Calculation Method: CALCM:03

Amendment to EN13202-2 data related calculations for combi boilers

Issue 1.0

DOCUMENT REVISIONS

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DOCUMENT REVISION LOG

DATE	VERSION NO.	AMENDMENT DETAILS	APPROVED BY
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1. INTRODUCTION

PCDB entries for boilers are based on lab test heating efficiency data processed using the 'SEDBUK' method. For combi boilers, manufacturers may optionally also supply EN13203-2 hot water test data, allowing a better assessment of hot water efficiency. Where this optional data is submitted, it is expected to result in a more favourable efficiency, due to conservative assumptions used otherwise. However, in some cases worse outcomes were found compared to similar products where additional data was not provided. On investigation, it was found that the 'combi loss' figure is sensitive to experimental error allowances in the test data, which could result in the calculated hot water performance being worse.

2. METHODOLOGY AMENDMENT

To address this issue, the existing formula[1] for the Combi Heat Loss (F2) was replaced with the following[2]:

$$F2 = (\eta_{Summer}/100) \times Q_{FLG} \times 0.98 - 5.845 \times (1 + r_1)$$

η_{Summer} is expressed in gross calorific terms and is calculated from Load Profile M test data and Load Profile L or S test data as normal but restricted to the following limits.

	Condensing boiler		
	Natural gas	**LPG**	**Oil**
With FGHRS active	98.9	98.9	98.9
Without FGHRS active	88.2	90.3	91.5

[1] See page 58 of the SAP 2012 specification: https://www.bre.co.uk/filelibrary/SAP/2012/SAP-2012_9-92.pdf

[2] This has been reviewed by the SAP Scientific Integrity Group.

Q_{FLG} is the daily fuel consumption expressed in terms of gross calorific value in kWh/day. It is the variable $Q_{gas,S}$ defined in clause 5.4.1 of EN 13203-2:2015 or EN 13203-2:2018, but expressed in gross calorific terms. This is achieved by dividing $Q_{gas,S}$ by a conversion factor (f) – see Table D2.1[3] of the SAP 2012 specification.

r_1 is the proportion of energy rejected for the M schedule because the water temperature is unacceptable, calculated from R ÷ 200 where R is the percentage of water rejected by volume as defined in EN13203-2.

This correction causes a reduction in the calculated 'combi loss' factor, resulting in a better overall hot water efficiency where S or L data is provided alongside M. Appendix A shows the improvement in outcome using two examples.

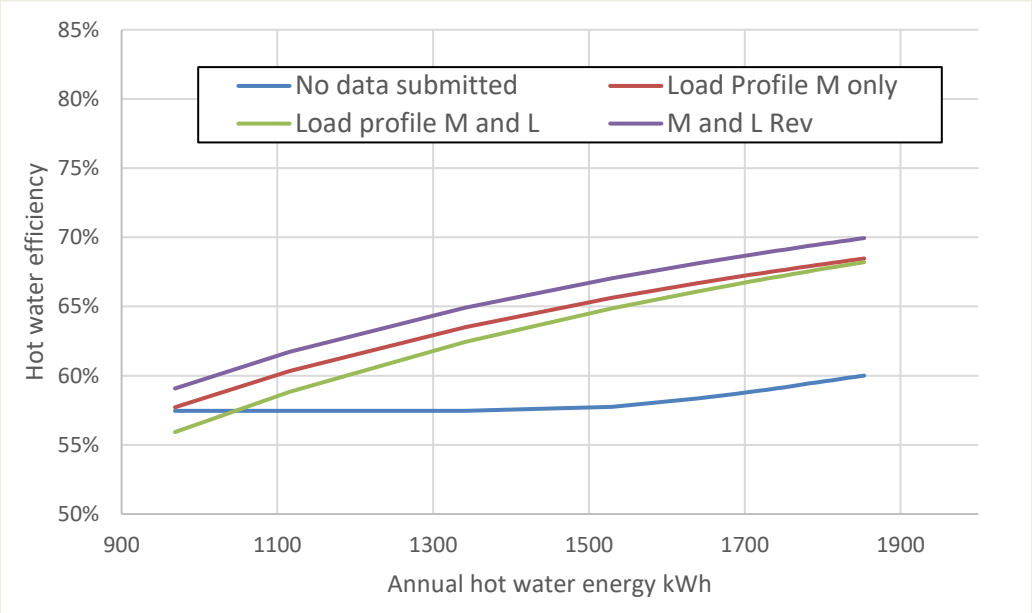
3. IMPLEMENTATION

The amendment described above has been applied to all existing boiler entries in the 2012 database and will be applied for all future applications.

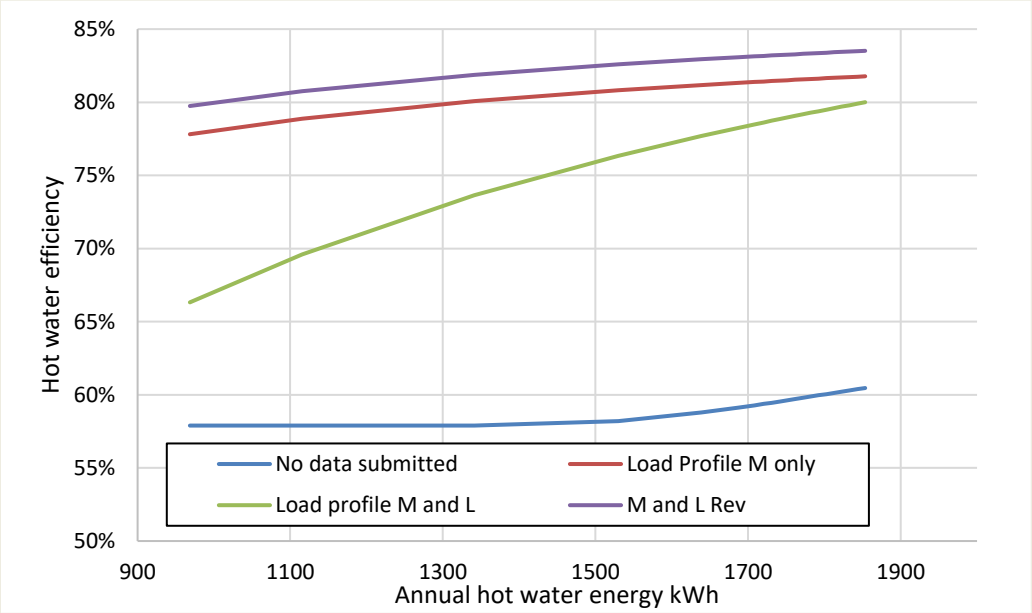
[3] Page 53 – same link as footnote 1.

4. APPENDIX A – EXAMPLES SHOWING IMPACT OF CHANGE

For a mid-table gas combi, the following graph shows that the new equation ensures the overall hot water efficiency (including the combi loss) using the amendment is always higher if the optional S or L data is supplied (purple line) compared to where only M data is supplied, or when no EN13202-2 data is supplied. Previously it was lower (the green line) than when only M data was supplied.



For high performing units, as shown in the following graph, the same change is shown, but the difference is much more pronounced.



The change ensures in all cases that the submission of additional S or L data gives a better outcome than providing M data only, or no EN13203-2 data at all.