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Solar thermal solutions  
within the Energy  
Labelling Context

**General features**

Place, Date

## General context linked to solar thermal solutions

### The Energy Labelling regulations refer to many “solar” items :

- Solar device: a solar-only system, a solar collector, a solar hot water storage tank or a pump in the collector loop, which are placed on the market separately;
- Solar-only system: a device that is equipped with one or more solar collectors and solar hot water storage tanks and possibly pumps in the collector loop and other parts, which is placed on the market as one unit and is not equipped with any heat generator except possibly one or more back-up immersion heaters;
- Solar collector: a device designed to absorb global solar irradiance and to transfer the heat energy so produced to a fluid passing through it;
- Solar hot water storage tank: a hot water storage tank storing heat energy produced by one or more solar collectors.

## General context linked to solar thermal solutions

### Space heater, Regulation 811-2013, Energy Labelling of :

- space heaters,
- combination heaters,
- packages of space heater, temperature control and solar device,
- packages of combination heater, temperature control and solar device.

Only solar thermal solutions used in package are concerned here.

Conventional space heater with or without water heater, associated to a solar thermal solution are subject to label package.

Efficiency classes ranked from G to A+++ from 26<sup>th</sup> September 2015.

Common use with solar thermal system will often be “packages of combination heater, temperature control and solar device”.

## General context linked to solar thermal solutions

### Water heater, Regulation 812-2013, Energy Labelling of :

- water heaters,
- hot water storage tanks,
- packages of water heater and solar device.

Solar thermal solutions could be found under “water heater”, as solar water heater (thermosyphon system with electrical back-up), and package of conventional water heater associated to solar device.

Hot water storage tanks will also be concerned if used to store hot water from solar collectors. This case will mainly be found in packages.

From 26<sup>th</sup> September 2015, efficiency classes of water heaters and storage tanks ranked from G to A, and efficiency classes of packages ranked from G to A+++.

Common use with solar thermal system will often be “water heaters” and “packages of water heater and solar device”.

# Different labels

**Three solutions are the most common associated to solar thermal solutions on the market:**

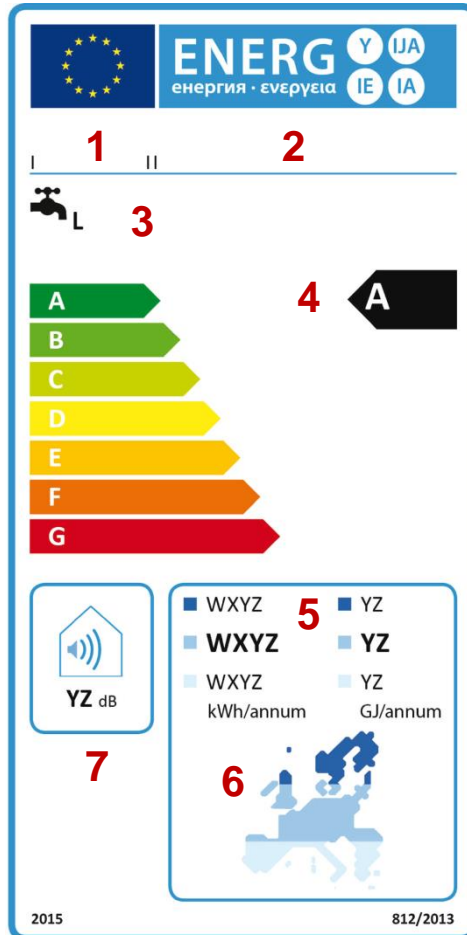
- Water heaters
- Packages of water heater and solar device
- Packages of combination heater, temperature control and solar device

The regulation on energy labelling defined a label type for each of these solutions, which will deliver specific information on efficiency and use.

Please note that solar only systems are not subject to energy labelling. But, when they are parts of a package, the manufacturer of the solar only-system has to provide technical documentation and the product fiche (see further).

# Different labels

## Solar water heaters in water heating energy efficiency classes A to G



Information available on the label:

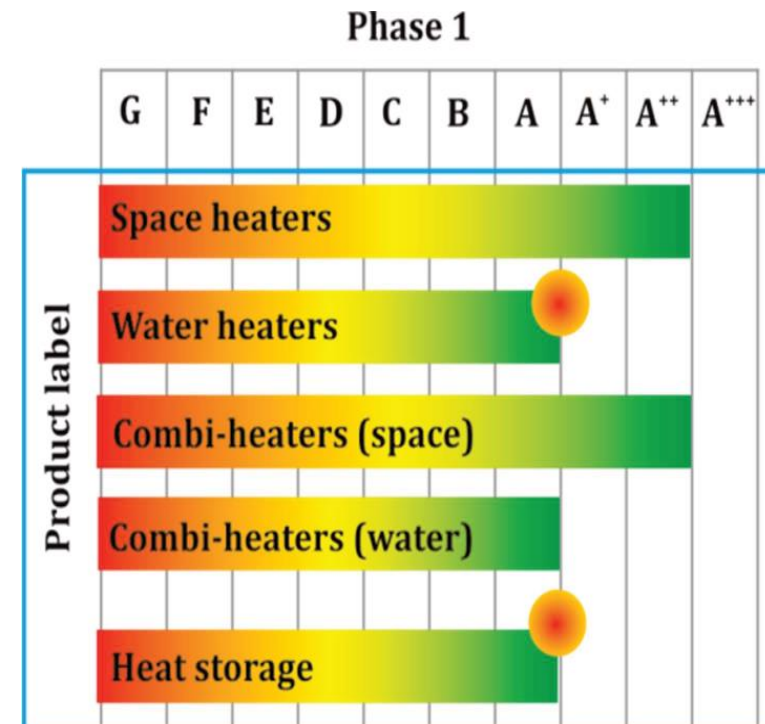
1. Supplier's name or trade mark;
2. Supplier's model identifier;
3. Water heating function, including the declared load profile;
4. Water heating energy efficiency class under average climate conditions;
5. Annual electricity consumption in kWh in terms of final energy or the annual fuel consumption in GJ in terms of GCV, under average, colder and warmer climate conditions;
6. European solar map displaying three indicative global solar irradiance zones;
7. Sound power level L WA , indoors, in dB.

# Different labels

## Solar water heaters in water heating energy efficiency classes A to G

Per se, solar devices do not require energy labels.

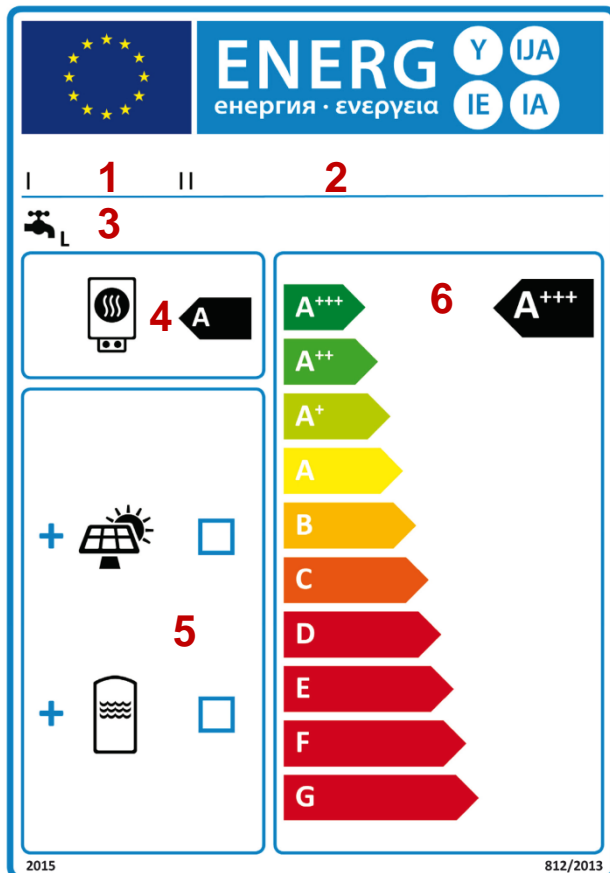
The exception to this are *thermosyphon* systems with integrated electrical resistance (the regulated acts define these equipment as solar water heaters). **According to the regulation's calculation procedures solar water heaters best energy class is limited to A, given that electrical water heaters have a predefined efficiency of 40%, and as so, an electrical water heater will be classified between C and D, enhanced to A with solar.**



Product labels energy class range, highlighting the solar enhanced solutions. (Source: "Ecodesign and the Energy label for solar thermal related products – Part 1., 2015, vAconsult)

# Different labels

## Label for packages of water heater and solar device in water heating energy efficiency classes A +++ to G



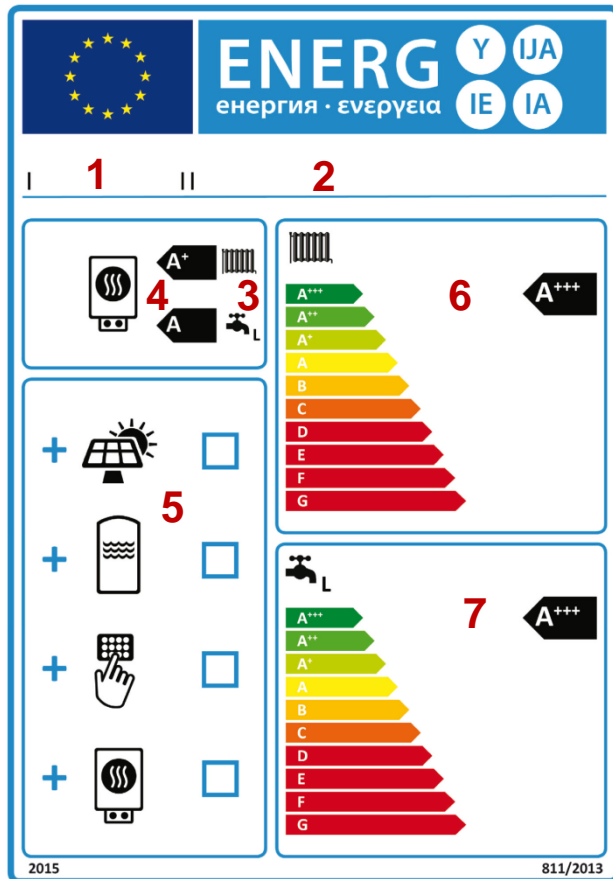
Information available on the label:

1. Dealer's and/or supplier's name or trade mark;
2. Dealer's and/or supplier's model(s) identifier;
3. Water heating function, including the declared load profile;
4. Water heating energy efficiency class of the primary water heater;
5. Indication of whether a solar collector and hot water storage tank may be included in the package of water heater and solar device;
6. Water heating energy efficiency class of the package of primary water heater and solar device.



# Different labels

**Label for packages of combination heater, temperature control and solar device  
in seasonal space and water heating energy efficiency classes A +++ to G**



Information available on the label:

1. Dealer's and/or supplier's name or trade mark;
2. Dealer's and/or supplier's model(s) identifier;
3. Space and water heating function, including the declared load;
4. Seasonal space and water heating energy efficiency classes of the primary combination heater;
5. Indication of whether a solar collector, hot water storage tank, temperature control and/or supplementary heater, may be included in the package of combination heater, temperature control and solar device;
6. Seasonal space heating energy efficiency class of the package of combination heater, temperature control and solar device;
7. Water heating energy efficiency class of the package of combination heater, temperature control and solar device.

# Different labels

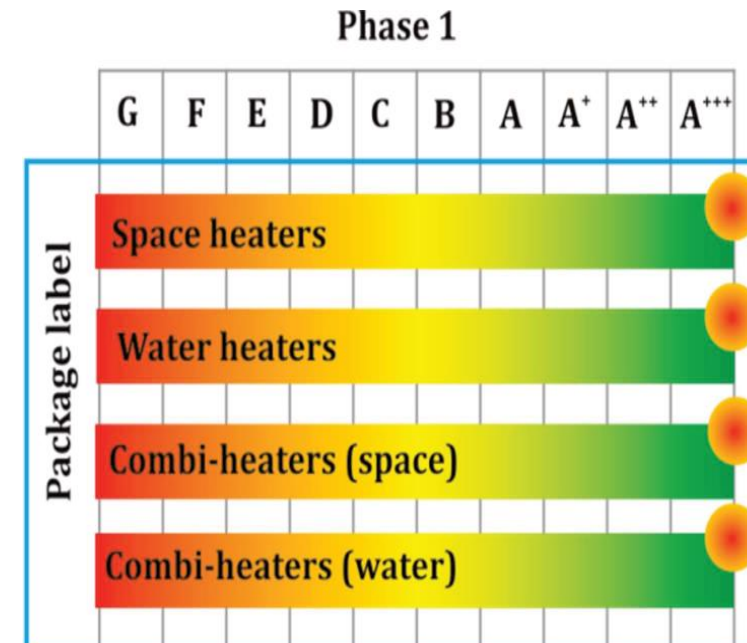
**Label for packages of water, space or combination heaters, temperature control and solar device in seasonal space and water heating energy efficiency classes**

**A +++ to G**

When high class backup heaters are part of the heating package, the distinction in the added value of solar devices is limited to the range A to A<sup>+++</sup>.

The space for distinction between brands and types will be short, and the differences will mainly focus on the system size than on the system's efficiency.

Additionally, the end-user perception on the differences between the A to A<sup>+++</sup> class is not clear, and the real added value of A<sup>+++</sup> classes is not correctly valued.



Package labels energy class range, highlighting the solar enhanced solutions. (Source: "Ecodesign and the Energy label for solar thermal related products – Part 1., 2015, vAconsult)

# Product fiches

**Each product should be delivered with a product fiche, which is more comprehensive than the label and contains detailed information on the appliance.**

There is no specific template for this fiche, but the regulation sets a precise list of information and a specific order to present them.

The Fiche contents includes, amongst other:

- Specific information according to the appliance type,
- Load profile for which it was tested,
- Heating energy efficiency,
- Electricity consumption (when applicable),
- Sound power LWA indoors,
- Standby power consumption,
- Standing loss (for storage tanks)
- Indication of specific precautions that shall be taken when the appliance is assembled, installed or maintained
- ...

The same product fiche may cover a wide number of appliance models provided by the same supplier.

# Package fiches

Each package should be delivered with a fiche, which contains detailed information on the energy efficiency of the products and overall system.

There are specific templates for this fiche.

1. Package of water heater and solar device (812-2013, Annex IV)
2. Package of space heater, temperature control and solar device – Space heating efficiency (811-2013, Annex IV)
3. Package of combination heater, temperature control and solar device – Water heating efficiency (811-2013, Annex IV)

Fiche for a package of water heater and solar device indicating the water heating energy efficiency of the package offered

1

Water heating energy efficiency of water heater

<sup>1</sup>  
T %

Declared load profile:

☐

Solar contribution  
From fiche of solar device

Auxiliary electricity

$(1,1 \times T - 10\%) \times 'II' - 'I' = +$  <sup>2</sup>  %

Water heating energy efficiency of package under average climate

<sup>3</sup>  
 %

Water heating energy efficiency class of package under average climate

	G	F	E	D	C	B	A	A <sup>+</sup>	A <sup>++</sup>	A <sup>+++</sup>
M	< 27 %	≥ 27 %	≥ 30 %	≥ 33 %	≥ 36 %	≥ 39 %	≥ 65 %	≥ 100 %	≥ 130 %	≥ 163 %
L	< 27 %	≥ 27 %	≥ 30 %	≥ 34 %	≥ 37 %	≥ 50 %	≥ 75 %	≥ 115 %	≥ 150 %	≥ 188 %
XL	< 27 %	≥ 27 %	≥ 30 %	≥ 35 %	≥ 38 %	≥ 55 %	≥ 80 %	≥ 123 %	≥ 160 %	≥ 200 %
XXL	< 28 %	≥ 28 %	≥ 32 %	≥ 36 %	≥ 40 %	≥ 60 %	≥ 85 %	≥ 131 %	≥ 170 %	≥ 213 %

Water heating energy efficiency under colder and warmer climate conditions

Colder: <sup>3</sup>  - 0,2 × <sup>2</sup>  =  %

Warmer: <sup>3</sup>  + 0,4 × <sup>2</sup>  =  %

The energy efficiency of the package of products provided for in this fiche may not correspond to its actual energy efficiency once installed in a building, as this efficiency is influenced by further factors such as heat loss in the distribution system and the dimensioning of the products in relation to building size and characteristics.

# Package fiches

For preferential boiler space heaters and preferential boiler combination heaters, element of the fiche for a package of space heater, temperature control and solar device and a package of combination heater, temperature control and solar device, respectively, indicating the seasonal space heating energy efficiency of the package offered

2

Seasonal space heating energy efficiency of boiler 1  %

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Temperature control  
From fiche of temperature control

Class I = 1 %, Class II = 2 %, Class III = 1,5 %, Class IV = 2 %, Class V = 3 %, Class VI = 4 %, Class VII = 3,5 %, Class VIII = 5 %

+ 2  %

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Supplementary boiler  
From fiche of boiler

Seasonal space heating energy efficiency (in %)

(  - '1' ) × 0,1 = ± 3  %

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Solar contribution  
From fiche of solar device

Collector size (in m<sup>2</sup>)

Tank volume (in m<sup>3</sup>)

Collector efficiency (in %)

Tank rating  
A\* = 0,95, A = 0,91,  
B = 0,86, C = 0,83,  
D-G = 0,81

+ 4  %

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Supplementary heat pump  
From fiche of heat pump

Seasonal space heating energy efficiency (in %)

(  - '1' ) × 'II' = + 5  %

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Solar contribution AND Supplementary heat pump

Select smaller value

0,5 × 4  OR 0,5 × 5  = - 6  %

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Seasonal space heating energy efficiency of package 7  %

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Seasonal space heating energy efficiency class of package

☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐ ☐

**G F E D C B A A<sup>+</sup> A<sup>++</sup> A<sup>+++</sup>**

< 30 % ≥ 30 % ≥ 34 % ≥ 36 % ≥ 75 % ≥ 82 % ≥ 90 % ≥ 96 % ≥ 125 % ≥ 150 %

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Boiler and supplementary heat pump installed with low temperature heat emitters at 35 °C?

From fiche of heat pump 7  + ( 50 × 'II' ) = 8  %

For preferential boiler combination heaters and preferential heat pump combination heaters, element of the fiche for a package of combination heater, temperature control and solar device indicating the water heating energy efficiency of the package offered

3

Water heating energy efficiency of combination heater 1  %

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Declared load profile: ☐

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Solar contribution  
From fiche of solar device

Auxiliary electricity

+ 2  %

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Water heating energy efficiency of package under average climate 3  %

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Water heating energy efficiency class of package under average climate

	G	F	E	D	C	B	A	A <sup>+</sup>	A <sup>++</sup>	A <sup>+++</sup>
<b>M</b>	< 27 %	≥ 27 %	≥ 30 %	≥ 33 %	≥ 36 %	≥ 39 %	≥ 45 %	≥ 50 %	≥ 55 %	≥ 60 %
<b>L</b>	< 27 %	≥ 27 %	≥ 30 %	≥ 34 %	≥ 37 %	≥ 40 %	≥ 45 %	≥ 50 %	≥ 55 %	≥ 60 %
<b>XL</b>	< 27 %	≥ 27 %	≥ 30 %	≥ 35 %	≥ 38 %	≥ 41 %	≥ 46 %	≥ 51 %	≥ 56 %	≥ 61 %
<b>XXL</b>	< 28 %	≥ 28 %	≥ 32 %	≥ 36 %	≥ 40 %	≥ 44 %	≥ 49 %	≥ 54 %	≥ 59 %	≥ 64 %

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Water heating energy efficiency under colder and warmer climate conditions

Colder: 3  - 0,2 × 2  = 4  %

Warmer: 3  + 0,4 × 2  = 5  %

# Technical documentation

**Each product or package should be delivered with a technical documentation. This document has to be provided upon request to the authorities of the Member States and to the European Commission.**

Technical documentation is not a commercial document. There is no specific template, but it should contain specific information listed by the regulation:

- Supplier reference,
- Clear description of the product or package,
- References of the harmonized standards applied,
- Other technical standards and specifications used,
- Technical parameters,
- Any specific precautions that shall be taken when the space heater is assembled, installed or maintained.

# Detailed information

**If the consumer can not see the heater displayed, the dealer is responsible to provide him detailed information.**

This situation could be met when the presentation of equipment is made through catalogues or advertising material (product not physically accessible).

The information assembled is a compilation of the information displayed in the energy label and in the product fiche.

The regulation sets for each product or package what would have to be include in this detailed information.

# Global irradiance zones

**Energy efficiency has to be calculated for average, colder and warmer climate conditions which are defined by 3 global geographical zones.**

The energy label has to present energy efficiency under average climate condition.

Calculations have also to be made for colder and warmer conditions.

Climate condition = temperature and global solar irradiance conditions characteristic for a specific city

- **Average: Strasbourg**
- **Colder: Helsinki**
- **Warmer: Athens**

Technical parameters allowing these calculations for solar device are specified by the regulation (Delegated regulation 812-2013, Annex VII). Results for these 3 climate conditions have to be included in the product or package fiches.



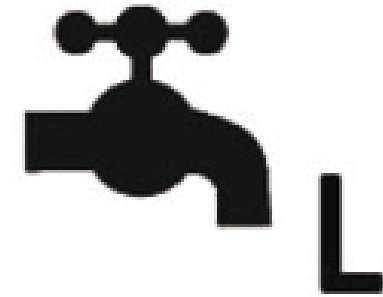


# Load profile for water heating

**Energy efficiency of a water heater has to be calculated depending on a specific load profile, from M to XXL.**

The load profile is a given sequence of water draw-offs, over 24hrs.

It's the manufacturers responsibility to choose the load profile within which the water heater is tested.  
Each water heater meets at least one load profile.



The declared load profile shall be the maximum load profile or the load profile one below the maximum load profile that could be met with the water heating solution.

The maximum load profile is the one 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.

# Load profile for water heating

Energy efficiency of a water heater has to be calculated depending on a specific load profile, from M to XXL..

The regulation explore the method to calculate the load profile.

For example, if a 2 bedrooms dwelling is considered, 3 inhabitants could be expected, which 3 daily showers, which correspond to an L profile.

Each load profile could also be expressed by energy content of water draw-offs:

Load profile:	3XS	XXS	XS	S	M	L	XL	XXL	
Qref:	0.345	2.1	2.1	2.1	5.845	11.655	19.07	24.53	kWh/day

Due to ecodesign and energy labelling specifications on storage tanks, only load profile from M to XXL are concerned by the energy labelling.

# Load profile for water heating

Identifying the consumer's water load profile is an essential step when helping the consumer to choose the most adequate solution.

## **Factors determining DHW profiles:**

- **Season**
- **Day of the week**
- **Time of day**
- **Occupancy pattern**
- **Number of occupants**

## **DHW draw off points are:**

- Bath
- Shower
- Sink
- (Washing machine)
- (Dishwasher)