

Working Document

COMMISSION DELEGATED REGULATION (EU) No .../..

of [...]

implementing Directive 2010/30/EU of the European Parliament and of the Council with regard to energy labelling of water heaters and hot water storage tanks

THE EUROPEAN COMMISSION,

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

Having regard to Directive 2010/30/EU of 19 May 2010 of the European Parliament and of the Council on the indication by labelling and standard product information of the consumption of energy and other resources energy-related products¹, and in particular Article 11 thereof,

Whereas:

- (1) Directive 2010/30/EU requires the Commission to adopt delegated acts as regards the labelling of energy-related products representing significant potential for energy savings and having a wide disparity in performance levels with equivalent functionality.
- (2) The energy consumed by water heaters and hot water storage tanks accounts for a significant share of the energy demand in the Union, and water heaters with equivalent functionality have a wide disparity in term of energy efficiency and standing loss. The energy efficiency of water heaters and the standing loss of hot water storage tanks can be significantly improved. Water heaters and hot water storage tanks should therefore be covered by requirements on energy labelling.
- (3) Harmonised provisions for indicating the energy efficiency and consumption of water heaters and hot storage tanks by labelling and standard product information should be established in order to provide incentives for manufacturers to improve the energy efficiency of water heaters and hot water storage tanks, encourage end-users to purchase energy-efficient models, reduce the energy consumption of these products, and contribute to the functioning of the internal market.
- (4) The combined effect of the provisions set out in this Regulation and Commission Regulation (EC) No .../... of ... implementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for

¹ OJ L 153, 18.6.2010, p. 1.

water heaters and hot water storage tanks² could amount to annual energy savings of ... by 2020, compared to the situation if no measures were taken.

- (5) The information provided on the label should be obtained through reliable, accurate and reproducible measurement procedures that take into account the recognised state-of-the-art measurement methods including, where available, harmonised standards adopted by the European standardisation bodies, as listed in Annex I to Directive 98/34/EC of the European Parliament and of the Council of 22 June 1998 laying down a procedure for the provision of information in the field of technical standards and regulations and of rules on Information Society services³.
- (6) This Regulation should specify a uniform design and content of the label for water heaters and hot water storage tanks.
- (7) In addition, this Regulation should specify requirements as to the technical documentation and the fiche for water heating equipment and hot water storage tanks.
- (8) Moreover, this Regulation should specify requirements as to the information to be provided for any form of distance selling, advertisements and technical promotional material of water heaters and hot water storage tanks.

HAS ADOPTED THIS REGULATION:

Article 1
Subject matter

1. This Regulation establishes requirements for the labelling of and the provision of supplementary product information on water heaters and hot water storage tanks.
2. This Regulation shall not apply to:
 - (a) water heating equipment specifically designed for using biofuels;
 - (b) water heating equipment using solid fuels;
 - (c) water heating equipment within the scope of Directive 2001/80/EC on Large Combustion Plants;
 - (d) water heating equipment driven by district heating, including district heating using waste heat from power plants, waste incineration plants and industrial installations;
 - (e) components and sub-assemblies of water heating equipment other than storage tanks and solar preheat systems, including burners, heat exchangers and controls;
 - (f) equipment generating heat for room heating purposes.

² OJ L 191, 23.7.2009, p. 42.

³ OJ L 204, 21.7.1998, p. 37.

Article 2
Definitions

In addition to the definitions set out in Directive 2010/30/EC, the following definitions shall apply:

- (1) “water heater” means a device which:
 - is connected to an external supply of drinking or sanitary water;
 - generates and transfers heat to deliver drinking or sanitary hot water at certain temperature levels, quantities and flow rates during certain intervals;
 - has one or more heat generators, including cascades of the same type of heat generators;
 - provides drinking or sanitary hot water only, but does not provide heat for room heating;
- (2) “heat generator” means the part of a water heater that generates the heat using the following processes:
 - combustion of gaseous and/or liquid fossil fuels;
 - use of the Joule effect in electric resistance heating elements;
 - capture of solar thermal energy;
 - capture of ambient heat from air, water or ground source, and/or waste heat;
- (3) “biofuel” means a gaseous, liquid or solid fuel produced from biomass;
- (4) "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 agriculture, as well as the biodegradable fraction of industrial and municipal waste;
- (5) "fuel" means a gaseous, liquid or solid fuel of fossil origin;
- (6) "hot water storage tank", hereafter referred to as "storage tank", means a vessel for storing drinking, sanitary or room heating hot water, including with additives, and including vessels equipped with the means for indirect heating or cooling the water content by an external heat source or heat sink;
- (7) "solar preheat system" means a device composed of solar collector and other components, including storage tank, for the delivery of thermal energy to preheat water prior to its entry into a further heat generator;
- (8) "solar collector" means a device designed to absorb solar irradiation and to transfer the resulting thermal energy to a fluid passing through it;

- (9) “energy efficiency”, *etawah*, means the ratio between the useful energy provided by a water heater, and the energy required for its generation, taking also into account effects of hot water distribution and waste heat recovery;
- (10) "standing loss", *S*, means the heating power dissipated from a storage tank at certain water and ambient temperatures, in Watts.

Article 3
Responsibilities of suppliers

1. Suppliers of water heaters shall ensure that:
- (a) each water heater is supplied with a printed label in the format and containing information as set out in point 1 of Annex II.
 - (b) a product fiche, as set out in point 1 of Annex III, is made available;
 - (c) the technical documentation, as set out in point 1 of Annex IV, is made available on request to the authorities of Member States and to the Commission;
 - (d) any advertisement for a specific water heater model contains the energy efficiency class under average climate conditions, if the advertisement discloses energy-related or price information;
 - (e) any technical promotional material concerning a specific water heater model, which describes its specific technical parameters, includes the energy efficiency class under average climate conditions, of that model;
 - (f) the format of the label set out in point 1 of Annex II is applied according to the following timetable:
 - (i) for water heaters placed on the market from [date to be inserted: 12 months after publication of this Regulation in the Official Journal of the European Union] labels shall be in accordance with point 1(1) of Annex II;
 - (ii) for water heaters placed on the market from [date to be inserted and to be aligned with stage 2 requirements of ecodesign regulation] labels for water heaters shall be in accordance with point 1(2) of Annex II;
2. Suppliers of storage tanks shall ensure that:
- (a) each storage tank is supplied with a printed label in the format and containing information as set out in point 2 of Annex II.
 - (b) a product fiche, as set out in point 2 of Annex III, is made available;
 - (c) the technical documentation, as set out in point 2 of Annex IV, is made available on request to the authorities of Member States and to the Commission;

- (d) any advertisement for a specific storage tank model contains the energy efficiency class, if the advertisement discloses energy-related or price information;
 - (e) any technical promotional material concerning a specific storage tank model, which describes its specific technical parameters, includes the energy efficiency class of that model.
3. Suppliers of solar preheat systems shall ensure that:
- (a) a product fiche, as set out in point 3 of Annex III, is made available;
 - (b) the technical documentation set out in point 3 of Annex IV is made available on request to the authorities of Member States.

Article 4
Responsibilities of dealers

1. Dealers of water heaters shall ensure that:
- (a) each water heater, at the point of sale, bears the label provided by suppliers in accordance with Article 3(1), in such a way as to be clearly visible;
 - (b) water heaters offered for sale, hire or hire-purchase, where the end-user cannot be expected to see the water heater displayed, are marketed with the information to be provided by the suppliers in accordance with point 1 of Annex V;
 - (c) any advertisement for a specific water heater model contains the energy efficiency class under average climate conditions, if the advertisement discloses energy-related or price information;
 - (d) any technical promotional material concerning a specific water heater model, which describes its specific technical parameters, includes the energy efficiency class under average climate conditions, of that model;
2. Dealers of storage tanks shall ensure that:
- (a) each storage tank, at the point of sale, bears the label provided by suppliers in accordance with Article 3(1), in such a way as to be clearly visible;
 - (b) storage tanks offered for sale, hire or hire-purchase, where the end-user cannot be expected to see the water heater displayed, are marketed with the information to be provided by the suppliers in accordance with point 2 of Annex V;
 - (c) any advertisement for a specific storage tank model contains the energy efficiency class, if the advertisement discloses energy-related or price information;

- (d) any technical promotional material concerning a specific storage tank model, which describes its specific technical parameters, includes the energy efficiency class of that model;
3. Dealers of solar preheat systems shall ensure that:
- (a) solar preheat systems are marketed with the information to be provided by the suppliers in accordance with point 3 of Annex V;

[NB: "installer label"]

- (b) offers for combinations of solar preheat systems with water heaters placed on the market by suppliers separately include the energy efficiency and the energy efficiency class of that combination under average, colder and warmer climate conditions to be provided by suppliers of solar preheat systems in accordance with point 3(b) of Annex III.

Article 5
Measurement methods

The information to be provided under Articles 3 and 4 shall be obtained by reliable, accurate and reproducible measurement procedures, which take into account the recognised state of the art measurement methods, as set out in Annex VI.

Article 6
Verification procedure for market surveillance purposes

When Member States assess the conformity of the declared energy efficiency class they shall apply the procedure laid down in Annex VII.

Article 7
Revision

The Commission shall review this delegated Regulation in the light of technological progress no later than five years after its entry into force.

Article 8
Transitional provision

Articles 3-6 shall not apply to printed advertisement and printed technical promotional material published before [date to be inserted: 16 months after publication of this delegated regulation in the Official Journal].

Article 9
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, [...]

For the Commission
The President

ANNEX I
Definitions applicable for the purposes of Annexes II to X

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

- (1) "Conventional water heater" means a water heater equipped with one or more conventional heat generator(s);
- (2) "conventional heat generator" means a heat generator that generates heat using the combustion of fuels or the Joule effect in electric resistance heating elements;
- (3) "heat pump water heater" means a water heater, which uses ambient and/or waste heat for heat generation;
- (4) "solar water heater" means a water heater, which uses solar heat for heat generation;
- (5) "load profile" means a certain sequence of water draw-offs, as specified in Annex VI, Table 1;
- (6) "water draw-off" means a certain combination of useful water flow rate, useful water temperature, useful water energy content and peak temperature, as specified in Annex VI, Table 1;
- (7) "useful water flow rate", f , means the flow rate in litres per minute for which hot water is contributing to the reference heat, as specified in Annex VI, Table 1;
- (8) "useful water temperature", T_m , means the water temperature for which hot water is contributing to the reference heat, as specified in Annex VI, Table 1;
- (9) "useful energy content", Q_{tap} , means the energy content of water provided at temperature equal to, or above, the useful temperature, and at flow rates equal to, or above, the useful water flow rate, as specified in Annex VI, Table 1;
- (10) "energy content of hot water" means the product of the specific heat capacity of water, the average temperature difference between the cold water input and hot water output, and the total mass of the hot water delivered;
- (11) "peak temperature", T_p , means the minimum water temperature in degrees Celsius to be achieved during water draw-off, as specified in Annex VI, Table 1;
- (12) "reference energy", Q_{ref} , means the sum of the energy content of water draw-offs in a specific load profile, as specified in Annex VI, Table 1;
- (13) "maximum load profile" means the load profile with the largest reference energy Q_{ref} defined in Annex VI, Table 1, which a water heater is capable to provide under the thermostat settings specified in point 2(c) of Annex VI and fulfilling the minimum temperature and flow rate conditions of that load profile;

- (14) "electricity consumption", Q_{elec} , means the consumption of electricity during 24 consecutive hours under a particular load profile and certain climate conditions, in kWh;
- (15) "fuel consumption", Q_{fuel} , means the consumption of fuels during 24 consecutive hours under a particular load profile and under certain climate conditions, in terms of the gross calorific value of the fuel, in kWh;
- (16) "gross calorific value" means the heat released when a certain fuel is burned completely with oxygen at a constant pressure, and when the products of combustion are returned to ambient temperature, in kWh;
- (17) "average flue gas temperature", T_{flue} , means the dry bulb temperature of combustion gases, in degrees Celsius;
- (18) "combustion efficiency", η_{comb} , means the efficiency taking into account only heat loss in flue gases;
- (19) "average climate conditions", "colder climate conditions" and "warmer climate conditions" mean the temperature and the global solar irradiance conditions characteristic for the cities of Strasbourg, Helsinki and Athens, respectively, as specified in point 4 of Annex VI;
- (20) "envelope volume" means the volume of the smallest rectangular-shaped or cylindrical envelope fitting the water heater envelope, in m³;
- (21) "input power" means the maximum design fossil fuel input rate, in kWh gross calorific value of the fuel per hour;
- (22) "back-up heater" means the conventional water heater or the heat pump water heater that is part of a solar water heater;
- (23) "back-up heater energy efficiency", $\eta_{awh_{bu}}$, means the energy efficiency of a back-up heater;
- (24) "smart control" means a device that automatically adapts the water heating process to the individual usage conditions with the aim to reduce energy consumption;
- (25) "smart control qualifying/non-qualifying", $smart$, means that a water heater equipped with smart controls fulfils/does not fulfil the criterion set out in point 6 of Annex VIII;
- (26) "fuel consumption with smart controls", $Q_{fuel,week,smart}$, and "electricity consumption with smart controls", $Q_{elec,week,smart}$, means the weekly fuel and electricity consumption with smart control function enabled, measured under the conditions set out in point 3 of Annex VI, in kWh;
- (27) "fuel consumption without smart controls", $Q_{fuel,week}$, and "electricity consumption without smart controls", $Q_{elec,week}$, means the weekly fuel and electricity consumption with smart control function disabled, measured under the conditions set out in point 3 of Annex VI, in kWh;

- (26) "storage volume", V , means the nominal volume of a storage tank, in litres;
- (27) "annual electricity consumption", AEC , means the annual electricity consumption of a water heater under the maximum load profile and certain climate conditions, in kWh;
- (28) "annual fuel consumption", AFC , means the annual gas or oil consumption of a water heater under the maximum load profile and certain climate conditions, in kWh;
- (29) "conversion factor", $prim$, means the EU average of the amount of primary energy used for providing one unit electricity to the end-user;
- (30) "distribution loss", Q_{distr} , means the heat loss due to the distribution of hot water inside a dwelling, in kWh;
- (31) "reference distribution loss", $Q_{distref}$, means the average distribution loss of the EU stock of water heaters, in kWh;
- (32) "recoverable waste heat", $Q_{r\text{waste}}$, means the heat generated by the water heater that is not transferred to water or flue gases, in kWh;
- (33) "recovered fraction of waste heat", q_{recov} , means the fraction of the waste heat $Q_{r\text{waste}}$ that contributes to useful space heating;
- (34) "flue gas heat", $Q_{fluegas}$, means the average sensible heat contained in the flue gasses of water heaters using fuels emitted during a particular load profile, in kWh.

[NB: "solar parameters" related to the methods pursuant to EN 13203, EN 15316-4-3 and ISO 9459-5:2007]

- (35) "global solar irradiance" means the rate of total incoming solar energy, both direct and diffuse, on a collector plane with an inclination of 45 degrees and southward orientation at the Earth's surface;
- (36) "collector aperture area", A_{sol} , means the solar collector maximum projected through which un-concentrated solar radiation enters the collector, in m^2 ;
- (37) "zero-load efficiency", η_{a0} , means the zero-loss collector efficiency;
- (38) "first order coefficient", a_1 , means the heat loss coefficient, in Watts/(m^2 K);
- (39) "second order coefficient", a_2 , means the coefficient measuring the temperature dependence of the first order coefficient, in Watts/(m^2 K);

[NB: further "solar parameters" related to the methods pursuant to EN 15316-4-3 and ISO 9459-5:2007]

- (40) "pump power consumption", $solpump$, means the rated electrical power consumption of the pump of a solar water or solar preheat system heater tested under the conditions set out in points 4(b) and 4(c) of Annex VI, in Watts;

- (41) "standby power consumption", $solstandby$, means the electrical power consumption a solar water heater or solar preheat system tested under the conditions set out in points 4(b) and 4(c) of Annex VI when the pump and the back-up heater are inactive, in Watts;
- (42) "auxiliary energy consumption", Q_{aux} , means the annual energy consumption of a solar water heater or a solar preheat system that is due to the pump power consumption and the standby power consumption, in kWh;
- (43) "solar heat contribution", Q_{sol} , means the annual contribution of solar thermal energy of solar water heaters and solar preheat systems tested under the conditions set out in points 4(b) and 4(c) of Annex VI, taking into account the auxiliary energy consumption and heat losses of the storage tank, in kWh;

[NB: further "solar parameter" related to the method pursuant to EN 15316-4-3]

- (44) "incidence angle modifier", IAM , means the ratio of the output of the solar collector of a solar water heater or a solar preheat system tested under the conditions set out in point 4(b) of Annex VI at a certain incidence angle, and its output at an incidence angle of 90 degrees;
- (45) "incidence angle" means the angle between the direction to the sun and the direction perpendicular to the solar collector aperture;
- (46) "storage tank loss", Q_{buf} , means the annual standing loss of a storage tank of a solar water heater or a solar preheat system tested under the conditions set out in points 4(b) of Annex VI.

ANNEX II The label

1. Water heaters

(1) Label 1

(a) Conventional water heaters



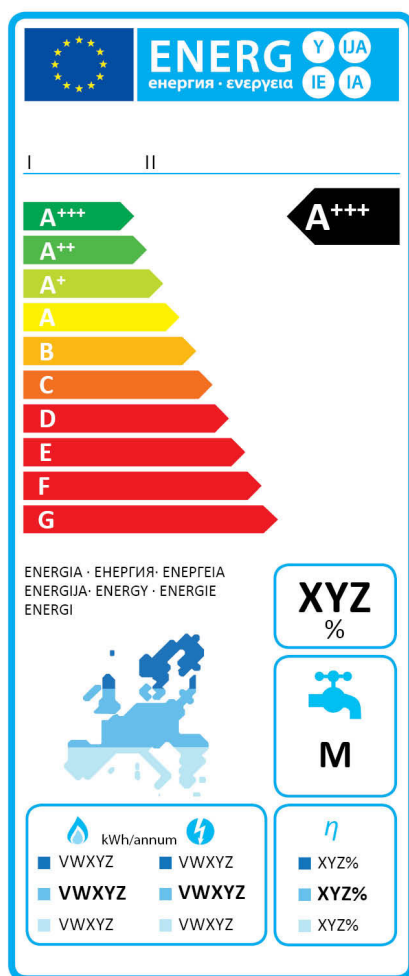
- (i) The following information shall be included in the label:
- I. supplier's name or trade mark;
 - II. supplier's model identifier, where model identifier means the code, usually alphanumeric, which distinguishes a specific water heater model from other models of the same trade mark or supplier's name;
 - III. the energy efficiency class, determined in accordance with point 1 of Annex IX. The head of the arrow containing the energy efficiency class of the water heater shall be placed at the same height as the head of the relevant energy efficiency class;
 - IV. the energy efficiency, rounded up to the nearest integer and calculated in accordance with point 4 of Annex VIII;
 - VI. the declared load profile;

- VII. the annual electricity and the annual fuel consumption, as applicable, in kWh per year, rounded up to the nearest integer and calculated in accordance with point 5 of Annex VIII;

For conventional water heaters, which can achieve the declared energy efficiency class by electricity input provided only during the period after 22:00 hours and before 7:00 hours of the measurement cycle specified in Table 1 of Annex VI the symbol defined in point ... of point 4 may be added.

- (ii) The design aspects of the label for conventional water heaters shall be in accordance with point 4.

(b) Solar water heaters and heat pump water heaters



(i) The following information shall be included in the label:

- I. supplier's name or trade mark;
- II. supplier's model identifier, where model identifier means the code, usually alphanumeric, which distinguishes a specific model from other models of the same trade mark or supplier's name;
- III. the energy efficiency class under average climate conditions, determined in accordance with point 1 of Annex IX. The head of the arrow shall be placed at the same height as the head of the relevant energy efficiency class;
- IV. the energy efficiency under average climate conditions, rounded to the nearest integer and calculated in accordance with point 4 of Annex VIII;

- V. the energy efficiency under colder climate and warmer climate conditions, rounded up to the nearest integer and calculated in accordance with point 4 of Annex VIII;
- VII. the annual electricity and the annual fuel consumption, as applicable, in kWh per year under average climate conditions, rounded up to the nearest integer and calculated in accordance with point 5 of Annex VIII;
- VIII. the energy efficiency, and the annual electricity consumption and the annual fuel consumption, as applicable, in kWh per year under colder climate and warmer climate conditions, rounded up to the nearest integer and calculated in accordance with point 5 of Annex VIII;
- IX. the maximum load profile;

Where a model has been granted a ‘European Union eco-label’ under Regulation (EC) No 66/2010⁴ of the European Parliament and of the Council, a copy of the EU eco-label may be added.

- (ii) The design aspects of the label for solar water heaters and heat pump water heaters shall be in accordance with point 5.

⁴ OJ L 237, 21.9.2000, p. 1.

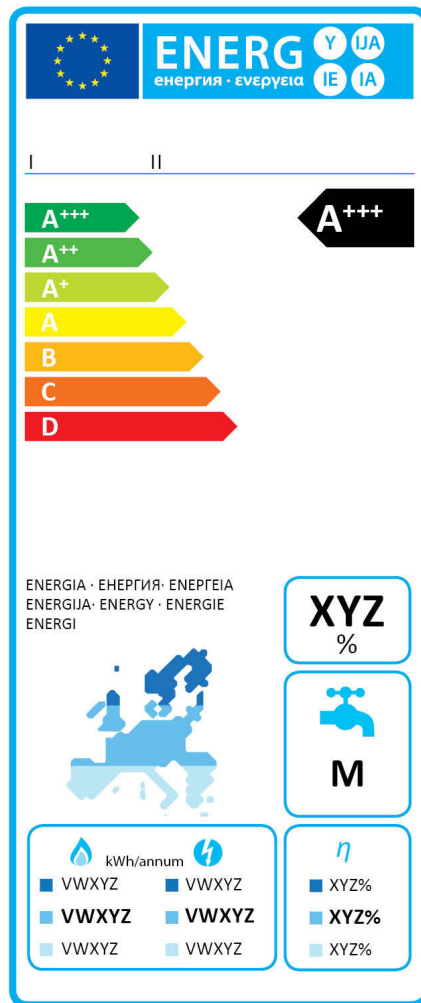
(2) Label 2

(a) Conventional water heaters



- (i) The information listed in point 1(1)(a)(i) shall be included in the label.
- (ii) The design aspects of the label shall be in accordance with point 4.

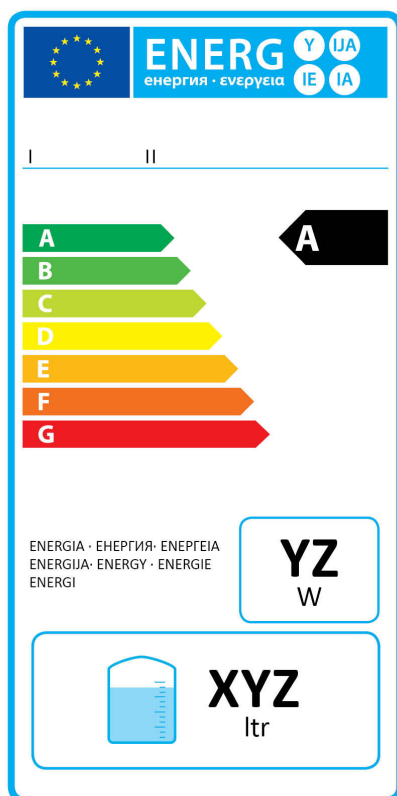
(b) Solar water heaters and heat pump water heaters



(i) The information listed in point 1(1)(b)(i) shall be included in the label.

(ii) The design aspects of the label shall be in accordance with point 5.

3. Storage tanks



- (i) The following information shall be included in the label:
- I. supplier's name or trade mark.
 - II. supplier's model identifier, where model identifier means the code, usually alphanumeric, which distinguishes a specific storage tank model from other models of the same trade mark or supplier's name;
 - III. the energy efficiency class, determined in accordance with point 2 of Annex IX. The head of the arrow containing the energy efficiency class of the storage tank shall be placed at the same height as the head of the relevant energy efficiency class;
 - IV. the standing loss in Watts, rounded up to the nearest integer;
 - V. the storage tank volume in litres, rounded up to the nearest integer.
- (ii) The design aspects of the label for storage tanks shall be in accordance with point 6.

4. The design of the label for conventional water heaters shall be the following:

...

Whereby:

- (a) The label shall be at least 90 mm wide and 170 mm high. Where the label is printed in a larger format, its content must nevertheless remain proportionate to the specifications above.

[NB: further details TBD]

5. The design of the label solar water heaters and heat pump water heaters shall be the following:

...

Whereby:

- (a) The label shall be at least 90 mm wide and 200 mm high. Where the label is printed in a larger format, its content must nevertheless remain proportionate to the specifications above.

[NB: further details TBD]

6. The design of the label for storage tanks shall be the following:

...

Whereby:

- (a) The label shall be at least 90 mm wide and 170 mm high. Where the label is printed in a larger format, its content must nevertheless remain proportionate to the specifications above.

[NB: further details TBD]

ANNEX III
Product Fiche

1. Water heaters

- (a) The information in the product fiche of the water heater shall be provided in the following order, and shall be included in the product brochure or other literature provided with the product:
- (i) supplier's name or trade mark;
 - (ii) supplier's model identifier; where model identifier means the code, usually alphanumeric, which distinguishes a specific water heater model from other models of the same trade mark or supplier's name.
 - (iii) the energy efficiency class of the model under average climate conditions, determined in accordance with point 1 of Annex IX;
 - (iv) the energy efficiency under average climate conditions, rounded to the nearest integer and calculated in accordance with point 4 of Annex VIII;
 - (v) the annual electricity consumption and the annual fuel consumption, as applicable, under average climate conditions, rounded to the nearest integer and calculated in accordance with point 5 of Annex VIII;
 - (vi) the maximum load profile;
 - (vii) the thermostat temperature settings of the water heater, as placed on the market by the supplier;
 - (viii) any specific precautions that must be taken when the water heater is assembled, installed or maintained;
 - (ix) the intended positioning of heat generator(s) and storage tank(s) of a water heater, that is inside or outside of a building;
 - (x) in addition for water heaters using fossil fuels, the air-intake system, that is open or closed;
 - (xi) indication that the information on energy efficiency, annual electricity and fuel consumption, as applicable, and declared load profile relate to the thermostat temperature setting of the water heater, as placed on the market by the supplier;
 - (xii) indication that thermostat temperature settings corresponding to higher temperatures imply larger annual electricity and fuel consumption, as applicable;
 - (xiii) where the value of *smart* is declared as being "1", indication that the information on energy efficiency, annual electricity and fuel consumption, as applicable, relate to enabled smart control settings only;

in addition for solar water heaters and heat pump water heaters:

- (xiv) the energy efficiency under colder and warmer climate conditions, rounded up to the nearest integer and calculated in accordance with point 4 of Annex VIII;
- (xv) the annual electricity consumption and the annual fuel consumption, as applicable, under colder and warmer climate conditions, in kWh per year, rounded up to the nearest integer and calculated in accordance with point 5 of Annex VIII.

in addition for solar water heaters:

- (xvi) solar collector aperture area A_{sol} in m², to two decimal places;
- (xvii) zero-load efficiency η_{a0} , to three decimal places;
- (xviii) first-order coefficient a_1 in Wm⁻²K⁻¹, to two decimal places;
- (xix) second-order coefficient a_2 in Wm⁻²K⁻¹, to two decimal places;
- (xx) storage tank volume V in litres, rounded to the nearest integer;

in addition, for solar water heaters tested under the conditions set out in points 4(b) and 4(c) of Annex VI:

- (xxi) pump power consumption sol_{pump} in Watts, rounded to the nearest integer;
- (xxii) standby power consumption $sol_{standby}$ in Watts, to two decimal places;
- (xxiii) the annual solar contribution Q_{sol} in kWh, rounded to the nearest integer;

in addition for solar water heaters tested under the conditions set out point 4(b) of Annex VI:

- (xxiv) incidence angle modifier IAM , to two decimal places;

- (b) One fiche may cover a number of water heater models supplied by the same supplier.
- (c) The information contained in the fiche 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 (a) not already displayed on the label must also be provided.

2. Storage tanks

- (a) The information in the product fiche of the storage tank shall be provided in the following order, and shall be included in the product brochure or other literature provided with the product:

- (i) supplier's name or trade mark;
 - (ii) supplier's model identifier; where model identifier means the code, usually alphanumeric, which distinguishes a specific storage tank model from other models of the same trade mark or supplier's name;
 - (iii) the energy efficiency class of the model, in accordance with point 2 of Annex IX;
 - (iv) the standing loss S in Watts, rounded up to the nearest integer;
 - (v) the storage volume V in litres, rounded up to the nearest integer;
- (b) One fiche may cover a number of storage tank models supplied by the same supplier.
- (c) The information contained in the fiche 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 not already displayed on the label must also be provided.

3. Solar preheat systems

- (a) The information in the product fiche shall be provided in the following order, and shall be included in the product brochure or other literature provided with the product:
- (i) supplier's name or trade mark;
 - (ii) supplier's model identifier; where model identifier means the code, usually alphanumeric, which distinguishes a specific television model from other models of the same trade mark or supplier's name.
 - (iii) solar collector aperture area A_{sol} in m², to two decimal places;
 - (iv) zero-load efficiency η_0 in three decimal places;
 - (v) first-order coefficient a_1 in Wm⁻²K⁻¹, to two decimal places;
 - (vi) second-order coefficient a_2 in Wm⁻²K⁻¹, to two decimal places;
 - (vii) storage tank volume V in litres, rounded to the nearest integer;
 - (viii) storage tank position, that is, indoors or outdoors;
 - (ix) pump power consumption sol_{pump} in Watts, rounded to the nearest integer;
 - (x) standby power consumption $sol_{standby}$ in Watts, to two decimal places;
 - (xi) solar heat contribution Q_{sol} in kWh, rounded to the nearest integer;

in addition for solar preheat systems tested under the conditions set out point 4(b) of Annex VI:

(xii) incidence angle modifier *IAM*, to two decimal places;

[NB: "installer label"]

- (b) the energy efficiency and the energy efficiency class of combinations of the solar preheat system with water heaters of size classes M to 4XL and with energy efficiency classes A+++ to G under average, colder and warmer climate conditions, calculated in accordance with Annex X;
- (c) One fiche may cover a number of solar collector models supplied by the same supplier.

ANNEX IV
Technical documentation

1. Water heaters

The technical documentation of water heaters referred to in Article 3(1)(c) shall include:

- (a) the name and address of the supplier;
- (b) a general description of the water heater model, sufficient for it to be unequivocally and easily identified;
- (c) where appropriate, the references of the harmonised standards applied;
- (d) where appropriate, the other technical standards and specifications used;
- (e) identification and signature of the person empowered to bind the supplier;
- (f) the results of the measurements for the technical parameters specified in point 5 of Annex VI;
- (g) the results of the calculations for the technical parameters specified in point 2 of Annex VIII;
- (h) any specific precautions that must be taken when the water heater is assembled, installed or maintained;
- (i) the intended positioning of heat generator(s) and storage tank(s) of a water heater, that is inside or outside of a building;
- (j) in addition for water heaters using fossil fuels, the air-intake system, that is open or closed.

2. Storage tanks

The technical documentation of storage tanks referred to in Article 3(2)(c) shall include:

- (a) the name and address of the supplier;
- (b) a general description of the storage tank model, sufficient for it to be unequivocally and easily identified;
- (c) where appropriate, the references of the harmonised standards applied;
- (d) where appropriate, the other technical standards and specifications used;
- (e) identification and signature of the person empowered to bind the supplier;
- (f) test parameters for measurements as specified in point 6 of Annex VI;
- (g) any specific precautions that must be taken when the storage tank is assembled, installed or maintained.

3. Solar preheat systems

The technical documentation of solar preheat systems referred to in Article 3(3)(b) shall include:

- (a) the name and address of the supplier;
- (b) a general description of the solar preheat system model, sufficient for it to be unequivocally and easily identified;
- (c) where appropriate, the references of the harmonised standards applied;
- (d) where appropriate, the other technical standards and specifications used;
- (e) identification and signature of the person empowered to bind the supplier;
- (f) test parameters for measurements as specified in point 7 of Annex VI;
- (g) any specific precautions that must be taken when the solar collector is assembled, installed or maintained.

ANNEX V

Information to be provided in the cases where end-users cannot be expected to see the product displayed

1. Water heaters
 - (a) The information referred to in Article 4(1)(b) shall be provided in the following order:
 - (i) the energy efficiency class of the model under average climate conditions, in accordance with point 1 of Annex IX;
 - (ii) the energy efficiency under average climate conditions, rounded up to the nearest integer and calculated in accordance with point 4 of Annex VIII;
 - (iii) the annual electricity and the annual fuel consumption under average climate conditions, as applicable, rounded up to the nearest integer and calculated in accordance with point 5 of Annex VIII;
 - (iv) the maximum load profile;in addition for solar water heaters and heat pump water heaters:
 - (v) the energy efficiency class of the model under colder and warmer climate conditions, in accordance with point 1 of Annex IX;
 - (vi) the energy efficiency under colder and warmer climate conditions, rounded up to the nearest integer and calculated in accordance with point 5 of Annex VIII;
 - (vii) the annual electricity and the annual fuel consumption, as applicable, under colder and warmer climate conditions, rounded up to the nearest integer and calculated in accordance with point 5 of Annex VIII.
 - (viii) solar collector aperture area A_{sol} in m^2 , to two decimal places;
 - (ix) storage tank volume V in litres, rounded to the nearest integer.
 - (b) Where other information contained in the product information fiche is also provided, it shall be in the form and order specified in point 1 of Annex III.
 - (c) The size and font in which all the information referred in this Annex is printed or shown shall be legible.
2. Storage tanks
 - (a) The information referred to in Article 4(2)(b) shall be provided in the following order:
 - (i) the energy efficiency class of the model, in accordance with point 2 of Annex IX;
 - (iv) the standing loss S in Watts, rounded up to the nearest integer;

- (v) the storage volume V in litres, rounded up to the nearest integer;
 - (b) The size and font in which all the information referred in this Annex is printed or shown shall be legible.
3. Solar preheat systems
- (a) The information referred to in Article 4, point 3(b) shall be provided in the following order:
 - (i) solar collector aperture area A_{sol} in m², to two decimal places;
 - (ii) storage tank volume V in litres, rounded to the nearest integer;
 - (b) Where other information contained in the product information fiche is also provided, it shall be in the form and order specified in point 3 of Annex III.
 - (c) The size and font in which all the information referred in this Annex is printed or shown shall be legible.

ANNEX VI Measurements

1. For the purposes of compliance and verification of compliance with the requirements of the Regulation, measurements shall be made using a reliable, accurate, and reproducible method, which takes into account the generally recognised state of the measurement methods, including methods set out in documents the reference numbers of which have been published for the purpose in the Official Journal of the European Union.

2. General conditions for testing water heaters

- (a) measurements shall be carried out using the load profiles set out in Table 1;
- (b) measurements shall be carried out using a 24-hour measurement cycle as follows:
 - (i) 00:00 hours to 06:59 hours: no water draw-off;
 - (ii) from 7:00 hours: water draw-offs according to the declared load profile;
 - (iii) from end of last water draw-off until 24:00 hours: no water draw-off;
- (c) the mean temperature between the thermostat temperature setting which starts the water heating, and the thermostat temperature setting which stops the water heating, shall not fall below 55°C;
- (d) the load profile applied for testing shall be the maximum load profile.

H	3XS			XXS			XS			S			
	Qtap	F	Tm	Qtap	f	Tm	Qtap	F	Tm	Qtap	f	Tm	TP
	kWh	l/mn	°C	kWh	l/mn	°C	kWh	l/mn	°C	kWh	l/mn	°C	°C
07.00	0,015	2	25	0,105	2	25				0,105	3	25	
07.05	0,015	2	25										
07.15	0,015	2	25										
07.26	0,015	2	25										
07.30	0,015	2	25	0,105	2	25	0,525	4	35	0,105	3	25	
07.45													
08.01													
08.05													
08.15													
08.25													
08.30				0,105	2	25				0,105	3	25	
08.45													
09.00	0,015	2	25							0,105	3	25	
09.30	0,015	2	25	0,105	2	25				0,105	3	25	
10.00													
10.30													
11.00													
11.30	0,015	2	25	0,105	2	25				0,105	3	25	
11.45	0,015	2	25	0,105	2	25				0,105	3	25	
12.00	0,015	2	25	0,105	2	25							
12.30	0,015	2	25	0,105	2	25							
12.45	0,015	2	25	0,105	2	25	0,525	4	35	0,315	4	10	55
14.30	0,015	2	25										
15.00	0,015	2	25										
15.30	0,015	2	25										
16.00	0,015	2	25										
16.30													
17.00													
18.00				0,105	2	25				0,105	3	25	
18.15				0,105	2	25				0,105	3	40	
18.30	0,015	2	25	0,105	2	25							
19.00	0,015	2	25	0,105	2	25							
19.30	0,015	2	25	0,105	2	25							
20.00				0,105	2	25							
20.30							1,05	4	35	0,42	4	10	55
20.45				0,105	2	25							
20.46													
21.00				0,105	2	25							
21.15	0,015	2	25	0,105	2	25							
21.30	0,015	2	25							0,525	5	45	
21.30	0,015	2	25	0,105	2	25							
21.45	0,015	2	25	0,105	2	25							
Qref	0,345			2,1			2,1			2,1			

h	M				L				XL				
	Qtap	F	Tm	TP	Qtap	f	Tm	TP	Qtap	f	Tm	TP	
	kWh	l/mn	°C	°C	kWh	l/mn	°C	°C	kWh	l/mn	°C	°C	
07.00	0,105	3	25		0,105	3	25		0,105	3	25		
07.05	1,4	6	40		1,4	6	40						
07.15									1,82	6	40		
07.26									0,105	3	25		
07.30	0,105	3	25		0,105	3	25						
07.45					0,105	3	25		4,42	10	10	40	
08.01	0,105	3	25						0,105	3	25		
08.05					3,605	10	10	40					
08.15	0,105	3	25						0,105	3	25		
08.25					0,105	3	25						
08.30	0,105	3	25		0,105	3	25		0,105	3	25		
08.45	0,105	3	25		0,105	3	25		0,105	3	25		
09.00	0,105	3	25		0,105	3	25		0,105	3	25		
09.30	0,105	3	25		0,105	3	25		0,105	3	25		
10.00									0,105	3	25		
10.30	0,105	3	10	40	0,105	3	10	40	0,105	3	10	40	
11.00									0,105	3	25		
11.30	0,105	3	25		0,105	3	25		0,105	3	25		
11.45	0,105	3	25		0,105	3	25		0,105	3	25		
12.00													
12.30													
12.45	0,315	4	10	55	0,315	4	10	55	0,735	4	10	55	
14.30	0,105	3	25		0,105	3	25		0,105	3	25		
15.00									0,105	3	25		
15.30	0,105	3	25		0,105	3	25		0,105	3	25		
16.00									0,105	3	25		
16.30	0,105	3	25		0,105	3	25		0,105	3	25		
17.00									0,105	3	25		
18.00	0,105	3	25		0,105	3	25		0,105	3	25		
18.15	0,105	3	40		0,105	3	40		0,105	3	40		
18.30	0,105	3	40		0,105	3	40		0,105	3	40		
19.00	0,105	3	25		0,105	3	25		0,105	3	25		
19.30													
20.00													
20.30	0,735	4	10	55	0,735	4	10	55	0,735	4	10	55	
20.45													
20.46									4,42	10	10	40	
21.00									3,605	10	10	40	
21.15	0,105	3	25						0,105	3	25		
21.30	1,4	6	40		0,105	3	25		4,42	10	10	40	
21.30													
21.45													
Qref	5,845				11,655				19,07				

h	XXL				3XL				4XL				
	Qtap	f	Tm	TP	Qtap	f	Tm	TP	Qtap	f	Tm	TP	
	kWh	l/mn	°C	°C	kWh	l/mn	°C	°C	kWh	l/mn	°C	°C	
07.00	0,105	3	25		11,2	48	40		22,4	96	40		
07.05													
07.15	1,82	6	40										
07.26	0,105	3	25										
07.30													
07.45	6,24	16	10	40									
08.01	0,105	3	25		5,04	24	25		10,08	48	25		
08.05													
08.15	0,105	3	25										
08.25													
08.30	0,105	3	25										
08.45	0,105	3	25										
09.00	0,105	3	25		1,68	24	25		3,36	48	25		
09.30	0,105	3	25										
10.00	0,105	3	25										
10.30	0,105	3	10	40	0,84	24	10	40	1,68	48	10	40	
11.00	0,105	3	25										
11.30	0,105	3	25										
11.45	0,105	3	25		1,68	24	25		3,36	48	25		
12.00													
12.30													
12.45	0,735	4	10	55	2,52	32	10	55	5,04	64	10	55	
14.30	0,105	3	25										
15.00	0,105	3	25										
15.30	0,105	3	25		2,52	24	25		5,04	48	25		
16.00	0,105	3	25										
16.30	0,105	3	25										
17.00	0,105	3	25										
18.00	0,105	3	25										
18.15	0,105	3	40										
18.30	0,105	3	40		3,36	24	25		6,72	48	25		
19.00	0,105	3	25										
19.30													
20.00													
20.30	0,735	4	10	55	5,88	32	10	55	11,76	64	10	55	
20.45													
20.46	6,24	16	10	40									
21.00													
21.15	0,105	3	25										
21.30	6,24	16	10	40	12,04	48	40		24,08	96	40		
21.30													
21.45													
Qref	24,53				46,76				93,52				

3. Conditions for testing *smart* of water heaters

Where the supplier deems appropriate to declare the value of *smart* as being "1", measurements of the weekly electricity consumption shall be carried out using a two-week measurement cycle as follows:

- (i) days 1 to 5: random sequence of load profiles chosen from the declared load profile and the load profile below the declared load profile, and smart control disabled;
- (ii) days 6 and 7: no water draw-offs, and smart control disabled;
- (iii) days 8 to 12: repetition of the sequence applied for days 1 to 5, and smart control enabled;
- (iv) days 13 and 14: no water draw-offs, and smart control enabled.

4. Conditions for testing solar water heaters

Solar water heaters shall be tested under one of the following conditions:

[NB: measurements and calculations pursuant to EN 13203-3:]

- (a) The solar collector shall be tested separately. The remaining parts of the solar water heater shall be tested with an additional heat generator that simulates the daily solar energy captured by the solar collector under the conditions set out in Table 2. The results shall be used for the calculations set out in point 4(a) of Annex VIII.

[NB: measurements and calculations pursuant to EN 15316-4-3:]

- (b) Solar collector, storage tank, solar pump and back-up water heater shall be tested separately. The back-up water heater shall be tested under the conditions set out in point 2. The results shall be used for the calculations set out in point 4(b) of Annex VIII under the conditions set out in Tables 3 and 4.

[NB: measurements and calculations pursuant to ISO 9459-5:]

- (c) Where solar collector and storage tank cannot be tested separately their combination shall be tested. The back-up water heater and the solar pump shall be tested separately, and the back-up water heater shall be tested under the conditions set out in point 2. The results shall be used for the calculations set out in point 4(b) of Annex VIII under the conditions set out in Tables 3 and 4.

5. Conditions for testing heat pump water heaters

- (a) Heat pump water heaters which do not use ventilation exhaust air as heat source shall be tested under the conditions set out in Table 5.
- (b) Heat pump water heaters which use ventilation exhaust as heat source shall be tested under the conditions set out in Table 6. Where the supplier deems appropriate outdoor air may be used as additional heat source under the conditions set out in Table 6.

6. Conditions for testing solar preheat systems

Solar preheat systems shall be tested under one of the following conditions:

[NB: measurements and calculations pursuant to EN 15316-4-3:]

- (a) Solar collector, storage tank and solar pump shall be tested separately. The results shall be used for calculating Q_{sol} referred to in point 7 of Annex VIII under the conditions set out in Tables 3 and 4.

[NB: measurements and calculations pursuant to ISO 9459-5:]

- (b) Where solar collector and storage tank cannot be tested separately their combination shall be tested, and the solar pump shall be tested separately. The results shall be used for the calculating Q_{sol} referred to in point 7 of Annex VIII under the conditions set out in Tables 3 and 4.

Table 2: Global solar irradiance in W/m²

	6h-7h	7h-8h	8h-9h	9h-10h	10h-11	11h-12h	12h-13h	13h-14h	14h-15h	15h-16h	16h-17h	17h-18h
Average climate conditions	95	171	237	303	351	393	436	474	512	455	218	47
Colder climate conditions	78	141	196	250	290	325	360	391	423	376	180	39
Warmer climate conditions	122	219	305	390	451	506	561	609	658	585	280	61

Table 3 : Average daytime temperature in degrees Celsius

	January	February	March	April	May	June	July	August	September	October	November	December
Average climate conditions	2,8	2,6	7,4	12,2	16,3	19,8	21,0	22,0	17,0	11,9	5,6	3,2
Colder climate conditions	9,5	10,1	11,6	15,3	21,4	26,5	28,8	27,9	23,6	19,0	14,5	10,4
Warmer climate conditions	-3,8	-4,1	-0,6	5,2	11,0	16,5	19,3	18,4	12,8	6,7	1,2	-3,5

Table 4 : Average global solar irradiance in W/m²

	January	February	March	April	May	June	July	August	September	October	November	December
Average climate conditions	70	104	149	192	221	222	232	217	176	129	80	56
Colder climate conditions	22	75	124	192	234	237	238	181	120	64	23	13
Warmer climate conditions	128	137	182	227	248	268	268	263	243	175	126	109

Table 5 : Ambient heat source temperatures for heat pump water heaters (air source: dry bulb temperature) and humidity by heat transfer medium

Heat source	outdoor air			Brine	Water
	Average climate conditions	Colder climate conditions	Warmer climate conditions	all climate conditions	all climate conditions
Temperature	10,0°C	5,5°C	16,0°C	2,5°C	11,5°C
Humidity	5,5 g/m ³			not applicable	

Table 6 : Maximum ventilation exhaust air available in m³/h⁵

Load profile	XXS	XS	S	M	L	XL	XXL	3XL	4XL
Ventilation waste heat	109	136	128	159	190	870	1021	2943	8830

5. Technical parameters of water heaters

The following parameters shall be established:

- (i) the daily electricity consumption Q_{elec} in kWh, measured to three decimal places;
- (ii) the maximum load profile;
- (iii) the envelope volume in m³, measured to two decimal places;
- (iv) the noise in dB(A) re 1pW, measured to to the nearest integer;

in addition, for water heaters depending on the energy input of fossil fuels:

- (v) the daily gas or oil consumption Q_{fuel} , measured to three decimal places
- (vi) the combustion efficiency, measured to three decimal places
- (vii) the average flue gas temperature T_{flue} in degrees Celsius, measured to the first decimal place;

in addition, for water heaters for which the value of smart is declared as being "1":

- (viii) the weekly fuel consumption $Q_{fuel,week,smart}$ with smart control function enabled in kWh, measured to three decimal places;
- (ix) the weekly electricity consumption $Q_{elec,week,smart}$ in kWh with smart control function enabled in kWh, measured to three decimal places;
- (x) the weekly fuel consumption $Q_{fuel,week}$ with smart control function disabled in kWh, measured to three decimal places;
- (xi) the weekly electricity consumption $Q_{elec,week}$ with smart control function disabled in kWh, measured to three decimal places;

in addition, for solar water heaters the following parameters shall also be determined:

- (xii) the solar collector aperture area A_{sol} in m², measured to two decimal places;

⁵ at temperature of 20°C and humidity of 5,5 g H₂O/m³

- (xiii) the zero-load efficiency η_{a0} , measured to three decimal places;
- (xiv) the first order coefficient a_1 , measured to two decimal places;
- (xv) the second order coefficient a_2 , measured to two decimal places;

[NB: measurements and calculations pursuant to EN 15316-4-3 and ISO 9459-5:]

in addition, for solar water heaters tested under the conditions set out in points 4(b) and 4(c) of Annex VI:

- (xvi) the back-up heater energy efficiency η_{awhbu} , measured to one decimal place;
- (xvii) the pump power consumption sol_{pump} , measured to two decimal places;
- (xviii) the standby power consumption $sol_{standby}$, measured to two decimal places;

[NB: measurements and calculations pursuant to EN 15316-4-3:]

in addition, for solar water heaters tested under the conditions set out in point 4(b) of Annex VI:

- (xix) the incidence angle modifier I_{AM} , measured to one decimal place.

6. Technical parameters of storage tanks

The following technical parameters shall be established for storage tanks:

- (i) Storage tank volume V in litres, measured to one decimal place;
- (ii) Standing loss S in Watts, measured to one decimal place.

7. Technical parameters of solar preheat systems

The following technical parameters shall be established for solar preheat systems:

- (i) the solar collector aperture area A_{sol} in m^2 , measured to two decimal places;
- (ii) the zero-load efficiency η_{a0} , measured to three decimal places;
- (iii) the first order coefficient a_1 , measured to two decimal places;
- (iv) the second order coefficient a_2 , measured to two decimal places;
- (v) the pump power consumption sol_{pump} in Watts, measured to two decimal places;
- (vi) the standby power consumption, $sol_{standby}$ in Watts, measured to two decimal places

in addition, for solar preheat systems tested under the conditions set out in point 4(b) of Annex VI:

(vii) the incidence angle modifier LAM , to one decimal place.

ANNEX VII

Verification procedure for market surveillance purposes

For the purposes of checking conformity with the requirements laid down in Articles 3 and 4, Member State authorities shall test a single water heater or storage tank. If the measured parameters do not meet the values declared by the manufacturer within the ranges defined in Table 7, the measurement shall be carried out on three additional water heaters or storage tanks. The arithmetic mean of the measured values of these three water heaters or storage tanks shall meet the values declared by the supplier within the range defined in Table 7.

Otherwise, the model shall be considered not to comply.

In addition to the procedure set out in Annex VI, Member State authorities shall use reliable, accurate and reproducible measurement procedures, which take into account the generally recognised state-of-the-art measurement methods, including methods set out in documents the reference numbers of which have been published for that purpose in the Official Journal of the European Union.

Table 7: Verification tolerances

Measured parameter	Verification tolerance
daily electricity consumption Q_{elec}	the measured value shall not be higher than the rated value* by more than 5 %
envelope volume	the measured value shall not be higher than the rated value by more than 5 %
noise	the measured value shall not be higher than the rated value by more than 1,5 dB(A)
daily fuel consumption Q_{fuel}	the measured value shall not be higher than the rated value by more than 5 %
combustion efficiency η_{comb}	the measured value shall not be higher than the rated value by more than 5 %
average flue gas temperature T_{flue}	the measured value shall not be lower than the rated value by more than 5 %
emissions of nitrogen oxides	the measured value shall not be higher than the rated value by more than 5 %.
weekly fuel consumption with smart controls enabled or disabled $Q_{fuel,week}/Q_{fuel,week,smart}$	the measured value shall not be higher than the rated value by more than 5%.
weekly electricity consumption with smart controls enabled or disabled $Q_{elec,week}/Q_{elec,week,smart}$	the measured value shall not be higher than the rated value by more than 5%.
storage volume V	the measured value shall not be lower than the rated value by more than 5 %.
collector aperture area A_{sol}	the measured value shall not be lower than the rated value by more than 5%.
pump power consumption sol_{pump}	the measured value shall not be higher than the rated value by more than 5%.
standby power consumption $sol_{standby}$	the measured value shall not be higher than the rated value by more than 5%.

* "rated value means a value declared by the manufacturer

ANNEX VIII

Method for calculating the energy efficiency of water heaters

1. For the purposes of compliance and verification of compliance with the requirements of this Regulation, calculations shall be made using a reliable, accurate, and reproducible method, which takes into account the generally recognised state-of-the-art calculation methods, including methods set out in documents the reference numbers of which have been published for the purpose in the Official Journal of the European Union.
2. Technical parameters of water heaters
 - (a) The following parameters shall be calculated for all water heaters under average climate conditions:
 - (i) the energy efficiency η_{awh} in percent, to one decimal place;
 - (ii) the annual electricity consumption AEC in kWh, to the nearest integer;
 - (iii) the distribution losses Q_{distr} in kWh, to three decimal places;
 - (iv) the reference distribution losses $Q_{distribref}$ in kWh, to three decimal places;
 - (v) the recoverable waste heat Q_{waste} in kWh, to three decimal places;
 - (vi) the recovered fraction of waste heat q_{recov} , to two decimal places.
 - (b) In addition, for water heaters depending on the energy input of fossil fuels, the following parameters shall be calculated for average climate conditions:
 - (viii) the annual fossil fuel consumption AFC in kWh Gross Calorific Value of the fuel, to the nearest integer;
 - (ix) the flue gas heat $Q_{fluegas}$ in kWh sensible heat, to the nearest integer.
 - (c) in addition, for solar water heaters and heat pump water heaters, the parameters set out in points (a) and (b) shall be calculated for colder and warmer climate conditions;
 - (d) in addition for solar water heaters tested under the conditions set out in points 4(b) and 4(c) of Annex VI, the following parameters shall be calculated for average, colder and warmer climate conditions:
 - (xi) the solar energy Q_{sol} ;
 - (xiii) the annual auxiliary energy consumption Q_{aux} ;
 - (d) in addition for solar water heaters tested under the conditions set out in point 4(b) of Annex VI, the following parameters shall be calculated for average, colder and warmer climate conditions:
 - (xii) the annual standing losses of the storage tank Q_{buf} .
3. Conversion factor

The value of the conversion factor shall be $prim = 2,5$.

4. Calculation of the energy efficiency $etawh$

- (a) Conventional water heaters, heat pump water heaters and solar water heaters tested under the conditions set out in point 4(a) of Annex VI:

The energy efficiency is calculated as follows:

$$etawh = \frac{Q_{ref}}{(Q_{fuel} + prim \cdot Q_{elec})(1 - 0,07 \cdot smart) + Q_{distr} - (qrecov \cdot Q_{rwaste})}$$

- (b) Solar water heaters tested under the conditions set out in points 4(b) and 4(c) of Annex VI:

The energy efficiency is calculated as follows:

$$etawh = 0,6 \cdot 366 \cdot Q_{ref}/Q_{tota} ,$$

where

$$Q_{tota} = \{0,6 \cdot 366 \cdot (Q_{ref} + Q_{distref}) - Q_{sol}\} / \{etawhbu - (0,1 \cdot etawhbu - 0,1)\}$$

5. Calculation of the annual electricity consumption AEC and the annual fuel consumption AFC

- (a) Conventional water heaters, heat pump water heaters and solar water heaters tested under the conditions set out in point 4(a) of Annex VI:

- (i) The annual fuel consumption AFC in kWh GCV of the fuel is calculated as:

$$AFC = 0,6 \cdot 366 \cdot \left(Q_{fuel} \cdot (1 - 0,07 \cdot smart) + \frac{Q_{fuel}}{Q_{fuel} + prim \cdot Q_{elec}} \cdot (Q_{distr} - qrecov \cdot Q_{rwaste}) \right)$$

- (ii) The annual electricity consumption AEC is calculated as:

$$AEC = 0,6 \cdot 366 \cdot \left(Q_{elec} \cdot (1 - 0,07 \cdot smart) + \frac{prim \cdot Q_{elec}}{Q_{fuel} + prim \cdot Q_{elec}} \cdot (Q_{distr} - qrecov \cdot Q_{rwaste}) \right)$$

- (b) Solar water heaters tested under the conditions set out in points 4(b) and 4(c) of Annex VI:

- (i) The annual electricity consumption is calculated as:

$$AEC = \frac{prim \cdot Q_{elec}}{Q_{fuel} + prim \cdot Q_{elec}} \cdot \left(\frac{Q_{tota}}{prim} \right)$$

- (ii) The annual fuel consumption is calculated as:

$$AFC = \frac{Q_{fuel}}{Q_{fuel} + prim \cdot Q_{elec}} \cdot Q_{tota}$$

6. Determination of the value of *smart*

The value of *smart* is "1", if:

$$(Q_{fuel,week\ smart} + prim \cdot Q_{elec,week\ smart}) / (Q_{fuel,week} + prim \cdot Q_{elec,week}) \leq 0.93.$$

In all other cases the value of *smart* is "0".

7. Calculation of *Q_rwaste*, *Q_fluegas*, *q_recov*, *Q_distref*, *Q_distr*, *Q_sol*, *Q_aux*, *Q_buf*

For the purposes of compliance and verification of compliance with the requirements of this Regulation, calculations of *Q_rwaste*, *Q_fluegas*, *q_recov*, *Q_distref*, *Q_distr*, *Q_sol*, *Q_aux* and *Q_buf* shall be made using a reliable, accurate, and reproducible method, which takes into account the generally recognised state-of-the-art calculation methods, including methods set out in documents the reference numbers of which have been published for the purpose in the Official Journal of the European Union.

8. Technical parameters of solar preheat systems

- (a) For solar preheat systems tested under the conditions set out in points 4(b) and 4(c) of Annex VI the following parameters shall be calculated for average, colder and warmer climate conditions:
- (i) the solar energy *Q_sol*;
 - (ii) the annual auxiliary energy consumption *Q_aux*.
- (b) In addition for solar preheat systems tested under the conditions set out in point 4(b) of Annex VI, the following parameters shall be calculated for average, colder and warmer climate conditions:
- (iii) the annual standing losses of the storage tank *Q_buf*.

ANNEX IX
Energy efficiency class

1. Energy efficiency classes of water heaters

The energy efficiency class of a water heater shall be determined on the basis of its energy efficiency as set out in Table 8.

The energy efficiency of a water heater shall be calculated in accordance with point 4 of Annex VIII.

Table 8: Energy efficiency classes of water heaters

	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL
A+++	$\eta > 62$	$\eta > 62$	$\eta > 69$	$\eta > 90$	$\eta > 96$	$\eta > 107$	$\eta > 112$	$\eta > 124$	$\eta > 140$	$\eta > 150$
A++	$53 \leq \eta < 62$	$53 \leq \eta < 62$	$61 \leq \eta < 69$	$72 \leq \eta < 90$	$79 \leq \eta < 96$	$90 \leq \eta < 107$	$92 \leq \eta < 112$	$104 \leq \eta < 124$	$110 \leq \eta < 140$	$120 \leq \eta < 150$
A+	$44 \leq \eta < 53$	$44 \leq \eta < 53$	$53 \leq \eta < 61$	$55 \leq \eta < 72$	$62 \leq \eta < 79$	$73 \leq \eta < 90$	$76 \leq \eta < 92$	$84 \leq \eta < 104$	$96 \leq \eta < 110$	$96 \leq \eta < 120$
A	$35 \leq \eta < 44$	$35 \leq \eta < 44$	$38 \leq \eta < 53$	$38 \leq \eta < 55$	$45 \leq \eta < 62$	$56 \leq \eta < 73$	$62 \leq \eta < 76$	$72 \leq \eta < 84$	$80 \leq \eta < 96$	$86 \leq \eta < 96$
B	$32 \leq \eta < 35$	$32 \leq \eta < 35$	$35 \leq \eta < 38$	$35 \leq \eta < 38$	$39 \leq \eta < 45$	$46 \leq \eta < 56$	$50 \leq \eta < 62$	$60 \leq \eta < 72$	$64 \leq \eta < 80$	$64 \leq \eta < 86$
C	$29 \leq \eta < 32$	$29 \leq \eta < 32$	$32 \leq \eta < 35$	$32 \leq \eta < 35$	$36 \leq \eta < 39$	$37 \leq \eta < 46$	$38 \leq \eta < 50$	$40 \leq \eta < 60$	$40 \leq \eta < 64$	$40 \leq \eta < 64$
D	$26 \leq \eta < 29$	$26 \leq \eta < 29$	$29 \leq \eta < 32$	$29 \leq \eta < 32$	$33 \leq \eta < 36$	$34 \leq \eta < 37$	$34 \leq \eta < 38$	$36 \leq \eta < 40$	$36 \leq \eta < 40$	$36 \leq \eta < 40$
E	$23 \leq \eta < 26$	$23 \leq \eta < 26$	$26 \leq \eta < 29$	$26 \leq \eta < 29$	$30 \leq \eta < 33$	$30 \leq \eta < 34$	$30 \leq \eta < 34$	$32 \leq \eta < 36$	$32 \leq \eta < 36$	$32 \leq \eta < 36$
F	$20 \leq \eta < 23$	$20 \leq \eta < 23$	$23 \leq \eta < 26$	$23 \leq \eta < 26$	$27 \leq \eta < 30$	$27 \leq \eta < 30$	$27 \leq \eta < 30$	$28 \leq \eta < 32$	$28 \leq \eta < 32$	$28 \leq \eta < 32$
G	$\eta < 20$	$\eta < 20$	$\eta < 23$	$\eta < 23$	$\eta < 27$	$\eta < 27$	$\eta < 27$	$\eta < 28$	$\eta < 28$	$\eta < 28$

2. Energy efficiency class of storage tanks

The energy efficiency class of a storage tank shall be determined on the basis of accordance its standing loss as set out in Table 9.

Table 9: Energy efficiency classes of storage tanks

Energy efficiency class	Standing loss S
A	$S \leq 5+4,16V^{0,4}$
B	$11+6,25V^{0,4} \leq S < 5+4,16V^{0,4}$
C	$16,66+8,33V^{0,4} \leq S < 11+6,25V^{0,4}$
D	$21+10,33V^{0,4} \leq S < 16,66+8,33V^{0,4}$
E	$26+13,66V^{0,4} \leq S < 21+10,33V^{0,4}$
F	$31+16,66V^{0,4} \leq S < 26+13,66V^{0,4}$
G	$S > 31+16,66V^{0,4}$

ANNEX X

Method for calculating the energy efficiency of combinations of solar preheat systems and water heaters with load profiles M to 4XL placed on the market separately

1. The energy efficiency of combinations of solar preheat systems and water heaters placed on the market separately shall be calculated as set out in point 4(b) of Annex VIII.

2. Distribution losses $Q_{distref}$

For the purposes of this Annex, the reference distribution losses $Q_{distref}$ of water heaters shall be as follows:

	M	L	XL	XXL	3XL	4XL
$Q_{distref}$, in kWh	0,55	1,09	1,09	1,09	2,19	4,37

3. Energy efficiency of the water heater $etawhbu$

For the purposes of this Annex, the energy efficiency $etawhbu$ of water heaters with energy efficiency classes A+++ - G shall be as follows:

	M	L	XL	XXL	3XL	4XL
A+++	96	107	112	124	140	150
A++	79	90	92	104	110	120
A+	62	73	76	84	96	96
A	45	56	62	72	80	86
B	39	46	50	60	64	64
C	36	37	38	40	40	40
D	33	34	34	36	36	36
E	30	30	30	32	32	32
F	27	27	27	28	28	28
G	24	24	24	25	25	25