Bosch Thermotechnik comments on final report of Lot 1/2 preparatory study and discussion document for 1st WG3 meeting “Calculation methods”

Bosch Thermotechnik as a world leading company of Heating and Domestic Hot Water systems closely followed the ongoing Lot1/Lot review process. Due to technical constraints during the web-conference of 10th of March we would like – as already announced - to take the opportunity to provide the following written answers and comments on the discussion document for 1st WG3 meeting “Calculation methods”.

Section 1.3.1 Streamlining and clarifying the structure

Question 1 (general):

Given that the approach and parameters in the Regulation(s) can now be considered largely proven, would it not be clearer and legally more robust to describe and integrate the complete test and calculation method as much as possible in the Regulation(s) instead of several source documents?

Bosch TT appreciates in general the idea of clear and robust regulations.

On one hand side, we would see in some cases (e.g. specific types of less complex “plug-in-products” or physically/technically “static” conditions) indeed the integration of test and calculation methods in a regulation as a possible way of achieving that goal.
On the other hand, due to the range and complexity of products in scope of the discussed eco-design and labelling regulations (space heaters, combination heaters, water heaters, hot water storage tanks, solar devices and packages thereof) we are convinced that this will not be a realizable, reliable and recommendable way in case of this regulations.

The current subdivision in “regulation” and “transitional documents” and the related contents was decided with good cause and should remain unchanged.

The regulation should contain the legal requirements and – if necessary – standard rating conditions. Test and calculation methods should described with links to the related EN-Standards, only possibly missing or new tests and calculation procedures should place in the transitional documents with the goal to introduce and replace by EN-standards.

A clear description of that principle - including a clarification regarding the legal “order” of regulation, transitional documents and EN-Standards - in the regulation could be helpful to avoid misunderstandings and possible loopholes.

Section 1.3.2 Accommodating hybrids

Question 2 (hybrids):
Independent of the exact method (e.g. as proposed hereafter or otherwise), would the experts agree that the issue should be handled comprehensively?

Bosch Thermotechnik would agree that the legal requirements for this type of product should be handled comprehensively. More in the related section 1.4

Section 1.3.3 Calculation with harmonised test points

Question 3 (working with harmonised testing points):
Do the experts support the logic (assuming that problems of costs etc. can be solved) of working with harmonised testing points for central hydronic space heaters that should perform the same function? If not, what is the alternative and how should we accommodate hybrids in the future?

The above shown question (and the answer) has to divide into several independent sections.

First section regards the general need of introducing new harmonised (in other words differing from current standards) test points.

We see generally no necessity to introduce such new testing points for a
comparison of the several technologies in scope of the regulations. Current standardised testing procedures are able to deliver all necessary input values for efficiency calculations (like e.g. EN 15316-4-1).

Some of the mentioned reasons for introducing such new test/calculation procedures for some technologies are also currently questionable and could – in case of validation – solved without any difficulty or change of test points.

An example are conclusions for fuel condensing boilers based on VHK’s interpretation of the “Brennwertcheck”- monitoring study results. It was pointed out in Preparatory Study\textsuperscript{1} that this monitoring study shows a clear deviation between average return temperature (and therefore efficiency) of “real life” and the calculated value of EtaS in current regulation.

This conclusions seems not be applicable on current situation.

- The “Brennwertcheck” Study was finished in 2011 and included at that time boilers from the “last 20 years” – means from 1991 to 2011. In Germany the introduction of condensing boilers started in 1991. Neither technologies nor installer skills were on current level. These impacts were also mentioned in Brennwertcheck “Clear is the impact of the boiler age. For the monitored Boilers – mainly installed within the last 15 years [= 1996-2011] the average condensing rate grows round about 2% per year [newer].”

- The outdoor-temperatures during the test period of “Brennwertcheck” were stated there as “between -10°C and +10°C” and were accordingly used as base of the calculation of the “average return temperature calculation” of that study.

The comparison in Preparatory Study with the results of current EtaS-calculation did not take into account the impact of all remaining days with higher outdoor- (and therefore lower return-) temperatures up to the base temperature. Checks according BIN-Method shows that nearly 15% of the annual heating time is therefore not included (only 4196 h/y instead of 4910 h/y) - and the BIN method base temperature of 15,5°C provided according our knowledge a “wind tight and well insulated building”. For other buildings, the mentioned not incorporated heating time will be even larger.

\textsuperscript{1}Review Study Task 4 Final July 2019, Chapter 2.2 Analysing results of German monitoring study “Aktion Brennwertcheck”
First estimations show that the efficiencies of the suggested new test method would lead only to minor differences compared with current methods.

Even assuming that a more reliable research will show serious deviations in return temperature and related heating efficiency of “real life” and current EtaS-calculation – a simple change of Full- and Partload share in the latter (currently 15%/85% = 34,5°C average) could easily correct that (e. g. 25%/75% = 37,5°C; 35%/65% = 40,5°C etc.).

Second section regards the proposal of introducing a new “harmonized” calculation method for all technologies in scope of Lot 1.

As written before, some of the claimed deviations between “real life” and current calculation results could considered – if finally verified - with less extensive changes of current calculation and without change of testing points

Other parts of the current calculation proposal seems to be not technically mature.

The “oversizing” impact on boiler efficiency and the proposed inclusion of that impact (“Osize”-factor) in new test and calculation method based similar on not reliable assumptions only.

The relation of “10/24” (or 1/2,4) for 24 kW upward and the related intermediate values between 10 and 24 kW was derived under the assumption that there are no “oversized” heat pumps and above 10 kW only “oversized” boilers – which is both not the case.

Additionally, that relation and the unverified numeric assumption regarding the negative impact on efficiency of “oversized” Combis in the range of 15-30 kW should now be extended to every heater – with no clear thermal output range (up 70 kW? 400kW? 1000 kW?) and independent if it is a combi or not.

The “Brennwertcheck” monitoring Study concluded clearly, “an oversizing of the boilers has no negative impact on condensing rate”. The Preparatory Study claims the opposite and shows beside others as confirmation under “Figure 7 illustrates the effect of wrongly sized condensing boilers and a suboptimal system design”. It worth to note that this figure/measuring result/ was described in the original study/Annex as caused by a “most probably defect appliance”.

2 Ecodesign Boilers, Task 4, Final July 2019 p.10
Even with a view on a possible benefit for a possible future calculation method for hybrids (we will discuss this in detail later) we find no reason to introduce such an “Osize”-factor. Whatever the treatment of hybrids in that respect will be – we have serious doubts that future offered combinations of technologies in such hybrids will include an assumed exact dimensioned (heat pump) part and an assumed extremely oversized (boiler) part.

The introduction of “oversize related” - factors for efficiency – in test and/or in calculation methods – seems therefore not to be justified.

That above-mentioned availability of all necessary data for heating efficiency calculation is also valid for the specific building related energy certification calculation like required in EPBD (Energy performance of Building Directive). Current already available EN standards (EN 15316-4-1) and several national implementations/technical rules (DIN V 18599) includes related methods.

Summarizing, we repeat that we would see no necessity to introduce changed testing points or a general new calculation method.

**Section 1.3.4 Inter- and extrapolation of test results for boilers**

**Question 4**

*Do stakeholders find it acceptable to limit boiler testing to the suggested 4 points and derive the missing points through inter-/extrapolation? Are there suggestions for alternatives, e.g. further simplification at lowest temperature test point of HT and LT?*

As consequence of what written before under Section 1.3.3 the question is not relevant because no new test points necessary.

**Section 1.3.5 Solar and Ecodesign**

**Question 5 (solar):**

*Do you agree continue to exclude solar devices from the scope of the Ecodesign regulation?*

That question should be discussed not until we have a clear picture what calculation and verification procedure will be proposed by Solar Heat Europe (SHE).
Section 1.3.6 Solar and Energy Labelling

Question 6 (solar):
*Do stakeholders agree using the SHE method, based on look up tables for the solar contribution.*

Evaluations of the currently existing SHE-proposal shows up to now several gaps / lack of / considering relevant parts of a solar system in the “look up tables” (e.g. missing solar storage tanks). A related amendment of the proposed look-up tables seems generally thinkable but would extend the tables to wall-paper format.

Without having a related proposal we would see neither the advantage of the “table method” nor a real difficulty to multiply and add four different values in a formula (any installer who is able to prepare a bill to his customer should also be able to handle this).

Generally we have also doubts that the mentioned reasoning “the package calculation is non-transparent and too complicated” is finally responsible for the claimed less use of the current package calculation method.

Beside from what we have written before we would see the necessity to check the current methodology regarding the results for solar heating support.

Section 1.3.7 Cogeneration with supplementary heater

Question 7 (cogeneration with supplementary heater)
*It seems preferable to have one method for assessing the efficiency of a cogeneration package and not two. It also seems preferable to weigh the efficiency in one way or another by using the relative proportion of the rated powers of the cogeneration heater and the supplementary heater. Do stakeholders agree? Discussion?*

Bosch Thermotechnik agrees that it is necessary to define clearly one single method for assessing the efficiency of a cogeneration package. This is caused not only by current different calculation methods in Ecodesign and Labelling (package). Since several years we faced the situation that some manufacturers are using the calculation method providing by EN 50625 (and claims that is the more actual or the more “correct” method) whilst others like Bosch TT using the method described in transitional method. The differences between these are not negligible and leads to several market distortions.
Section 1.4 Calculation method for hybrids revisited;

1.4.2 Combined method

Questions 8 (combined method)

What will be the timeline to establish a reproducible, accurate, reliable test and calculation method (not necessarily a test standard yet) for the combined method? What would be the set-up (type of packages) budget required to do the round-robin tests for the combined method? Do experts already have an idea of the verification tolerances, possible loopholes, etc. that can be expected?

...and...

Section 1.4.3 Separate package method

Questions 9 (separate method)

Would stakeholders agree that despite the disadvantages and problems to be solved, it appears that the separate method is currently the most robust way forward? If not, what would be the alternative? What do stakeholders think of the proposed calculation method in the Task 6 report? Where is agreement and where are disputes?

With a view on “hybrids” and “packages”, we believe that two methods should be available to mirror current market practise.

First method is the already existing “package”-solution. This allows manufacturers, but also wholesalers and installers to create and to label their own specific combinations, e.g. depending on customer wishes or market requirements. The current principle that in “packages” for the different included heat generators (e.g. HP and boiler) the related eco-design minimum values are valid should remain unchanged. The existing label design/practise for these packages should also be continued.

A second method should be added for specifically developed hybrids. Those should be placed on the market as “units” and would require the introduction of a new product category with dedicated Ecodesign requirements and a specific label. A related test method is currently available in EN 14825 and is improved by a joint CEN/CENELEC TC 113 / TC 109 Working group.

Minimum requirements for these units could be dependent on the share of the annual heat supplied by the heat generators incorporated under the assumption, that at least the individual existing minimum values for these components would be met. This requires a separate calculation of the specifically valid (Ecodesign-) minimum values and a related test result of the hybrid. The latter has to be at least on the level of the calculated minimum values.
Section 1.5 Ecodesign limits

1.5.1 PEF-corrected Ecodesign limits for single heat generators;

No question here. As general remarks on the proposed table:

1. Any discussion about Ecodesign minimum values provide that the related test- and calculation conditions remains unchanged. Otherwise, the discussion is obviously useless.

2. Provided that same (testing- and calculation) conditions remains unchanged – the “PEF-Corrected” table shows for boiler >70 kW - 400 kW a proposed change from 86%/94% to 87%/95% (Full-/Partload thermal efficiency). Whilst a correction seems to be applicable for boilers <70 kW (= impact of auxiliary energy consumption in EtaS-calculation “F(2)”), the current limit values for boilers >70 kW are not influenced by electricity consumption. (= only the measured thermal efficiency). Therefore, a correction of limits due to new PEF for products in that range are not justified.

3. Beside that we see no need for new testing and calculation methods as written before – the proposal from VHK opens some additional questions:
   a. If current test- and calculation methods for heatgenerators should remain unchanged (like the proposed Ecodesign-Min-value table suggested) – would that mean additional tests and calculations compared to the other proposals (Label-test and calculation) of VHK?

   b. Or should the other (Label-) “new testpoints” be valid and the necessary 30%/100% input values for the Ecodesign calculation mathematically derived from those?

   c. Would be such a “mathematical approach” in line with rules of “placing on the market” and possible MSA activities?

Section 1.5.2 Limits for packages

What is the stakeholder’s opinion of the proposed limit-calculation for packages? Alternative suggestion?

Pls. see our remarks/answer on questions 8 and 9.
Section 1.6.1 NOx limits

Question 11 (NOx limits)
Are the corrections of the limit value by 1.30 for appliances tested with reference gas G30 and 1.20 for appliances tested with reference gas G31 acceptable? Should these corrections extend to gas-driven heat pumps (or cogeneration)?

The proposed NOx-corrections for both G30 and G31 are correct and in line with EN-Standards.

Section 1.6.2 Temperature control factor F(1)

Questions 12 (temperature controls)
Do experts agree with the proposals on the temperature control factor F(1), in principle?

According our opinion show both, the existing calculation and the current related values, an appropriate relation of F(1) in the concerned product range up to 70 kW. New developments/features in the control section (remote control, presence detection, weather forecast functions etc.) should be considered by adding some new classes. We support here a related proposal from our Association EHI.

Section 1.6.3 Test conditions for sound power

Question 13 (sound power test conditions).
What is the practical proposal for the test conditions for sound power, i.e. how can it be defined clearly and without the risk of loopholes?

We support the joint EHI-EHPA position paper on heat pumps acoustics, sent to VHK (document date: 24 March 2020).

Yours sincerely

Bosch Thermotechnik GmbH
Michael Pittner