



# **Annex R1 Systems EN 12977**

## **General**

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## 1. Abbreviations

The definitions in the Solar Keymark Scheme Rules apply.

## 2. Sampling

### 2.1 From serial production

A series production is assumed when at least 10 stores/controllers are produced with the same materials and the same manufacturing technologies in the same way and all major production processes are performed in presence of the inspector.

### 2.2 From stock

At least 10 samples (complete systems / collectors / storage tanks as applicable) of the same type more than the number of test samples picked must be available in the stock for picking the sample(s) to be tested.

### 2.3 Prototype testing

If for any reason the described standard sampling procedures are not applicable and prototypes must be submitted for testing, the CB has to decide on appropriate sampling procedures. In this case a factory inspection is required after the sampling and within 6 months after the issue of the certificate to verify the conformity of the sampled product with the planned serial production.

## 3. Compliance criteria for performance

### 3.1 General

To compare the thermal performance of two systems collectors in the framework of the Solar Keymark the principles and figures given in this chapter shall be used.

### 3.2 Solar-plus-supplementary systems (EN 12977-2)

The difference between the calculated  $Q_{aux,net}$  (as defined in EN 12977-2, paragraph 7.7.4) of two systems shall be less than 10% based on the Würzburg climate data and the design load given by the manufacturer (see: EN 12977-2, Annex A, table A.1).

### 3.3 Solar-only and solar preheat systems (EN 12977-2)

The difference between the calculated  $f_{sol}$  (as defined in EN 12977-2, paragraph 7.7.5) of two systems shall be less than 10% based on the Würzburg climate data and the design load given by the manufacturer (see EN 12977-2 Annex A, table A.1).

### 3.4 Large unique systems (EN 12977-2)

The difference between the predicted and calculated system gain according to EN 12977-2 Annex C 4.8 of two systems shall be less than 15% for the same reference conditions.

### 3.5 Solar water heater stores (EN 12977-3)

- Values of heat loss shall be within  $\pm 10\%$  of the original values.
- Effective volume shall be within  $\pm 5\%$  of the original values.
- Heat capacity shall be within  $\pm 5\%$  of the original values.

### 3.6 Solar combistores (EN 12977-4)

- Values of heat loss shall be within  $\pm 10\%$  of the original values.
- Effective volume shall be within  $\pm 5\%$  of the original values.
- Heat capacity shall be within  $\pm 5\%$  of the original values.

### 3.7 Solar controllers (EN 12977-5)

- The special test shall show no principal deviations in the functions of the controller and the accuracy of the sensors shall be within the required maximum deviation as specified in EN 12977-5, §7.

## 4. Product families (including unique large systems)

### 4.1 Solar water heater stores

A series of solar water heater stores fulfilling the requirements in EN 12977-3 Annex E is considered as one store family - and same subtype.

### 4.2 Solar combi stores

Combi stores shall be certified individually. So far, no family concept defined for stores related to EN 12977-4.

### 4.3 Controller

Controllers with exactly the same control functions, sensors and actuators are considered as one controller family - and same subtype.

## 5. Tolerances and equivalences

None

## 6. Miscellaneous

### 6.1 Specific rules for custom built systems

The systems defined in one assortment file according to EN 12977-1 section 6.8.2 "Assortment file for small systems" are considered being the same subtype (within the same system "family").

The following components in a custom-built system shall (as a general rule) be Solar Keymark certified:

- Solar collectors (EN 12975)
- Solar water heater stores (EN 12977-3)
- Solar combistores (EN 12977-4)
- Control equipment (EN 12977-5)

For large custom built systems performance testing and test results may be given in accordance with EN 12977-2 Annex C. For such large custom-built solar thermal systems tested according to Annex C, the concept of "system family" is not applicable and the certification is valid only for the specific configuration.

If a large system is tested according to EN 12977-2 Annex C (method C4), only the collectors shall be Solar Keymark certified.

### 6.2 Nominal store volume

The nominal store volume stated on the system identification label shall not differ by more than 10 % from the effective store volume determined from the measured thermal capacity. The calculation of the percentage of the difference between the two volumes is based on the value of the effective volume. The effective store volume shall be mentioned in the test report.