

*This draft legal text is a working document prepared as follow up to the review studies undertaken for the revision of Regulation (EU) 814/2013 for water heaters and storage tanks, in preparation of the Consultation Forum meeting of 27-28 September. Please note that whilst this draft document has been prepared by DG ENER staff and its consultants, it is by no means an official document endorsed by the European Commission.*

## DRAFT

**[XXX/XXXX] Ecodesign regulation water heaters & storage tanks**

**COMMISSION REGULATION (EU) No [XXX/XXXX] of [date]**

**implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water heaters and storage tanks, repealing Commission Regulation (EU) No 814/2013**

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

Having regard to the Treaty on the Functioning of the European Union,

Having regard to Directive 2009/125/EC of the European Parliament and of the Council of 21 October 2009 establishing a framework for the setting of ecodesign requirements for energy-related products (1) and in particular Article 15(1) thereof,

After consulting the Ecodesign Consultation Forum,

(1) ...

(2) ...

Proposed revised text

HAS ADOPTED THIS REGULATION:

## *Article 1*

### **Subject matter and scope**

- 1) This Regulation establishes ecodesign requirements for the placing on the market and/or putting into service of dedicated water heaters using gaseous fuels, liquid fuels, electric energy, ambient and/or waste heat with a rated heat output  $\leq 400$  kW or with a hot water tank storage or equivalent volume  $\leq 2\,000$  litres as well as hot water storage tanks with a storage or equivalent volume  $\leq 2\,000$  litres.
- 2) This Regulation shall not apply to:
  - a) water heaters specifically designed for using gaseous or liquid fuels predominantly produced from biomass, unless they are also found fit for using gaseous or liquid fossil fuels;
  - b) water heaters using solid fuels;
  - c) water heaters within the scope of Directives 2010/75/EU<sup>1</sup> and (EU) 2015/2193<sup>2</sup> of the European Parliament and the Council;
  - d) products covered by Commission Regulation (EU) 2015/1188<sup>3</sup> with regard to ecodesign requirements for local space heaters;
  - e) combination heaters as covered by (EU) Regulation xx/xx on space and combination heaters;
  - f) water heaters which cannot provide sanitary water at least in accordance with the load profile with the smallest reference energy as specified in Annex III, Table 5;
  - g) water heaters designed for making hot drinks and/or food only;

## *Article 2*

### **Definitions**

In addition to the definitions set out in Article 2 of Directive 2009/125/EC, the following definitions shall apply for the purposes of this Regulation:

- 1) 'water heater' means a product that:
  - a) is permanently connected to an external supply of drinking or sanitary water, and
  - b) equipped with one or more water heater heat generators, to
  - c) generate and transfer heat to deliver drinking water or sanitary hot water at given temperature levels, quantities and flow rates during given intervals;

whereby a heat generator for a water heater and a housing designed to be equipped with such a heat generator shall, together, be considered as a water heater;

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<sup>1</sup> OJ L 334, 17.12.2010, p. 17–119 on industrial emissions (integrated pollution prevention and control)

<sup>2</sup> OJ L 313, 28.11.2015, p. 1–19 on the limitation of emissions of certain pollutants into the air from medium combustion plants

<sup>3</sup> OJ L 193, 21.7.2015, p. 76–99 on ecodesign requirements of local space heaters

- 2) 'heat generator' means the part of a water heater that generates the heat using one or more of the following processes:
  - a) the combustion of liquid and/or gaseous fuels;
  - b) the conversion of electricity into heat, without using a vapour compression or sorption cycle;
  - c) the capture of exhaust air, ambient heat, geothermal heat, and/or waste heat using a vapour compression or sorption cycle, driven by thermal or electric energy;
  - d) the electrochemical conversion of chemical energy from a fuel and an oxidising agent into heat and power;
- 3) 'water heater housing' means the part of a water heater designed to have a heat generator fitted;
- 4) 'rated heat output' ( $P_{rated,wh}$ ) means the heat output of the water heater when providing water heating at standard rating conditions, expressed in kW;
- 5) 'storage volume' ( $V$ ) means the actual or equivalent volume of water stored in a hot water storage tank used for supplying heated drinking or sanitary water, expressed in litres;
- 6) 'equivalent volume' ( $V_{eq}$ ) means the actual storage volume of a hot water storage tank, in litres, with the same  $V40$  as any storage facility capable of delivering heated drinking or sanitary water of at least 65°C after being appropriately charged, as set out in Annex III, 4, sub (e);
- 7) 'mixed water at 40 °C' ( $V40$ ) means the quantity of water at 40 °C, which has the same heat content (enthalpy) as the heated water which is delivered above 40 °C by a hot water storage tank or storage water heater measured, expressed in litres, as set out in Annex III, section 3, sub (i) and section 4, sub (d);
- 8) 'thermal capacity' ( $Q_{th}$ ) means the energy content stored in a hot water storage tank used for supplying heated drinking or sanitary water, expressed in kWh;
- 9) 'standard rating conditions' means the operating conditions of water heaters for establishing the rated heat output, water heating energy efficiency, sound power level and nitrogen oxide emissions, and the operating conditions of hot water storage tanks for establishing the standing loss, as set out in Annex III, section 3;
- 10) 'circulation water heater' means a dedicated flow-through water heater designed for use in a building's sanitary hot water circulation system and/or in an external circulation loop for heating a large hot water storage volume;
- 11) 'biomass' means the biodegradable fraction of products, waste and residues from biological origin from agriculture (including vegetal and animal substances), forestry and related industries including fisheries and aquaculture, as well as the biodegradable fraction of industrial and municipal waste;
- 12) 'biomass fuel' means a gaseous or liquid fuel produced from biomass;
- 13) 'conventional water heater' means a water heater that generates heat using the combustion of fuels and/or the Joule effect in electric resistance heating elements;
- 14) 'hot water storage tank' means a vessel for storing hot water for water and/or space heating purposes, including any additives, which is not equipped with any heat generator except possibly one or more back-up immersion heaters;
- 15) 'back-up immersion heater' means an electric resistance water heater heat generator in a multivalent tank to generate hot sanitary water only when the main external heat source is disrupted (including

during maintenance periods) or out of order, or when the solar irradiance is not sufficient to satisfy required comfort levels;

- 16) ‘water heating energy efficiency’ ( $\eta_{wh}$ ) means the ratio between the useful heat provided by a water heater and the energy (as primary energy) required for its generation, expressed in %, as set out in Annex III, sections 3 and 4 ;
- 17) ‘sound power level’ ( $L_{WA}$ ) means the A-weighted sound power level, expressed in dB, as set out in Annex III, section 3;
- 18) ‘standing loss’ ( $S$ ) means the heating power dissipated from a hot water storage tank at standard rating conditions expressed in W;
- 19) ‘conversion coefficient’ ( $CC$ ) means the default coefficient for primary energy per kWh electricity referred to in Directive (EU) 2018/2002 of the European Parliament and of the Council (4); the value of the conversion coefficient is  $CC = 2.1$ ;
- 20) ‘model identifier’ means the code, usually alphanumeric, which distinguishes a specific water heater, hot water storage tank from other models with the same trade mark, supplier’s name or dealer’s name.

For the purposes of Annexes II to V, additional definitions are set out in Annex I.

### *Article 3*

#### **Ecodesign requirements and timetable**

- 1) From [date]
  - a) water heaters in the scope of the regulation, except for circulating water heaters, shall meet the requirements set out in section 1 of Annex II as appropriate;
  - b) circulation water heaters shall meet the specific information requirements as set out in Annex II, section 1.6.
  - c) hot water storage tanks shall meet the requirements set out in section 2 of Annex II;
- 2) Compliance with ecodesign requirements shall be measured and calculated in accordance with the requirements set out in Annexes III, following transitional provisions as indicated in Annex IIIa as appropriate.

### *Article 4*

#### **Conformity assessment**

- 1) The conformity assessment procedure referred to in Article 8(2) of Directive 2009/125/EC shall be the internal design control set out in Annex IV to that Directive or the management system set out in Annex V to that Directive.
- 2) For the purposes of the conformity assessment pursuant to Article 8 of Directive 2009/125/EC, the technical documentation shall contain a copy of the product information provided in accordance

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4 Directive (EU) 2018/2002 of the European Parliament and of the Council of 11 December 2018 amending Directive 2012/27/EU on energy efficiency, OJ L 328, 21.12.2018, p. 210–230

with point 1.6 of Annex II and the details and results of the calculations set out in Annex III and, where applicable, Annex IIIa to this Regulation.

Note to CF: Until proven otherwise it is assumed that, as in the current regulation, third party conformity assessment does not apply to gas- and oil-fired appliances (?).

#### *Article 5*

### **Verification procedure for market surveillance purposes**

When performing the market surveillance checks referred to in Article 3(2) of Directive 2009/125/EC to ensure compliance with the requirements set out in Annex II to this Regulation, the Member States' authorities shall apply the verification procedure set out in Annex IV to this Regulation.

#### *Article 6*

### **Circumvention and software updates**

The manufacturer, importer or authorised representative shall not place on the market products designed to be able to detect they are being tested (for example by recognising the test conditions or test cycle) and to react specifically by automatically altering their performance during the test with the aim of reaching a more favourable level for any of the parameters in the technical documentation or included in any documentation provided.

The energy consumption of the product and any of the other declared parameters shall not deteriorate after a software or firmware update when measured with the same test standard originally used for the declaration of conformity, except with explicit consent of the end-user prior to the update. No performance change shall occur as a result of rejecting the update. A software update shall never have the effect of changing the product's performance in a way that makes it noncompliant with the ecodesign requirements applicable for the declaration of conformity.

#### *Article 7*

### **Indicative benchmarks**

The indicative benchmarks for best-performing water heaters and hot water storage tanks available on the market at the time of entry into force of this Regulation are set out in Annex V.

#### *Article 8*

### **Review**

- 1) The Commission shall review this Regulation in the light of technological progress with water heaters and storage tanks and present the result of that review to the Ecodesign Consultation Forum no later than five years from the date of entry into force of this Regulation. In particular, the review shall include an assessment of the following aspects:
  - a) the appropriateness of setting stricter ecodesign requirements for water heating energy efficiency, sound power level and emissions of nitrogen oxides;
  - b) the appropriateness of setting stricter ecodesign requirements for the standing losses of storage tanks;
  - c) the appropriateness of setting ecodesign requirements for circulation water heaters;

- d) the appropriateness of setting ecodesign requirements for heaters specifically designed for using gaseous or liquid fuels predominantly produced from biomass;
- e) the validity of the conversion coefficient value;
- f) the appropriateness of third-party certification and monitoring.

*Article 9*

**Repeal**

Commission Regulation (EU) No 814/2013 shall be repealed with effect from [date]

*Article 10*

**Entry into force**

This Regulation shall enter into force on the twentieth day following that of its publication in the Official Journal of the European Union.

This Regulation shall be binding in its entirety and directly applicable in all Member States.

Done at Brussels, [date].

Done at Brussels, XX Month XXXX.

*For the Commission*

*The President*

Ursula VON DER LEYEN

## ANNEX I

### Definitions applicable for Annexes II to V

For the purposes of Annexes II to V the following definitions shall apply,

- 1) 'storage water heater' means a water heater equipped with a hot water storage tank(s) placed on the market as one unit;
- 2) 'electric storage water heater' (ESWH) is an electric powered storage water heater;
- 3) 'gaseous or liquid fuel driven storage water heater' (GSWH) is a storage water heater using gaseous or liquid fuel to produce the heat;
- 4) 'instantaneous water heater' means an appliance intended to heat water while it flows through the appliance;
- 5) 'electric instantaneous water heater' (EIWH) means an electric powered instantaneous water heater;
- 6) 'gaseous or liquid fuel driven instantaneous water heater' (GIWH) is an instantaneous water heater using gaseous or liquid fuel to produce the heat;
- 7) 'heat pump water heater' (HPWH) means an electric powered water heater that uses a vapour compression cycle or sorption cycle and energy from renewable sources (ambient heat, geothermal heat, solar irradiance) and/or waste heat (exhaust air), or heat from other energy systems, to heat up water;
- 8) 'thermally driven heat pump water heater' (TD HPWH) means a HPWH using heat to drive the sorption or compression cycle;
- 9) 'cogeneration water heater' (CHPWH) means a water heater that simultaneously produces hot sanitary water and electric energy in a single process;
- 10) 'load profile' means a sequence of water draw-offs, as specified in Annex III, Table 5;
- 11) 'water draw-off' means a given combination of useful water flow rate, useful water temperature, useful energy content and peak temperature, as specified in Annex III, Table 5;
- 12) 'useful water flow rate' ( $f$ ) means the minimum flow rate, expressed in litres per minute, for which heated water is contributing to the reference energy, as specified in Annex III, Table 5;
- 13) 'useful water temperature' ( $T_m$ ), means the water temperature, expressed in degrees Celsius, at which heated water starts contributing to the reference energy, as specified in Annex III, Table 5;
- 14) 'useful energy content' ( $Q_{tap}$ ) means the thermal energy content of heated water, expressed in kWh, provided at a temperature equal to, or above, the useful water temperature, and at water flow rates equal to, or above, the useful water flow rate, as specified in Annex III, Table 5;
- 15) 'energy content of hot water' means the product of the specific heat capacity of water, the average temperature difference between the heated water output and cold water input, and the total mass of the hot water delivered;
- 16) 'peak temperature' ( $T_{peak}$ ) means the water temperature, expressed in degree Celsius, to be achieved during the water draw-off, as specified in Annex III Table 5;

- 17) 'set temperature' ( $T_{set}$ ) means the water temperature, without withdrawal of water, measured with a thermocouple placed inside the upper section of the tank. For metal tanks the thermocouple may be placed on the outer surface of the tank as well. This value is the water temperature measured after the last cut-out of the thermostat during testing, as set out in Annex III, section 3, sub (i);
- 18) 'cold water temperature' ( $\theta_c$ ) means the cold water inlet temperature during testing (nominally +10°C);
- 19) 'average normalised hot water temperature  $\geq 40^\circ\text{C}$ ' ( $\theta_p$ ) means the average hot water outlet temperature during the test for the mixed water at 40°C ( $V40$ ), as set out in Annex III, section 3, sub(k);
- 20) 'reference energy' ( $Q_{ref}$ ) means the sum of the useful energy content of water draw-offs, expressed in kWh, in a particular load profile, as specified in Annex III, Table 5;
- 21) 'maximum load profile' means the load profile with the greatest reference energy that a water heater is able to provide while fulfilling the temperature and flow rate conditions and times of that load profile;
- 22) 'declared load profile' means the load profile used for conformity assessment when determining water heating energy efficiency;
- 23) 'daily electricity consumption' ( $Q_{elec}$ ) means the consumption of electricity over 24 consecutive hours under the declared load profile, expressed in kWh in terms of final energy, as set out in Annex III, section 4, sub (a);
- 24) 'daily fuel consumption' ( $Q_{fuel}$ ) means the consumption of fuels over 24 consecutive hours under the declared load profile, expressed in kWh in terms of GCV, as set out in Annex VIII, section 4, sub (a);
- 25) 'gross calorific value' (GCV) means the total amount of heat released by a unit quantity of fuel when it is burned completely with oxygen and when the products of combustion are returned to ambient temperature; this quantity includes the condensation heat of any water vapour contained in the fuel and of the water vapour formed by the combustion of any hydrogen contained in the fuel;
- 26) 'smart control' means a device that automatically adapts the water heating process to individual usage conditions with the aim of reducing energy consumption;
- 27) 'smart control compliance' (*smart*) means the measure of whether a water heater equipped with smart controls fulfils the criterion set out in Annex III, section 3, sub (g);
- 28) 'smart control factor' (*SCF*) means the water heating energy efficiency gain due to smart control under the conditions set out in Annex III, section 4, sub (b);
- 29) 'smart grid enabled' means the water heater is equipped with a controller which can (de)activate the heat generator and/or change the set store temperature depending on signals from electric grid operators and/or equipment that controls on-site generated photovoltaic power.
- 30) 'weekly electricity consumption with smart controls' ( $Q_{elec,week,smart}$ ) means the weekly electricity consumption of a water heater with the smart control function enabled, [-] expressed in kWh in terms of final energy;



- 31) ‘weekly fuel consumption with smart controls’ ( $Q_{fuel,week,smart}$ ) means the weekly fuel consumption of a water heater with the smart control function enabled, expressed in kWh in terms of GCV;
- 32) ‘weekly electricity consumption without smart controls’ ( $Q_{elec,week}$ ) means the weekly electricity consumption of a water heater with the smart control function disabled, expressed in kWh in terms of final energy;
- 33) ‘weekly fuel consumption without smart controls’ ( $Q_{fuel,week}$ ) means the weekly fuel consumption of a water heater with the smart control function disabled, expressed in kWh in terms of GCV;
- 34) ‘ambient correction term’ ( $Q_{cor}$ ) means a term which takes into account the fact that the place where the water heater is installed is not an isothermal place, expressed in kWh;
- 35) ‘standby heat loss’ ( $P_{stby}$ ) means the heat loss of a water heater in operating modes without heat demand, expressed in kW;
- 36) ‘multivalent tank’ means a hot water storage tank that allows heating its contents using at least two or more different heat exchangers or heat generators ;
- 37) ‘multivalent tank correction’ ( $mvc$ ) means a correction of 15W if the hot water storage tank is a multivalent tank, and is ‘0’ (zero) if it is not, as set out in Annex II, section 2, sub 2.1;
- 38) ‘equivalent model’ means a model placed on the market with the same technical parameters set out in the applicable product information requirements of Annex II as another model placed on the market by the same manufacturer.
- 39) ‘average climate conditions’ means the climate conditions (outdoor temperature, solar irradiance, etc.) characteristic for Strasbourg, or Würzburg as a proxy for the average European Union climate;
- 40) ‘off-peak water heater’ means a water heater that is energised for a maximum period of 8 consecutive hours between 22:00 and 07:00 of the 24 hour tapping pattern in the load profiles, as set out in Annex III, section 3;
- 41) ‘biomethane’ is a purified form of raw biogas, as defined in and meeting the sustainability criteria in Directive (EU) 2018/2001 of the European Parliament and of the Council<sup>5</sup>, where CO<sub>2</sub>, H<sub>2</sub>O, H<sub>2</sub>S and other impurities are removed and that can be used as a natural gas substitute;
- 42) ‘bioliquids’ means liquid fuel produced from biomass for stationary energy purposes, meeting sustainability criteria as defined in Directive (EU) 2018/2001 of the European Parliament and of the Council and including hydrated vegetable oil (HVO), biodiesel (fatty acid methyl esters produced by transesterification of vegetable oil with methanol) and straight vegetable oil;
- 43) ‘hydrogen-ready’ (‘H<sub>2</sub>-ready’) of a water heater using gaseous fossil fuel means that the water heater is technically prepared to be converted, within at the most 2 hours, into a safe and efficient water heater using 100% hydrogen as a fuel and is placed on the market by the manufacturer with a conversion kit containing the components to be replaced, a manual for this replacement and a voucher.

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<sup>5</sup> Directive (EU) 2018/2001 of the European Parliament and of the Council of 11 December 2018 on the promotion of the use of energy from renewable sources. OJ L 328, 21.12.2018, p. 82–209

- 44) 'maximum ventilation exhaust air flow rate for water heating' ( $q_{v,maxw}$ ) is the maximum flow rate of exhaust air at temperature conditions, as set out in Annex III, Table 4, that can be used when assessing the water heating efficiency;
- 45) 'Temperature/flow dependency factor' ( $F_{ctrl}$ ) means a correction factor in the calculation of the 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, as set out in Annex III, section 4, sub (a);

## ANNEX II

### Ecodesign requirements

#### 1. ECODESIGN REQUIREMENTS FOR WATER HEATERS

##### 1.1. Energy efficiency requirements

From [date] the water heating energy efficiency of water heaters shall not be less than the following values for the load profiles as set out in Annex III, Table 5;

Water heater type	Load profile						
	3XS to S	M	L	XL	XXL	3XL	4XL
Electric instantaneous	42%	45%				not applicable	
Electric storage	38.0%	43.0%	44.0%	44.0%	45.0%	not applicable	
Fuel instantaneous	70%	70%	75%	80%	80%	80%	80%
Fuel storage	45%	56%	67%	78%	83%	88%	88%
Electric heat pump	85%	85%	105%	105%	120%	130%	130%
Thermally driven heat pump	55%	66%	77%	88%	93%	98%	98%
Cogeneration	45%	56%	67%	78%	100%	105%	105%

##### 1.2. Requirements for sound power level

From [date] the sound power level of heat pump water heaters shall not exceed the following values when providing water heating.

Rated heat output, as set out in Annex IIIa	Sound power level ( $L_{WA}$ ), indoors	Sound power level ( $L_{WA}$ ), outdoors
$\leq 6$ kW	60 dB	65 dB
$> 6$ kW and $\leq 12$ kW	65 dB	70 dB
$> 12$ kW and $\leq 30$ kW	70 dB	78 dB
$> 30$ kW	80 dB	88 dB

### 1.3. Requirements related to emissions

- (a) From [date] the emissions of nitrogen oxides, expressed in mg nitrogen dioxide per kWh fuel input, of water heaters using gaseous or liquid fuels shall not exceed the following values, when tested with respectively G20, G25, G30 or G31 reference gas or liquid fuels.

Water heater type	Fuel type			
	gas G20 or G25	gas G30	gas G31	liquid fuels
Fuel instantaneous water heater or fuel storage water heater	56	73	67	120
Thermally driven heat pump water heater or cogeneration water heater				
- using external combustion	70	91	84	120
- using internal combustion	240	312	288	420

- (b) From [date], gas-fired fuel water heaters shall be able to operate safely and efficiently with a blend of a fossil gas and up to at least 20% hydrogen;
- (c) From [date], gas-fired fuel water heaters shall be able to operate safely and efficiently with a blend of a fossil gas and up to at least 20% biomethane;
- (d) From [date], liquid fuel fired water heaters shall be able to operate safely and efficiently with a blend of a fossil liquid fuel and up to at least 20% liquid biofuel;

### 1.4. Functional requirements

From [date]

- 1) For water heaters declared for load profile 3XS to S
  - a) the storage volume of storage water heaters with declared load profile 3XS shall not exceed 7 litres;
  - b) the storage volume of storage water heaters with declared load profiles XXS and XS, the storage volume shall not exceed 15 litres;
  - c) the storage volume of storage water heaters with declared load profile S the storage volume shall not exceed 36 litres.
- 2) For water heaters declared for load profile M to 4XL
  - a) the amount of mixed water at 40 °C of a water heater shall not fall below the following values:

#### Maximum amount of mixed water at 40°C

Mixed water at 40°C (litres)	Load profile					
	M	L	XL	XXL	3XL	4XL
	65	130	210	300	520	1040

- 3) Electric heat pump water heaters that are tested using 'indoor air' shall:
  - a) be functional when supplied with an air temperature of 7°C or higher;
  - b) have an average electric input power when in test conditions in ANNEX III for water heating energy efficiency of 300 Watt or smaller;

- c) not be equipped with a 4-way reversing valve and/or a hot gas bypass valve;
- d) have a storage volume of 140 litres or less.

### **1.5 Material efficiency requirements**

From [date], manufacturers, importers or authorised representatives of water heaters shall:

- 1) regarding availability of spare parts
  - a) make available to professional repairers spare parts and software that allow a full repair of the unit for water heaters they placed on the market, for a minimum period of 10 years after placing the last unit of a model on the market;
  - b) ensure that the spare parts concerned by point (a) can be replaced with the use of commonly available tools and without permanent damage to the water heater;
  - c) ensure that the spare parts concerned by point (a) and the procedure for ordering them shall be publicly available on the free access website of the manufacturer, importer or authorised representative, at the latest two years after the placing on the market of the first unit of a model and until the end of the period of availability of these spare parts;
  - d) ensure that the list of spare parts concerned by point (a) and the procedure for ordering them and the repair instructions shall be publicly available on the free access website of the manufacturer, importer or authorised representative, when placing the first unit of a model on the market and until the end of the period of availability of these spare parts;
- 2) regarding maximum delivery time of spare parts:
  - a) during the time period mentioned under (1)(a), the delivery of the spare parts within 15 working days after having received the order;
  - b) in the case of spare parts concerned by point (1)(a), limit the availability of spare parts to professional repairers registered in accordance with point (3)(a) and (b);

#### 3) regarding access to repair and maintenance Information

After a period of two years since the placing on the market of the first unit of a model after the date of entry into application of this Regulation, and until the end of the period mentioned under (1), the manufacturer, importer or authorised representative shall provide access to the water heater repair and maintenance information to professional repairers in the following conditions:

- a) the manufacturer's, importer's or authorised representative's website shall indicate the process for professional repairers to register for access to information; to accept such a request, the manufacturers, importers or authorised representatives may require the professional repairer to demonstrate that
  - i) the professional repairer has the technical competence to repair relevant water heaters and complies with the applicable regulations for repairers of relevant water heaters in the Member States where it operates. Reference to an official registration system as professional repairer, where such system exists in the Member States concerned, shall be accepted as proof of compliance with this point;
  - ii) the professional repairer is covered by insurance covering liabilities resulting from its activity regardless of whether this is required by the Member State.

- b) The manufacturers, importers or authorised representatives shall accept or refuse the registration within 5 working days from the date of request;
  - c) Manufacturers, importers or authorised representatives may charge reasonable and proportionate fees for access to the repair and maintenance information or for receiving regular updates. A fee is reasonable if it does not discourage access by failing to take into account the extent to which the professional repairer uses the information.
  - d) Once registered, a professional repairer shall have access, within one working day after requesting it, to the requested repair and maintenance information. The information may be provided for an equivalent model or model of the same family, if relevant.
  - e) The water heater repair and maintenance information referred to in (a) shall include:
    - the unequivocal heater identification;
    - a disassembly map or exploded view;
    - technical manual of instructions for repair;
    - list of necessary repair and test equipment;
    - component and diagnosis information (such as minimum and maximum theoretical values for measurements);
    - wiring and connection diagrams;
    - diagnostic fault and error codes (including manufacturer-specific codes, where applicable); and
    - instructions for installation of relevant software and firmware including reset software.
    - information on how to access data records of reported failure incidents stored on the central hydronic heating appliance (where applicable).
- 4) regarding requirements for dismantling for material recovery and recycling while avoiding pollution
- ensure that water heaters are designed in such a way that the materials and components referred to in Annex VII to Directive 2012/19/EU can be removed with the use of commonly available tools.
  - provide information free of charge about preparation for re-use and treatment in respect of each type of water heater placed for the first time on the Union market within one year after the equipment is placed on the market. This information shall identify, as far as it is needed by centres which prepare for re-use and treatment and recycling facilities in order to comply with the provisions of Directive 2012/19/EU, the different components and materials mentioned in Annex VII of that Directive, as well as the location of dangerous substances and mixtures in water heaters. It shall be made available to centres which prepare for re-use and treatment and recycling facilities by producers of water heaters in the form of manuals or by means of electronic media (e.g. CD-ROM, online services)
- 5) regarding remote monitoring for improved maintenance and repair, where the option exists it shall be indicated in the product.

## 1.6 Product information requirements

From [date] the instruction manuals for installers and end-users, free access websites of manufacturers, their authorised representatives and importers and technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:

- (a) The information referred to in Table 1
- (b) any specific precautions that shall be taken when the water heater is assembled, installed or maintained;
- (c) for heat generators designed for water heaters and water heater housings to be equipped with such heat generators, their characteristics, the requirements for assembly, to ensure compliance with the ecodesign requirements for water heaters and, where appropriate, the list of combinations recommended by the manufacturer;
- (d) information relevant for disassembly, recycling and/or disposal at end-of-life.
- (e) *H2-ready* declaration. If so declared –following the definition in Annex I-- the following text shall be added to the product information:

***IMPORTANT NOTICE:***

*This heating appliance is 'H2-ready', meaning that it is supplied with a conversion kit which, when installed by a trained professional, can be made to safely operate with hydrogen as a fuel, supplied taking into account proper safety requirements, instead of natural gas. However, the qualification 'H2-ready' holds no promise or assurance by the manufacturer or authorities that --within the lifetime of the appliance-- hydrogen will be made publicly available for space- and/or water heating.*

- (f) for circulation water heaters, declaration of the rated heat output  $P_{rated}$  (in kW), the *COP* at  $P_{rated}$  and the water heating efficiency  $\eta_{wh}$ , as set out in Annex III.

*Table 1*  
**Product information water heaters**

Supplier's name or trademark:							
Model identifier:							
Load Profile declared [3XS..4XL]:							
<b>For packages of water heater, hot water storage tank and solar device</b>							
Water heater efficiency as supplied ( $\eta_{wh,prod}$ )							X,X
Solar device efficiency, as supplied (compatible with climates and load profiles presented)							X,X
Tank factor							X,X
Shower water heat recovery factor							X,X
Solar device(s) supplied							yes/no
Off-peak functionality							yes/no
Energy smart functionality							yes/no
Shower water heat recovery device supplied							yes/no
<b>Water heater parameters</b>	<b>EIWH</b>	<b>ESWH</b>	<b>GIWH</b>	<b>GSWH</b>	<b>mCHP WH</b>	<b>HPWH</b>	<b>TD_ HPWH</b>
Prated (kW)	X,X	X,X	X,X	X,X	X,X	X,X	X,X
Water heater energy efficiency (%)	X,X	X,X	X,X	X,X	X,X	X,X	X,X
Daily electricity consumption (Qelec, kWh/d)	X,X	X,X	X,X	X,X	X,X	X,X	X,X
Daily fuel consumption (Qfuel, kWh GCV/d)	X,X	X,X	X,X	X,X	X,X	-	X,X
Smart control factor (SCF)	X,XXX	X,XXX	X,XXX	X,XXX	X,XXX	X,XXX	X,XXX
Storage volume (litres)	-	X	-	X	X	X	X
PCM thermal capacity at 65°C (kWh)	-	X,XXX	-	X,XXX	X,XXX	X,XXX	X,XXX
Mixed water at 40°C (litres)	-	X,X	-	X,X	X,X	X,X	X,X
Electric power output (kW)	-	-	-	-	X,X	-	-
Electric efficiency (%)	-	-	-	-	X,X	-	-
Sound power level, in dB(A)	X	X	X	X	X	X	X
Ventilation air flow rate (m <sup>3</sup> /h)*	X	X	X	X	X	X	X
* = if ventilation air source heat pump							
<b>Solar device parameters</b>							
Solar device efficiency (for number of collectors or modules, climate and annual heating demand, in %), <i>to be supplied in table format for multiple collectors (areas), conditions</i>							X
Gross collector aperture area (Ag, m <sup>2</sup> )							X,X
Gross solar yield (GSY), in kWh/solar device per climate, <i>as established for solar devices the collectors of which were tested separately</i>							X
Solar heat delivered (QL), in kWh/solar device, per climate and load profile, <i>as established for solar devices the collectors of which were tested separately</i>							X
<b>Shower heat recovery device</b>							
Shower water heat recovery device factor (f <sub>SWHRD</sub> ) per load profile, <i>to be supplied in table format for multiple load profiles</i>							X,XX
Shower water heat recovery efficiency, per applicable flow rate							X,XX



## 2. ECODESIGN REQUIREMENTS FOR HOT WATER STORAGE TANKS

### 2.1. Requirement for standing loss

From [date] the standing loss  $S$  of hot water storage tanks (in Watts) shall not exceed the following limit:

$$S \leq mvc + 16.66 + (8.33 * V^{0.4})$$

Where:

- $V$  is tank storage volume or equivalent volume  $V_{eq}$ , expressed in litres;
- $mvc$  is the multivalent tank correction ('15' if the storage tank is a multivalent tank).

### 2.2. Product information requirements related to hot water storage tanks

From [date] the instruction manuals for installers and end-users, free access websites of manufacturers, their authorised representatives and importers and technical documentation for the purposes of conformity assessment pursuant to Article 4 shall contain the following elements:

- (a) information identifying the model(s), including equivalent models, to which the information relates;
- (b) the results of the measurements for the technical parameters specified in Annex III, section 3, sub j) and k) as well as section 4, sub d) and e) as appropriate;
- (c) any specific precautions that shall be taken when the water heater is assembled, installed or maintained;
- (d) information relevant for disassembly, recycling and/or disposal at end-of-life.

Table 2

**Product information hot water storage tanks**

Rated storage volume (litres)	x
Standing loss (Watt)	x,x
Multivalent tank correction, (yes/no)	x
PCM thermal capacity at 65°C (kWh or equivalent litres)	x

## ANNEX III

### Measurements and calculations

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, measurements shall be made using harmonised standards the reference numbers of which have been published for this purpose in the Official Journal of the European Union, or using other reliable, accurate and reproducible methods that take into account the generally recognised state-of-the-art methods. They shall meet the conditions and technical parameters set out in sections 2 to 4 hereafter.
2. In the absence of existing relevant standards and until the publication of the references of the relevant harmonised standards in the Official Journal, the transitional testing methods set out in Annex IIIa or other reliable, accurate and reproducible methods, which take into account the generally recognised state-of-the-art, shall be used.
3. TEST CONDITIONS
  - (a) For all water heaters, the measurements shall be carried out for the load profile with the largest reference energy ( $Q_{ref}$ ) that can be supplied by the water heater, or the load profile with a reference energy just below the largest that can be supplied, as set out in Table 5, taking into account the functional requirements in Annex II, section 1.4;
  - (b) for measurements under (a), the cold sanitary water inlet temperature is +10 °C and the ambient temperature is +20 °C if the water heater is designated for use in a heated space. If the water heater is designated for use in an unheated space then it shall be tested at the ambient temperature outdoors or, in case of a heat pump water heater, of the source air temperature.
  - (c) The tests to determine energy efficiency and performance are subject to the following conditions:
    - measurements shall be carried out using the load profiles set out in Table 5;
    - measurements shall be carried out using a 24-hour measurement cycle as follows:
      - 00:00 to 06:59: no water draw-off;
      - from 07:00: water draw-offs according to the declared load profile;
      - from end of last water draw-off until 24:00: no water draw-off;
  - (d) heat pump water heaters shall be tested under the conditions set out in Table 3, whereby indoor air shall only be used as a rating condition for electric heat pumps if they are functional when supplied with an air temperature of 7°C or higher and have a rated electric input power of 300 Watt or smaller;
  - (e) heat pump water heaters which use ventilation exhaust air as the heat source shall be tested under the conditions set out in Table 4, whereby an alternate source is to be used –and declared–if and in as much as the ventilation exhaust air is not enough to perform the requirements of the declared load profile;
  - (f) water heaters classified as off-peak water heaters are energised for a maximum period of 8 consecutive hours between 22:00 and 07:00 of the 24-hour tapping pattern. At the end of the 24-hour tapping pattern the water heaters are energised till the end of the step;

Table 3

**Standard rating conditions for heat pump water heaters, dry bulb air temperatures (wet bulb temperatures in brackets)\***

Heat source	Outdoor air	Indoor air	Exhaust air	Brine	Water
Temperature	+7 °C/+6 °C	+20 °C (maximum +15 °C)	+20 °C (+12 °C)	+5 °C(inlet)/ +2 °C (outlet)	+10 °C (inlet )/ +7 °C (outlet)

\*=for direct exchange heat pumps the bath temperature is +4 °C

Table 4

**Maximum ventilation exhaust air flow rate available for water heating [ $q_{v,max w}$ ] at various loads in m<sup>3</sup>/h, at 20(15)°C dry(wet) bulb**

Declared tapping profile	S	M	L	XL	XXL	3XL	4XL
Ventilation exhaust air flow rate available for water heating $q_{v,max w}$ in m <sup>3</sup> /h	80	160	320	600	900	1700	3500

- (g) Where the manufacturer deems it appropriate to declare the value of smart as being ‘1’, measurements of the weekly electricity and/or fuel consumption with or without smart controls shall be carried out using a two-week measurement cycle as follows:
- days 1 to 5: random sequence of load profiles chosen from the declared load profile and the load profile one below the declared load profile, and smart control disabled,
  - days 6 and 7: no water draw-offs, and smart control disabled,
  - days 8 to 12: repetition of the same sequence applied for days 1 to 5, and smart control enabled,
  - days 13 and 14: no water draw-offs, and smart control enabled,
- (h) For circulation water heaters, i.e. where no load profile can be established, the rated heat output (in kW) and the COP at the rated heat output shall be established
- at an inlet temperature of 15 °C and an outlet temperature of 60 °C of the indoor heat exchanger for circulation water heaters using a trans-critical heat pump or using fossil fuel combustion;
  - at an inlet temperature of 45 °C and outlet temperature of 60 °C for the indoor heat exchanger of circulation water heaters not using a trans-critical heat pump.
- (i) The sound power level of heat pump water heaters is to be measured at maximum heat output. Measurements shall be done outdoors for outdoor modules of split units and shall be done at inlet or exhaust duct opening in case of monobloc units, whichever produces the highest sound power level;
- (j) Standing losses of hot water storage tanks shall be measured at ambient temperature of 20 °C and a storage temperature of 65 °C to be achieved and maintained during the test;
- (k) To measure the mixed water at 40 °C (V40) of a storage water heater or PCM tank, the product is kept at its nominal operating temperature  $T_{set}$  (in °C) for at least 12 hours and then, at the end of the first thermostat cut-out thereafter, is switched off and the water is withdrawn at the maximum flow rate in the declared load profile until the water temperature at the outlet, measured and registered at the most at every 3s, drops below 40 °C. The cold water at temperature  $\theta_c$  is nominally 10 °C. The average outlet temperature during withdrawal  $\theta'_p$  (in °C) is assessed, corrected for sharp fluctuations in temperature readings as appropriate. The normalised value of  $\theta'_p$  is  $\theta_p$  (in °C), which is calculated as

$$\theta_p = (T_{set} - 10) \frac{(\theta'_p - \theta_c)}{(T_{set} - \theta_c)} + 10$$

$\theta_p$  and the volume of the hot water withdrawn with temperature  $\geq 40$  °C  $V_{40exp}$  (in litres) are the inputs for the calculation of  $V_{40}$  in section 4, sub (d);

- (l) For tests and test conditions not mentioned here the transitional methods mentioned in Annex IIIa apply, as appropriate.

#### 4. CALCULATION METHODS

- (a) The water heating energy efficiency  $\eta_{wh}$ , in %, of a water heater, except a circulation water heater, shall be calculated as the ratio between the reference energy  $Q_{ref}$  of the declared tapping load profile and the energy required for its generation based on GCV and including primary energy for electricity calculated as:

The water heating energy efficiency  $\eta_{wh}$ , in %, of a water heater shall be calculated as the ratio between the reference energy  $Q_{ref}$  of the declared tapping load profile and the energy required for its generation based on GCV and including primary energy for electricity calculated as:

$$\eta_{wh} = \frac{Q_{ref}}{(Q_{fuel} + CC \cdot Q_{elec}) \cdot (1 - SCF \cdot smart) + Q_{cor}} \cdot F_{ctrl} \cdot 100$$

where

- $Q_{ref}$  is the total energy delivered by the load profile used, value from Table 5, in kWh;
- $Q_{elec}$  is the consumption of electricity for water heating over 24 consecutive hours under the declared load profile, expressed in kWh, in terms of final energy, corrected also for electricity use of auxiliary components that are necessary for testing the load profile but not delivered with the product;
- $Q_{fuel}$  is the daily fuel consumption for domestic hot water over 24 consecutive hours at the declared load profile, expressed in kWh, in terms of GCV;
- SCF smart control factor ( $SCF$ ) means the water heating energy efficiency gain due to smart control, as set out in point (b) hereafter;
- $smart$  is the smart control coefficient, is equal to 0 without smart control or 1 with smart control;
- $Q_{cor}$  is the ambient correction term and is equal to 0 for load profiles XXL to 4XL, and for load profiles S to XL with
  - conventional fuel heating  $Q_{cor} = -0,23 \cdot (Q_{fuel} \cdot (1 - SCF \cdot smart) - Q_{ref})$  ;
  - electric resistance heating  $Q_{cor} = -0,23 \cdot (CC \cdot Q_{elec} \cdot (1 - SCF \cdot smart) - Q_{ref})$  ;
  - heat pump water heating  $Q_{cor} = -k \times 24h \times P_{stby}$
- $F_{ctrl}$  is 1.00 if the water heater can maintain a set water temperature independent of the water volume flow rate supplied by the water heater and 0.95 if it cannot;

Note to CF: The exact value of 0.95 for  $F_{ctrl}$  can be discussed but should be sufficient to differentiate the electronic from the hydraulic EIWHs .

For heat pump water heaters, if during a tapping the  $T_{peak}$  of 55 °C in the load profiles of table 9 cannot be achieved by the heat pump, the average of the measured hot water temperature over the tapping shall not be lower than 52 °C and the water heating efficiency  $\eta_{wh}$  shall be lowered by 2 percentage points;

- (b) Where the manufacturer deems it appropriate to declare the value of *smart* as being ‘1’, measurements of the weekly electricity and/or fuel consumption with or without smart controls shall be carried out using a two-week measurement cycle as indicated in section 3, sub (g) of this Annex.

The smart control factor (SCF) is calculated as follows

$$SCF = 1 - \frac{Q_{fuel,week,smart} + CC \times Q_{elec,week,smart}}{Q_{fuel,week} + CC \times Q_{elec,week}}$$

If  $SCF \geq 0,07$  and the product is ‘smart compliant’ the value of smart shall be 1. In all other cases the value of smart shall be 0.

The product shall be ‘*smart compliant*’ if the difference between the useful energy content measured during days 1 to 7 and the useful energy content measured during days 8 to 14 does not exceed 2 % of  $Q_{ref}$  of the declared load profile.

- (c) The water heating efficiency of circulator water heaters is determined as

$$\eta_{wh} = \frac{COP_{rated}}{CC} \cdot 100$$

where

- $COP_{rated}$  is the coefficient of performance as a ratio the kWh heat output at kWh electricity input at rated conditions set out in section 3 of this Annex.
- $CC$  equals the primary energy factor 2,1 if the energy input is electricity and 1 if the input is fossil fuel;

- (d) The mixed water at 40 °C ( $V_{40}$ ), in litres of 40 °C water, is based on the input values assessed in section 3, sub (k) and calculated as

$$V_{40} = V_{40\_exp} \times \frac{(\theta_p - 10)}{30}$$

- (e) The equivalent volume  $V_{eq}$ , in litres, of a PCM tank or other storage facility capable of producing hot water at temperatures of 65 °C is calculated from its  $V_{40}$  value as assessed in sub (d),

$$V_{eq} = V40 \times \frac{30}{(\theta_p - 10)}$$

based on  $\theta_c$  of +10 °C, Tset of +65 °C and  $\theta_p$  equals  $\theta'_p$ , the normalised average temperature  $\theta_p$  during withdrawal is  $40+(65-40)/2= 52.5$  °C the default formula becomes

$$V_{eq} = 0.706 \times V40$$

Note to CF: The testing and calculation of mixed water at 40°C ( $V40$ ) is now described adequately in the appropriate standards in Annex VIIIa and is shown here only to make transparent how the definition and calculation of the equivalent volume  $V_{eq}$  is arrived at.

Table 5. Tapping profiles

h	3XS			XXS			XS			S				M				h	L				XL				XXL				h	3XL				
	$Q_{tap}$	$f$	$T_m$	$Q_{tap}$	$f$	$T_m$	$Q_{tap}$	$f$	$T_m$	$Q_{tap}$	$f$	$T_m$	$T_p$	$Q_{tap}$	$f$	$T_m$	$T_p$		$Q_{tap}$	$f$	$T_m$	$T_p$	$Q_{tap}$	$f$	$T_m$	$T_p$	$Q_{tap}$	$f$	$T_m$	$T_p$		$Q_{tap}$	$f$	$T_m$	$T_p$	
	kWh	l/min	°C	kWh	l/min	°C	kWh	l/min	°C	kWh	l/min	°C	°C	kWh	l/min	°C	°C		kWh	l/min	°C	°C	kWh	l/min	°C	°C	kWh	l/min	°C	°C		kWh	l/min	°C	°C	kWh
07:00	0,015	2	25	0,105	2	25				0,105	3	25				0,105	3	25				0,105	3	25				0,105	3	25	07:00	11,2	48	40		
07:05	0,015	2	25											1,4	6	40						1,4	6	40				1,4	6	40	07:05	5,04	24	25		
07:15	0,015	2	25																			1,82	6	40				1,82	6	40	09:00	1,68	24	25		
07:26	0,015	2	25																			0,105	3	25				0,105	3	25	10:30	0,84	24	10 40		
07:30	0,015	2	25	0,105	2	25	0,525	3	35	0,105	3	25				0,105	3	25				0,105	3	25				0,105	3	25	11:45	1,68	24	25		
08:01																0,105	3	25				0,105	3	25				0,105	3	25	12:45	2,52	32	10 55		
08:15																0,105	3	25				0,105	3	25				0,105	3	25	15:30	2,52	24	25		
08:30				0,105	2	25				0,105	3	25				0,105	3	25	3,605	10	10 40	0,105	3	25				0,105	3	25	18:30	3,36	24	25		
08:45																0,105	3	25				0,105	3	25				0,105	3	25	20:30	5,88	32	10 55		
09:00	0,015	2	25													0,105	3	25				0,105	3	25				0,105	3	25	21:30	12,04	48	40		
09:30	0,015	2	25	0,105	2	25				0,105	3	25				0,105	3	25				0,105	3	25				0,105	3	25	$Q_{ref}$	46,76				
11:30	0,015	2	25	0,105	2	25				0,105	3	25				0,105	3	10 40				0,105	3	25				0,105	3	25	08:45	0,105	3	25		
11:45	0,015	2	25	0,105	2	25				0,105	3	25				0,105	3	25				0,105	3	25				0,105	3	25	09:00	0,105	3	25		
12:00	0,015	2	25	0,105	2	25										0,105	3	25				0,105	3	25				0,105	3	25	09:30	0,105	3	25		
12:30	0,015	2	25	0,105	2	25																0,105	3	25				0,105	3	25	10:00					
12:45	0,015	2	25	0,105	2	25	0,525	3	35	0,315	4	10 55				0,315	4	10 55				0,105	3	25				0,105	3	25	10:30	0,105	3	10 40		
14:30	0,015	2	25													0,105	3	25				0,105	3	25				0,105	3	25	11:00					
15:00	0,015	2	25																			0,105	3	25				0,105	3	25	11:30	0,105	3	25		
15:30	0,015	2	25													0,105	3	25				0,105	3	25				0,105	3	25	11:45	0,105	3	25		
16:00	0,015	2	25																			0,105	3	25				0,105	3	25	12:45	0,315	4	10 55		
16:30																0,105	3	25				0,105	3	25				0,105	3	25	14:30	0,105	3	25		
18:00				0,105	2	25				0,105	3	25				0,105	3	25				0,105	3	25				0,105	3	25	15:00	0,105	3	25		
18:15				0,105	2	25				0,105	3	40				0,105	3	40				0,105	3	25				0,105	3	25	15:30	0,105	3	25		
18:30	0,015	2	25	0,105	2	25										0,105	3	40				0,105	3	25				0,105	3	25	16:00	0,105	3	25		
19:00	0,015	2	25	0,105	2	25										0,105	3	25				0,105	3	25				0,105	3	25	16:30	0,105	3	25		
19:30	0,015	2	25	0,105	2	25																0,105	3	25				0,105	3	25	17:00					
20:00				0,105	2	25																0,105	3	25				0,105	3	25	18:00	0,105	3	25		
20:30							1,05	3	35	0,42	4	10 55				0,735	4	10 55				0,105	3	25				0,105	3	25	18:15	0,105	3	40		
20:45				0,105	2	25																0,105	3	25				0,105	3	25	18:30	0,105	3	40		
21:00				0,105	2	25																0,105	3	25				0,105	3	25	19:00	0,105	3	25		
21:15	0,015	2	25	0,105	2	25										0,105	3	25				0,105	3	25				0,735	4	10 55	20:30	0,735	4	10 55		
21:30	0,015	2	25							0,525	5	45				1,4	6	40				3,605	10	10 40				4,42	10	10 40	20:46	6,24	16	10 40		
21:35	0,015	2	25	0,105	2	25																0,105	3	25				0,105	3	25	21:00	0,105	3	25		
21:45	0,015	2	25	0,105	2	25																0,105	3	25				0,105	3	25	21:15	0,105	3	25		
$Q_{ref}$	0,345			2,100			2,100			2,100						5,845					$Q_{ref}$	11,655						19,07			24,53					

Legend:  
 $Q_{tap}$  is kWh energy  
 $f$  is flow rate in l/min  
 $T_m$  minimum temperature °C  
 $T_p$  peak temperature °C  
 cold water temperature °C  
 specific heat water: 1,163 Wh/kgK

ANNEX IIIa

**Transitional Methods**

Table 6 References and qualifying notes for water heaters and hot water storage tanks

Parameter	Reference Test Method / Title	Notes
	Source	
<b>Electric instantaneous water heaters</b>		
Rated heat output, Prated	EN 50193-1:2016/A1:2020 Clause 5.1.2	The value of Pnom is the power consumption of the appliance measured after a minimum of 30 minutes of operation under full load conditions
Water heating energy efficiency $\eta_{wh}$	EN 50193-1:2016/A1:2020 Electric instantaneous water heaters - Methods for measuring the Performance - Part 1: General requirements 5.2.4	
Sound power level (LWA)		It is assumed that values are not significant
Daily electricity consumption Qelec	5.2.2	
Weekly electricity consumption Qelec,week	5.1.4	By default the standard assumes SCF=0 (as there are no efficiency gains to be achieved for smart control)
Weekly electricity consumption 'smart' enabled Qelec,week,smart	5.1.4	
SCF	5.1.4	
<b>Electric storage water heater</b>		
Rated heat output, Prated		EN 50440 does not present a method for determining Prated. EN 16147:2017 Clause 7.14.1 describes a method that could be applied, which is the effective thermal capacity (when fully charged) divided by the time required to charge the product as in EN 16147:2017 Clause 7.7.
Water heating energy efficiency $\eta_{wh}$	EN 50440:2015+A1:2020 Efficiency of domestic	



	electrical storage water heaters and testing methods A.2	
Sound power level ( $L_{WA}$ )		It is assumed that values are not significant
Storage volume	9.1.4	
Mixed water at 40 °C	9.1.10	
Daily electricity consumption Qelec	9.1.8.	
Weekly electricity consumption Qelec,week	9.2	
Weekly electricity consumption 'smart' enabled Qelec,week,smart	9.2	
SCF	9.2.	

### Fuel instantaneous water heater

Rated heat output, Prated		Prated is called nominal useful output Pn in EN26 but that standard does not describe a measurement method. Proposed is to define Prated as the nominal fuel input multiplied by the nominal efficiency from EN26:2017 Clause 7.3.2 corrected for GCV.of the fuel.
Water heating energy efficiency $\eta_{wh}$	gaseous fuels: prEN13203:2017 Clause 7.1	
	liquid fuels: prEN 303-6:2017 Clause 10.1	
Sound power level ( $L_{WA}$ )	FprEN 26:2021 Clause 11.	
NOx emissions / gaseous	FprEN 26:2021 Clause 10.	
NOx emissions / liquid	EN 267:2020 Automatic forced draught burners for liquid fuels; Clause 5. Testing. ANNEX B	Tests to be performed at nominal conditions (80/60 supply/return and maximum capacity)
Daily electricity consumption Qelec	prEN13203:2017 Clause 5.5	
Daily fuel consumption Qfuel	prEN13203:2017 Clause 7.1	
Weekly electricity consumption Qelec,week		Smart control is not covered by standards for fuel fired appliances
Weekly electricity consumption 'smart' enabled Qelec,week,smart		
Weekly fuel consumption Qfuel,week		

Weekly fuel consumption  
 'smart' enabled  
 Q<sub>fuel,week,smart</sub>  
 SCF

**Fuel storage water heater**

Rated heat output, Prated

Prated is called nominal useful output P<sub>n</sub> in EN89 but that standard does not describe a measurement method. Proposed is to define Prated as the nominal fuel input multiplied by the nominal efficiency from EN89:2015 Clause 7.1.2.2 corrected for GCV.of the fuel.

Water heating energy efficiency  
 $\eta_{wh}$

gaseous fuels: EN 89:2015 Gas-fired storage water heaters for the production of domestic hot water

refers to prEN13203:2017 Clause 7.1

Sound power level (L<sub>WA</sub>)

liquid fuels: prEN 303-6:2017 Clause 10.1  
 EN 89:2015 Gas-fired storage water heaters for the production of domestic hot water Clause 11.

NO<sub>x</sub> emissions / gaseous  
 NO<sub>x</sub> emissions / liquid

EN 89:2015 Clause 10  
 EN 267:2020 Automatic forced draught burners for liquid fuels; § 5. Testing. ANNEX B  
 EN 89:2015 Clause 6.11

Tests to be performed at nominal conditions (80/60 supply/return and maximum capacity)  
 Referred to as nominal capacity

Storage volume

EN 89:2015 Clause 7.4

mixed water at 40 °C  
 Daily electricity consumption  
 Q<sub>elec</sub>  
 Daily fuel consumption Q<sub>fuel</sub>

prEN13203:2017 Clause 5.5  
 prEN13203:2017 Clause 7.1

Weekly electricity consumption  
 Q<sub>elec,week</sub>  
 Weekly electricity consumption 'smart' enabled  
 Q<sub>elec,week,smart</sub>  
 Weekly fuel consumption  
 Q<sub>fuel,week</sub>  
 Weekly fuel consumption 'smart' enabled  
 Q<sub>fuel,week,smart</sub>  
 SCF

Smart control is not covered by standards for fuel fired appliances

**Electric heat pump water heater**

Rated heat output / water heating (Prated)	EN 16147:2017 Clause 7.14.1	
Water heating energy efficiency $\eta_{wh}$	EN 16147:2017 Heat pumps with electrically driven compressors - Testing, performance rating and requirements for marking of domestic hot water units Clause 7.13	
Sound power level ( $L_{WA}$ )	EN 12102-2:xx	
Storage volume mixed water at 40 °C	EN 16147:2017 Clause 7.6	"Rated volume"
Electric input power	EN 16147:2017 Clause 7.10	Use electrical energy consumption $W_{EL-LP}$ (Clause 7.9.2) divided by 24h
Daily electricity consumption $Q_{elec}$	EN 16147:2017 Clause 7.13.1	
Weekly electricity consumption $Q_{elec,week}$		
Weekly electricity consumption 'smart' enabled $Q_{elec,week,smart}$	EN 16147:2017 Clause 7.11.2	
SCF		
Pstby	EN 16147:2017 Clause 7.8	

#### Thermally driven heat pump water heater

Rated heat output / water heating (Prated)		There is currently no procedure described in existing standards for establishing the Prated for thermally driven dedicated HPWH (only for space heating). The same calculation principle as in EN 16147:2017 Clause 7.14.1 shall be applied.
Water heating energy efficiency $\eta_{wh}$	prEN 13203-6:2020 Clause 7.1	
Sound power level ( $L_{WA}$ )	prEN 12102-2:2016 Clause 10.1.3.2	
NOx emissions / gaseous	EN12309-2:2015 Clause 7.3.13	Important! No correction for 3 <sup>rd</sup> family gases shall be applied whatsoever (this is already taken into account in the ecodesign requirements)
NOx emissions / liquid	EN 267:2020 Automatic forced draught burners for liquid fuels; § 5. Testing. ANNEX B	Tests to be performed at nominal conditions (80/60 supply/return and maximum capacity)
Storage volume mixed water at 40 °C	prEN 13203-6:2020 Clause 5.1.1 prEN13203-4:2020 Clause 7.5	

Daily electricity consumption Qelec	prEN 13203-6:2020 Clause 5.7	Refers to prEN13203-2:2020 Clause 5.7
Daily fuel consumption Qfuel	prEN13203-6:2012 Clause 7.1	
Weekly electricity consumption Qelec,week	prEN13203-6:2012 Clause 7.1	
Weekly electricity consumption 'smart' enabled Qelec,week,smart		
Weekly fuel consumption Qfuel,week		
Weekly fuel consumption 'smart' enabled Qfuel,week,smart		
SCF		
Pstby		Determination of Pstby is not covered in prEN13203- 6:2020. A procedure similar to EN 16147:2017 Clause 7.8 can be applied.

### Cogeneration water heater

Rated heat output, Prated	EN 50465:2015 Clause 6.3.4	This clause does not describe actual measurement but a verification of claimed value and the product of nominal heat input and overall efficiency
Water heating energy efficiency $\eta_{wh}$		The standard prEN 13203- 4:2020 describes the correct test set-up but in Clause 7.1 the net delivered electrical energy is subtracted from the fuel input, whereas the Regulation requires (for space heating) conversion of net electric output to thermal output using a factor 2.65
Sound power level ( $L_{WA}$ )	EN 15036 - 1:2006 Heating boilers - Test regulations for airborne noise emissions from heat generators	
NOx emissions / gaseous	EN 50465:2015 Clause 7.8.2 NOx (Other pollutants)	The clause describes the correct measurement set-up and calculations for NOx emissions for space heating, but prescribes output capacities relevant for space heating. For water heating the conditions in Clause 7.3.1 shall apply.
NOx emissions / liquid		

Storage volume mixed water at 40 °C	prEN 13203-4:2020 Clause 5.1 EN 89:2015 Clause 6.11	There is no determination of storage volume in prEN13203-4:2020 not its 'mother' standard prEN13203-2:2020. Instead reference is made to EN 89:2015
Daily electricity consumption Qelec	prEN 13203-4:2020 Clause 5.5	Referred to as EelecCo
Daily fuel consumption Qfuel	prEN 13203-4:2020 Clause 7.1	
Weekly electricity consumption Qelec,week	prEN 13203-4:2020 Clause 7.2	
Weekly electricity consumption 'smart' enabled Qelec,week,smart		
Weekly fuel consumption Qfuel,week		
Weekly fuel consumption 'smart' enabled Qfuel,week,smart		
SCF		

### Hot water storage tanks

Storage volume	FprEN 15332:2019 Clause 5.4 EN 12897:2016+A1:2020 Clause 6.2.2	All volumes relevant for providing the effective thermal capacity (here: for water heating) and relevant for determining the standing losses must be included in the measurement, for example: If the tank is filled with primary water only, and uses a heat exchanger to extract heat for domestic hot water (DE: Hygiene- speicher), the primary side has to be filled as well.
Mixed water at 40 °C	EN 12897:2016+A1:2020 Clause 6.2.2 Annex A.4.3	
Standing loss	FprEN 15332:2019 Clause 5.3 EN 12897:2016+A1:2020 Clause 6.2.2 Annex B EN 12977-3:2018 Annex F.2	When determining standing losses using EN 12897 all relevant volumes, for both/either primary side and domestic side should be filled and heated to required storage temperatures, similar as how the tank would be used in real-life. See EN 15332 for instructions.
Equivalent storage volume OR thermal capacity		To calculate as: $V_{40} * 0.5$ OR kWh / (0.00116*deltaT) with

kWh = thermal capacity at  
65°C  
 $\Delta T = 65 - 20 = 45$

## ANNEX IV

### **Verification procedure for market surveillance purposes**

The verification tolerances defined in this Annex relate only to the verification by Member State authorities of the declared values and shall not be used by the manufacturer, importer or authorised representative as an allowed tolerance to establish the values in the technical documentation or in interpreting these values with a view to achieving compliance or to communicate better performance by any means.

As part of verifying the compliance of a product with the requirements laid down in this Regulation pursuant to Article 3(2) of Directive 2009/125/EC, for the requirements referred to in this Annex, the authorities of the Member States shall apply the following procedure:

- (1) The Member State authorities shall verify one single unit of the model.
- (2) The model shall be considered to comply with the applicable requirements if:
  - (a) the values given in the technical documentation pursuant to point 2 of Annex IV to Directive 2009/125/EC (declared values), and, where applicable, the values used to calculate these values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements carried out pursuant to paragraph (g) thereof; and
  - (b) the declared values meet any requirements laid down in this Regulation, and any required product information published by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the declared values; and
  - (c) when the Member State authorities test the unit of the model, the determined values (the values of the relevant parameters as measured in testing and the values calculated from these measurements) comply with the respective verification tolerances as given in Table 7.
- (3) If the results referred to in point 2(a) or (b) are not achieved, the model and all other equivalent models shall be considered not to comply with this Regulation.
- (4) If the result referred to in point 2(c) is not achieved, the Member State authorities shall select three additional units of the same model for testing. As an alternative, the three additional units selected may be of one or more different equivalent models.
- (5) The model shall be considered to comply with the applicable requirements if, for these three units, the arithmetical mean of the determined values complies with the respective verification tolerances given in Table 7.
- (6) If the result referred to in point 5 is not achieved, the model and all other equivalent models shall be considered not to comply with this Regulation.
- (7) The Member State authorities shall provide all relevant information to the authorities of the other Member States and to the Commission without delay after a decision being taken on the non-compliance of the model according to points 3 and 6.

The Member State authorities shall use the measurement and calculation methods set out in Annex III.

The Member State authorities shall only apply the verification tolerances that are set out in Table 7 and shall only use the procedure described in points 1 to 7 for the requirements referred to in this Annex. No other tolerances, such as those set out in harmonised standards or in any other measurement method, shall be applied.

Table 7

**Verification tolerances**

<b>Parameters</b>	<b>Verification tolerances</b>
Water-heating energy efficiency, $\eta_{wh}$	The determined value shall not be lower than the declared value by more than 8 %.
Sound power level, $L_{WA}$	The determined value shall not exceed the declared value by more than 2 dB(A).
Daily electricity consumption, $Q_{elec}$	The determined value shall not exceed the declared value by more than 5 %
Daily fuel consumption, $Q_{fuel}$	The determined value shall not exceed the declared value by more than 5 %
Weekly fuel consumption without smart controls, $Q_{fuel,week}$	The determined value shall not exceed the declared value by more than 5 %
Weekly fuel consumption with smart controls, $Q_{fuel,week,smart}$	The determined value shall not exceed the declared value by more than 5 %
Weekly electricity consumption without smart controls, $Q_{elec,week}$	The determined value shall not exceed the declared value by more than 5 %
Weekly electricity consumption with smart controls, $Q_{elec,week,smart}$	The determined value shall not exceed the declared value by more than 5 %
Storage volume, $V$	The determined value shall not be lower than the declared value by more than 2 %.
Mixed water at 40 °C, $V_{40}$	The determined value shall not be lower than the declared value by more than 3 %.
Standing loss, $S$	The determined value shall not exceed the declared value by more than 5 %
Emissions of nitrogen oxides	The determined value shall not exceed the declared value by more than 20 %.



## ANNEX V

### Indicative benchmarks

At the time of entry into force of this Regulation, the best available technology on the market for water heaters and hot water storage tanks in terms of water heating energy efficiency, sound power level, standing loss and emissions of nitrogen oxides was identified as follows:

#### 1) BENCHMARKS FOR WATER HEATING ENERGY EFFICIENCY OF WATER HEATERS:

Water heater type	Declared tapping profiles						
	3XS to S	M	L	XL	XXL	3XL	4XL
Electric instantaneous or storage water heater	38%	43%	44%	45%	45%	45%	45%
Fuel instantaneous water heater	65%	80%	85%	90%	94%	94%	94%
Fuel storage water heater	60%	75%	80%	86%	90%	90%	90%
Electric heat pump water heater(*)	-	100%	195%	195%	190%	190%	190%
Thermally driven heat pump water heater	-	100%	110%	120%	120%	125%	125%
Cogeneration water heater	-	80%	85%	90%	170%	170%	170%

(\*) Note to CF: The highest heat pump water heaters in the EPREL database use a combination of ventilation exhaust air and indoor air (heated or unheated space). This will not be applicable for rating purposes in this regulation, i.e. outdoor air is to be used as an alternate source when exhaust air is not sufficient for the load profile. This has been taken into account.

#### 2. BENCHMARKS FOR SOUND POWER LEVEL (LWA), OUTDOORS, OF HEAT PUMP WATER HEATERS WITH:

- a) rated heat output  $\leq 6$  kW: 39 dB;
- b) rated heat output  $> 6$  kW and  $\leq 12$  kW: 40 dB;
- c) rated heat output  $> 12$  kW and  $\leq 30$  kW: 41 dB;
- d) rated heat output  $> 30$  kW and  $\leq 70$  kW: 67 dB

#### 3. BENCHMARK FOR EMISSIONS OF NITROGEN OXIDES, EXPRESSED IN NITROGEN OXIDE, OF CONVENTIONAL WATER HEATERS USING GASEOUS FUELS:

- e) of water heaters using gaseous fuels: 14 mg/kWh fuel input in terms of GCV;
- f) of water heaters using liquid fuels: 50 mg/kWh fuel input in terms of GCV.

4. BENCHMARK FOR STANDING LOSS, IN WATTS, OF HOT WATER STORAGE TANKS WITH STORAGE VOLUME  $V$ , EXPRESSED IN LITRES:

*[no EPREL data available at this time]*

The benchmarks specified in points 1, 2 and 4 do not necessarily imply that a combination of these values is achievable for a single water heater.