



CABINET OF MINISTERS OF UKRAINE
RESOLUTION

No. 740 of 14 August 2019
Kyiv

**On Approval of the Technical Regulation on Ecodesign
Requirements for Water Heaters and Hot Water Storage Tanks**

In accordance with [Article 5](#) of the Law of Ukraine ‘On Technical Regulations and Conformity Assessment’, the Cabinet of Ministers of Ukraine hereby **resolves**:

1. The **Technical Regulation on Ecodesign Requirements for Water Heaters and Hot Water Storage Tanks** shall be approved as attached to the original.
2. The State Agency on Energy Efficiency and Energy Saving shall ensure the implementation of the Technical Regulation approved by this Resolution.
3. The attached amendment shall be introduced to [the list of types of products subject to state market surveillance by state market surveillance authorities](#), approved by the Resolution of the Cabinet of Ministers of Ukraine No. 1069 of 28 December 2016 (Official Journal of Ukraine, 2017, No. 50, p. 1550).
4. This Resolution shall enter into force after six months following its publication.

Prime Minister of Ukraine

VOLODYMYR GROYSMAN

Ind. 21

APPROVED
by the Resolution of the Cabinet of Ministers of Ukraine
No. 740 of 14 August 2019

AMENDMENT
to be introduced to the list of types of products subject to state
market surveillance by state market surveillance authorities

The **list** shall be supplemented with point 53 to read as follows:

‘53. Water heaters and hot water storage tanks	Resolution of the Cabinet of Ministers of Ukraine No. 740 of 14 August 2019 “On Approval of the Technical Regulation on Ecodesign Requirements for Water Heaters and Hot Water Storage Tanks”	State Service of Ukraine on Food Safety and Consumer Protection’.
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{The text of the Technical Regulation was taken from the official website of the Cabinet of Ministers of Ukraine}

TECHNICAL REGULATION

on Ecodesign Requirements for Water Heaters and Hot Water Storage Tanks General Provisions

1. This Technical Regulation establishes ecodesign requirements for the placing on the market and/or putting into service of water heaters with a rated heat output ≤ 400 kW and hot water storage tanks with a storage volume $\leq 2\,000$ litres, including those integrated in packages of water heater and solar device.

This Technical Regulation is based on the Commission Regulation (EU) No. 814/2013 of 2 August 2013 supplementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water heaters and hot water storage tanks.

2. This Regulation shall not apply to:

water heaters specifically designed for using gaseous or liquid fuels predominantly produced from biomass;

water heaters using solid fuels;

combination water heaters;

water heaters which do not meet at least the load profile with the smallest reference energy, as specified in Annex 3, Table 1;

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

heat generators designed for water heaters and water heater housings to be equipped with such heat generators placed on the market before 1 January 2024 to replace identical heat generators and identical water heater housings. The replacement product or its packaging shall clearly indicate the water heater model for which it is intended.

3. Terms and definitions used in this Technical Regulation shall have the following meanings:

‘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 immersion heaters;

‘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;

‘biomass fuel’ means a gaseous or liquid fuel produced from biomass;

‘fossil fuel’ means a gaseous or liquid fuel of fossil origin;

‘water heater’ means a device that:

is connected to an external supply of drinking or sanitary water;

generates and transfers heat to drinking or sanitary water at given temperature, quantities and during given intervals;

is equipped with one or more heat generators;

‘heat pump water heater’ means a water heater using ambient heat from an air source, water source or ground source, and/or waste heat for heat generation;

‘water heating energy efficiency’ (η_{wh}) means the ratio between the useful energy provided by a water heater and the energy required for its generation, expressed in %;

‘convective water heater’ means a water heater that generates heat using the combustion of fossil and/or biomass fuels and/or the Joule effect in electric resistance heating elements;

‘conversion coefficient’ (CC) means a coefficient reflecting the estimated 40% average generation efficiency, the value of the conversion coefficient is $CC = 2,5$;

‘water heater housing’ means the part of a water heater designed to have a heat generator fitted;

‘rated heat output’ means the declared heat output of the water heater when providing water heating at standard rating conditions, expressed in kW;

‘storage volume’ (V) means the rated volume of a hot water storage tank or a storage water heater, expressed in litres;

‘standing loss’ (S) means the heating power dissipated from a hot water storage tank at given water and ambient temperatures, expressed in W;

‘back-up immersion heater’ means a Joule effect electric resistance heater that is part of a hot water storage tank and generates heat only when intervention in the external heat source takes place (including during maintenance periods), or that is part of a solar hot water storage tank and provides heat when the solar heat source is not sufficient to satisfy required comfort level;

‘sound power level’ (L_{WA}) means the amplitude-weighted sound power level, indoors and/or outdoors, expressed in dB;

‘solar water heater’ means a water heater equipped with one or more solar collectors, solar hot water storage tanks, heat generator and pumps in the collector loop and other parts. A solar water heater is placed on the market as a single product;

‘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 rated heat loss level;

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

combustion of fossil fuels and/or biomass fuels;

use of the Joule effect in electric resistance heating elements;

capture of ambient heat from an air source, water source or ground source, and/or waste heat;

whereby a heat generator designed for a water heater and a water heater housing to be equipped with such a heat generator shall be also considered a water heater.

For convenient application of Annexes 2 to 6 hereto, additional definitions are set out in Annex 1.

Other terms used herein shall have meanings set out in the Laws of Ukraine ‘On Technical Regulations and Conformity Assessment’, ‘On State Market Surveillance and Control of Non-Food Products’, ‘On Standardization’ and in the Technical Regulation establishing a framework for the setting of ecodesign requirements for energy-related products, approved by the Resolution of the Cabinet of Ministers of Ukraine of 3 October 2018 No. 804 (Official Journal of Ukraine, 2018, No. 80, p. 2678).

Ecodesign Requirements

4. The ecodesign requirements for water heaters and hot water storage tanks are set out in Annex 2 to this Technical Regulation.

The ecodesign requirements shall apply in accordance with the following timetable:

2 years after this Technical Regulation has come into force:

water heaters shall meet the requirements set out in Annex 2, section I, subpoint 1 of point 1, points 2, 3, 4 and 6;

hot water storage tanks shall meet the requirements set out in Annex 2, section II, point 2;

4 years after this Technical Regulation has come into force:

water heaters shall meet the requirements set out in Annex 2, section I, point 1, subpoint 2;

hot water storage tanks shall meet the requirements set out in Annex 2, section II, point 1;

5 years after this Technical Regulation has come into force:

water heaters shall meet the requirements set out in Annex 2, section I, point 1, subpoint 3;

water heaters shall meet the requirements set out in Annex 2, section I, point 5.

Compliance with ecodesign requirements shall be measured and calculated in accordance with the requirements set out in Annexes 3 and 4 to this Technical Regulation.

Conformity Assessment

5. Conformity of water heaters and hot water storage tanks with the requirements

of this Technical Regulation shall be assessed by applying the internal design control procedure or the management system procedure for conformity assessment set out, respectively, in Annexes 3 and 4 to the Technical Regulation establishing a framework for the setting of ecodesign requirements for energy-related products, approved by the Resolution of the Cabinet of Ministers of Ukraine No 804 of 3 October 2018 (Official Journal of Ukraine, 2018, No 80, p. 2678).

For the purposes of conformity assessment, the technical documentation shall contain a copy of the calculations as laid down in Annex 4 to this Technical Regulation.

State Market Surveillance

6. Verification of conformity of water heaters and hot water storage tanks with the requirements of this Technical Regulation in the course of state market surveillance shall be made in accordance with the requirements set out in Annex 5 to this Technical Regulation.

Indicative Benchmarks

7. The indicative benchmarks for best-performing water heaters and hot water storage tanks available on the market are set out in Annex 6 to this Technical Regulation.

Correlation Table

8. The correlation table between the provisions of the Commission Regulation (EU) No. 814/2013 of 2 August 2013 supplementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water heaters and hot water storage tanks, and of this Technical Regulation are set out in Annex 7 to this Technical Regulation.

**Definitions applicable for Annexes 2 to 5
to this Technical Regulation**

For the purposes of Annexes 2 to 4 to this Technical Regulation the following definitions shall apply:

‘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 Table 1 of Annex 3 to the Technical Regulation;

‘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 room 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;

‘smart control compliance’ (*smart*) means the measure of whether a water heater equipped with smart controls fulfils the criterion set out in point 4 of Annex 4 to the Technical Regulation;

‘water draw-off’ means a given combination of useful water flow rate, useful water temperature, useful energy content and peak temperature, as specified in Table 1 of Annex 3 to the Technical Regulation;

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

‘daily electricity consumption’ (Q_{elec}) means the consumption of electricity for water heating over 24 consecutive hours under the declared load profile, expressed in kWh;

‘daily fuel consumption’ (Q_{fuel}) means the consumption of fuels for water heating over 24 consecutive hours under the declared load profile, expressed in kWh in terms of gross calorific value (GCV);

‘auxiliary electricity consumption’ (Q_{aux}) means the annual electricity consumption of a solar water heater that is due to the pump power consumption and the standby power consumption, expressed in kWh;

‘equivalent model’ means a model placed on the market with the same technical parameters set out in the applicable product information requirements of Annex 2 to this Technical Regulation as another model placed on the market by the same manufacturer;

‘energy content of hot water’ means the product of the specific heat capacity

of water, the average temperature difference between the hot water output and cold water input, and the total mass of the hot water delivered;

‘heat generator water heating energy efficiency’ ($\eta_{wh,nonsol}$) means the water heating energy efficiency of a heat generator which is part of a solar water heater, expressed in %, established under average climate conditions and without using solar heat input;

‘pump power consumption’ ($solpump$) means the rated electrical power consumption of the pump in the collector loop of a solar water heater, expressed in W;

‘standby power consumption’ ($solstandby$) means the rated electrical power consumption of a solar water heater when the pump and the heat generator of a solar water heater are inactive, expressed in W;

‘zero-loss efficiency’ (η_0) means the efficiency of the solar collector, when the solar collector mean fluid temperature is equal to the ambient temperature;

‘declared load profile’ means the load profile applied for conformity assessment;

‘mixed water at 40 °C’ ($V40$) means the quantity of water at 40°C, which has the same heat content (enthalpy) as the hot water which is delivered above 40 °C at the output of the water heater, expressed in litres;

‘smart control’ means a device that automatically adapts the water heating process to individual usage conditions with the aim of reducing energy consumption;

‘second-order coefficient’ (a_2) means the coefficient measuring the temperature dependence of the first-order coefficient, expressed in $W/(m^2 K^2)$;

‘first-order coefficient’ (a_1) means the heat loss coefficient of a solar collector, expressed in $W/(m^2 K)$;

‘useful water flow rate’ (f) means the minimum flow rate, expressed in litres per minute, at which hot water is emitting extra energy, as specified in Table 1 in Annex 3 to this Technical Regulation;

‘useful water temperature’ (T_m) means the water temperature, expressed in degrees Celsius, at which hot water starts contributing to the reference energy, as referred to in Table 1 of Annex 3 to this Technical Regulation;

‘useful energy content’ (Q_{tap}) means the energy content of hot 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 Table 1 of Annex 3 to this Technical Regulation;

‘ambient correction term’ (Q_{cor}) means a coefficient, expressed in kWh, which takes into account the fact that the temperature in the place where the water heater is installed is not constant;

‘incidence angle’ means the angle between the direction to the sun and the direction perpendicular to the solar collector aperture;

‘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 of that load profile;

‘incidence angle modifier’ (*IAM*) means the ratio of the useful heat output of the solar collector at a given incidence angle and its useful heat output at an incidence angle of 0 degrees;

‘storage water heater’ means a water heater equipped with hot water storage tank(s), heat generator(s) and possibly other parts, which are contained in a single housing;

‘peak temperature’ (T_p) means the minimum water temperature, expressed in degrees Celsius, to be achieved during water draw-off, as specified in Table 1 of Annex 3 to this Technical Regulation;

‘collector aperture area’ (A_{sol}) means the maximum projected area through which unconcentrated solar radiation enters the collector, expressed in m^2 ;

‘smart control factor’ (*SCF*) means the water heating energy efficiency gain due to smart control under the conditions set out in point 3 of Annex 3 to this Technical Regulation;

‘load profile’ means a given sequence of water draw-offs, as specified in Table 1 of Annex 3 to the Technical Regulation. Each water heater meets at least one load profile;

‘annual non-solar heat contribution’ (Q_{nonsol}) means the annual contribution of electricity (expressed in kWh in terms of primary energy) and/or fuel (expressed in kWh in terms of *GCV*) to the useful heat output of a solar water heater, taking into account the annual amount of heat captured by the solar collector and the heat losses of the solar hot water storage tank;

‘annual energy consumption’ (Q_{total}) means the annual energy consumption of a solar water heater, expressed in kWh in terms of primary energy or in terms of gross calorific value (*GCV*);

‘average climate conditions’ mean the temperature and global solar irradiance conditions characteristic for the city of Kyiv;

‘solar hot water storage tank’ means a hot water storage tank storing heat energy produced by one or more solar collectors;

‘solar collector’ means a device designed to absorb global solar irradiance and to transfer the heat so produced to a fluid passing through it; it is characterised by the collector aperture area, the zero-loss efficiency, the first order coefficient, the second-order coefficient and the incidence angle modifier;

‘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, expressed in W/m;

‘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, measured under the conditions set out in point 3 of Annex 3 to this Technical Regulation;

‘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 gross calorific value (*GCV*), measured under the conditions set out in point 3 of Annex 3 to this Technical Regulation;

‘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, measured under the conditions set out in point 3 of Annex 3 to this Technical Regulation;

‘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 gross calorific value (*GCV*), measured under the conditions set out in point 3 of Annex 3 to this Technical Regulation.

Annex 2
to the Technical Regulation

Ecodesign requirements

I. ECODESIGN REQUIREMENTS FOR WATER HEATERS

1. Requirements for water heating energy efficiency

1) In 2 years after this Technical Regulation has come into force, the water heating energy efficiency of water heaters shall not fall below the following values:

Declared load profile	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL
Water heating energy efficiency	22 %	23 %	26 %	26 %	30 %	30 %	30 %	32 %	32 %	32 %
In addition, for water heaters with the parameter <i>smart</i> = '1': water heating energy efficiency calculated for <i>smart</i> = 0, tested under the declared load profile	19 %	20 %	23 %	23 %	27 %	27 %	27 %	28 %	28 %	28 %

2) In 4 years after this Technical Regulation has come into force, the water heating energy efficiency of water heaters shall not fall below the following values:

Declared load profile	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL
Water heating energy efficiency	32 %	32 %	32 %	32 %	36 %	37 %	37 %	37 %	37 %	38 %
In addition, for water heaters with the parameter <i>smart</i> = '1': water heating energy efficiency calculated for <i>smart</i> = 0, tested under the declared load profile	29 %	29 %	29 %	29 %	33 %	34 %	35 %	36 %	36 %	36 %

3) In 5 years after this Technical Regulation has come into force, the water heating energy efficiency of water heaters shall not fall below the following values:

Declared load profile	XXL	3XL	4XL
Water heating energy efficiency	60 %	64	64

2. Requirements for storage volume of storage water heaters with declared load profiles 3XS, XXS, XS and S

2 years after this Technical Regulation has come into force:

1) for storage water heaters with declared load profiles 3XS the storage volume shall not exceed 7 litres;

2) for storage water heaters with declared load profiles XXS and XS, the storage volume shall not exceed 15 litres;

3) for storage water heaters with declared load profiles S the storage volume shall not exceed 36 litres.

3. Requirements for mixed water at 40°C of storage water heaters with declared load profiles M, L, XL, XXL, 3XL and 4XL

In 2 years after this Technical Regulation has come into force the amount of mixed water at 40°C shall not fall below the following values:

Declared load profile	M	L	XL	XXL	3XL	4XL
Mixed water at 40°C	65 l	130 l	210 l	300 l	520 l	1 040 l

4. Requirements for sound power level

In 2 years after this Technical Regulation has come into force the sound power level of heat pump water heaters shall not exceed the following values:

Rated heat output ≤ 6 kW		Rated heat output > 6 kW and ≤ 12 kW		Rated heat output > 12 kW and ≤ 30 kW		Rated heat output > 30 kW and ≤ 70 kW	
Sound power level (L_{WA}), indoors	Sound power level (L_{WA}), outdoors	Sound power level (L_{WA}), indoors	Sound power level (L_{WA}), outdoors	Sound power level (L_{WA}), indoors	Sound power level (L_{WA}), outdoors	Sound power level (L_{WA}), indoors	Sound power level (L_{WA}), outdoors
60 dB	65 dB	65 dB	70 dB	70 dB	78 dB	80 dB	88 dB

5. Requirements for emissions of nitrogen oxides

In 5 years after this Technical Regulation has come into force, emissions of nitrogen oxides (expressed in nitrogen dioxide) of water heaters shall not exceed the following values:

convective water heaters using gaseous fuels: 56 mg/kWh fuel input in terms of *GCV*;

convective water heaters using liquid fuels: 120 mg/kWh fuel input in terms of *GCV*;

heat pump water heaters equipped with external combustion using gaseous fuels and solar water heaters using gaseous fuels: 70 mg/kWh fuel input in terms of *GCV*;

heat pump water heaters equipped with external combustion using liquid fuels and solar water heaters using liquid fuels: 120 mg/kWh fuel input in terms of *GCV*;

heat pump water heaters equipped with an internal combustion engine using gaseous fuels: 240 mg/kWh fuel input in terms of *GCV*;

heat pump water heaters equipped with an internal combustion engine using liquid fuels: 420 mg/kWh fuel input in terms of *GCV*.

6. Requirements for product information related to water heaters

In 2 years after this Technical Regulation has come into force the instruction manuals for installers and end-users, free access websites of manufacturers, their authorised representatives and importers and technical documentation for the purposes of conformity assessment pursuant to point 5 of this Technical Regulation shall contain the following elements:

1) information on the model(s), including equivalent models, to which the information relates;

2) the results of the measurements for the technical parameters specified in point 6 of Annex 3 to this Technical Regulation;

3) the results of the calculations for the technical parameters specified in point 2 of Annex 4 to this Technical Regulation;

4) any specific precautions that shall be taken when the water heater is assembled, installed or maintained;

5) for heat generators designed for water heaters and water heater housings to be equipped with such heat generators: their characteristics, the requirements for assembly, to ensure compliance with the ecodesign requirements for water heaters and, where appropriate, the list of combinable equipment recommended by the manufacturer;

6) information relevant for disassembly, recycling and/or disposal at end-of-life.

II. ECODESIGN REQUIREMENTS FOR HOT WATER STORAGE TANKS

1. Requirement for standing loss

In 4 years after this Technical Regulation has come into force the standing loss S of hot water storage tanks with storage volume V , expressed in litres, shall not exceed the following limit:

$$16,66 + 8,33 \cdot V^{0,4} \text{ Watts}$$

2. Requirements for product information related to hot water storage tanks

In 2 years after this Technical Regulation has come into force the instruction manuals for installers and end-users, free access websites of manufacturers, their authorised representatives and importers and technical documentation for the purposes of conformity assessment pursuant to point 5 of this Technical Regulation shall contain the following elements:

- 1) information on the model(s), including equivalent models, to which the information relates;
 - 2) the results of the measurements for the technical parameters specified in point 7 of Annex 3 to this Technical Regulation;
 - 3) any specific precautions that shall be taken when the hot water storage tank is assembled, installed or maintained;
 - 4) information relevant for disassembly, recycling and/or disposal at end-of-life.
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Measurements

1. For the purposes of compliance and verification of compliance of water heaters and hot water storage tanks with the requirements of the Technical Regulation on Ecodesign Requirements for Water Heaters and Hot Water Storage Tanks (hereinafter referred to as the 'Technical Regulation'), measurements shall be made using state-of-the-art measurement methods, which produce results deemed to be of low uncertainty, including methods set out in the standards from the list of national standards.

They shall meet the conditions and technical parameters set out in points 2 to 7 hereof.

2. General conditions for testing water heaters

Measurements shall be carried out using the load profiles set out in Table 1 of this Annex.

Measurements shall be carried out using a 24-hour measurement cycle as follows:

00:00 to 06:59: no water draw-off;

from 7:00: water draw-offs according to the declared load profile;

from end of last water draw-off until 24:00: no water draw-off.

The declared load profile shall be the maximum load profile or the load profile one below the maximum load profile.

Each heat generator designed for a water heater, and each water heater housing to be equipped with such a heat generator, shall be tested with an appropriate water heater housing and heat generator, respectively.

Water heaters to be 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 1

Load profiles of water heaters

h	3XS			XXS			XS			S			
	Q_{tap}	f	T_m	Q_{tap}	f	T_m	Q_{tap}	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
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	3	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	0,105	2	25										
09:30	0,105	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	3	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	3	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	
21:35	0,015	2	25	0,105	2	25							
21:45	0,015	2	25	0,105	2	25							
Q_{ref}	0,345			2,100			2,100			2,100			

h	M				L				XL			
	Q_{tap}	f	T_m	T_p	Q_{tap}	f	T_m	T_p	Q_{tap}	f	T_m	T_p
	kWh	l/min	°C	°C	kWh	l/min	°C	°C	kWh	l/min	°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

h	XXL				3XL				4XL			
	Q_{tap}	f	T_m	T_p	Q_{tap}	f	T_m	T_p	Q_{tap}	f	T_m	T_p
	kWh	l/min	°C	°C	kWh	l/min	°C	°C	kWh	l/min	°C	°C
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	
21:35												
21:45												
Q_{ref}	24,53				46,76				93,52			

3. Conditions for testing the smart control compliance (*smart*) of water heaters

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 control function 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;

Whereas the difference between the useful energy content measured during days 1 to 7 and the useful energy content measured during days 8 to 14 shall not exceed 2% of Q_{ref} of the declared load profile.

4. Conditions for testing solar water heaters

The solar collector, solar hot water storage tank, pump in the collector loop (if applicable) and heat generator shall be tested separately. Where the solar collector and solar hot water storage tank cannot be tested separately, they shall be tested in combination. The heat generator shall be tested under the conditions set out in point 2 of this Annex.

The results shall be used for the calculations set out in subpoint 2 of point 3 of Annex 4 to this Technical Regulation under the conditions set out in Tables 2 and 3 of this Annex. For the purpose of establishing Q_{total} the efficiency of the heat generator using the Joule effect in electric resistance heating elements is assumed to be 100/CC.

5. Conditions for testing heat pump water heaters

Heat pump water heaters shall be tested under the conditions set out in Table 4 of this Annex.

Heat pump water heaters which use ventilation exhaust air as the heat source shall be tested under the conditions set out in Table 5 of this Annex.

Table 2

Average daytime temperature (°C)

	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

Table 3

Average global solar irradiance (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

Table 4

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

Heat source	Outdoor air	Indoor air	Exhaust air	Brine	Water
Temperature	+ 7°C (+ 6°C)	+ 20°C (maximum + 15°C)	+ 20°C (+ 12°C)	0°C (inlet)/ - 3°C (outlet)	+ 10°C (inlet)/ + 7°C (outlet)

Таблица 5

Maximum ventilation exhaust air available (m^3/h), at a temperature of 20°C and with humidity of 5,5 g/m^3

Declared load profile	XXS	XS	S	M	L	XL	XXL	3XL	4XL
Maximum ventilation exhaust air available	109	128	128	159	190	870	1 021	2 943	8 830

6. Technical parameters of water heaters

The following parameters shall be established for water heaters:

the daily electricity consumption Q_{elec} in kWh, rounded to three decimal places;

the declared load profile, expressed by the appropriate letter in accordance with Table 1 of this Annex;

the sound power level L_{WA} , in dB, indoors, rounded to the nearest integer (for heat pump water heaters, if applicable);

in addition, for water heaters using fossil and/or biomass fuels:

the daily fuel consumption Q_{fuel} in kWh in terms of gross calorific value GCV , rounded to three decimal places;

the emissions of nitrogen oxides, expressed in nitrogen dioxide, in mg/kWh, in terms of gross calorific value GCV , rounded to the nearest integer;

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

the weekly fuel consumption with smart controls $Q_{fuel,week,smart}$ in kWh in terms of gross calorific value (GCV), rounded to three decimal places;

the weekly fuel consumption with smart controls $Q_{fuel,week,smart}$ in kWh in terms of final energy consumption, rounded to three decimal places;

the weekly electricity consumption without smart controls $Q_{elec,week}$ in kWh in terms of gross calorific value (GCV), rounded to three decimal places;

the weekly fuel consumption without smart controls $Q_{fuel,week}$ in kWh in terms of final energy consumption, rounded to three decimal places;

in addition, for storage water heaters with declared load profiles 3XS, XXS and XS:

the storage volume V in litres, rounded to one decimal place;

in addition, for storage water heaters with declared load profiles M, L, XL, XXL, 3XL and 4XL:

the mixed water at 40°C V_{40} in litres, rounded to the nearest integer;

in addition, for solar water heaters:

the collector aperture area A_{sol} in m^2 , rounded to two decimal places;

the zero-loss efficiency η_0 , rounded to three decimal places;

the first-order coefficient a_1 in $W/(m^2K)$, rounded to two decimal places;

the second-order coefficient a_2 in $W/(m^2K^2)$, rounded to three decimal places;

the incidence angle modifier IAM, rounded to two decimal places;

the pump power consumption sol_{pump} in W, rounded to two decimal places;

in addition, for heat pump water heaters:

the sound power level (L_{WA}) outdoors, in dB, rounded to the nearest integer.

7. Technical parameters of hot water storage tanks

The following parameters shall be established for hot water storage tanks:

the storage volume V in litres, rounded to one decimal place;

the standing loss (S) in W, rounded to one decimal place.

Calculations

1. For the purposes of compliance and verification of compliance of water heaters and hot water storage tanks with the requirements of this Technical Regulation, calculations shall be made using state-of-the-art measurement methods, which produce results deemed to be of low uncertainty, including methods set out in the standards from the list of national standards. They shall meet the technical parameters and calculations set out in points 2 to 5 of this Annex.

Technical parameters used for the calculations shall be measured in accordance with Annex 3 to this Technical Regulation.

2. Technical parameters of water heaters

The following parameters shall be calculated for water heaters under average climate conditions:

the water heating energy efficiency η_{wh} in %, rounded to one decimal place;
in addition, for solar water heaters under average climate conditions:

the annual non-solar heat contribution Q_{nonsol} , expressed in kWh, in terms of primary energy for electricity and/or in kWh in terms of GCV for various fuels, rounded to one decimal place;

the heat generator water heating energy efficiency $\eta_{wh,nonsol}$ in %, rounded to one decimal place;

the annual auxiliary electricity consumption Q_{aux} in kWh, rounded to one decimal place.

3. Calculation of the water heating energy efficiency η_{wh}

Conventional water heaters and water heaters with integrated heat pump

The water heating energy efficiency is calculated as follows:

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

For brine-to-water heat pump water heaters, the electricity consumption of one or more ground water pumps shall be taken into account.

2) Solar water heaters

The water heating energy efficiency is calculated as follows

$$\eta_{wh} = \frac{0,6 \cdot 366 \cdot Q_{ref}}{Q_{tota}}$$

where

$$Q_{total} = \frac{Q_{nonsol}}{1,1 \cdot \eta_{wh,nonsol} - 0,1} + Q_{aux} \cdot CC$$

4. Determination of the smart control factor SCF and of smart control compliance $smart$

1) The smart control factor is calculated as follows:

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

2) If $SCF \geq 0,07$, the value of $smart$ shall be 1. In all other cases, the value of $smart$ shall be 0.

5. Determination of the ambient correction term Q_{cor}

The ambient correction term is calculated as follows:

1) for conventional water heaters using electricity:

$$Q_{cor} = -k \cdot (CC \cdot (Q_{elec} \cdot (1 - SCF \cdot smart) - Q_{ref}))$$

2) for conventional water heaters using fuels:

$$Q_{cor} = -k \cdot (Q_{fuel} \cdot (1 - SCF \cdot smart) - Q_{ref}))$$

3) for heat pump water heaters:

$$Q_{cor} = -k \cdot 24h \cdot P_{stby}$$

Where k are the values given in Table 6 for each load profile.

Table 6

Values k										
	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL
k	0,23	0,23	0,23	0,23	0,23	0,23	0,23	0,0	0,0	0,0

REQUIREMENTS**to verification during state market surveillance**

1. The verification tolerances referred to in this Annex relate only to the verification of the measured parameters by state market surveillance authorities and shall not be used by the manufacturer or importer 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.

2. When verifying compliance of water heaters or hot water storage tanks with the requirements of this Technical Regulation, state market surveillance authorities shall apply the following procedure:

1) A single water heater or hot water storage tank per model shall be tested;

2) a model of the water heater or hot water storage tank shall be considered to comply with the requirements of the Technical Regulation if:

the values given in the technical documentation and, where applicable, the values used to calculate those values, are not more favourable for the manufacturer or importer than the results of the corresponding measurements;

the declared values meet any requirements laid down in the Technical Regulation, and the necessary product information provided by the manufacturer or importer does not contain values that are more favourable for the manufacturer or importer than the indicated values;

when state market surveillance authorities test the water heater or hot water storage tank, the indicated values (the values of the relevant parameters as measured during the tests and the values calculated from these measurements) shall comply with the respective verification tolerances as indicated in Table 7 of this Annex.

3) if the results referred to in the first and the second indents of point 2, subpoint 2 are not achieved, the model of water heater and hot water storage tank and all equivalent water heaters or hot water storage tanks referred to in the technical documentation provided by the manufacturer or importer shall be considered not to comply with the requirements of the Technical Regulation.

4) if the result referred to in the third indent of point 2, subpoint 2 is not achieved, the market surveillance authorities shall randomly select three additional water heaters or hot water storage tanks of the same model for testing. As an alternative,

the three additional water heaters or hot water storage tanks shall be selected which are equivalent to the models referred to in the technical documentation provided by the manufacturer or importer;

5) the model shall be considered to comply with the requirements if, for these three water heaters or hot water storage tanks, the arithmetical mean is within the verification tolerances indicated in Table 7 of this Annex;

6) if the result referred to in point 5 is not achieved, the model of water heater or hot water storage tank and all equivalent water heaters or hot water storage tanks referred to in the technical documentation provided by the manufacturer or importer shall be considered not to comply with the requirements of the Technical Regulation.

The state market surveillance authorities shall use the measurement and calculation methods set out in Annexes 3 and 4 to the Technical Regulation.

State market surveillance authorities shall only apply the verification tolerances that are set out in the table below and shall only use the procedure described in points 1 to 6 of this Annex. No other tolerances, such as those set out in national standards that are identical to the European harmonised standards or in any other measurement method, shall be applied.

Table 7

Verification tolerances

Parameters	Verification tolerances
Daily electricity consumption Q_{elec}	The established value shall not be more than 5% higher than the declared value
Sound power level LWA , indoors and/or outdoors	The established value shall not be more than 2 dB higher than the declared value
Daily fuel consumption Q_{fuel}	The established value shall not be more than 5% higher than the declared value
Emissions of nitrogen oxides	The established value shall not be more than 20% higher than the declared value
Weekly fuel consumption with smart controls $Q_{fuel,week,smart}$	The established value shall not be more than 5% higher than the declared value
Weekly fuel consumption without smart controls $Q_{fuel,week}$	The established value shall not be more than 5% higher than the declared value
Weekly electricity consumption with smart controls $Q_{elec,week,smart}$	The established value shall not be more than 5% higher than the declared value
Weekly electricity consumption without	The established value shall not be more than 5%

smart controls $Q_{elec,week}$	higher than the declared value
Storage volume V	The established value shall not be more than 2% lower than the declared value
Mixed water at 40°C V_{40}	The established value shall not be more than 3% lower than the declared value
Collector aperture area A_{sol}	The established value shall not be more than 2% lower than the declared value
Pump power consumption sol_{pump}	The established value shall not be more than 3% higher than the declared value
Standby power consumption $sol_{standby}$	The established value shall not be more than 5% higher than the declared value
Standing loss S	The established value shall not be more than 5% higher than the declared value

Indicative Benchmarks

The best indicative benchmarks for technologies available at the time of entry into force of this Technical Regulation for water heaters and hot water storage tanks in terms of water heating energy efficiency, sound power level, standing loss and emissions of nitrogen oxides are as follows:

1. Indicative benchmarks for water heating energy efficiency of water heaters

Declared load profile	3XS	XXS	XS	S	M	L	XL	XXL	3XL	4XL
Water heating energy efficiency	35 %	35 %	38 %	38 %	75 %	110 %	115 %	120 %	130 %	130 %

2. Indicative benchmarks for sound power levels L_{WA} outdoors, of heat pump water heaters with:

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

3. Indicative benchmarks for standing loss of hot water storage tanks with storage volume V , expressed in litres:

$$5+4,16V^{0,4} \text{ Watts}$$

4. Indicative benchmarks for emissions of nitrogen oxides, expressed in nitrogen oxide, of conventional water heaters using gaseous fuels:

$$35 \text{ mg/kWh fuel input in terms of gross calorific value } GCV$$

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

Annex 7
to the Technical Regulation

CORRELATION TABLE

between the provisions of the Commission Regulation (EU) No. 814/2013 of 2 August 2013 supplementing Directive 2009/125/EC of the European Parliament and of the Council with regard to ecodesign requirements for water heaters and hot water storage tanks, and of the Technical Regulation on Ecodesign Requirements for Water Heaters and Hot Water Storage Tanks

Provisions of the Commission Regulation (EU)	Provisions of the Technical Regulation
Point 1 of Article 1	point 1
Point 2 of Article 1	point 2
First indent of Article 2	point 3
Point 1 of Article 2	sixth indent of point 3
Point 2 of Article 2	nineteenth indent of point 3
Point 3 of Article 2	eleventh indent of point 3
Point 4 of Article 2	twelfth indent of point 3
Point 5 of Article 2	thirteenth indent of point 3
Point 6 of Article 2	eighteenth indent of point 3
Point 7 of Article 2	third indent of point 3
Point 8 of Article 2	fourth indent of point 3
Point 9 of Article 2	fifth indent of point 3
Point 10 of Article 2	ninth indent of point 3
Point 11 of Article 2	seventh indent of point 3
Point 12 of Article 2	seventeenth indent of point 3
Point 13 of Article 2	second indent of point 3
Point 14 of Article 2	fifteenth indent of point 3
Point 15 of Article 2	eighth indent of point 3
Point 16 of Article 2	sixteenth indent of point 3
Point 17 of Article 2	fourteenth indent of point 3
Point 18 of Article 2	tenth indent of point 3
Article 3	point 4
Article 4	point 5
Article 5	point 6
Article 6	point 7
Article 7	-
Article 8	-
Article 9	-
Annex I	Annex 1
Annex II	Annex 2
Annex III	Annex 3
Annex IV	Annex 4
Annex V	Annex 5
Annex VI	Annex 6