEC-value) at a reference ventilation performance. This will encourage manufacturers to improve the energy performance of RVUs without compromising ventilation performance.
- Extension of RVU-control options in Energy Performance Assessment: The energy performance and ventilation performance of RVUs largely depend on the controls that are used. The term controls relates here to both the technical ability of the RVU to control airflow rates per section or room in a dwelling and to controls that can determine the actual ventilation demand (IAQ-sensors). Since RVUs are already on the market having more sophisticated airflow control options and IAQ-sensors than anticipated in the current regulations, the revised regulation must facilitate a proper assessment of such RVUs. Therefore, the original table with CTRL-factors is replaced by a more extended list with CTRL-factors, addressing both control features in relation to a reference ventilation performance.
- Including humidity recovery: Recovery of humidity can be advantages. Especially in warm climate zones, recovery of humidity is an asset since it can significantly reduce the energy needed for cooling, when compared to sensible heat recovery only. In average and colder climates recovery of humidity will lower the risk of frozen heat exchangers and will help increasing the humidity levels of the indoor air during winter periods.
- Minimum requirements BVU-leakages: Leakages inside a bidirectional ventilation unit (BVU) will compromise the ventilation capacity of the unit because outdoor supply flowrates and/or exhaust air flowrates are not in conformity with the specifications of the product. Leakages will also influences the heat recovery performance. Anecdotal reports on leakage rates for non-ducted local BVUs mention leakages of up to 40%, indicating that these unintended airflows can have a significant impact on the key performances of such ventilation units. Apart from information requirements, the current Regulations EU 1253/2014 and 1254/2014 do not consider leakages or mixing when determining the heat recovery performance, the SPI and the outdoor supply air flowrate of RVUs. It is therefore proposed to introduce the limit values for internal and external BVU-leakages:
- Differentiation energy consumption for frost protection: Currently the energy that is involved for frost protection of BVUs is determined based on electric resistance heating principle giving default values for q_{defr} of 5.82, 0.45 and 0.0 $kWh/a/m^2$ for cold, average and warm climate respectively. Numerous defrosting strategies are applied in the market, all with different impacts on related energy consumptions, and the available supply airflows. It is therefore

proposed to determine the energy consumption for defrosting based on the defrosting strategy that is applied.

- Scope extension to RVUs < 30 Watts: More and more non-ducted (local) RVUs are put on the market and frequently used in the renovation market because installation and renovation cost are lower compared ducted (central) RVUs. These products are currently not in the scope but represent a considerable and constant growing market and therefore need to be included. The dedicated assessment of their ventilation- and energy performance is also addressed in the proposal of the revised regulation.

- Scope extension with multifunctional bidirectional ventilation units (MFR-BVUs) Multifunctional residential BVUs are defined as units that, next to their primary function '*ventilation with heat recovery*', fulfil additional hydronic or air-based heating/cooling functions. They are defined as units that are designed and supplied as a complete package with mount instructions, covering packages that contain at least, within one or more casing: supply and exhaust air fans, air filters, common control system, and one or more of the following three additional components: air-to-air heat exchanger, air to water heat pump, air to air heat pump. Although sales figures of these multifunctional BVUs are below 15000 units a year, MFR-BVUs are cot considered eligible (yet) for Ecodesign measures. Because their numbers are steadily growing and stakeholders consider this 1253/2014/EU regulation the best place for these products, it is proposed to include performance data of these multifunctional residential BVUs according to EN 16573, in the information requirements of the revised regulation.

- Inclusion of the airflow sensitivity and the airtightness in the assessment of non-ducted RVUs: With non-ducted (local) RVUs included in the scope, new product-specific features that influence ventilation and heat-recovery performance are also introduced. Depending on the fans and the unit-design, non-ducted RVUs can be very sensitive to pressure differences over the façade and in addition unintended leakages can be introduced. In the revised regulation it is proposed to include these parameters when determining the CTRL-factor.

- Adjusted SEC-formula: The following changes are proposed in the SEC-formula:

  1) q_{ref} is adjusted from 2.20 to 2.50 $m^3/h/m^2$ and is now based on an assessment of the average airflow rates in the average naturally ventilation dwelling (still 70% of current buildings stock), having an average airtightness of n50 = 7.4.

  2)_q_{net} is adjusted from 1.30 to 1.97 $m^3/h/m^2$ and now relates to the reference ventilation performance.

  3) For non-ducted RVUs dedicated values for q_{net} and q_{ref} are defined.

  4) MISC-factor is integrated in the CTRL-factor.

  5) Qdefr is now calculated in dependence of the frost-protection strategy and the CTRL-factor.

- New minimum requirements SEC-values : Due to the adjustments described above, other minimum Ecodesign requirements are also needed. The basis for the ambition level of Ecodesign measures is the Least Life Cycle Cost(LLCC) for the consumer.

  Due to technology differences, the minimum requirements are now differentiated for ducted and non-ducted RVUs and for BVUs and UVUs.

- Separate energy label for non-ducted RVUs: ducted RVUs provide ventilation for both habitable spaces and extract (or wet) spaces, and the reference airflow rate used for determining the CTRL-factor is based thereupon. Non-ducted (local) RVUs generally provide ventilation either for a habitable space or an extract space, in which case local flow control is applicable and reference airflow rates will also be different. As a result, SEC-values and label classes are different explaining the need for a separate Energy Label for non-ducted RVUs.
- Rescaling of energy labels: several issues require a rescaling of the energy label. Not only the adjusted primary energy factor, but also the modifications regarding CTRL-factors, reference ventilation rates, calculation for frost protection require the rescaling. As regards limits on Energy Label classes, the new Energy Labelling Regulation gives indications on the class(es) being empty at introduction. Baring this in mind the label classes of Annex II to the Energy Labelling Regulation are proposed.

  The proposed rescaling of the energy labelling classes is intended to simplify comparisons for consumers and provide an incentive to manufacture to continue improving their appliances.

- Display filter type on energy label: For dwellings built in areas with higher outdoor air pollutants, the use of supply filters can improve the quality of the air that is supplied into the dwelling. Factual data on the type of supply filter used, provides essential information for the consumer regarding the functionality of the related RVU. It is proposed to use the filter performance data following the ISO 16890 standard.
- Display '*ventilation performance indicator'* on energy label: Although the revised regulation proposes to relate the energy performance to a reference ventilation performance and as such ventilation performance is already indirectly addressed, it is proposed to also explicitly display the ventilation performance indicator on the energy label. The expectation is that this will more clearly guide and encourage the market to develop, put on the market and buy RVUs that achieve better ventilation performance and IAQ-levels while reducing its energy consumption.

The main changes that are proposed regarding non-residential ventilation units (NRVUs) are the following:

- Including humidity recovery: As for RVUs, recovery of humidity is also advantages for NRVUs, especially in warm climate zones where humidity significantly reduce the energy needed for cooling, when compared to sensible heat recovery only. By introducing humidity recovery as part of the total energy recovery performance of non-residential BVUs, the economic viability of BVU for warmer climates is further improved.

- Adjusted minimum requirements HRS: The limit values for fan efficiency (η_{vu}) remain unchanged, as do the limit values for temperature ratio (η_{t_nrvu}) of thermal recovery only BVUs and BVUs having a run-around ERS (73% and 68% respectively) . For BVUs having a thermal and moisture recovery ERS, the minimal requirement for the total energy efficiency (η_{e_nrvu}) is set at 75%, with η_{e_nrvu} being calculated with the formula: $\eta_{e\_nrvu} = \eta_{t\_nrvu} + 0{,}08 \cdot \eta_{x\_nrvu}$ with η_{x_nrvu} being the humidity ratio of the ERS.

- Adjusted minimum requirements SFPint: The limit values for SFP_{int_limit} have been adjusted and now relate to 1) the type of filters that are used, and 2) the type of controls that are used. As regards the efficiency bonus 'E' related to efficiency values of the ERS above minimum requirements, this is no longer a stand-alone value that can be calculated using a linear function. The efficiency bonus 'E' is now defined as a multiplier of the SFP_{int_limit} of the ERS, using a non lineair function to determine the multiplier: $E = \eta_{t\ nrvu} /(1- \eta_{t\ nrvu}) / \eta_{t\_nrvu\_min} *(1- \eta_{t\_nrvu\_min})$. With these adjustments the ecodesign requirements are now more in line with real life situations and allow for appropriate additional measures as regards the energy consumption of filters and the valuation of smart controls.

- Bonus on SFPint for smart controls: Next to the efficiency bonus 'E', an efficiency bonus 'C' for smart controls is proposed in the revised regulation. Adequate controls can have a considerable impact on the overall energy consumption for ventilation and simultaneously can increase the ventilation performance. It is proposed that the revised regulation values the integration of smart control options and actively promotes the use of smart controls. For NRVUs that include specific control options regarding VDC (Ventilation Demand Control) and/or monitoring functions, it is proposed to allow an additional multiplier 'C' with which slightly higher SFP_{int_limit} values are tolerated because the overall energy consumption for ventilation using smart controls, is reduced.

- Minimum requirements energy consumption filters: The energy consumption related to filters can be significant. Low grade ePM2.5-50% filters may consume around 2000 kWh of electricity per year with continuous high airflows. The review study indicates that, with a stock of around 5 million non-residential BVUs in 2020 and reduced airflows, this can amount to up to 5 TWh per year. When more energy efficient filters are applied, considerable saving (around 30%) can be achieved. It is therefore proposed to set limit values on the Annual Electricity Consumption for filters in dependence of the filter class that is required. The method for determining the annual electricity consumption for NRVU-filters that is already used for over 50% of the NRVU-filters that are put on the market is the method described in the Eurovent Industry Recommendation 4/21-2019. The following limit values are proposed:

Table 3. Limit AEC values for filters, in dependence of their filter class.

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

- Minimum requirements BVU-leakages: Leakages inside a bidirectional ventilation unit compromises the ventilation capacity of the unit because outdoor supply flowrates and/or exhaust air flowrates are not in conformity with the specifications of the product. Leakages will also influences the heat recovery performance. To minimise these adverse effect, minimal requirements regarding external and internal leakages are proposed in the revised regulation.

The remaining topic mentioned in Article 8 of Regulation 1253/2014/EU refers to verification tolerances:

- Verification tolerances:

  The current and new proposed tolerances are indicated in the table below

	RVU		NRVU	
	current	new	current	new
Sound power level	2 dB	**3 dB**	5 dB	
Temperature ratio	7%		7%	
SPI	7%	**10%**		
SFPint			7%	
Fan efficiency			7%	**10%**

Proposed adjustments relates to the sound power level of RVUs, where a tolerance of 2 dB is considered too small, given the tolerances that are already applicable for separate fans and given the accuracy with which flowrates can be tuned. A new value of 3 dB is proposed here. Also for the SPI and fan-efficiency (η_{vu}), the tolerances are considered too small, and the proposal is to increase these values from 7% to 10%.

3. LEGAL ELEMENTS OF THE PROPOSAL

3.1. Summary proposed options Ecodesign & Energy Labelling Regulation

The two working document on ecodesign and energy labelling requirements for ventilation units propose and explain the following changes in comparison to the existing Regulation 1253/2014 and 1254/2014:

1. <u>As regards the scope of the proposed Regulations</u>

   The scope of the Regulations is extended to
   - Ventilation units having an electric power inputs below 30W, except for bathroom and toilet fans that only operate occasionally (i.e. lack the capability to continuously ventilate the room);
   - Multifunctional residential BVUs (MFR-BVUs) for information requirements only;

2. <u>As regards requirements on residential ventilation units</u>
   - The energy performance of RVUs will be based on a reference ventilation performance corresponding to Category II expectation levels according to Annex B of EN 16798-1;
   - Because ventilation performance largely depends on airflow- and ventilation demand controls, the list of control options is extended;
   - Humidity recovery will be included in the revised regulation;
   - Minimum requirements are introduced for internal and external BVU leakages;
   - Energy consumption for frost protection is determined in relation to the applied frost protection strategy;
   - Assessment of airflow sensitivity and airtightness of non-ducted RVUs and the related effects on energy performance and ventilation performance;
   - Minimum requirements for SEC-values are adjusted and a differentiation is made between UVUs and BVUs;

   - Energy labels are also proposed for non-ducted RVUs-HS;
   - A rescaling of the energy label was done to account for the adjusted PEF-value, the modifications regarding the CTRL-factor, the reference ventilation rates, the adjusted calculation for Q_{defr} and the fact that the highest label class is empty at introduction.
   - The label will display the ventilation performance indicator
   - The label will display whether a supply filter is used or not and indicate it's type
   - The airflow mentioned on the label will relate to the reference airflow

3. <u>As regards requirements on non-residential ventilation units</u>
   - Humidity recovery will be included in the revised regulation;
   - The minimum requirements for HRS are increased to 75% for HRS that enable both thermal and humidity recovery;
   - The limit values for SFP_{int_limit} have been adjusted and now relate to 1) the type of filters that are used and 2) the type of controls that are used;
   - The efficiency bonus 'E' related to efficiency values of the ERS above minimum requirements, is no longer a stand-alone value that can be calculated using a linear function. The efficiency bonus 'E' is now defined as a multiplier of the

SFP_{int_limit} of the ERS, using a non lineair function to determine the multiplier: $E = \eta_{e\ nrvu} /(1- \eta_{e\ nrvu}) / \eta_{e\_nrvu\_min} *(1- \eta_{e\_nrvu\_min})$.

- A bonus is introduced on SFP_{int} for smart controls
- Minimum requirements regarding the energy consumption of filters are introduced;
- Minimum requirements are introduced for internal and external BVU leakages;

4. <u>Information requirements</u>

- The information requirements for RVUs have been further specified as regards the newly defined parameters, amongst which controls and related ventilation performance index, leakages, humidity recovery, frost-protection strategy, filter class, clean pressure drop and final pressure drop and power consumption of used/full filters;
- A new list of information requirements has been added for the multifunctional residential BVUs (MFR-BVU).
- Also for non-residential VUs the information requirements have been further specified as regards humidity recovery, leakages and filters
- For RVUs and NRVUs information requests are added regarding detailed instructions for the manual disassembly of permanent magnet motors, electronic parts, batteries and larger plastic parts for the purpose of efficient material recycling;