EXPLANATORY MEMORANDUM

Revision of Commission regulations (EU) 813/2013 and (EU) 811/2013 on respectively Ecodesign and Energy Label of central hydronic space and combination heaters as well as (EU) 814/2013 and (EU) 812/2013 on respectively Ecodesign and Energy Label of water heater and hot water storage tank

Introduction

The four draft working documents, together more than 200 pages, have a considerable redundancy due to the fact that the two different product groups have largely identical functionality and use identical heating technologies. The overlap, unavoidable for legal purposes, is briefly discussed here.

Space heating

The sections on measurements and calculations for space heating energy efficiency in the ED and EL for space heater regulations (Annexes III and VIII) are almost identical, as are the related definitions (Article 2 and Annex I) and verification tolerances (Annex V and X) except that

- the ED measurement and calculation methods (Annex III) use only Average climate parameters[1], whereas EL measurement and calculation methods (Annex VIII) use parameters for all three climates (Average, Warm, Cold).
- A new category called solar hybrid is introduced in the ED regulation. It is a particular form of 'packages', as defined in the EL regulation. The difference is that in the solar hybrid the temperature controls do not play a role, whereas in packages they can be part of the package. Apart from that, the calculation method is the same, and is repeated in the ED annex III.

Water heating

The sections on measurements and calculations for water heating are almost identical in all four documents. This concerns Annex III.6 & 7b in ED drafts and Annex VIII.6 & 7b in EL drafts. The only differences are:

- appropriate naming (e.g. combi heater vs. dedicated water heater) and referencing,
- combi heaters don't have the option to choose small tapping load profiles 3XS-XS (typically do not occur in those types of heaters);
- combi heaters have the option of the Passive Flue Heat Recovery Device (PFHRD) with storage, meaning a device that captures and stores extra latent energy from flue gases through heat exchange with the cold sanitary water inlet, i.e. at nominally 10 °C instead of the 35 °C or more from the central heating return temperature.
- the dedicated water heaters draft regulation also regulates ED and EL of hot water storage tanks, so –apart from picking up key parameters of the tanks in the information/documentation annex—the measurement and calculation methods for the tanks are not repeated in the space heater regulation;
- the ED regulations use only parameters for the Average climate (as with space heating), whereas the EL regulations use climate-specific test and calculation parameters for Average, Warm and Cold climates.

[1] because a geography-independent limit is needed to set mandatory minimum requirements for placing on the EU single market,

The definitions in Article 1 and Annex I that are used in the above-mentioned measurement and calculation methods are also almost identical amongst the four documents, except for naming and references.

Ecodesign main features

- An updated tier of ecodesign space heating requirements is proposed for 1 year after entry into force of the regulation[2], introducing the new primary energy factor 1,9 Conversion Coefficient (CC) for electricity generation and distribution, introducing new space heating categories like thermally driven heat pumps LT and hybrid heaters, the latter not only including hybrid heat pump but also solar hybrid (solar thermal with gas back-up);

- A 2nd tier of ecodesign requirements proposed by 1 Sept. 2029, setting space heating seasonal efficiency at least at 115% and thus phasing out stand-alone sales of fuel and electric resistance boilers;

- Up-to-date technology-specific requirements for combination- and dedicated water heating in six and eight categories respectively, instead of the current technology-neutral approach, thus allowing a more effective and tailor-made approach;

- Extension of the ED space heater scope from 400 kW to 1 MW for more reduction of NO_x emissions (differentiated by gas type) and more energy savings (up to 15%), filling in the gap between the scope of Ecodesign and the scope of the Medium Combustion Plant Directive. The EL space heater scope remains capacities ≤ 70 kW;

- ED scope for dedicated water heaters includes instantaneous types ≤400 kW and storage types ≤2000 L. The EL scope for instantaneous types is capacities ≤ 70 kW;

- Third party conformity assessment (TPCA) for the space heating efficiency of heat pumps and hybrid heaters to instil best confidence in test results, inter alia promoting and facilitating the single market principle and avoiding additional test requirements from individual Member States;

- Transitional methods and standards references now integrated in the regulations (ED Annex IV and EL Annex IX), creating a more robust legal framework;

- Latest state-of-the-art in definitions, test- and calculation methods for existing and new product groups (hybrids and new heat recovery devices) building on close to 40 EN test standards, many of which have been released in the recent years by the European standardisation organisations, including a standard that finally enables full testing of the Passive Flue Heat Recovery Devices (PFHRD) for water heating;

- A proposed temperature/flow dependency factor (*Fctrl*) corrects the dedicated water heater energy efficiency to account for the capability of the water heater to maintain a set water temperature independent of the water volume flow rate;

[2] Currently, entry into force is deemed feasible by 1.9.'24 and thus the 1st tier would be for 1.9.'25.

- Control Verification Procedure (CVP) method introduced to have closer to real-life results. Review of the 'compensation-method'[3], further improving testing of heat pumps closer to real-life, is planned and candidate for early implementation;

- The NOx emission limits of the current Ecodesign regulations for space (combination) heaters and dedicated water heaters are maintained as today, but now applicable only for G20 or G25 gases, whereas for 3rd family gases factors 1,3 (G30) and 1,2 (G31) of he G20/G25 values apply;

- The maximum sound power level requirements indoors and outdoors for heat pump and hybrid heaters as well as heat pump water heaters stays nominally the same as today and as proposed in 2021, but a new, more stringent agreement on the measurement and calculation method is proposed;

- The proposed requirements for material resource efficiency have been made more specific, e.g. as regards a list of spare parts and their availability (till 10 years after placing the last unit of a model on the market). Parts shall be sent within 10 working days after having received the order. Access to repair and maintenance information shall be granted to professional repairers under certain conditions related to safety issues of the heaters;

- Proposed requirements on product information are tightened and more extensive to allow more effective and efficient market surveillance;

- There are requirements for self-monitoring of the heater efficiency with amongst others specific tolerance levels for energy input and heat output of the appliance as a basis for a standardisation request;

- Comprehensive manufacturer instructions that allow to duplicate heat pump efficiency tests by market surveillance for compliance verification will have to be available within a strict time limit after request;

- The possible use of green gaseous or liquid fuels in the long term for the products in scope will depend on the development of safety standards under the Gas Appliance Regulation (GAR) and specific requirements are not included in the ED & EL proposals;

- Most test- and calculation methods are reworked, following latest standards. Compared to the current regulation the approach of the package label is new, as is the way the solar assistance is calculated and that information is presented in look-up tables;

- For dedicated water heaters the functional requirements for maximum storage volume of storage water heaters with declared load profiles [3XS], [XXS or XS] and [S] stay the same at respectively 7, 15 and 36 litres. The same goes for minimum amount of maximum mixed water volume at 40ºC for load profiles M through 4XL. There are new rules proposed for electric heat pump water heaters ≤140 litres that are tested using 'indoor air';

[3] This method uses the heat pump controls, rather than manufacturer prescriptions to set the conditions for heat pump test points. It is currently under development to test –amongst others—the reproducibility and practical implications.

- The regulations for dedicated water heaters also include hot water tanks ≤2000 L. The maximum ecodesign standing losses S in Watts for multivalent tanks with a volume V > 80 L is $12 + 6.43*V^{0,4}$. For all other hot water storage tanks maximum S is $12 + 5,93*V^{0,4}$. This is more stringent than the current maximum S at $16,66 + 8,33 \cdot V^{0,4}$ Watts;
- Calculation of equivalent volume (Veq) of a storage tank with Phase Change Material (PCM) is added.

Energy Label main features

- In the proposed energy labels for space- and water heating for both space (combination) heaters and dedicated water heaters the current 10 class-rating with A^{+++} top-class is changed to a 7 class with an A to G rating, with no models currently in the A top-class[4].
- Labelling classes distinguish between Low Temperature (LT) versus Medium Temperature/default (MT) technology, accommodating typically new or renovated versus existing building stock.
- Class limit metrics use seasonal efficiency (etas) for space heating and water heating efficiency per tapping load profile, both using *CC*=1,9.
- Space heating class limits are considerably higher than the current limits. The proposed 'A' class limit, accounting for the difference in CC, is ~30% higher than the current 'A+++' for MT and ~55% for LT. The current MT 'A' label e.g. for a condensing boiler is an 'F' in the new label classification. The difference between MT and LT class limits is, rounded to a multiple of 5%, a factor 1,25 (with the exception of the A class).
- Water heating class limits are given per tapping load profile and are rescaled to A-G as required. For combination heaters the smaller load profiles are not used in practice and the values for the highest load profiles (from L upwards) are very similar, so only 3 load profile clusters (S, M and 'larger than M') are used. Likewise, there are 4 clusters of load profiles (3XS-XXS, XS-S, M, 'larger than M') for dedicated water heaters
- Current top water heating labelling classes of both combination heaters and dedicated water heaters are not or very scarcely populated. Therefore, after correction for the change in *CC*, the proposed water heating labelling classes are slightly less stringent than the current water heating class limits. Note that the combination heater class limits are different from those for dedicated water heaters because the technologies and test standards are slightly different.
- The proposed energy label for hot water storage tanks takes the class limits of top 4 energy classes, of the current energy label for tanks that are not multivalent and <80 L. The class limits for multivalent tanks ≥ 80 L are new.
- The design of energy labels is identical to that in 2021 and will be further optimised by the Commission graphic designers. A specific consumer survey has shown that the label

[4] For water-to-water heat pumps the declared efficiency may be higher than the proposed A-class, but typically excludes energy needed for water-source systems like low temperature (district) heat networks, ATES (aquifer thermal energy storage) or other energy use at the source.

is mainly used by the installer, who then passes the knowledge to the customer. Consumers seem to value and understand, apart from the A-G rating (arrows) the efficiency number (in %), which gives granularity within the A-G rating.

The tables below show the new proposals and predecessors.

Table 1. Proposed Ecodesign minimum efficiency limits for space & water heating of (combi) heaters *(etas in % Gross Calorific Value GCV) at various Conversion Coefficients*

Heater technology *MT =Medium Temperature* *LT= Low Temperature*	**minimum space heating efficiency etas**				**minimum water heating efficiency** per load profile & technology						
					from 1.9.2025						
	etas now (26.9.2017) at *CC*=2.5	proposed at CF 27.9.2021 at *CC*=2.1	1st tier 1.9.2025 proposed now at *CC*=1.9	2nd tier 1.9.2029 proposed now at *CC*=1.9	**S**	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
B1 Fuel boiler ≤10 kW & combi ≤30 kW	75	77	76	*115 phased out as stand-alone product*	61	66	72	77	83	80	80
Fuel boiler ≤ 70 kW	86	88 (etas)	87		50	65	70	80	88	88	88
Fuel boiler > 70 kW ≤ 1 MW (P_1/P_4)	86/94		87/95								
Electric (combi) boiler	36	43	48		42	48	49	49	50	130	130
Electric heat pump, MT	110	130	145	145	66	88	99	99	127		
Electric heat pump, LT	125	155	170	170							
Cogeneration space heaters <50 kW_{el}	100	100	115	115	50	62	75	86	111	105	105
Hybrid heat pump / Solar hybrid	-	110	125	125	50	65	70	80	88	88	88
Thermally Driven (TD) heat pump, MT	110	115	120	120	56	67	79	90	97	100	100
Thermally Driven (TD) heat pump, LT	-	-	125	125							
Limits now (at CC= 2.5)→					*32*	*36*	*37*	*38*	*60*	*64*	*64*

Table 2. Proposed Ecodesign minimum efficiency limits for dedicated water heaters *(etawh in % Gross Calorific Value GCV) at CC=1.9*

Water heater technology	***Minimum etawh per Load profile, in %***						
	3XS to S	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
Electric instantaneous water heater	46.4	49.7				144	
Electric storage water heater	42.0	47.5	48.6	48.6	49.7		
Electric heat pump water heater	94	94	116	116	133		
Fuel instantaneous water heater	70	70	75	80	80	70	80
Fuel storage water heater	45	56	67	78	83	45	88
Thermally driven heat pump water heater	55	66	77	88	93	55	98
Cogeneration water heater	45	56	67	78	100	45	105
Limits now for all types(at CC=2.5)→	32	36	37	37	60	64	64

***Table 3. Energy label classes CH (combi) boiler**, in efficiency lower class limits (except G-class), for space heating in seasonal efficiency (%); for water heating in energy efficiency (%) per load profile*

Space heating						Water heating (combi)											
Today (at CC 2.5)			Proposed (at CC 1.9)			Today (at CC=2.5)									Proposed (at CC=1.9)			
class	MT	LT	class	MT	LT	Class	3XS	XXS	XS	S	M	L	XL	XXL	Class	S	M	L-XL-XXL-3XL-4XL
A^{+++}	150	175	A	260	360	A^{+++}	62	62	69	90	163	188	200	213	A	100	210	260
A^{++}	125	150	B	200	250	A^{++}	53	53	61	72	130	150	160	170	B	80	160	210
A^{+}	98	123	C	165	205	A^{+}	44	44	53	55	100	115	123	131	C	70	130	160
A	90	115	D	140	175	A	35	35	38	38	65	75	80	85	D	60	115	130
B	82	107	E	120	150	B	32	32	35	35	39	50	55	60	E	50	80	115
C	75	100	F	90	115	C	29	29	32	32	36	37	38	40	F	45	50	50
D	36	61	G	<90	<115	D	26	26	29	29	33	34	35	36	G	<45	<50	<50
E	34	59				E	22	23	26	26	30	30	30	32				
F	30	55				F	19	20	23	23	27	27	27	28				
G	<30	<55				G	<19	<20	<23	<23	<27	<27	<27	<28				

***Table 4. Energy label classes dedicated water heaters,** in water heating efficiency lower class limits (in % per load profile)*

Today (at CC=2.5)						
Class	3XS-XXS	XS-S	M	L	XL	XXL
A^{+++}	62	69	163	188	200	213
A^{++}	53	61	130	150	160	170
A^{+}	44	53	100	115	123	131
A	35	38	65	75	80	85
B	32	35	39	50	55	60
C	29	32	36	37	38	40
D	26	29	33	34	35	36
E	22	26	30	30	30	32
F	19	23	27	27	27	28
G	<19	<23	<27	<27	<27	<28

Proposed (at CC=1.9)				
Class	3XS - XXS	XS - S	M	L-XL-XXL-3XL-4XL
A	55	77	177	221
B	50	50	133	177
C	46	46	111	133
D	43	43	90	111
E	<43	<43	70	90
F			50	50
G			<50	<50

Table 5. Proposed labelling classes for standing loss S in Watts, with storage volume V in litres

Class	hot water storage tanks except multivalent tanks with a volume $\geq$ 80 L	multivalent tanks with a volume $\geq$ 80 L
A	$S < 3 + 2.5 * V^{0,4}$	$S < 3 + 3.0 * V^{0,4}$
B	$3 + 2.5 * V^{0,4} \leq S \leq 5,5 + 3.16 * V^{0,4}$	$3 + 3.0 * V^{0,4} \leq S \leq 5,5 + 3.66 * V^{0,4}$
C	$5,5 + 3.16 * V^{0,4} \leq S < 8,5 + 4,25 * V^{0,4}$	$5,5 + 3.66 * V^{0,4} \leq S < 8,5 + 4,75 * V^{0,4}$
D	$8,5 + 4,25 * V^{0,4} \leq S$	$8,5 + 4,75 * V^{0,4} \leq S$