Introductory note: EHPA would like to thank the study team for the work already carried out and welcome the opportunity given to comment on the options proposed in the final reports as well as the discussion paper for WG2 meeting on testing. Please find below EHPA’s comments on several options and recommendations addressed during the experts meeting of 2nd April 2020.

Below, EHPA is further explaining its views on key topics:

1. Maintaining the medium temperature application 55°C as the mandatory rating temperature, not to be replaced by high temperature application 65°C.
2. The compensation method is not fit for short-term introduction. Further work: finalization of the ongoing round robin test, additional testing on other heat pump technologies, higher capacity range and then standardization activities, is needed before the method can be adopted.
3. Defining common test setting mode for HP is a very complicated issue and it is not representative of heat pump operation on site.
4. EHPA supports the proposal to display the seasonal energy efficiency $\eta_s$ on the label
5. Verification Tolerance for both electrical and gas heat pumps should be maintained at the current value of 8% both for Etas and Etawh.
6. No extension of the Lot 1 scope to 1MW.
7. Adjusting sound testing conditions should be left to standardization discussions. As the conditions in which maximum sound power occurs, in reality, are different from one unit to the other, are depending on heating capacity delivered and are not representative for the normal use of a heat pump, maximum sound power level information is not ready to be displayed according to the existing framework and test conditions.
8. Maintaining the temperature control factor $F(1)$ at 3% and keeping the controls for space heaters and combination heaters in Lot 1.
1. HARMONIZED TESTING HEAT PUMPS

A. Assessing the energy performance of Heat Pumps

The current proposal is not satisfying and not acceptable for EHPA; the proposed test temperatures for heat pumps are not realistic or representative of the market. EHPA is against raising the HP rating temperature from medium temperature application 55°C to high temperature application 65°C.

It is scientifically incorrect to assume that there is a correlation between the increase of test temperatures and the improvement of the "real life" outcome of the testing. In fact, the increase of the temperature will result in higher inefficiency and could be compared to oversizing.

High temperature heat pumps able to supply 65°C water temperature can be found on the market; the high temperature rating conditions are also available in the performance rating standard EN 14825 and manufacturers can test, declare and certify products with these ratings on a voluntary basis provided there is consumer demand for it. However, there is very low market demand and these products remain dedicated to a niche market and do not represent the vast majority of systems and applications. Ultimately consumer choice is mainly driven by economic reasoning, adding a mandatory HT application in ErP regulation will not change the LCC of HT heat pump and will not create any additional market demand or make heat pumps more attractive to consumers to sufficiently incentivize the industry to develop HT heat pumps on a mandatory basis.

EHPA would like to remind that the proposal is based on a study which is not representative of the heat pump technology; the study was carried out on a limited number of units (19). In this regard, it is not reasonable to propose a change in testing temperature from medium temperature to high temperature on the basis of a single limited study. In addition, the authors of the study already flagged that the conclusions of the study cannot lead to a recommendation of increasing the rating temperature to 65°C, on the contrary. Moreover, the analysis of this study made in the different versions of the reports is not consistent and compares maximum supply temperatures with seasonal average values whereas average mean values are totally comparable between the experimental study and the EN 14825 standard. Today the EN 14825 relies on the bin method, which allows for a more accurate profile than considering an average seasonal value.

It is always difficult to compare test temperatures with "real life" temperatures. The design and characteristics of the emitters, the regulation system and the set ambient temperature may affect the behaviour of the heat pump in real life compared to testing. Therefore, this is not a reliable argument.

The values for these water temperatures vs outdoor temperatures are coming from very long discussions at CEN/TC113 WG7 based on the heat exchange (radiation/convection/conduction) in radiators. In addition, we shall keep in mind that in office buildings fan coil units (FCUs) are used with a water temperature of 45°C. For heat pumps connected to FCUs, we should keep 35°C and 55°C that somehow may be representative; 65°C will not.

Basic thermodynamics dictate that the lower the sink temperature, the better the efficiency results. Thus, increasing the rating application, encouraging end users to use higher...
temperature and not improving their building to require lower heating temperature supply will result in the loss of potential energy savings, which goes against eco-design basic principles.

Article 8 of the EPBD prescribes the optimization of system performance of an individual space heating and other technical building systems. Such an article was introduced ten years ago because optimizing the energy use in technical building systems is too complicated to be reflected when placing a product on the market. Requirements under the article 8 of the EPBD were recently improved. In this regard, a move to requiring a higher temperature regime for all heat pumps will pre-empt any benefits from the new requirements of the EPBD, such as higher air tightness and better indoor temperature controls.

Finally, bin weighted average temperatures provided by VHK (from presentation) are:

<table>
<thead>
<tr>
<th>EN 14825 test temperatures and related system temperatures</th>
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<tbody>
<tr>
<td>Temperature Application</td>
</tr>
<tr>
<td>Design temperature</td>
</tr>
<tr>
<td>Bin-weighted average Tsys</td>
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<tr>
<td>Avg Tsys new built</td>
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<tr>
<td>Avg Tsys existing dwellings</td>
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</table>

For the bin weighted average $T_{syw}$, it is obviously assumed by VHK to operate the heat pump with fixed $dT$ in bivalent-alternate mode with an operation limit of -7°C outdoor temperature. The bin calculation from EN 14825 under those conditions confirms the tabulated values.

Accounting the common practice with heat pumps on site under average climate conditions, the following should apply:

- Monovalent or bivalent parallel operation at 35/30°C, 45/40°C, 55/47°C, 65/55°C
- fixed flow rate with return temperatures always above 20°C, this is respecting the reduced modulation range of circulators compared to compressor capacity.

The bin-weighted average temperatures from this approach are significantly higher compared to the tabulated numbers for the respective applications: 27 °C (Low), 32,3°C (Intermediate), 36,8°C (Medium) and 41,5°C (High). These values fit to the typical applications of heat pumps for new and existing buildings. Consequently, there is no need to change the rating of heat pumps.

Therefore, EHPA strongly opposes the recommendation for rising the supply temperature level for appliance rating. And considering this position, there is no need to answer the question 1b “If test temperatures should reflect real life situations, what are the actual seasonal average system temperatures for new built and existing dwellings? Do they differ from the ranges indicated in Table 1”
B. Dynamic/compensation method for testing heat pumps

EHPA welcomes the fact that BAM recognizes the dynamic method is unfit for introduction and consequently decided to focus on the compensation method.

Industry and standardization bodies have been open and supportive to investigate BAM proposals. However, a thorough assessment of the method reliability, repeatability and reproducibility has to be carried out for all the products under the scope of Lot 1 before considering whether the methodology is fit for introduction or not. Another important point is that the method should not only consider inverter driven small capacity HP but all design types of fixed capacity and modulating compressors. For fair approach the method shall be applicable to all technologies of heat pumps, regardless of the capacity control, heat source/sink and capacity range and shall not induce a drastic increase of test duration and thus costs. However, for units having other controls than the one on the outdoor temperature, it may be not possible to simulate/take them into account.

On the claim to better represent “real life”, the BAM proposed method only addresses refrigerant cycle of the HP and its basic water temperature control, while disregarding or bypassing other unit’s controls that are operating in “real life” (if it is smarter than just relying only on heating curve). The compensation method includes the system control into the test and thus into the performance rating of the heat pump. It shall be pointed out that any “quality” of a control is mainly the opportunity of adapting the parameters to the requirements of the heat pump application on site. This cannot be assessed by any pre-defined outdoor-to-flow temperature setting. At the very end, real installation with a water-based distribution system is a very slow working system. It cannot be assumed that any test rig is able to simulate this and offer acceptable test durations. First results of BAM show some operation points in part load where heat pumps could not satisfy the demand of the building. This is far away from practical use of a heater.

While EHPA supports and is willing to contribute to improving test methods for heat pumps, the compensation method is not fit for short term introduction. Indeed, there is a need for a much deeper investigation of the feasibility of implementing the compensation method and the capability of the laboratories to use it for all products under the scope of the regulation. There is a need for further discussion within the standardisation group and further investigation of the reliability, repeatability and reproducibility of the method. Therefore, the compensation test method is not ready to be included in the current revision of the Ecodesign Lot 1.

EHPA would like to stress the fact that the process for the development and introduction of a possible new test method is currently unclear and unpredictable, while industry requires predictability to operate. We would also like to understand whether such a test method would be solely considered for heat pumps or would be considered for other heat generators.

In addition, the currently conducted RRT is limited to 15kW. Although the scope of the Lot 1 is up to 400kW, only part of the heat pump systems is covered by the currently ongoing RRT and large heat pumps systems are left out of the scope. Any future test method should be fit for all capacities.

Last but not least, EHPA strongly disagrees with the proposal made during the web meeting to introduce the compensation method under the transitional method. As previously highlighted by the consultant in WG 3 having bits and parts in different pieces of documents can only create confusion and increase the risks of misinterpretation. As the willingness to consider the method and assess it in the standardization process has been established, we believe that process
should take its course and see high risks if rushing its introduction through Regulation while the methodology has not even been thoroughly investigated yet.

What would be the impact of a new test method on energy efficiency thresholds if SCOP values using the compensation method are much lower than the ones today declared according to EN 14825?

C. **Heat pump settings**

EHPA would like further clarifications on the consultant proposal and on the analogy outlined by ECOS.

Since the original proposal concerning settings was not intended for heaters, EHPA believes that the out of the box method is not applicable to heat pumps. Furthermore, today, heat pumps are tested according to the EN 14825, which does not need any other setting than the frequency of the compressor. Tests according to the compensation would require several settings such as the heat curve, influence of ambient temperature. These settings are done by installers on the field accordingly to the location, the insulation level of the house and the type of emitters. Since different settings are possible depending on the specific requirements on site, the out of the box method cannot be a basis for performance declaration. Furthermore, settings as described in the consultant proposal apply to the system control. It is not mandatory required to provide a heat pump in conjunction with a system control box. Indeed, many units are sold without this system control box for several reasons such as options offered to the customer or in preparation to be controlled by BACS. Finally, HP settings will increasingly become more complex with the generalization of connectivity and smart controls and development of components controls.

For all those reasons, EHPA believes it will be very difficult to develop common and meaningful settings for testing for all products under the scope of Lot 1 without hindering manufacturers innovation. Therefore, while we would like to get further clarification on the proposal, we recommend that the testing procedure should solely focus on test conditions and usage scenarios.

D. **Display η_s on Energy labels**

EHPA supports having the seasonal energy efficiency η_s value on the label.
2. VERIFICATION TOLERANCES

EHPA would like to raise the attention on the fact that verification tolerances are intimately related to a given test method. Therefore, provided that no new test methods are introduced, EHPA recommends keeping the verification tolerances at their current level.

Furthermore, the consultant supports the reduction of the verification tolerances by using the results obtained from the Ecotest project, which include a limited number of heat pump models. Therefore, the outcomes of the tests cannot be used to derive verification tolerances for electric or gas driven heat pumps.

Finally, verification tolerances should not be smaller than uncertainties of measurement of the considered performance parameter. Laboratories are already working on reducing the uncertainties implemented in the testing standards.

For all these reasons, EHPA recommends maintaining the current 8% tolerance for electric and gas driven HPs.

3. SCOPE EXTENSION 1MW

EHPA strongly opposes including heat pumps to the scope 1 MW.

Initially, the target of this proposal was only boilers, the report did not have the intention to include HPs. Consequently, there is no mapping of data and no investigation on the effects of such extension. EHPA strongly recommends conducting a study before including HPs to the scope extension.

Furthermore, EHPA believes that it could interfere with ENER Lot 21 (2016/2281/EU) especially if there is no mapping of these products.

4. NEW ErP GROUP: EMITTERS AND CONTROLS

EHPA agrees with the crucial role of radiator size in achieving lower temperature. However, EHPA would like to note that such an issue is already addressed in the scope of the EPBD.

EHPA believes that before creating a new ErP group, a working plan study should be driven to evaluate the need to set ecodesign requirements on emitters. However, EHPA would like to point out the fact that the scope of emitters is very wide. Therefore, launching a study on emitters could then convey overlapping with other products and not only with the ENER Lot 1
(811/2013/EU and 813/2013/EU). Conflicts should be avoided with existing regulations: Radiators and Convector are already in scope of CPR (305/2011/EU). Testing and declaration of thermal performance values is clearly described in EN 442 series. Emitters are usually chosen by experts based on detailed planning with regards to the requirements on site. Thermal capacity at low system temperature might be such a requirement where appropriate. This will be accounted for by the datasheet of the emitter which is provided by the manufacturer.

In addition, fan coil units are emitters already covered by ErP reg. 2016/2281.

How to consider floor heating as an emitter for low temperature heat pumps? Floor heating systems are tailor made with pre-manufactured components (pipes of several diameters, installation material ..) heat curves, flow rates and piping will be designed individually depending on required capacity and floor construction.

Controls are often a component of the space heating appliances systems. In this regard, Lot 33 on Smart Appliances and Lot 38 on Building Automation Control Systems are already dealing with control systems. For this reason, EHPA believes that there is no need to establish a new Lot for controls.

5. SOUND PROPOSAL VHK

EHPA would like to reaffirm its position stated in its contribution on acoustics developed in collaboration with EHI and sent to VHK a few weeks ago.

In addition, it can be clearly pointed out that the proposed procedure for test and declaration including compressor frequency is exclusively related to heat pumps with frequency-controlled compressors. Furthermore, declaration of frequency values will lead to confusion. It is not suitable for any other kind of capacity control such as digital scroll, piston compressor with cylinder shut-off or staged operation in compound refrigeration units. Innovative concepts like high speed continuous flow machines or linear drives are also not accounted for properly. A reliable approach shall be suitable for all solutions, not only for the well-known and most common technology.

As the conditions in which maximum sound power occurs, in reality, are different from one unit to the other, are depending on heating capacity delivered and are not representative for the normal use of a heat pump, maximum sound power level information is not ready to be displayed according to the existing framework and test conditions.

Therefore, although EHPA agrees that current rating conditions need adjustment, we believe the issue need to be addressed at later stage to allow further discussion under standardization working groups and consideration of the outcome of IEA HPT Annex 51 “Acoustic Signatures of Heat Pumps” at a later stage.
6. EHI PROPOSAL

A. Temperature control factors in regulation

As previously expressed in our position paper for WG3, EHPA recommends maintaining the temperature control malus F(1) at 3%.

Adjusting the temperature control factor F(1) to 8% instead of 3% is not only too high but will also result in the penalisation of -5%, which is not justifiable. Such a proposal is penalising the heat generator and it is something that heat pumps could anyway not compensate for, as it is not linked to the product itself.

Consequently, the only correction of controls that are provided with the system (can be compensated) should remain as today.

Therefore, **EHPA recommends maintaining the temperature control factor F(1) at 3%.**

B. Controls

EHPA is in favour of **continue keeping the controls for space heaters and combination heaters in lot 1.**