European Partnership for Energy and the Environment

Mr. Kolb
DG Energy and Transport
Energy Efficiency
TREN D 3
European Commission
B-1049 Brussels

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Copy: André Brisaer, Ms Lichtenvort, Mr Kemna

EUP lot 1 – Ecodesign requirements for boilers Preliminary comments on document 3, 5 & 6 in preparation of 16 december 2009

Dear Mr Kolb,

EPEE wishes to thank the commission for the opportunity to give additional comments on documents 5 & 6.

At first, we welcome the changes made in the document and more in particular we are pleased to see that low temperature applications are included in proposed testing and calculation procedures. Also the ongoing simplification is well noticed, and indeed heat load profiles have been deleted to set out the trend for "heat generator system approach".

Regardless, we feel that there are still some points that need to be addressed in the present proposal, to finetune the document and ensure that it is fit for use once finalised.

The main issues that need to be considered are that the heat generator approach needs to be respected and this is for the moment not included.
The methodology is still containing mistakes with relation to heatpumps, as such we are still not confident that this tool is fit for use.
As such, attached with this position paper, you can find a reworked document 5 & 6 making the tool technologically acceptable for heatpumps and including the heatgenerator approach. We feel that these changes have to be included in order for EPEE to find the calculation method technically acceptable. Afterwards, we feel that a new evaluation will be required.

We hope that this document will contribute in a positive way.

If there is need for further clarification or if additional information is required EPEE will be happy to give more information,

Yours sincerely,

Andrea Voigt
Director General - EPEE

General approach of the calculation

The calculation tool needs to be adjusted to embrace the heat generator approach. It is for the moment not fit for that purpose.

The calculation assumes a certain degree of losses, which are clearly related to the installation and user behaviour. Manufacturers are not able to predict or improve these kind of impacts, and rely for that matter to specific application calculations such as the ones provided for EPBD.

Also these assumptions of losses are not reflecting real life situations. In case of high investment cost products, such as heatpumps, the consumer will in first place reduce the heat demand by improving the insulation, will install double glazing and do all that matters to reduce the energy consumption. At that stage, it is clear that the losses will have been significantly reduced, in contradiction with the present calculation methodology.

It is clear that the impact on least life cycle cost has not been evaluated throughout the study of lot 1, as such, we feel that system losses should not be included in present calculations.

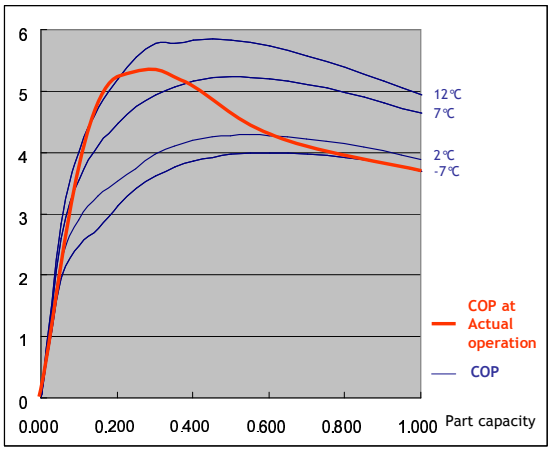
As a conclusion, we feel that these losses, should be excluded from the calculation to ensure a heat generator approach.

The attached proposal for revision of document 5 & 6 provides a proposal how this calculation should be adapted to serve this comment.

Assumptions taken for floorheating are technology prescriptive

The basic assumption that the efficiency variation at partload is less than 5% is not taking into account present available technologies. Furthermore, this differentiation is not specified in EN 15316-4-2 (2008) annex B, so we question the source of this assumption (refer to annex A)

In following graph you can find how the efficiency is evolving in general for present air to water heatpumps applying variable speed compressors.



This basic data shows that the efficiency of the heatpump is affected by much more than 5% due to partload operation. As such, present assumption makes it technology prescriptive and does not reflect other and new technologies.

EPEE proposes for floorheating to apply the same approach as for radiator heating with regard to input data, and provisions need to be taken to declare minimum capacities as well for those manufacturers who believe it is necessary for their technology.
This also implies that for floorheating, in the calculation, degradation needs to be applied.

Conversion to system temperatures

The conversion to systemtemperatures should be calculated correctly.

1. In cold climates, current calculation requires much higher system temperatures than average climate. The system temperatures will not change that much since buildings in colder climates are better insulated than buildings in average climates reducing the heat demand, as such systemtemperatures at extreme conditions will not increase. Consequently the systemtemperature at extreme condition for cold climates will be the same as the extreme condition for average climate. This needs further correction.

2. In current calculation tool, systemtesttemperatures (Tsystst) for floorheating are the same as for radiator heating. Correction is to be made as follows:

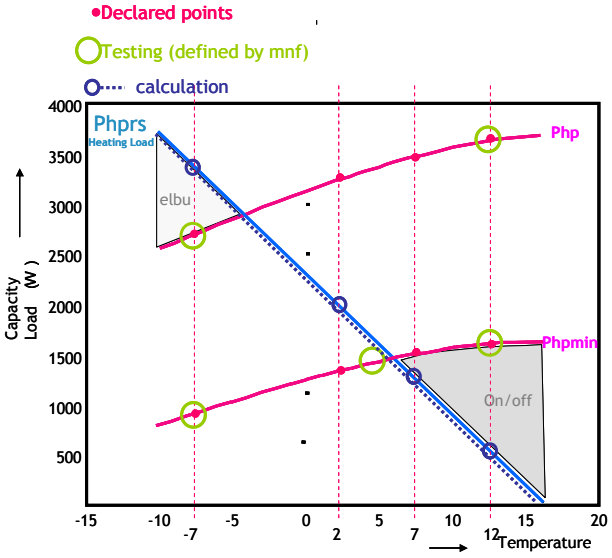
Tsystst5	34,5
Tsystst4	32
Tsystst3	27,5
Tsystst2	26
Tsystst1	24,5

Floorheating systemtemperatures should not exceed 35°C. For floor heating the temperatures are limited as the floor temperature should not be higher than 29°C.

Testing of heatpumps:
EPEE is happy to see that different options are presented for testing the products in view of lot 1. However, it is technology prescriptive and there should be a balance in the number of tests for all technologies.

It should be very clear that the calculation points as defined in the present method can be a "declared" value for capacity and COP. Not necessarily, these points have to be tested.

It should be up to the manufacturer to test the points that he sees fit for defining the operation and efficiency range of his product. Based on this data set, the manufacturer can then, based upon calculation, define the declared values for capacity and COP to be entered in the calculation tool.
Following graph explains the difference between calculation points, declaration points, and test points for the purpose of this particular proposal.



An additional option D needs to be added, making it possible for manufacturers to provide values based on a set of data obtained from testing and calculation.

For the proposed option B, we feel that the numbers proposed are based on assumptions that are not clarified.
The assumption that for fixed capacity units Phpmin is half of the tested capacity is incorrect and not validated by annex B of prEN 15316-4-2 (see attached annex A). We propose to set Phpmin at Php.

Hrs max & BINhours.

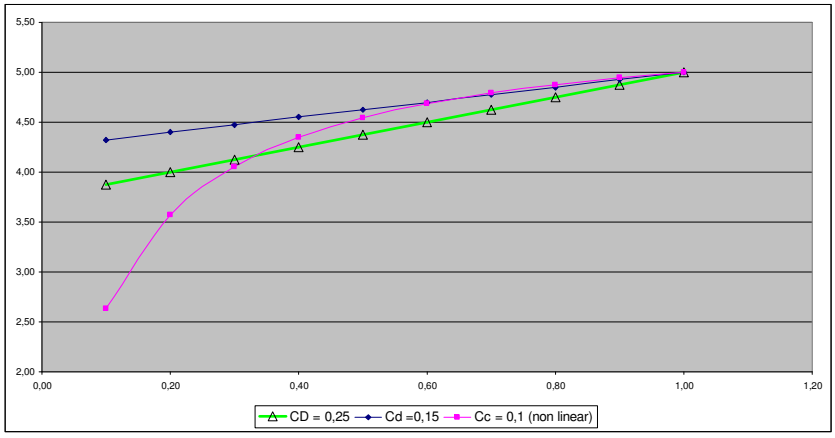
The proposed equivalent hours should have a clear explanation, we would assume that present hours are defined taking into account average loading, but this is not clear at all. If this is the case, then this is a very new concept for seasonal efficiency calculation.
EPEE would like to see a clear explanation how these hours are defined, this is usefull for future references and standardisation work and furthermore, it will enhance transparancy of the methodology.

Inclusion of Cd factor

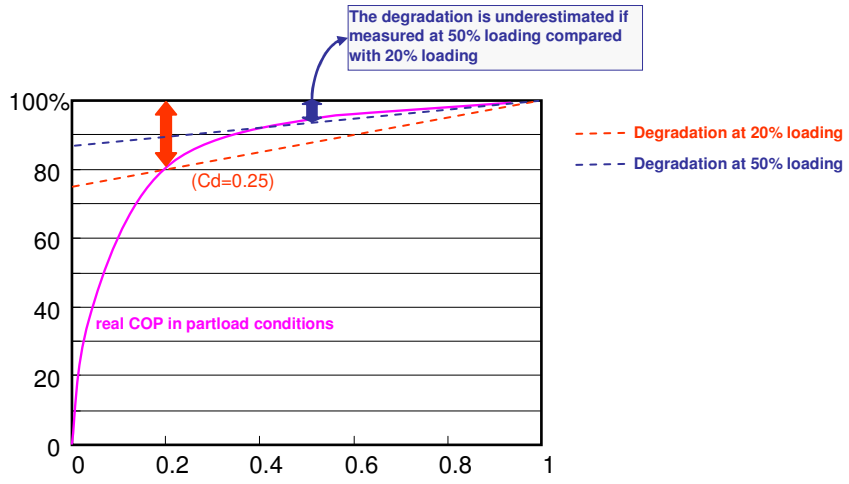
The default Cd factor of 0,25 is only valid for air to air products and should be reduced for air to water systems. This is based on the simple fact that for air to water products, the pressure equalisation is negligable due to the small waterheatexchangers. When the compressor stops, the refrigerant will migrate from high temperature (condensor) to low temperature (evaporator). This also causes a large heat transfer in the system.
In case of air to air, with big heat exchangers, much more refrigerant must be compressed when the unit starts again. In case of air to water, less energy has to be used, due to smaller size of heat exchanger.
In addition to that effect, due to the higher temperature of the water in the condensor, the unit will require less power to heat up the refrigerant mass and heat exchanger of the unit.
In case of air to water, in prEN 14825, only the residual power is considered to be contributing to the degradation effect.
As such, a Cd factor of 0,25 is not taking into account the particularities of air to water systems and should be reduced. However, since the linear formula is proposed to be used, we can not find a good value for the moment. In prEN 14825, a non linear approach has been taken and as

such we can for the moment not make a good correlation. Tentatively we propose to use 0,15 instead of 0,25.

This would give following result in relation to present Cd factor and Cc factor.



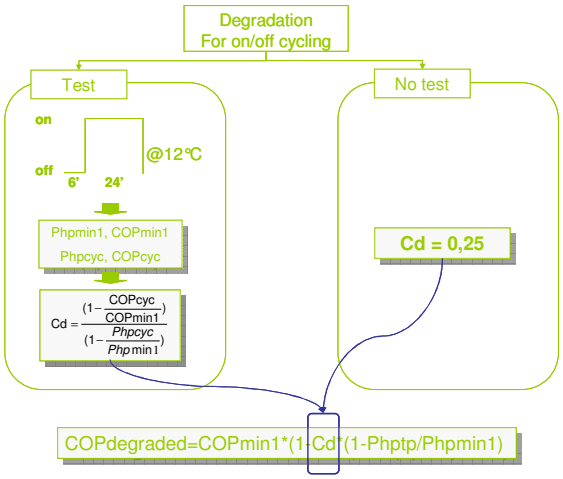
prEN 14825 is proposing default value for the Cd factor of 0,25, but this is presumed based on testing 6'on and 24'off (20% on)
At the standard testing condition in prEN 14825 at partloads of 20% the Cd factor is considered to be well balanced between flating and deflating from real value. (see following graph). However at 50% the measured Cd factor is assumed to be much smaller.



The perception of using the default value is incorrect. If a manufacturer opts to apply the default value, and does not want to perform test for technical reasons (because the capacity is too low, and uncertainties of measurement would be too high), then this default Cd factor needs to be used for the degradation. In the proposal there are formulas included (line 86a) that are indicating how to define COPcyc for the default value, but this is redundant. In the excel the approach is somewhat confusing so we want to have the method clear and transparant.
If the manufacturer however chooses to perform tests for determining the Cd factor, then in this case, it should be possible to include that Cd factor. The calculation method has to be corrected in that sence. Necessary changes have been done in the revised document.

The test method should be in line with what prEN 14825 prescribes, but if there is opted to use another method, this should also be possible. As such, any formula used should allow for different loading.

EPEE proposes to use: Cd =(1-(COPcyc/COPmin1))/((1-(Phpcyc/Phpmin1)

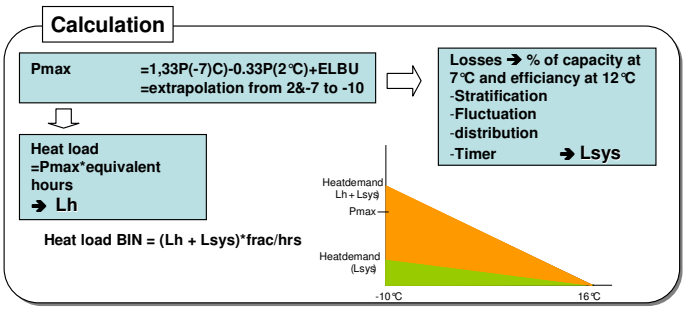


Definition of heat demand

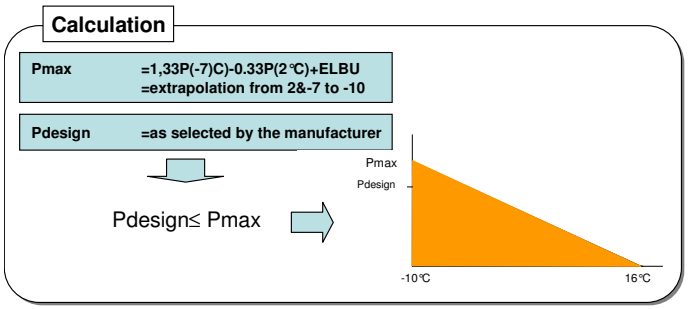
In former meetings there has been agreed that the manufacturer may declare different heat demands where he sees fit, as long as this heat demand does not exceed the capacity of the heat generator.
This approach is now not clearly reflected in the calculation.

EPEE proposes that the manufacturer needs to be able to declare a "Pdesign" which would be the factor deciding the heatdemand. It seems natural for heatpump manufacturers to define the heatload and then declare the COP at conditions matching as close as possible the heatdemand.

The way heat demand is defined for now is not transparent for the user of the calculation method.
In the present method the heat demand is defined as follows



While we feel it can be simplified much more as follows:



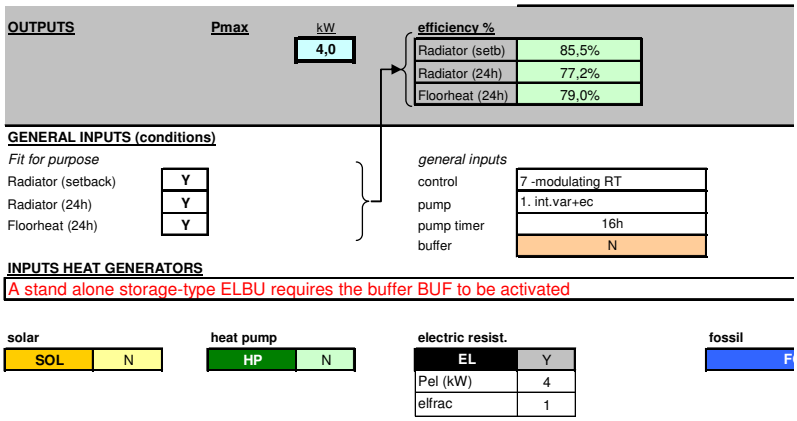
Set back and reheat:

The assumption that the system temperature is 63°C when reheat occurs is not appropriate for heatpumps. If the consumer applies setback, the boiler will only raise the temperatures to the limits it is designed for. As such if a heatpump is designed to maximally achieve 50°C, then it will do reheat at maximally 50°C. The assumption to reheat at 63°C is degrading the efficiency of heat pumps and is not acceptable. This approach is only suitable for combustion type boilers. For heatpumps the reheat temperature will be lower (it is limited by the technology), and at a better efficiency than at 63°C. The most reasonable approach would be to apply the efficiency of the heatpump at maximum sinktemperature applicable for heatpumps and increase reheat time if necessary.
Also the assumed ambient condition for reheat is not well explained and needs further clarification. If it is standardised, then we would like to see it referenced.

Pump:
The efficiency drop of inclusion of different types of pumps is unclear, and why it is 5% for floorheating in comparison to radiatorheating is unclear.
Due to set back, 1,5 times more pumppower is required, however we fail to understand why.

	option 5	option 3	option 1	difference
Radiator (setb)	74%	75%	76%	1,0%
Radiator	78%	79%	80%	1,3%
floorheating	118%	122%	127%	4,6%

Consideration of electric backup heater is erronous.
The calculation result for electric back up heater is incorrect.
Following efficiencies are achieved with only an electric heater in the calculation tool:



This is obviously incorrect. The error occurred when the nomenclature of elbu has been converted to el. This resulted in 2 Qel values, each having a different meaning.

Proposed correction:
Rename Qel for back up heater to Qelrh and include Qelrh in calculation of Qtot.

Other comments

Page Clause	Current contents	Comment and proposal
p. 2	Formula etas=cctrl+ Lh/Qtot	Formula is not correct. etas=(1+cctrl) Lh/Qtot 'cctrl' may change the system loss while efficiency of heat generator is almost maintained.
p.2	1000 is incorrect	To be replaced with the present defined equivalent hours.
p.8	Formula for K K = (pa + pg)/1013,25 + 288,15/(273,15+Tg)	Formula is not correct. K = (pa + pg)/1013,25 * 288,15/(273,15+Tg) In addition following should be indicated. 'pa' is absolute pressure while 'pg' is gauge pressure.
p.10 Table I.6	Heat pump assistance	Heat pump supplies more than 90% of heat demand, so the word "assistance" may mislead the consumer.

Page Clause	Current contents	Comment and proposal
p.12	Circulator pump options (PMP). Numerical parameter indicating the type of circulator pump and pump configuration, to be chosen from the following options : 1. Variable speed pump & permanent magnet [option vsd&pm] 2. Variable speed pump, no permanent magnet type [option vsd] 3. Fixed speed pump [option fixed speed] 4. No pump, meaning there will be a stand-alone pump in the CH-circuit [option no pump] 5. Internal pump only, meaning a configuration with two circulators: one for a small boiler loop and another external pump for the CH-circuit [option internal only]	Pump option number in document does not match the option number in the calculation tool. Number 4 and 5 should be exchanged.
p.13	According to standards the heating curve is set at a level that can guarantee a temperature of 25 ° in every room, depending on the setting of the (thermostatic) radiator valve. For the night a setback temperature of 21 °C applies by default.	Temperature setting is extremely high. Spanish government prohibits the setting temperature of thermostat more than 21 degree C at heating condition. Japanese government recommends setting at 20 degree C for heating. It is unclear which standards require 25 degree C. This needs to be clarified, since it requires manufacturer to optimize the system at wrong condition.
p.26 Table IV.2	14825 HT 52 43 38 33 Current text Radiator 52 43 38 32	Tret and Tfeed of radiator do not match draft 14825. Harmonization is necessary.
p.26 Table IV.2	Note 4	EN 14511-2-2007 is indicated, but prEN14825 is more appropriate to indicate the correlation between load and ambient temperature.
p.27	Option A, B and C	Efficiency estimation for fixed speed compressor unit does not appear to be proper. What is rationale of current assumption? Depending on type of unloading system, performances of staged capacity units are different.
Tool GUI		Pmax is determined only for radiator, but Pmax should be determined for both floor heating and radiator. These are two different value not one.
Tool GUI		Combi calculation is not proper. Combi system results in short of capacity due to use of power to hot water supply. This does not reflect ordinary choice of heating equipment.

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