This draft legal text is a working document prepared as follow up to the review studies undertaken for the revision of Regulation (EU) 812/2013 for water heaters, hot water storage tanks and packages of water heater and solar device, 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

COMMISSION DELEGATED REGULATION (EU) No [XXX/XXXX] of [XX/XX/XXXX]

of [date]

supplementing Regulation (EU) 2017/1369 of the European Parliament and of the Council with regard to energy labelling of water heaters, hot water storage tanks and packages of water heater and solar device, repealing Commission Regulation (EU) No 812/2013

(Text with EEA relevance)

THE EUROPEAN COMMISSION,

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

Having regard to Regulation (EU) 2017/1369 of the European Parliament and of the Council of 4 July 2017 setting a framework for energy labelling and repealing Directive 2010/30/EU (1[1]), and in particular Article 11(5) and Article 16(1) thereof,

Whereas:,

1)

2)

HAS ADOPTED THIS REGULATION:…

[1] **OJ L 198, 28.7.2017, p. 1**

Article 1

Subject matter and scope

1) This Regulation establishes requirements for the energy labelling of, and the provision of supplementary product information on dedicated water heaters and heat pump water heater heat generators with a rated heat output ≤ 70 kW or with a hot water storage tank (equivalent) volume ≤ 2000 litres as well as hot water storage tanks with a storage (equivalent) volume ≤ 2000 litres, including if sold as or integrated in a package of water heater, hot water storage tank, solar device and/or drain water heat recovery devices.

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 ([2]) and (EU) 2015/2193 ([3]) of the European Parliament and the Council;

   d) products covered by Commission Regulation (EU) 2015/1186 ([4]) 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 drinking or sanitary water at least in accordance with the load profile with the smallest reference energy as specified in Annex VIII, Table 5;

   g) water heaters designed for making hot drinks and/or food only;

   h) cogeneration space heaters with a maximum electrical capacity of 50 kW or above;

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 of 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;

2) ‘heat generator’ means the part of a water heater that generates the heat using one or more of the following processes:

[2] OJ L 334, 17.12.2010, p. 17–119 on industrial emissions (integrated pollution prevention and control)
[3] *OJ L 313, 28.11.2015, p. 1–19 on the limitation of emissions of certain pollutants into the air from medium combustion plants*
[4] *OJ L 193, 21.7.2015, p. 20-42 on* labelling of local space heaters

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 quantity 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 equivalent 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 VIII, section 4, sub (d);

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 VIII, section 3, sub (i) and section 4, sub (c);

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 VIII, section 3;

10) '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;

11) 'biomass fuel' means a gaseous or liquid fuel produced from biomass;

12) '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;

13) '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;

14) '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;

15) 'water heating energy efficiency' (η_{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 VIII, sections 3 and 4;

16) ‘sound power level’ (L_{WA}) means the A-weighted sound power level, indoors and/or outdoors, expressed in dB, as set out in Annex VIII, section 3, sub (h);

17) ‘standing loss’ (*S*) means the heating power dissipated from a hot water storage tank at standard rating conditions expressed in W;

18) ‘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 (*5*); the value of the conversion coefficient is *CC* = 2.1;

19) ‘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 IX, additional definitions are set out in Annex I.

Article 3 Obligations of suppliers

1) From [date], suppliers placing on the market and/or putting into service for
   (a) water heaters;
   (b) hot water storage tanks;
   (c) solar devices;
   (d) drain water heat recovery devices;
   (e) packages of water heater, water heater heat generator, hot water storage tank, solar device and/or drain water heat recovery device;
2) shall ensure that for ***water heaters***:
   (a) a printed label complying with the format and content is provided, except for temperature controls and solar devices, as set out in the designated section Annex III;
   (b) a product information sheet is provided, as set out in the designated section of Annex IV;
   (c) the technical documentation, as set out in the designated section of Annex V, is provided on request to the authorities of the Member States and to the Commission;
   (d) any advertisement relating to a specific space heater model and containing energy-related or price information includes a reference to the seasonal space heating energy efficiency class and, if appropriate, the water heating energy efficiency class under average climate conditions for that model;
   (e) any technical promotional material concerning a specific model and describing its specific technical parameters includes a reference to the seasonal space heating energy efficiency class and, if appropriate, the water heating energy efficiency class under average climate conditions for that model;
   (f) an electronic label in the format and content, as set out in the designated section of Annex VII, is made available to dealers, except for temperature controls and solar devices;

5 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

(g) an electronic product information sheet, as set out in the designated section of Annex III, is made available to dealers;

3) shall ensure that for ***hot water storage tanks***:

(a) a printed label complying with the format and content is provided, except for temperature controls and solar devices, as set out in the designated section Annex III;

(b) a product information sheet is provided, as set out in the designated section of Annex IV;

(c) the technical documentation, as set out in the designated section of Annex V, is provided on request to the authorities of the Member States and to the Commission;

(d) any advertisement relating to a specific space heater model and containing energy related or price information includes a reference to the seasonal space heating energy efficiency class and, if appropriate, the water heating energy efficiency class under average climate conditions for that model;

(e) any technical promotional material concerning a specific model and describing its specific technical parameters includes a reference to the seasonal space heating energy efficiency class and, if appropriate, the water heating energy efficiency class under average climate conditions for that model;

(f) an electronic label in the format and content, as set out in the designated section of Annex VII, is made available to dealers, except for temperature controls and solar devices;

(g) an electronic product information sheet, as set out in the designated section of Annex III, is made available to dealers;

4) shall ensure that for solar devices and drain water heat recovery devices:

a) an electronic product information sheet, as set out in the designated section of Annex IV is made available to dealers;

b) the technical documentation, as set out in the designated section of Annex V, is provided on request to the authorities of the Member States and to the Commission;

5) shall ensure that for packages of at least a water heater or water heater heat generator combined with a hot water storage tank, solar device and/or drain water heat recovery device:

a) a product information sheet is provided, as set out in the designated section of Annex IV;

b) the technical documentation of the parts that make up the package, as set out in the designated section of Annex V, is provided on request to the authorities of the Member States and to the Commission;

whereby the printed label is provided at least in the packaging of the part that contains the heat generator.

Article 4

Obligations of dealers

1) From [date], dealers shall ensure for each

a) water heater;

b) hot water storage tank;

c) solar device;

d) drain water heat recovery device;

e) package of water heater, water heater heat generator, hot water storage tank, solar device and/or drain water heat recovery device;

2) that

a) at the point of sale, it bears the label provided by suppliers in accordance with Article 3, on the outside of the front of the appliance, in such a way as to be clearly visible;

b) when it is offered for sale, hire or hire-purchase, where the end-user cannot be expected to see the product displayed, it is marketed with the information provided by the suppliers in accordance with Annex VI;

c) any advertisement relating to a specific water heater model or hot water storage tank and containing energy related or price information includes a reference to the water heating energy efficiency class for that water heater, respectively the standing loss class of that hot water storage tank;

d) any technical promotional material concerning a specific water heater model or hot water storage tank and containing energy related or price information includes a reference to the water heating energy efficiency class for that water heater, respectively the standing loss class of that hot water storage tank;

e) Where the product is a package any offer includes the water heating energy efficiency class and water heating energy efficiency (value) of that package per climate condition indicated, as applicable, by displaying with the package the label set out in point 4 of Annex III according to the characteristics of that package;

Article 5

Obligations of internet hosting platforms

Where a hosting service provider as referred to in Article 14 of Directive 2000/31/EC allows the direct selling of water heaters and/or hot water storage tanks through its internet site, the service provider shall enable the showing of the electronic label and electronic product information sheet provided by the dealer on the display mechanism, in accordance with the provisions of Annex VII, and shall inform the dealer of the obligation to display them.

Article 6

Measurement and calculation methods

The information to be provided pursuant to Articles 3 and 4 shall be obtained by reliable, accurate and reproducible measurement and calculation methods which take into account the recognised state-of-the-art measurement and calculation methods, as set out in Annex VIII, following transitional provisions as indicated in Annex VIIIa as appropriate.

Article 7

Verification procedure for market surveillance purposes

Member States shall apply the procedure set out in Annex IX when assessing the conformity of the declared water heating energy efficiency class, standing loss and sound power level of water heaters and packages of water heaters, water heater heat generators, solar devices and/or drain water heat recovery devices, if applicable.

Article 8

Review

The Commission shall review this Regulation in the light of technological progress no later than five years after its entry into force. The review shall in particular assess the following aspects:

- significant changes in sales and market shares, and energy aspects of different types of water heaters, hot water storage tanks, solar devices and/or drain water heat recovery devices;
- the energy classes of water heaters and hot water storage tanks, and the design of the energy label;
- the possibility to address extended circular economy aspects;
- the validity of the conversion coefficient value;
- the appropriateness of third-party certification and monitoring.

Article 9

Repeal

Commission Regulation (EU) No 812/2013 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, XX Month XXXX.

For the Commission

The President

Ursula VON DER LEYEN

ANNEX I

Definitions applicable for the Annexes

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

Definitions related to water heaters and hot water storage tanks

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 VIII, 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 VIII, 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 VIII, Table 5;

13) ‘useful water temperature’ (*Tm*), means the water temperature, expressed in degrees Celsius, at which heated water starts contributing to the reference energy, as specified in Annex VIII, 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 VIII, 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 VIII, 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 VIII, section 3, sub (i);

18) ‘cold water temperature’ (Θ_C) means the cold water inlet temperature during testing (nominally +10°C);

19) ‘average normalised hot water temperature ≥40°C’ (Θ_p) means the average hot water outlet temperature during the test for the mixed water at 40°C (*V40*), as set out in Annex VIII, section 3, sub(j);

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 VIII, 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, as specified in Annex VIII, Table 5;

22) ‘declared load profile’ means the load profile used for conformity assessment when determining water heating energy efficiency, as set out in Annex VIII, Table 5;

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 VIII, 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 VIII, section 3, sub (h);

28) ‘smart control factor’ (*SCF*) means the water heating energy efficiency gain due to smart control under the conditions set out in Annex VIII, 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) 'smart monitoring' means the water heater can share information on energy efficiency and maintenance parameter with end-users, service personnel and other external parties agreed with user;

31) ‘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;

32) ‘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;

33) ‘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;

34) ‘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;

35) ‘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;

36) ‘standby heat loss’ (P_{stby}) means the heat loss of a water heater in operating modes without heat demand, expressed in kW;

37) '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;

38) '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;

39) ‘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.

40) ‘average climate’(A), ‘colder climate’(C), ‘warmer climate’(W) are the climate conditions characteristic for the cities of Strasbourg, Helsinki and Athens, respectively (for solar devices Würzburg and Stockholm are allowed as alternatives to Strasbourg and Helsinki respectively);

41) '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.

42) ‘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[6], where CO_2, H_2O, H_2S and other impurities are removed and that can be used as a natural gas substitute;

43) ‘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;

44) ‘hydrogen-ready’ (‘H2-ready’) of a water heater using gaseous fossil fuel means that the boiler is technically prepared to be converted, within at the most 2 hours, into a safe and efficient boiler

[6] 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

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.

45) ‘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 VIII, Table 4, that can be used when assessing the water heating efficiency;

46) '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 VIII, section 4, sub (a);

Definitions related to solar devices

47) ‘solar device’ means a device that is equipped with one or more solar collectors (collector array) and hot water storage tanks and possibly pumps in the collector loop and other parts, which is not equipped with any additional heat generator except possibly one or more back-up immersion heaters;

48) ‘solar collector’ means a device designed to absorb solar irradiance and to transfer the thermal energy so produced to a fluid passing through it;

49) 'Gross Thermal Yield' (GTY) means the reference annual thermal yield of the collector array of the solar device for a specific climate calculated as the simple average of the thermal yield for the 25ºC and 50ºC collector operating temperature, in kWh/a;

50) ‘collector aperture area’(Ag) means the maximum projected area through which unconcentrated solar radiation enters the collector, expressed in m²;

51) ‘Solar device efficiency factor for water heating’ ($\eta_{sol,wh}$) means a factor (>1) representing the contribution of a solar device to the water heating efficiency of a water heater in a package, as set out in Annex VIII, section 5;

52) ‘tank correction factor’ (f_{tank}) means a factor in the calculation of the efficiency of packages with a solar device, with a value that depends on the energy efficiency class of the hot water storage tank connected to the solar collector, as set out in Annex VIII, section 8;

53) ‘water heating efficiency of a solar-assisted water heater’ (η_{wh+sol}) is the water heating efficiency of a package of a water heater and a solar device, in %;

54) 'non solar heat required' Q_{nonsol} is the part of the annual water heating demand which is not covered by the solar device yield and therefore must be provided by the water heater, in kWh/a;

55) 'annual solar water heating demand' $Q_{wh,sol}$ is the water heating demand per year to be met by the combination of solar device and water heater, in kWh/a.

56) 'solar heat delivered' Q_{sol} is the part of the annual water heating demand which is covered by the solar device yield, in kWh/a

Definitions related to drain water heat recovery devices

57) ‘drain water heat recovery device factor’ (f_{SWHRD}) means that part of the water heating package where heat from outflowing spent hot water directed to sewage is transferred simultaneous to incoming cold water during production of hot water;

58) 'shower drain water heat recovery efficiency' (ηDSWHRD) means the thermal efficiency of the drain water heat recovery device calculated as the ratio of the heat recovered by the device divided by the heat supplied to the device;

ANNEX II

Energy efficiency classes

1. ENERGY LABEL CLASSES FOR WATER HEATERS AND PACKAGES OF WATER HEATERS WITH SOLAR DEVICES, HOT WATER STORAGE TANKS AND/OR DRAIN WATER HEAT RECOVERY DEVICES

The water heating energy efficiency class of a water heater shall be determined on the basis of its water heating energy efficiency as set out in Table 1. That water heating energy efficiency of a water heater shall be calculated as set out in Annex VIII for average climate conditions.

Table 1

Water heating energy efficiency classes of water heaters, by declared load profiles, η_{wh} in %

Energy label class	**Declared tapping profiles**			
	3XS-XXS	**XS-S**	**M**	**L-XL-XXL 3XL-4XL**
A	$\eta_{wh} \geq 50$	$\eta_{wh} \geq 80$	$\eta_{wh} \geq 160$	$\eta_{wh} \geq 200$
B	$46 \leq \eta_{wh} < 50$	$70 \leq \eta_{wh} < 80$	$120 \leq \eta_{wh} < 160$	$200 \leq \eta_{wh} < 160$
C	$42 \leq \eta_{wh} < 46$	$55 \leq \eta_{wh} < 70$	$100 \leq \eta_{wh} < 120$	$160 \leq \eta_{wh} < 120$
D	$39 \leq \eta_{wh} < 42$	$48 \leq \eta_{wh} < 55$	$90 \leq \eta_{wh} < 100$	$120 \leq \eta_{wh} < 100$
E	$\eta_{wh} < 39$	$44 \leq \eta_{wh} < 48$	$70 \leq \eta_{wh} < 90$	$100 \leq \eta_{wh} < 90$
F	-	$40 \leq \eta_{wh} < 44$	$45 \leq \eta_{wh} < 70$	$90 \leq \eta_{wh} < 45$
G	-	$\eta_{wh} < 40$	$\eta_{wh} < 45$	$\eta_{wh} < 45$

Note to CF: The last two classes of 3XS-XXS are void because the products are EIWH/ESWH with a theoretical limit on one hand and a minimum efficiency on the other hand. Furthermore, the verification tolerance is 8% and there should be no 2-class jumps within that limit.

2. ENERGY LABEL CLASSES OF HOT WATER STORAGE TANKS

The energy efficiency class of a hot water storage tank shall be determined on the basis of its standing loss as set out in Table 2

Table 2

Energy efficiency classes of hot water storage tanks

Energy label class	**Standing loss S in Watts, with storage volume V in litres**
A	$S \leq mvc + 5,5 + 3,16 \cdot V^{0,4}$
B	$mvc + 5,5 + 3,16 \cdot V^{0,4} \leq S < mvc + 8,5 + 4,25 \cdot V^{0,4}$
C	$mvc + 8,5 + 4,25 \cdot V^{0,4} \leq S < mvc + 12 + 5,93 \cdot V^{0,4}$
D	$mvc + 12 + 5,93 \cdot V^{0,4} \leq S < mvc + 16,66 + 8,33 \cdot V^{0,4}$
E	$mvc + 8,33 + 3,16 \cdot V^{0,4} \leq S < mvc + 21 + 10,33 \cdot V^{0,4}$
F	$mvc + 21 + 10,33 \cdot V^{0,4} \leq S < mvc + 26 + 13,66 \cdot V^{0,4}$
G	$S > mvc + 26 + 13,66 \cdot V^{0,4}$

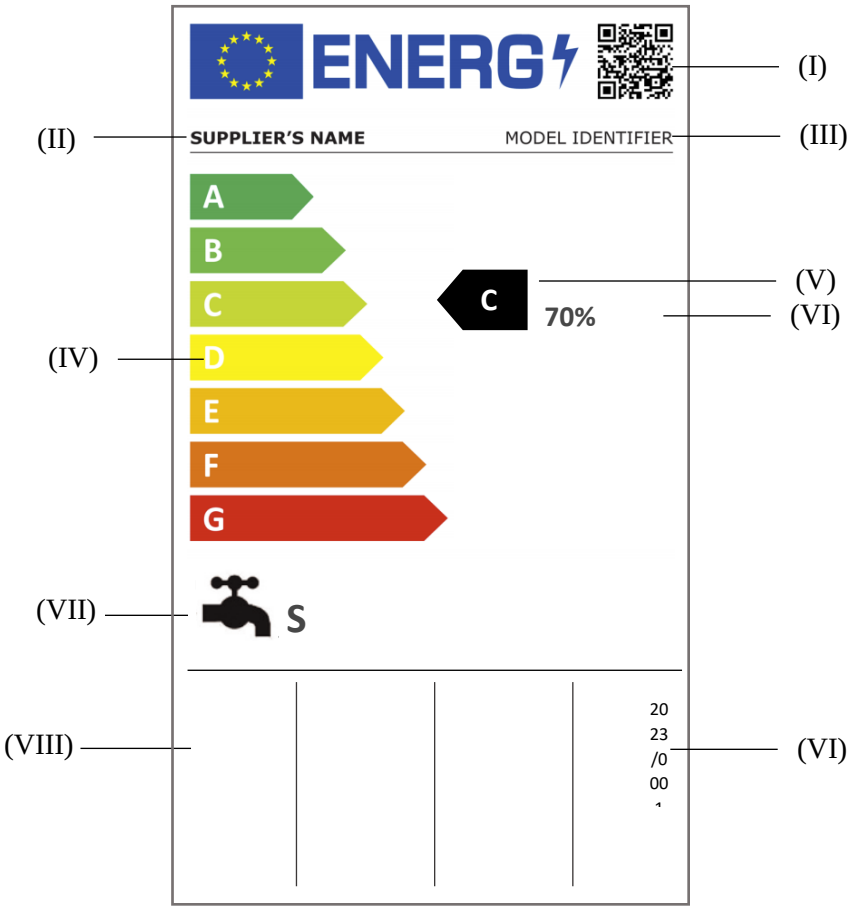
ANNEX III

Label for water heaters, storage tanks and packages of water heaters with solar devices and/or storage tanks and drain water heat recovery devices

1. LABEL FOR WATER HEATER OR PACKAGE OF WATER HEATER WITH SOLAR DEVICE, HOT WATER STORAGE TANK AND/OR DRAIN WATER HEAT RECOVERY DEVICE (not climate dependent)

1.1. Label:

Figure 1 Label for water heater or package of water heater with solar device and/or storage tank and drain water heat recovery device (not climate dependent)



1.2. The following information shall be included in the label:

I. QR code

II. supplier's name or trade mark;

III. supplier's model identifier;

IV. scale of energy efficiency classes from A to G;

V. the energy efficiency class determined in accordance with Annex II;

VI. the energy efficiency value determined in accordance with Annex II;

VII. pictogram for water heating, plus load profile;

VIII. pictograms for additional functionality and performance as presented under point 3. when applicable, taking into account that:

a. only the relevant pictograms, as set out in point 4, shall be shown and centred between the internal divider below the energy efficiency classes and the bottom of the energy label, multiple pictograms shall be evenly spaced;

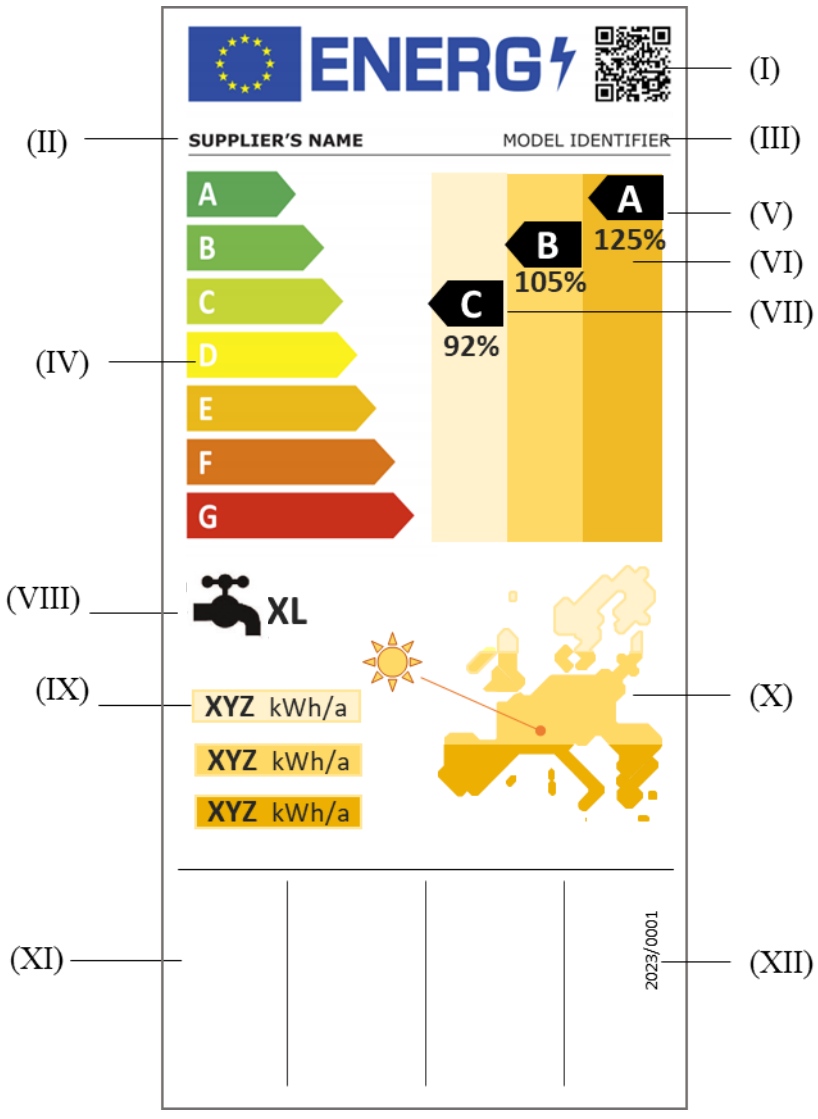
b. the height of the label shall be extended to ensure sufficient space around the symbols.

IX. the number of this Regulation, that is ‘xxxx/xxxx’

2. LABEL FOR WATER HEATER OR PACKAGES OF WATER HEATER WITH SOLAR DEVICE, HOT WATER STORAGE TANK AND/OR DRAIN WATER HEAT RECOVERY DEVICE (climate dependent)

2.1. Label:

Figure 2 Label for water heater or packages of water heater with solar device and/or storage tank and drain water heat recovery device (climate dependent)



C

2.2. The following information shall be included in the label:

I. QR code

II. supplier's name or trade mark;

III. supplier's model identifier;

IV. scale of energy efficiency classes from A to G;

V. the energy efficiency class determined in accordance with Annex II, for **warmer** climate, plus the efficiency value in %;

VI. the energy efficiency class determined in accordance with Annex II, for **average** climate, plus the efficiency value in %;

VII. the energy efficiency class determined in accordance with Annex II, for **colder** climate, plus the efficiency value in %;

VIII. symbol for water heating, plus load profile;

IX. the annual energy consumption for three possible climates (if applicable), expressed in kWh/annum;

X. pictogram for the EU map showing three climate conditions in geographic zones;

XI. pictograms for additional functionality and performance as presented under point 3. when applicable, taking into account that:

a. only the relevant pictograms, as set out in point 4, shall be shown and centred between the internal divider below the energy efficiency classes and the bottom of the energy label, multiple pictograms shall be evenly spaced;

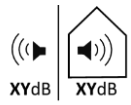
b. the height of the label shall be extended to ensure sufficient space around the symbols.

XII. the number of this Regulation, that is 'xxxx/xxxx'

3. ADDITIONAL PICTOGRAMS FOR THE LABEL

3.1. Additional pictograms to be added below the horizontal division line in Figure xx, xx and xx, where applicable:

I. Pictogram for solar device 

II. Pictogram for sound power outdoor | indoor, with values in dB 

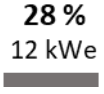
III. Pictogram for ventilation air flow rate (for HPWHs using ventilation air) 

IV. Pictogram for off-peak functionality 

V. Pictogram for 'Energy Smart' 

VI. Pictogram for Drain water heat recovery 

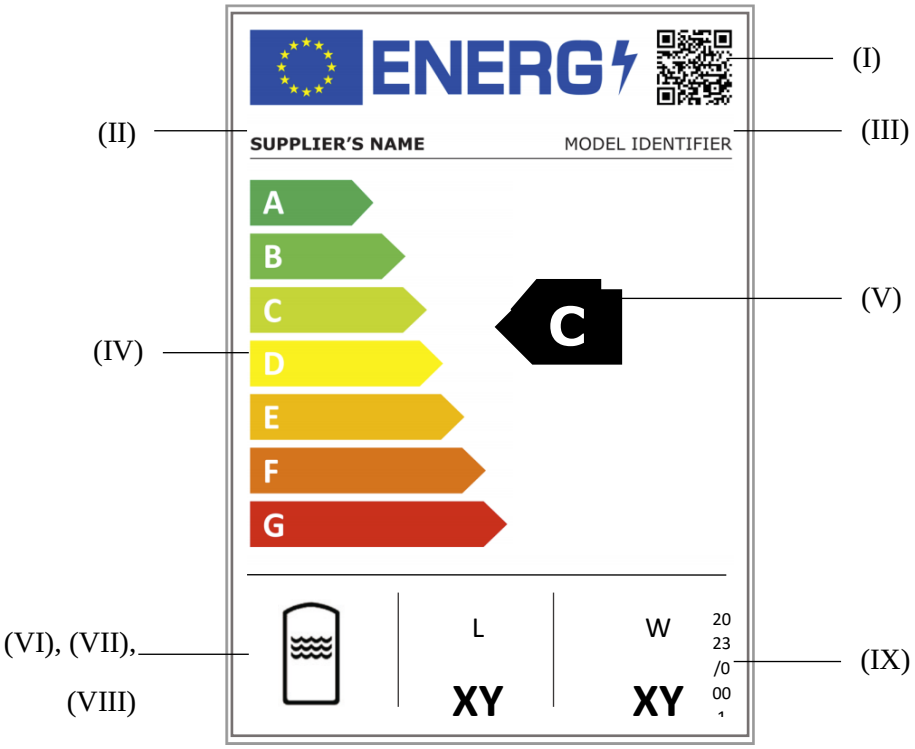
VII. Pictogram for energy source used 

VIII. Pictogram for annual electricity production by cogeneration water heater, showing output in kW (or kW peak) 

4. LABEL FOR HOT WATER STORAGE TANK

4.1. Label:

Figure 3 Label hot water storage tank



4.2. The following information shall be included in the label:

I. QR code

II. supplier's name or trade mark;

III. supplier's model identifier;

IV. scale of energy efficiency classes from A to G;

V. the energy efficiency class determined in accordance with Annex II;

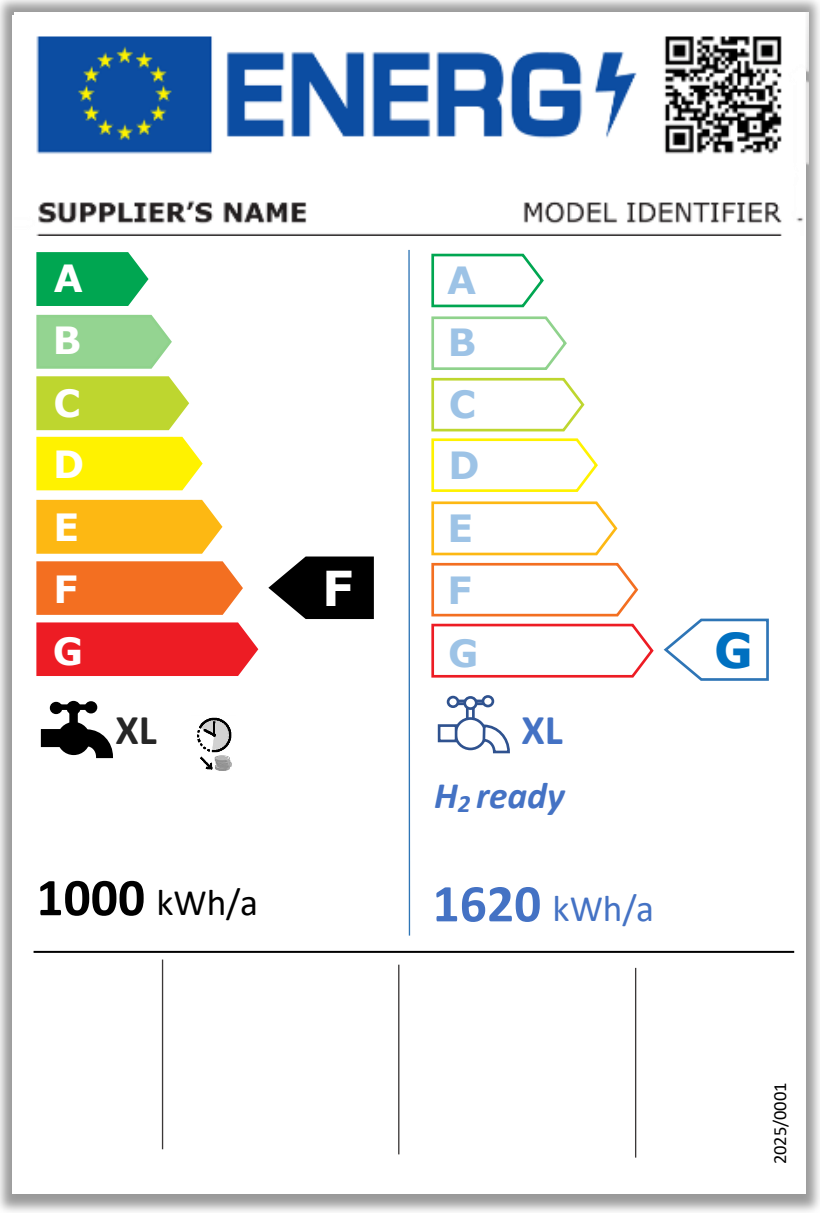
VI. Pictogram of storage tank;

VII. storage volume (in litres);

VIII. standing loss (in W);

IX. the number of this Regulation, that is ‘xxxx/xxxx’

5. LABEL GAS-FIRED WATER HEATER, H2-READY



Rating with natural gas

Rating with hydrogen

(pef 1.65 based on 95% methane steam reforming and 5% electrolysis)

6. LABEL DESIGNS

6.1. Label design for water heater or package of water heater with solar device, hot water storage tank and/or drain water heat recovery device (not climate dependent)

6.2. Label design for water heater or package of water heater with solar device, hot water storage tank and/or drain water heat recovery device (climate dependent)

6.3. Label design for additional pictograms;

6.4. Label design for hot water storage tanks;

6.5. Whereby:

a) The labels shall be at least 96 mm wide and 192 mm high. Where the label is printed in a larger format, its content shall nevertheless remain proportionate to the specifications above.

b) The background of the label shall be 100 % white.

c) The typefaces shall be Verdana and Calibri.

d) The dimensions and specifications of the elements constituting the label shall be as indicated in the label designs in points 4.1 to 4.3.

e) Colours shall be CMYK – cyan, magenta, yellow and black, following this example: 0,70,100,0: 0 % cyan, 70 % magenta, 100 % yellow, 0 % black.

f) The labels shall fulfil all the following requirements (numbers refer to the figures above):

❶ the colours of the EU logo shall be as follows:

— the background: 100,80,0,0;
— the stars: 0,0,100,0;

❷ the colour of the energy logo shall be: 100,80,0,0;

❸ the QR code shall be 100 % black;

❹ the supplier's name shall be 100 % black and in Verdana Bold, 9 pt;

❺ the model identifier shall be 100 % black and in Verdana Regular 9 pt;

❻ the A to G scale shall be as follows:

- the letters of the energy efficiency scale shall be 100 % white and in Calibri Bold 19 pt; the letters shall be centred on an axis at 4,5 mm from the left side of the arrows;
- the colours of the A to G scale arrows shall be as follows:
  - A-class: 100,0,100,0;
  - B-class: 70,0,100,0;
  - C-class: 30,0,100,0;
  - D-class: 0,0,100,0;
  - E-class: 0,30,100,0;
  - F-class: 0,70,100,0;
  - G-class: 0,100,100,0;

❼ the internal dividers shall have a weight of 0,5 pt and the colour shall be 100 % black;

❽ the letter of the energy efficiency class shall be 100 % white and in Calibri Bold 33 pt. The energy efficiency class arrow and the corresponding arrow in the A to G scale shall be positioned in such a way that their tips are aligned. The letter in the energy efficiency class

arrow shall be positioned in the centre of the rectangular part of the arrow which shall be 100 % black;

❾ the annual energy consumption value shall be in Verdana Bold 28 pt; 'kWh/annum' shall be in Verdana Regular 18 pt. They shall be centred and 100 % black;

❿ the pictograms shall be as shown as in the label designs and as follows:

- the pictograms' lines shall have a weight of 1,2 pt and they and the texts (numbers and units) shall be 100 % black;
- the numbers under the pictograms shall be in Verdana Bold 16 pt with the units in Verdana Regular 12 pt and they shall be centred under the pictograms;
- the [unit] values shall be in Verdana Bold 12 pt with the 'XX' in Verdana Regular 12 pt and they shall be placed either on the right side of the xx pictogram or inside the pictogram representing the xx;
- for [product x]: if the appliance contains [select], only the relevant pictograms, as set out in point 3, shall be shown and centred between the internal divider below the water heating pictogram or energy consumption and the bottom of the energy label;

⓫ the number of the regulation shall be 100 % black and in Verdana Regular 6 pt.

Note to CF:

The examples here are illustrative only. After discussion of the elements of these illustrative designs, and on the basis of these discussions, the graphic design department of the Commission will prepare the final design.

While some other energy labels for household appliances may be largely understandable for an untrained consumer, this is not possible, unless for simple gas/oil/electric boilers, for the more complex heaters. The primary target audience for this energy label is a trained professional installer that can use the energy label to gain a quick insight of him/herself in the efficiency of products on the market, knowledge that he/she can then transfer to the final consumer backed up by a label that is anyway easier to understand –with the right explanation-- than the technical documentation. Market studies show that the installer is the main influencer of heater purchasing and, in any case, a prudent consumer will request offers from several of these installers.

Annex IV

Product information sheet

1. GENERAL

1.1. The information in the product information sheet of the products presented hereafter shall be provided in the format of the tables given and shall be included in the product brochure or other literature provided with the product.

1.2. One product information sheet may cover a number of water heater models supplied by the same supplier;

1.3. The information contained in the product information sheet may be given in the form of a copy of the label, either in colour or in black and white. Where this is the case, the information listed in point 1.1 not already displayed on the label shall also be provided.

2. WATER HEATER

Water heaters

Supplier's name or trademark:		
Model identifier:		
Water heater type:	[EIWH/ ESWH/ GIWH/ GSWH/ mCHPWH/ HPWH/ TDHPWH]	
Package	[No/Yes, with solar-assist/ Yes, with shower heat recovery]	
Load Profile declared (as Table 5)	[3XS..4XL]	
Alternative Load Profile declared, if any [3XS..4XL]:	[3XS..4XL]	
Energy label class:	[A..G]	
Thermostat temperature setting, as sold	oC	
Sound power level heat pump outdoor	dB(A)	
Operating at off-peak hours?	[y/n]	
Smart?	[y/n]	
H2-ready	[y/n]	
For all water heaters and packages	Average climate	
Water heater efficiency (ηwh)	x %	
Annual electricity consumption (AEC)	x kWhe/a	
Annual fuel consumption (AEF, in GCV)	x kWh /a	
For heat pump water heaters and solar-assist	Warmer climate	Colder climate
Water heater efficiency (ηwh)	x%	x,x
Annual electricity consumption (AEC)	x kWhe/a	x kWhe/a
Annual fuel consumption (AEF, in GCV)	x kWh /a	x kWh /a

3. HOT WATER STORAGE TANK

Hot water storage tank

Supplier's name or trademark:	
Model identifier:	
Energy efficiency class of the model, determined in accordance with point 2 of Annex II;	[A..G]
Standing loss in W	x
Storage volume in litres	x

4. SOLAR DEVICES

Solar devices	
Supplier's name or trademark:	
Model identifier:	
Solar device efficiency factor for water heating (per climate: for collector surface versus tapping load profile, in %), *to be supplied in table format*	x %
Gross collector aperture area (Ag, m²)	x,x m²
Gross Thermal Yield (GTY), in kWh/a of a solar device per climate	x kWh
Tank factor f_{tank}	x,xx

5. DRAIN WATER HEAT RECOVERY DEVICE

Drain water heat recovery device	
Drain water heat recovery device factor (f_{SWHRD}) in decimals, per load profile, to be supplied in table format for multiple load profiles	x,xx
Drain water heat recovery efficiency, per applicable flow rate, in decimals	x,xx

6. PACKAGE OF WATER HEATER AND SOLAR DEVICE

Package of water heater and solar device	
Load Profile declared (as set out in Table 5)	[3XS..4XL]
Water heater efficiency (without solar assistance)	x%
Solar device efficiency	x%
Tank factor (as set out in Annex VIII)	x,x
Solar package water heating efficiency	x%

7. PACKAGE OF WATER HEATER AND DRAIN WATER HEAT RECOVERY DEVICE

Package of water heater and drain water heat recovery device	
Load Profile declared (as set out in Table 5)	[3XS..4XL]
Water heater efficiency (without drain water device)	x%
Drain water heat recovery device efficiency, per applicable flow rate, in decimals	x,xx
Drain water heat recovery device factor (f_{DWHRD}) in decimals, per load profile, to be supplied in table format for multiple load profiles	x,xx
Drain water heat recovery package water heating efficiency	x%

8. EXAMPLES OF LOOK-UP TABLES SOLAR DEVICES AND DRAIN WATER HEAT RECOVERY DEVICE

Example of presenting solar device efficiencies for multiple combinations of number of solar collectors in solar device, climate and load profiles in a single table (fictive values)

Climate	**Number of solar collectors supplied in solar device**	**Load profile**					
		M	**L**	**XL**	**XXL**	**3XL**	**4XL**
Average	lowest	182%	140%	114%	103%	minimum is 100%	
	inbetween	..	..	..	..	..	..
	highest	maximum is 450%		449%	394%	273%	186%
Colder	lowest	167%	134%	111%	102%	minimum is 100%	
	inbetween	..	..	..	..	..	..
	highest	maximum is 240%				233%	168%
Warmer	lowest	332%	205%	158%	143%	119%	105%
	inbetween	..	..	..	..	..	..
	highest	maximum is 500%					314%

Example of presenting drain water heat recovery factors for multiple load profiles in a single table (fictive values)

Load profile	**3XS**	**XXS**	**XS**	**S**	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
f_{SWHRD}, in decimal	not applicable			1.20	1.15	1.05				

Note that minimum shower water volume flow rates apply for each load profile and efficiencies of drain water heat recovery devices may be dependent on volume flow rates.

Annex V

Technical documentation

1. For all products in scope, the technical documentation referred to in Article 3(2)(c) shall include:

   (a) the name and address of the supplier;

   (b) a description of the water heater model sufficient for its unambiguous identification;

   (c) where appropriate, the references of the harmonised standards applied;

   (d) where appropriate, the other technical standards and specifications used;

   (e) the identification and signature of the person empowered to bind the supplier;

   (f) any specific precautions that shall be taken when the water heater is assembled, installed or maintained.

   Furthermore, depending on the product, the technical documentation referred to in Article 3(2)(c) shall also include:

2. for water heaters

   (g) the results of the measurements for the technical parameters specified in point 2 of Annex IV;

   (h) the results of the calculations for the technical parameters specified in point 2 of Annex VIII;

3. for hot water storage tanks

   (g) the results of the measurements for the technical parameters specified in point 3 of Annex IV;

4. For solar devices

   (g) the results of the measurements for the technical parameters as specified in point 4 of Annex IV;

5. For packages of water heater and solar device

   (g) Technical parameters:

   – The water heating efficiency in %, rounded to the nearest integer;

   – The technical parameters set out in points 1 to 4 of this Annex, as appropriate.

Annex VI

Information to be provided in visual advertisements, in technical promotional material or other promotional material, in distance selling except distance selling on the internet

(1) In visual advertisements for *the products in the scope*, for the purposes of ensuring conformity with the requirements laid down in point 1(e) Article 3 and point (c) of Article 4, the energy efficiency class and the range of energy efficiency classes available on the label shall be shown as set out in point 4 of this Annex.

(2) In technical promotional material or other promotional material for *water heaters, hot water storage tanks and/or packages of water heaters with solar devices, hot water storage tanks and/or drain water heat recovery devices,* for the purposes of ensuring conformity with the requirements laid down in point 1(f) Article 3 and point (d) of Article 4 the energy efficiency class and the range of energy efficiency classes available on the label shall be shown as set out in point 4 of this Annex.

(3) Any paper based distance selling of water heaters, storage tanks and/or packages of water heaters with solar devices, hot water storage tanks and/or drain water heat recovery devices must show the energy efficiency class and the range of energy efficiency classes available on the label as set out in point 4 of this Annex.

(4) The energy efficiency class and the range of energy efficiency classes shall be shown, as indicated in Figure 4, with:

(a) an arrow containing the letter of the energy efficiency class, in white, Calibri Bold and in a font size at least equivalent to that of the price, if the price is shown, in all other cases clearly visible and legible font size;

(b) the colour of the arrow matching the colour of the energy efficiency class;

(c) the range of available energy efficiency classes if the label class rating is not climate dependent or the applicable climate if the label class rating is climate dependent in 100 % black; and

(d) the size shall be such that the arrow is clearly visible and legible. The letter in the energy efficiency class arrow shall be positioned in the centre of the rectangular part of the arrow, with a border of 0,5 pt in black around the arrow and the letter of the energy efficiency class.

By derogation, if the visual advertisement, technical promotional material or other promotional material or paper based distance selling is printed in monochrome, the arrow can be in monochrome in that visual advertisement, technical promotional material, other promotional material or paper based distance selling.

Figure 4 Coloured/monochrome left/right arrow, if not climate dependent

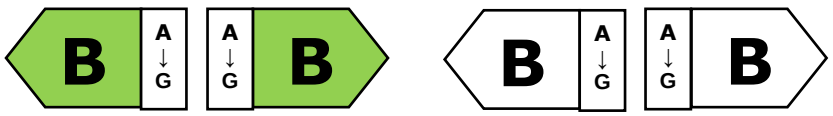
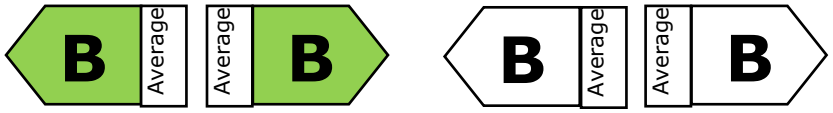


Figure 5 Coloured/monochrome left/right arrow, if climate dependent



5) Telemarketing based distance selling must specifically inform the customer of the energy efficiency class of the product and of the range of energy efficiency classes available on the label, and that the customer can access the full label and the product information sheet through a free access website, or by requesting a printed copy.

6) For all the situations mentioned in points 1 to 3 and 5, it must be possible for the customer to obtain, on request, a printed copy of the label and the product information sheet.

ANNEX VII

Information to be provided in the case of distance selling through the internet

1) The appropriate label made available by suppliers in accordance with point 1(g) of Article 3 shall be shown on the display mechanism in proximity to the price of the product, if the price is shown, and in all other cases in proximity to the product. The size shall be such that the label is clearly visible and legible and shall be proportionate to the size specified in point 4 of Annex III. The label may be displayed using a nested display, in which case the image used for accessing the label shall comply with the specifications laid down in point 3 of this Annex. If nested display is applied, the label shall appear on the first mouse click, mouse roll-over or tactile screen expansion on the image.

2) The image used for accessing the label in the case of a nested display, as indicated in Figure 2, shall:

   a) be an arrow in the colour corresponding to the energy efficiency class of the product on the label;

   b) indicate the energy efficiency class of the product on the arrow in white, Calibri Bold and in a font size equivalent to that of the price, if the price is shown, in all other cases a clearly visible and legible font size; and

   c) have the range of available energy efficiency classes in 100 % black; and,

   d) have one of the following two formats, and its size shall be such that the arrow is clearly visible and legible. The letter in the energy efficiency class arrow shall be positioned in the centre of the rectangular part of the arrow, with a visible border in 100 % black placed around the arrow and the letter of the energy efficiency class:

Figure 6 Coloured/monochrome left/right arrow, if not climate dependent

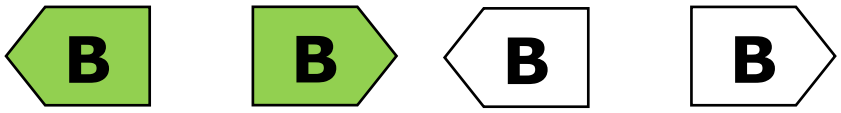
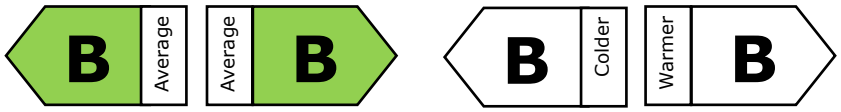


Figure 7 Coloured/monochrome left/right arrow, if climate dependent



(Example shows "Average" in coloured arrows, and "Colder" and "Warmer" in monochrome arrows)

3) In the case of a nested display, the sequence of display of the label shall be as follows:

   a) the image referred to in point 2 of this Annex shall be shown on the display mechanism in proximity to the price of the product, if the price is shown, and in all other cases in proximity to the product;

   b) the image shall link to the label set out in Annex III;

   c) the label shall be displayed after a mouse click, mouse roll-over or tactile screen expansion on the image;

   d) the label shall be displayed by pop up, new tab, new page or inset screen display;

   e) for magnification of the label on tactile screens, the device conventions for tactile magnification shall apply;

f) the label shall cease to be displayed by means of a close option or other standard closing mechanism;

g) the alternative text for the graphic, to be displayed on failure to display the label, shall be the energy efficiency class of the product in a font size equivalent to that of the price, if the price is shown, and in all other cases a clearly visible and legible font size.

4) The electronic product information sheet made available by suppliers in accordance with point 1(h) of Article 3 shall be shown on the display mechanism in proximity to the price of the product, if the price is shown, and in all other cases in proximity to the product. The size shall be such that the product information sheet is clearly visible and legible. The product information sheet may be displayed using a nested display or by referring to the product database, in which case the link used for accessing the product information sheet shall clearly and legibly indicate 'Product information sheet'. If a nested display is used, the product information sheet shall appear on the first mouse click, mouse roll-over or tactile screen expansion on the link.

ANNEX VIII

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 6 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 VIIIa 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;

(b) for measurements under (a), the cold sanitary water inlet temperature T_c is +10 °C and the ambient temperature T_a 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 [climate]	Non heated space air	Exhaust air	Brine	Water
Temperature	[average] +7 °C (+6 °C) [colder] +2 °C (+1 °C) [warmer] +14 °C (+13 °C)	+15 °C (12 °C)	+20 °C (+15 °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 m³/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 m³/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) 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;

(i) 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;

(j) 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 Θ_c is nominally 10°C. The average outlet temperature during withdrawal Θ'_p (in °C) is assessed, corrected for sharp fluctuations in temperature readings as appropriate. The normalised value of Θ'_p is Θ_p (in °C), which is calculated as

$$\Theta_p = (\mathrm{T}_{set} - 10)\frac{(\Theta'_p - \Theta_c)}{(T_{set} - \Theta_c)} + 10$$

Θ_p and the volume of the hot water withdrawn with temperature ≥40°C V_{40exp} (in litres) are the inputs for the calculation of *V40* in section 4, sub (d);

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

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	Q_{tap}	f	T_m	f	T_m		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
07:00	**0,015**	2	25	**0,105**	**2**	**25**				**0,105**	3	25		**0,105**	3	25		07:00	**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		07:05	**1,4**	6	40										08:01	**5,04**	24	25	
07:15	**0,015**	2	25															07:15					**1,82**	6	40		**1,82**	6	40		09:00	**1,68**	24	25	
07:26	**0,015**	2	25															07:26					**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		07:30	**0,105**	3	25										11:45	**1,68**	24	25	
08:01														**0,105**	3	25		07:45	**0,105**	3	25		**4,42**	10	10	40	**6,24**	16	10	40	12:45	**2,52**	32	10	55
08:15														**0,105**	3	25		08:01					**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		08:05	**3,605**	10	10	40									18:30	**3,36**	24	25	
08:45														**0,105**	3	25		08:15					**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		08:25	**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		08:30	**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	08:45	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25						
11:45	**0,015**	2	25	**0,105**	2	25				**0,105**	3	25		**0,105**	3	25		09:00	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25			4XL			
12:00	**0,015**	2	25	**0,105**	2	25								**0,105**	3	25		09:30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25		h	Q_{tap}	f	T_m	T_p
12:30	**0,015**	2	25	**0,105**	2	25												10:00					**0,105**	3	25		**0,105**	3	25			kWh	l/ min	°C	°C
12:45	**0,015**	2	25	**0,105**	2	25	**0,525**	3	35	**0,315**	4	10	55	**0,315**	4	10	55	10:30	**0,105**	3	10	40	**0,105**	3	10	40	**0,105**	3	10	40					
14:30	**0,015**	2	25											**0,105**	3	25		11:00					**0,105**	3	25		**0,105**	3	25		07:00	**22,4**	96	40	
15:00	**0,015**	2	25															11:30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25		08:01	**10,08**	48	25	
15:30	**0,015**	2	25											**0,105**	3	25		11:45	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25		09:00	**3,36**	48	25	
16:00	**0,015**	2	25															12:45	**0,315**	4	10	55	**0,735**	4	10	55	**0,735**	4	10	55	10:30	**1,68**	48	10	40
16:30														**0,105**	3	25		14:30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25		11:45	**3,36**	48	25	
18:00				**0,105**	2	25				**0,105**	3	25		**0,105**	3	25		15:00					**0,105**	3	25		**0,105**	3	25		12:45	**5,04**	64	10	55
18:15				**0,105**	2	25				**0,105**	3	40		**0,105**	3	40		15:30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25		15:30	**5,04**	48	25	
18:30	**0,015**	2	25	**0,105**	2	25								**0,105**	3	40		16:00					**0,105**	3	25		**0,105**	3	25		18:30	**6,72**	48	25	
19:00	**0,015**	2	25	**0,105**	2	25								**0,105**	3	25		16:30	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25		20:30	**11,76**	64	10	55
19:30	**0,015**	2	25	**0,105**	2	25												17:00					**0,105**	3	25		**0,105**	3	25		21:30	**24,08**	96	40	
20:00				**0,105**	2	25												18:00	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25		Q_{ref}	**93,52**			
20:30							**1,05**	3	35	**0,42**	4	10	55	**0,735**	4	10	55	18:15	**0,105**	3	40		**0,105**	3	40		**0,105**	3	40						
20:45				**0,105**	2	25												18:30	**0,105**	3	40		**0,105**	3	40		**0,105**	3	40		*Legend:*				
21:00				**0,105**	2	25												19:00	**0,105**	3	25		**0,105**	3	25		**0,105**	3	25		*Qtap* is kWh energy				
21:15	**0,015**	2	25	**0,105**	2	25								**0,105**	3	25		20:30	**0,735**	4	10	55	**0,735**	4	10	55	**0,735**	4	10	55	*f* is flow rate in				
21:30	**0,015**	2	25							**0,525**	5	45		**1,4**	6	40		20:46					**4,42**	10	10	40	**6,24**	16	10	40	*Tm* minimum				
21:35	**0,015**	2	25	**0,105**	2	25												21:00	**3,605**	10	10	40									*Tp* peak temperature °C				
21:45	**0,015**	2	25	**0,105**	2	25												21:15					**0,105**	3	25		**0,105**	3	25		cold water temperature				
																		21:30	**0,105**	3	25		**4,42**	10	10	40	**6,24**	16	10	40	specific heat water:				
Q_{ref}	**0,345**			**2,100**			**2,100**			**2,100**				**5,845**				Q_{ref}	**11,655**				**19,07**				**24,53**				1,163 Wh/kgK				

4. CALCULATION METHODS WATER HEATERS AND STORAGE TANKS

(a) The water heating energy efficiency η_{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:

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

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;

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 52ºC and the water heating efficiency η_{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

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

If SCF ≥ 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 mixed water at 40°C (*V40*), in litres of 40°C water, is based on the input values assessed in section 3, sub (i) and calculated as

$$V40 = V_{40\_exp} \times \frac{(\Theta_p - 10)}{30}$$

(d) 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 *V40* value as assessed in sub (c) above,

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

based on Θ_c of +10°C, Tset of +65°C and Θ_p equals Θ'_p , the normalised average temperature Θ_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.

5. SOLAR DEVICE EFFICIENCY FOR WATER HEATING

(a) Solar device testing

The solar collector(s) and, if applicable, the hot water storage tank(s), shall be tested separately, except when the performance of the solar device depends on the integral assessment of the solar collector in combination with hot water storage tank (such as with integrated collector-storage systems (ICS) and many thermosiphon systems).

The standards as referenced in Annex VIIIa shall be applied. The climate data to be used for determining GTY shall relate to the location of Helsinki for the colder climate, Strasbourg for the average climate, and Athens for the warmer climate. The orientation for non-tracking collectors shall be South for all locations. The inclination for non-tracking collectors shall be 45º for the colder climate, 35º for the average climate and 25º for the warmer climate. For collectors designed to track the path of the sun, the optimal tracking parameters for the above locations, as declared by the manufacturer, shall be used.

When performing tests of solar collectors and/or subsequent calculations the volume of the hot water storage tank shall be no less than 0,07 litre per kWh of GTY of the collector array(s).

(b) Solar device efficiency for water heating

1) The GTY of a solar device, the solar collector(s) of which were tested independent from the hot water storage tank shall be calculated using the calculation method referenced in ANNEX VIIIa.

2) The GTY of a solar device, the solar collector(s) and hot water storage tank of which form an inseparable unit (e.g. ICS - Integrated Collector Storage) or have been tested together in order to determine the performance of the solar device (e.g. for thermosiphon systems), shall be the amount of heat delivered by the solar device Q_{sol} determined for the smallest load profile where the Q_{nonsol} for the 'warmer' climate is equal to or higher than the limit values shown in the table below.

Where:

a) The limit value for Q_{nonsol} is, in kWh/a:

	M	**L**	**XL**	**XXL**	**3XL**	**4XL**
Limit value	520	950	1510	1910	3570	7060

b) The non-solar heat required Q_{nonsol}, in kWh/a

$$Q_{nonsol} = Q_{wh,sol} - Q_{sol}$$

c) The annual solar water heating demand $Q_{wh,sol}$, in kWh/a

$$Q_{wh,sol} = 0.6 * 366 * \left(Q_{ref} + 1.09\right) \text{, in kWh/a;}$$

d) The solar heat delivered Q_{sol} is established using standards referenced in Annex VIIIa, in kWh/a;

3) The solar device efficiency for water heating $\eta_{sol,wh}$ per climate condition is calculated as:

$$\eta_{sol,wh} = \left(a * \left(\frac{GTY}{Q_{wh,sol}}\right)^2 + \left(b + d * f_{profile}\right) * \frac{GTY}{Q_{wh,sol}} + c \right)$$

with:

- *GTY* is the Gross Thermal Yield per year (kWh/yr) of the solar device as established under point 1) or point 2), per applicable climate condition;
- *Qwh,sol* see point 2)c) above, for the applicable load profile;
- *Coefficient a, b, c and d* as per Table 6 below;
- $f_{profile}$ as per Table 7 below, where '*profile*' signifies the applicable load profile: M, L, XL, etc.;

Table 6 Coefficient a, b, c, and d for solar device efficiency for water heating

Solar device water heating efficiency coefficients per climate	**a**	**b**	**c**	**d**
Average	-0.22	1.93	0.55	0.36
Colder	-0.52	1.94	0.60	0.28
Warmer	1.17	0.59	0.83	0.50

Table 7 Coefficient $f_{profile}$ for solar device efficiency for water heating

Load profile	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
$f_{profile}$ (-)	f_M	f_L	f_{XL}	f_{XXL}	f_{3XL}	f_{4XL}
	0	0.92	1.38	1.64	2.43	3.56

The solar device efficiency as calculated for a combination of (climate specific) GTY and load profile shall not be less than 100 % and not more than the upper limits 240 %, 450 % and 500 % for the Colder, Average and Warmer climate respectively.

6. DRAIN WATER DRAIN HEAT RECOVERY DEVICE FACTOR

1) The contribution of the shower drain heat recovery device is calculated as follows:

   a) Use the *drain water heat recovery efficiency* (established in accordance with appropriate measurement methods in Annex VIIIa) determined for a shower water flow rate equal to or exceeding the values indicated per load profile below and at a shower water temperature between 35 and 45°C:

Table 8 Hot water volume flow rates

Load profile	**3XS**	**XXS**	**XS**	**S**	**M**	**L**	**XL**	**XXL**	**3XL**	**4XL**
f (l/min)	not applicable		3	5	6	8	8	12	48	96

Note to CF: For XL and XXL the share of showers is estimated at 40 %. For the other load profiles the share of showers is taken from larger than 40 °C water draw-offs in the morning and evening. Where the flow rate of the load profile exceeds the flow rate at which an individual DWHRD has been tested, the supplier of the package shall ensure that the number of DWHRDs supplied suffices to handle the flow rate indicated in the table above.

   b) The drain water heat recovery device factor f_{DWHRD} is calculated as:

$$f_{DWHRD} = Q_{ref} \frac{1}{\left(1 - \left(\eta_{DWHRD} * 0.4\right)\right)}$$

   Where:

   - η_{DWHRD} is the drain water heat recovery efficiency;
   - the value of 0.4 representsthe limited share of shower thermal energy in the total reference water energy, the difference in temperature of heated water leaving the device and shower water being offered to the device, corrections for potential suboptimal connection to heaters and taps, and corrections for other losses.

7. STANDING LOSSES OF HOT WATER STORAGE TANKS

(a) The standing losses of a hot water storage tank shall be determined with its effective thermal contents be it system or sanitary water are heated at 65ºC, after reaching thermal stabilisation and an ambient temperature of 20ºC.

(b) Heat exchangers shall be filled with system or sanitary water (whichever applies) where it can be assumed that the filled condition contributes significantly to standing loss measured, such as heat exchangers located on the perimeter of the hot water storage tank.

(c) The standing losses S of storage tanks shall be the energy required to keep the storage tank contents at the required temperature divided by the test duration.

(d) The multivalent tank correction (*mvc*) is a correction of 15 W to be added to S for higher standing losses in case of multivalent tanks that contain multiple heat exchangers for heat from various energy sources and renewable energy (solar, ambient heat, waste heat, etc.) in particular.

8. PACKAGES OF WATER HEATERS AND SOLAR DEVICES

The solar water heating efficiency of a solar assisted water heater is calculated, for each climate condition, as:

$$\eta_{wh+sol} = \eta_{sol,wh} * \eta_{wh} * f_{tank}$$

with

- η_{wh+sol} is water heating efficiency of the water heater without solar assistance, in %;
- $\eta_{sol,wh}$ is solar device efficiency for water heating, in %;
- η_{wh} is energy efficiency of the water heater (without solar-assistance);
- f_{tank}– correction factor for solar storage tank losses, specified for the energy efficiency class of the storage tank, taken from the product information sheet of the storage tank.

Storage tank energy label class	**A**	**B**	**C**	**D**	**E**	**F**
Storage tank correction factor f_{tank}	1.15	1.1	1.05	1	0.9	0.8

9. PACKAGES OF WATER HEATERS AND DRAIN WATER HEAT RECOVERY DEVICES

The water heating efficiency of a water heater with drain water heat recovery device (SWHRD) is calculated as

$$\eta_{wh+DWHRD} = \eta_{DWHRD} * \eta_{wh}$$

with

- η_{DWHRD} is DWHRD factor, in %;
- $H_{wh+DWHRD}$ is water heater efficiency with DWHRD, in %;

η_{wh} is energy efficiency of the water heater without DWHRD;

ANNEX VIIIa

Transitional Methods

1. LIST OF REFERENCED STANDARDS AND COMMENTS

Table 6

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

Parameter	**Source**	**Reference Test Method / Ttile**	**Notes**
instantaneous water heaters			
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 η_{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 (L_{WA})			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	
Electric storage water heater			
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 η_{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 η_{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 Qfuel,week,smart			
SCF			
Fuel storage water heater			
Rated heat output, Prated			Prated is called nominal useful output Pn 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 η_{wh}		gaseous fuels: EN 89:2015 Gas-fired storage water heaters for the production of domestic hot water liquid fuels: prEN 303-6:2017 Clause 10.1	refers to prEN13203:2017 Clause 7.1
Sound power level (L_{WA})		EN 89:2015 Gas-fired storage water heaters for the production of domestic hot water Clause 11.	
NOx emissions / gaseous		EN 89:2015 Clause 10	
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		EN 89:2015 Clause 6.11	Referred to as nominal capacity
mixed water at 40 °C		EN 89:2015 Clause 7.4	
Daily electricity consumption Qelec		prEN13203:2017 Clause 5.5	
Daily fuel consumption Qfuel		prEN13203:2017 Clause 7.1	
Weekly electricity consumption Qelec,week			

Weekly electricity consumption 'smart' enabled Qelec,week,smart			Smart control is not covered by standards for fuel fired appliances
Weekly fuel consumption Qfuel,week			
Weekly fuel consumption 'smart' enabled Qfuel,week,smart			
SCF			
Electric heat pump water heater			
Rated heat output / water heating (Prated)		EN 16147:2017 Clause 7.14.1	
Water heating energy efficiency η_{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		EN 16147:2017 Clause 7.6	"Rated volume"
mixed water at 40 °C		EN 16147:2017 Clause 7.10	
Electric input power			Use electrical energy consumption W_{EL-LP} (Clause 7.9.2) divided by 24h
Daily electricity consumption Qelec		EN 16147:2017 Clause 7.13.1	
Weekly electricity consumption Qelec,week		EN 16147:2017 Clause 7.11.2	
Weekly electricity consumption 'smart' enabled Qelec,week,smart			
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 η_{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 3rd 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		prEN 13203-6:2020 Clause 5.1.1	
mixed water at 40 °C		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 η_{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		prEN 13203-4:2020 Clause 5.1	
mixed water at 40 °C		EN 89:2015 Clause 6.11	There is no determination of storae 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			

Solar devices			
Gross Thermal Yield (GTY) of solar devices the solar collectors of which are tested separately		ScenoCalc v6.1, using inputs from ISO 9806:2017 Use prEN 12975:2021, Annex B, Clause B.2.1 for calculation of GTY, Clause B.1.2 and B.3 for the climate reference conditions.	The calculation of GTY shall be climate specific (warmer, average, colder) and take into account orientation and inclination as indicated in Annex VIII point 5. The GTY is calculated as the average thermal yield of collector operating temperatures of 25ºC and 50ºC.
Solar heat delivered (QL) of solar devices the solar collectors and hot water storage tanks of which are tested in an integral assessment.		Use EN 12976-2:2019, section 5.9, referring to ISO 9459-5:2007 (STB). Note that: - Table B.5 of EN 12976-2:2019 gives the draw-offs to use to calculate the annual performance when using ISO 9459-5:2007. - Table B.5 of EN 12976-2:2019 gives references for three ErP climate regions (average:Strasbourg, colder:Helsinki and warmer:Athens). Hourly files are available from Solar Heat Europe	
Zero-loss efficiency (η_0) determined, in decimals		ISO 9806:2017	The zero-loss efficiency shall be determined on the basis of the gross area (as used in ISO 9806). It is an input to ScenoCalc v6.1
Incidence angle modifier (IAM)		ISO 9806:2017	The incidence angle modifier shall be determined for of 50º. It is an input to ScenoCalc v6.1
First-order coefficient (a1) in W/(m^2*K)		ISO 9806:2017	The first-order coefficient shall be determined on the basis of the gross area (as used in ISO 9806). It is an input to ScenoCalc v6.1

Second-order coefficient (a2) in W/(m^2*K)		ISO 9806:2017	The second-order coefficient shall be determined on the basis of the gross area (as used in ISO 9806). It is an input to ScenoCalc v6.1
Correction factor $f_{profile}$		This document, Table 7	
Correction factor a, b, c and d, for water heating		This document, Table 6	
Solar device efficiency for water heating $\eta_{sol,wh}$		This document, Annex VIII, section 5, b), 3)	The value is determined for the applicable climates and annual heating demand
Tank factor f_{tank}		This document, Annex VIII, section 8	
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. The storage volume of PCM tanks is the equivalent volume; see the calculation under point xx [enter reference]
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 volume			See calculation in Annex VIII, point xx
Drain water heat recovery device			
Drain water heat recovery device efficiency (%)		NEN 7120:2011/C2:2011 NTA8800:2020, Bijlage U CSTB Protocole RECADO 2015	All three test standards may be accepted as method to determine shower drain heat recovery device efficiency, as long as the test conditions in ANNEX VII, point 4 are met. The efficiency to use in calculations should be determined using shower water flow rates equal or larger than the water flow rates shown in the table (combination of devices to achieve sufficient capacity is allowed)

ANNEX IX

Product compliance verification by market surveillance authorities

Note to CF: Annex IX uses this revised text of 2016/2282. Table 7 uses 'parameters', not 'measured parameters'. Also uses some changes from the omnibus regulation

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

Parameters	**Verification tolerances**
Water-heating energy efficiency, η_{wh}	The determined value shall not be more than 8 % lower than the declared value by
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, $V40$	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 %