Product Group 'Air Conditioners' PP – 2018-12-07

Team member	Phone	Email	Date
Francesco Scuderi	+32 (0)466 90 04 01	francesco.scuderi@eurovent.eu	2018-12-07
Felix Van Eyken		felix.vaneyken@eurovent.eu	

Position Paper

In a nutshell

With this paper, Eurovent and its Members would like to provide input for the European Commission review study of ecodesign and energy labelling for air conditioners and comfort fans (Commission Regulation (EU) No 206/2012 and the Commission Delegated Regulation (EU) No 626/2011).
Specifically, this paper provides comments on the final version of the Task 7 of the Study's report.

Background

Eurovent and its Members hold that the EU Ecodesign regulations and measures are a powerful tool to achieve the European Union energy saving targets and to ensure the level-playing-field. We do not regard these measures as a burden, but as a motivation to further innovate while contributing to progressive thinking throughout all sectors of our industry.

Eurovent, jointly with CECED/Applia, has already provided the study team with its comments/positions in two past Position Papers (2017.08.04– 2018.02.12).

Analysis and comments on the final report

Eurovent appreciates the work done by Viegand Maagøe and Armines for the ecodesign and energy labelling study on Air-conditioners and comfort fans.

We noticed that two major changes were made in the final version of the study in comparison with the previous draft versions, including the last revision circulated on December 2017 and discussed during the last Stakeholder meeting held in Brussel on January 12th, 2018:

1. A change in the products' categorisation: - Other than portable – Portable
2. A new method for the cooling capacity and seasonal efficiency measurement of single duct air conditioners in order to allow consumers to compare them with data of fixed air conditioners.

Products' categorisation

All the Review Study versions circulated between the Study Team and the Stakeholders during the preparation process, including the last revision circulated on December 2017 and discussed during the last Stakeholder meeting held in Brussels on Jan12th-2018, was keeping the same basic categories of the existing Ecodesign Regulation:

- Other than single duct and double duct - Single and double duct.

In the final version of the Study (Final Report of May 2nd-2018) a sudden and unmotivated change in the definition of the different categories appeared:

- Other than portable
- Portable.

<u>This proposal, which appeared only in the final version of the study, was not subjected to any stakeholders' discussion.</u>

Portable ACs (single and double duct): characteristics and features

Portable air conditioners are a very particular category with unique features and characteristics.

Portable air conditioners, despite the limited market share (about 14 % of the domestic ACs market according to the study's report), represent a very specific market segment which meets specific consumer's needs. They are a unique solution where installation of other categories air conditioners is forbidden or impracticable, for example, in rental situations. They do not have any impact on the building's facade, this is because they do not need an external unit or a portion of a unit extending outdoors. This is an important feature for customers living in historical buildings where external units cannot be installed. Portable air conditioners do not need installation or preliminary set up. The small dimension and the design of portable air conditioners allow the user to get comfort only in the area where it is needed, and to move easily the equipment from room to room or from dwelling to dwelling. For such reasons, they are cheaper and accessible to economically disadvantaged consumers. They can provide an effective cooling just after the purchase because they are "plug and play" appliances.

Wall fixed Double Duct ACs: characteristics and features

The wall fixed Double Duct AC represents a niche product, they are used only when other most common solutions (split units) cannot be applied because of physical constraints (i.e. no space for outdoor unit installation), or when the outdoor unit's installation is forbidden by local regulations, or when split outdoor units are aesthetically not compatible with building facade (i.e. historical buildings). The contribution of the double ducts units to the safeguarding of the architectural heritages, ensuring the possibility to have the air conditioning, is well recognized.

It must be noted that, in order to protect and preserve the national cultural heritage, the legislation of many EU Member States (national as well as regional/local legislation) defines very strict rules for the installation of Air Conditioners (especially outdoor units) in historical buildings. This is the case of Italy (Italy is cited just as an example, but the same applies to the major part of the other EU Countries) where this is strictly addressed by the D.Lgs. n.42/04 and the D.P.R. n. 31/2017.
In the case of historical buildings with a permanent use (e.g. not for rental usage but for offices, residential applications etc.) only wall fixed double duct ACs can be installed.

Based on the above comments and in order to guarantee a fair and technically sustainable treatment of Double Duct products (without any difference between portable or fixed use), Eurovent would like to ask that the product categories remain as addressed in the previous reports of the Review Study.

Cooling capacity and seasonal efficiency measurement of single duct air conditioners

In the final report a new method is proposed for the cooling capacity and seasonal efficiency measurement of single duct air conditioners, this is in order in order to allow the consumers to compare them with the data of fixed air conditioners. We noticed several inconsistencies and editorial mistakes in this proposal: they are reported in the Appendix 1 of this Position Paper. So we request to keep the current differentiation between split ACs, double duct ACs and single duct ACs and maintain the standard EN14511 for the measurement of efficiency and cooling capacity of double duct and single duct ACs.

Eurovent AISBL / IVZW / INPA
European Industry Association
www.eurovent.eu

80 Bd. A. Reyers Ln
1030 Brussels
BELGIUM

Phone: +32 (0)466 90 04 01
secretariat@eurovent.eu
Follow us on LinkedIn!

Fortis Bank
IBAN: BE 31 210043999555
BIC: GEBABEBB

For the reasons described in the above section, single duct, double duct and split ACs meet different consumers' needs and consumers do not compare them to each other. In fact market shares of the last decades demonstrate absence of competition between single duct / dual duct ACs and split ACs because there is no grow of one category at the expenses of the other: single and dual duct ACs are always a niche product in the air conditioning market.

Under current the Regulations 206/2012 and 626/2011, the efficiency testing of the products under the scope is based on a seasonal efficiency measurement method (standard EN 14825), except for single and double duct air conditioners for which steady-state energy efficiency performance indicators continued to be applied (based on standard EN 14511). Moreover, neither in ISO nor in CEN are there standards which define how to test the seasonal efficiency of a single/double duct AC.

This approach was based on technical considerations (available technology, technical physical constraints that limits the maximum performance for single duct and double ducts), market considerations (market size and contribution to electricity consumption) and scope of the products (emergency portable product or fixed product where other type of air conditioners cannot be installed). All these considerations did not change so we strongly believe that there are no real reasons for changing the scheme of the energy labelling and the testing method.

For single and double duct ACs the technical limitation to the product efficiency increase is mainly linked to the weight, dimensions and noise constraints. Portable ACs shall be light and compact while for double duct appliances the outdoor and indoor sections are merged into a single unit, whose size must be compatible with indoor installation and this creates a limitation to the size of the heat exchangers). For such reasons, single and double duct ACs have a limited improvement potential and cannot be compared directly with split ACs otherwise they would be relegated to the lower efficiency class without any possibility for the users to distinguish between better and worse models. A separate labelling scheme, as the current one, is essential for single and double duct ACs to provide their contribution in increasing energy efficiency in the future: this is demonstrated by the improvement achieved with the current energy label. In addition, the simple and quick testing procedure currently used for single and double duct ACs allows surveillance authorities to carry out an extensive and deep market control, which would be impossible with a more complex seasonal testing method.

Based on the above considerations Eurovent would like to ask that the ACs categories must be kept as in the current Regulations; Eurovent also would like to ask to keep specific testing method and specific energy classification for them, by setting requirements in terms of minimum SCOP/SEER only for the product in the scope of the EN 14825 and in terms of minimum EER and COP (according to EN 14511) for single and double duct ACs.

Measurement of blown air temperature and humidity

The study team is suggesting to provide in the technical documentation the blown air temperature in heating and cooling mode and dehumidification in cooling mode. Based on these values, it is planned for the next revision to evaluate the possible impacts on SEER and SCOP values and ensure that these remain representative of real life. The phenomena are well known and there is no need to delay this to the next revision. We believe that analysis at the next revision is too late.

Eurovent AISBL / IVZW / INPA
European Industry Association
www.eurovent.eu

80 Bd. A. Reyers Ln
1030 Brussels
BELGIUM

Phone: +32 (0)466 90 04 01
secretariat@eurovent.eu
Follow us on LinkedIn!

Fortis Bank
IBAN: BE 31 210043999555
BIC: GEBABEBB

This is referring to a major issue that was not properly taken into account in the study: the testing methods and the gap with reality, especially at BAT and BNAT levels.

The minimum efficiency requirements, BAT and BNAT and therefore the energy label scaling are based on the present testing methods. The proposed solution to achieve the BAT and BNAT is to have bigger heat exchangers with a high air flow rate (i.e Task 6). This type of unit can definitely be built. It will also be able to reach the minimum requirements and meet high energy class, but only in a laboratory. The reasons are:

- At first, there are limitations in sizing in the field. For built-in products, the space in false ceilings is limited and for wall hung models, customers require discrete models on the wall and above the door.
- Secondly, big heat exchanger with high fan speed that will meet A class will not be able to dehumidify a room at normal set point temperature. In cooling mode, the customer will set the temperature of the unit lower than the test condition in order to get dehumidification and as such avoid discomfort (i.e Task 3, 3.1.7).
- Finally, with the same unit a cold draft effect can be sensed in heating mode as the blowing temperature will be low and probably even lower than the skin temperature (i.e Task 3, 3.1.7). The customer will increase the set point temperature to avoid this discomfort. No energy savings will be made with this type of unit in real situations, only in a laboratory!

Currently, designers are considering these points while designing the unit. During testing however, the comfort is not taken into account while in reality it is the main concern for the users. With the current direction of having high targets for energy label, designers would therefore have to design a product without considering these fundamental points. This will lead to a situation where there will be energy savings in theory, as tested in the laboratory, but not in reality.

As the implementation is expected for 2023, we would therefore request the European Commission to use that time to investigate this topic and consider it on their timeline. The points to be studied are the blowing air temperature in heating mode and blowing air temperature and dehumidification in cooling mode. An investigation has to be done to assess if with the current technology and limits in blowing temperature and dehumidification, what the effect would be on efficiency, sound power level and the relevant requirements for the Energy Label. We would like to avoid putting units with unrealistic savings on the market that can damage the credibility of labels.

Eurovent would therefore like to ensure that this point is duly considered for the next Consultation Forum.

Testing information for set-up in technical documentation

Eurovent supports the proposal of showing testing information required to set up the machine to reach claimed values by Ecodesign".

However, it may not be appropriate to show these values in the technical documentation of the product for the end user to avoid that this information is used for other purposes than for laboratory testing. Therefore, it might be better that the data is available in a controlled manner, allowing the manufacturer to know who is asking the data and the reason of it.

Refrigerant charge reduction and alternative refrigerant fluid

The statement in the Task 4 that R32 is not a long-term choice is not justified and unfounded. According to the several findings, R32 even survives the F gas regulation after 2030.

It is also stated that hydrocarbons are a potential long term solution but manufacturers in Europe need to be convinced of its safety. This is a concern on a global scale, not only for European manufacturers

Proposed tolerances and uncertainties

The Regulation (EU) No 206/2012 defines the tolerances as follows:

- EER of single duct and double duct appliances: 10 %
- SEER and SCOP of split air conditioners: 8 %

The Task 7 final report proposes new tolerances level:

With present measurement uncertainties, tolerance levels can be set as follows:

split air conditioners:

- *SEER tolerance: 8 % below 2 kW cooling capacity, 6 % between 2 and 6 kW and 4 % between 6 and 12 kW.*
- *SCOP tolerance: 8 % below 2 kW cooling capacity, 7 % between 2 and 6 kW and 6 % between 6 and 12 kW.*

portable air conditioners:

- *SEER: 6 % for on/off and 8 % for inverter (12 % for lower than 2 kW @ 27/27 units)*
- *Pc(Teq): 7 % (13 % for lower than 2 kW @ 27/27 units)*
- *Teq: 0.3 K (0.4 K for lower than 2 kW @ 27/27 units)*

SEER and SCOP tolerance levels in Regulations (EU) No 206/2012 and 626/2011 need to be revised accordingly.

With improved measurement accuracy, tolerances could be reduced to the following levels:

split air conditioners:

- *SEER: 6 % below 6 kW cooling capacity and 4 % between 6 and 12 kW*
- *SCOP: 6 % below 6 kW cooling capacity and 4 % between 6 and 12 kW*

portable air conditioners:
SEER: 6 % (12 % for lower than 2 kW @ 27/27 units)

Eurovent holds that the appropriate tolerances level set in an ecodesign Regulation should be based upon the expanded measurement uncertainty which includes the repeatability and reproducibility components. The expanded measurement uncertainties should be based upon the results of Round Robin test (RRT) campaign.

At the time of the final Task7 final report, a RRT campaign was ongoing but no ne results were available.

Based on the above considerations, Eurovent would like to suggest to fix the tolerances level according to the result of a RRT campaign; Eurovent would also like to suggest the involvement of the CEN/TC113 'Heat pumps and air conditioning units' in the proposed RRT campaign.

Ventilation exhaust air-to-air heat pumps and air conditioners ≤ 12 kW

It is mentioned in Task 7 that CEN TC113/WG7 informed that it is not possible to develop a SEER/SCOP calculation for these units. Therefore, we would like to know whether these units will be included or not.

Life Cycle Cost Analysis

We would like to mention several inconsistencies in the reports: electricity prices are not the same in Task 5 and 6, PWF (present worth factor) is not the same in Task 5 and 6 and the impact of the sound power level while increasing the airflow rate was not properly taken into account.

In Task 6, the Figure 11 shows the increase of the outdoor sound power level with an increase of air flow rate. However, the report mentions the increase of both indoor and outdoor sound power level, which is not correct.
As an additional remark to Figure 11, it is explained that increasing the indoor air flow rate by 40% leads to an increase of 8 decibels and 4% increase in heat exchanger price is considered per dB attenuation. For example, HE1 option has 40% UA value increase with 40% increase in indoor unit price. It is not clear how option HE1, which leads to an increase of sound power level and therefore increase in price for attenuation, does not require more than a 40% increase of the indoor unit price.

APPENDIX 1

In this Appendix Eurovent wants to point out several discrepancies between the different Tasks of the study report.

Technical Issues

Capacity Ratio - CR(Tj):

Equations in Task 7 (p. 25) and Task 3 (p. 48) state:

$CR(Tj)=min(1; Pc_{corr}(Tj)/BL(Tj))$

While Task 3 @ p. 41 states:

The load ratio is computed by dividing the building load by the unit capacity corrected with infiltration below the equilibrium point.

Hence the correct formula should be:
If $Tj \leq Teq$: $CR(Tj)=BL(Tj)/Qc_{corr}(Tj)$

If Tj ↑ Teq: CR(Tj)=1 The above equations seem to be used in Table 12 @ p. 50 Task 3.

Considering $Pc_{corr}(Tj)=BL(Tj)$ (Task 7 @ p. 25 and Task 3 @ p. 48) for $Tj \leq Teq$ → CR(Tj) =1 the first formula results in not being correct.
For this reason we ask to replace it with the following:

If $Tj \leq Teq$: $CR(Tj)=BL(Tj)/Qc_{corr}(Tj)$ If Tj ↑ Teq: CR(Tj)=1

For consistency we kindly ask to revise the study according to this modification.

Maximum capacity of the unit corrected with infiltration - $Pc_{corr}(Tj)$

Equations in Task 7 (p. 25), Task 3 (pp. 41,48) are:
If $Tj \leq Teq$: $Pc_{corr}(Tj)=BL(Tj)$

If Tj ↑ Teq: $Pc_{corr}(Tj)=Qc_{corr}(Tj)$
which are different from those used in Table 12 @ p. 50 Task 3 reported hereafter:

If $Tj \leq Teq$: $Pc_{corr}(Tj)=BL(Tj)$
If Tj ↑ Teq: $Pc_{corr}(Tj)=Qc_{corr}(Teq)=BL\ (Teq)$

We kindly ask to solve this discrepancy and revise the study accordingly.

Energy efficiency corrected by corrective thermostat off factor CDC - EERbin(Tj)

Equations in Task 7 (p. 25), Task 3 (pp. 41,48) appear not to be properly implemented to determine data reported on Table 12 @ p. 50 Task 3:

If CR(Tj) ↓ 1; EERbin(Tj)=EERrated*(1 – Cdc*(1 – CR(TJ)))

We kindly ask to check correctness of data reported on Table 12 according to the above formula.
More in detail values EERbin(Tj) corrected by cdc should have the same trend of CR(Tj) for values included between 0 to 1.
We underline that this has a relevant impact on the value of SEERon.

For consistency we kindly ask to revise the study according to this modification.

Building Load - BL(Tj)

Equations in Task 3 (p. 38) state:

BL(Tj) = Pdesignc × PLR(Tj) = Pdesignc × (Tj − 23) / (35 − 23)

with Pdesignc = Pcrated, the portable rated cooling capacity.
Furthermore in Task 3 (p.38): For single duct: the rated cooling capacity is measured at 35 °C db / 24 °C wb without accounting for the impact of infiltration.
While Equation 3 in Task 3 (p. 41), Task 7 (p.25) states:

$BL(Tj)= Qc(27) \times(Tj-23)/(35-23)$

More in detail the example on Table 11 (Task 3) states:

Pdesignc = Pcrated = 2.6 kW

While on table 12 BL(35)=2.4 kW.
We kindly ask to solve this discrepancy:

- on the Equation 3 in Task 3 (p.41),Task 7 (p.25); - data BL(Tj) colum of table 12

and to revise for consistency the study according to this comment.

Rated capacity for temperature of bin j - Qc(TJ)

Equation 1 in Task 3 (p. 47), Task 7 (p.24) states:

Qc(Tj) = Qc(27)

Where Qc(27): rated capacity at 27(19) indoor and outdoor.

For:
- $Tj \leq Teq$ the IAT (indoor air temperature) is constant and equal to 27 °C.
- $Tj > Teq$ the IAT increases. For example for OAT (outdoor air temperature) = 38°C, the

IAT=35.1 °C

Since the IAT increases above the Teq also the Qc increases. For example when OAT=38°C and IAT=35 °C, the Qc should be Qc=2.6 kW (like on Table 11 - Task 3), while Table 12 reports as value Qc(38.1)=2.4 kW.

Hence the correct formula, in our opinion, should be:

If Tj ≤ Teq **:** Qc(Tj) = Qc(27) If Tj ↑ Teq **:** Qc(Tj) = Qc(IAT)

We kindly ask to solve this discrepancy and revise the study accordingly.

Editorial Issues

Seasonal Energy Efficiency Ratio ON ($SEER_{ON}$)

Equation in Task 3 (p. 41) states:

$$SEER_{on} = \frac{\sum_{j=1}^{n} hj \ \times Pc(Tj)}{\sum_{j=1}^{n} hj \ \times \left(\frac{Pc(Tj)}{EER(Tj)}\right)}$$

Pc(Tj) = below equilibrium point: the cooling demand of the building for the corresponding temperature Tj; above the equilibrium point: the capacity of the unit for the corresponding temperature Tj.

While in Task 3 (p. 46), Task 7 (p.23):

$$SEER_{on} = \frac{\sum_{j=1}^{n} hj \ \times Pc\_corr(Tj)}{\sum_{j=1}^{n} hj \ \times \left(\frac{Pc\_corr(Tj)}{EERbin(Tj)}\right)}$$

Pc_corr(Tj) = below equilibrium point: the cooling demand of the building for the corresponding temperature Tj; above the equilibrium point: the capacity of the unit for the corresponding temperature Tj.

We kindly ask to update the first formula with the second one.

Seasonal Energy Efficiency Ratio (SEER)

Equations in Task 7 (p. 23) state:

$$SEER = \frac{Qce}{\frac{Qce}{SEER_{on}} + H_{TO} \times P_{TO} + H_{SB} \times P_{SB}}$$

$$Qce = 10/24 \times \sum_{1}^{n} hj \times Pc\_corr(Tj)$$

Qce = cooling energy supplied by the unit over a season.

While in Task 3 (p. 46):

$$SEER = \frac{\sum_{j=1}^{n} hj \ \times Pc\_corr(Tj)}{\frac{\sum_{j=1}^{n} hj \ \times Pc\_corr(Tj)}{SEER_{on}} + H_{TO} \times P_{TO} + H_{SB} \times P_{SB}}$$

Even though seasonal index is the same for both equations, a $10/24$ factor (hours when the unit is on in a day) is missing on the second equation.

Maximum capacity of the unit corrected with infiltration (Pc_corr(Tj))

Equation 2 in Task 3 (p. 38) states:

$$Pc\_corr(Tj) = Pc(Tj) + Q_{INF}(Tj)$$

Pc_corr(Tj): maximum capacity of the unit corrected with infiltration

While in Task 3 (p. 48) and Task 7 (p. 25):

Pc_corr(Tj) is then computed as follows:

$If\ Tj \leq Teq: Pc\_corr(Tj) = BL(Tj)$
$If\ Tj > Teq: Pc\_corr(Tj) = Qc\_corr(Tj)$

Where Qc_corr(Tj) is defined from Eq.2 in Task 7 (p. 24) and Task 3 (p.47):

$Qc\_corr(Tj) = Qc(Tj) + Q_{INF}(Tj)$

Qc_corr(Tj): maximum capacity of the unit corrected with infiltration.

First definition of Pc_corr(Tj) seems to be in contradiction with the other two and needs to be revised, therefore we kindly ask to solve this discrepancy.

Eurovent and transparency

When assessing position papers, are you aware whom you are dealing with?

Eurovent's structure rests upon democratic decision-making procedures between its members and their representatives. The more than 1.000 organisations within the Eurovent network count on us to represent their needs in a fair and transparent manner. Accordingly, we can answer policy makers' questions regarding our representativeness and decisions-making processes as follows:

1. Who receives which amount of votes? At Eurovent, the number of votes is never related to organisation sizes, country sizes, or membership fee levels. No matter if SMEs or large organisations, each company receives one vote within our technical working groups. In our General Assembly or Eurovent Commission ('steering committee'), our national member associations receive two votes per country.	**2. Who has the final decision-making power?** The Eurovent Commission acts as the association's 'steering committee'. It defines the overall association roadmap, makes decisions on horizontal topics, and mediates in case manufacturers cannot agree within technical working groups. The Commission consists of national member associations, receiving two votes per country independent from its size or economic weight.
3. How European is the association? More than 90 per cent of manufacturers within Eurovent manufacture in and come from Europe. They employ around 150.000 people in Europe largely within the secondary sector. Our structure as an umbrella enables us to consolidate manufacturers' positions across the industry, ensuring a broad and credible representation.	**4. How representative is the organisation?** Eurovent represents more than 1.000 companies of all sizes spread widely across 20+ European countries, which are treated equally. As each country receives the same number of votes, there is no 'leading' country. Our national member associations ensure a wide-ranging national outreach also to remote locations.

Check on us in the European Union Transparency Register under identification no. 89424237848-89.

We are Europe's Industry Association for Indoor Climate (HVAC), Process Cooling, and Food Cold Chain Technologies – thinking 'Beyond HVACR'

Eurovent is Europe's Industry Association for Indoor Climate (HVAC), Process Cooling, and Food Cold Chain Technologies. Its members from throughout Europe, the Middle East and Africa represent more than 1.000 companies, the majority small and medium-sized manufacturers. Based on objective and verifiable data, these account for a combined annual turnover of more than 30bn Euros, employing around 150.000 people within the association's geographic area. This makes Eurovent one of the largest cross-regional industry committees of its kind. The organisation's activities are based on highly valued democratic decision-making principles, ensuring a level-playing field for the entire industry independent from organisation sizes or membership fees.

Eurovent's roots date back to 1958. Over the years, the Brussels-based organisation has become a well-respected and known stakeholder that builds bridges between manufacturers it represents, associations, legislators and standardisation bodies on a national, regional and international level. While Eurovent strongly supports energy-efficient and sustainable technologies, it advocates a holistic approach that also integrates health, life and work quality as well as safety aspects. Eurovent holds in-depth relations with partner associations around the globe. It is a founding member of the ICARHMA network, supporter of REHVA, and contributor to various EU and UN initiatives.