

## **ANNEX A2. SOLAR KEYMARK SURVEILLANCE TEST**

*Normative annex.*

*Version of 2012-06-26.*

### **1 Introduction**

This document gives a brief description of the procedure of the so called “Physical Inspection” as mentioned in section 6 Surveillance within the Specific CEN Keymark Scheme Rules for Solar Thermal Products, Version 13.01, January 2012 and carried out by the inspectors of Solar Keymark empowered certification bodies.

...The surveillance test is a physical inspection of the product and a comparison with the specifications of the original type tested sample. ...

### **2 Procedure**

The physical inspection is carried out at the production site of the manufacturer using a Physical Inspection Report - like enclosed. The process of the physical inspection can be subdivided in two parts:

1. Comparison of current engineering drawings with the drawings valid at the time of the initial testing which were filed by the corresponding test institute. By this comparison potential differences between the certified and the current product can be detected which would not be obvious during the assessment of the physical product.
2. Assessment of a certified product and its main components taken from the production line or from stock (only necessary if some differences were detected during step 1)

All findings from the physical inspection are reported within the Physical Inspection Report and send to responsible certification body.

### **3 Guide – Preparation of „physical inspection reports“ for Solar Thermal products according to the Solar Keymark scheme rules**

The overall goal of a physical inspection is to assure that a licensed product has not changed to such an extent, that the characteristics defined for that product in the initial type testing report and data sheet would not be correct anymore.

The physical inspection of a certified product has to be performed every two years.

To prepare the first re-inspection, an initial physical inspection at the time of the initial type testing shall be done.

The inspection body ordered to perform this physical inspection needs to have access to the complete documentation regarding the product to be inspected. There has to be minimum one module of the product physically accessible at the time the inspector is present in the company.

The following chapters describe which documentation and information has to be available for the physical inspection. This of course varies from product type to product type. So the list is only a minimum requirement, more documentation may be needed to describe specific details for the licensed product. This is in the duty of the inspector to decide.

If the licensed product to be inspected is not at all in one of the following categories, the inspector shall define the documentation of information which is needed to describe the product exactly.

This Physical Inspection Report can only be used for one product or a product family. The family has to be listed in a technical data sheet from [www.solarkeymark.org](http://www.solarkeymark.org).

### 3.1 Flat plate collector (FPC):

#### Parts list / Bill of Materials (BOM)

For each of the collectors of a certified series a part list / BOM must be made available to the inspector / test institute. The part list / BOM shall include **all** parts of the collector and shall be identifiable by a number or name and traceable by a date of revision.

#### Engineering drawings

For each of the collectors of a certified series a set of engineering drawings must be made available to the inspector / test institute. The engineering drawings shall be fully dimensioned, identifiable by a drawing number or drawing name and traceable by a date of revision. These drawings have to include at least the following:

- General view
- Sectional view
- Casing
- Absorber (plate and hydraulic layout)
- Transparent cover
- Insulation

#### Data Sheets

The components listed below must be described and specified using data sheets (alternatively the specification can be documented in the corresponding drawing). The data sheets shall be traceable by a date of revision and shall contain at least the following information.

##### Absorber

- Manufacturer / Deliverer
- Material of the absorber plate
- Thickness of the absorber plate
- Kind of surface treatment
- Manufacturer / Deliverer of surface treatment
- Solar absorption
- Infra-red emission

##### Transparent cover

- Manufacturer / Deliverer
- Product brand name
- Material
- Type (e.g. toughened glass, etc.)
- Thickness
- Surface properties (e.g. coatings, structure, etc.)
- Solar transmission at normal incidence (air mass 1.5)

##### Insulations

- Manufacturer / Deliverer
- Product brand name
- Material
- Type (e.g. open porous, closed porous, etc.)
- Thickness
- Density
- thermal conductivity

##### Casing

- Manufacturer / Deliverer
- Material (frame parts and back plate)
- Surface treatment

##### Sealing / adhesive material / rubber parts / plastic parts

- Manufacturer / Deliverer
- Material declaration

**Remarks:**

- If several sizes of the same collectors are certified, all documents have to be submitted for all the individual collectors.
- In case of special collector designs the delivery of additional documents might be required.
- The documents are kept strictly confidential by the inspector / test institute.
- The documents must be supplied to the inspector / test institute either in the language of the country that the inspector / test institute is located or in English.

**3.2 Evacuated tubular collector (ETC):****Parts list / Bill of Materials (BOM)**

For each of the collectors of a certification series parts list / BOM must be made available to the inspector / test institute. The parts list / BOM shall include **all** parts of the collector and shall be identifiable by a number or name and traceable by a date of revision.

**Engineering drawings**

For each of the collectors of a certified series a set of engineering drawings must be made available to the inspector / test institute. The engineering drawings shall be fully dimensioned, identifiable by a drawing number or drawing name and traceable by a date of revision. These drawings have to include at least the following:

- General view
- Sectional view
- Casing
- Insulation between the outer casing and the manifold tube
- Manifold tube
- Vacuum tube
- Absorber
- Heat contact sheet
- Heat pipe, injection tube, u-pipe
- Reflector

**Data Sheets**

The components listed below must be described and specified using data sheets (alternatively the specification can be documented in the corresponding drawing). The data sheets shall be traceable by a date of revision and shall contain at least the following information.

**Absorber**

- Manufacturer / Deliverer
- Material of the absorber
- Thickness of the absorber
- Kind of surface treatment
- Manufacturer / Deliverer of surface treatment
- Solar absorption
- Infra-red emission

**Transparent cover / Vacuum tube**

- Manufacturer / Deliverer
- Product brand name
- Material
- Type (e.g. toughened glass, etc.)
- Thickness
- Surface properties (e.g. coatings, structure, etc.)
- Solar transmission at normal incidence (air mass 1.5)

**Insulations**

- Manufacturer / Deliverer
- Product brand name

- Material
- Type (e.g. open porous, closed porous, etc.)
- Thickness
- Density
- thermal conductivity

**Casing**

- Manufacturer / Deliverer
- Material
- Surface treatment

**Sealing / adhesive material / rubber parts / plastic parts**

- Manufacturer / Deliverer
- Material declaration

**Heat Pipe**

- Manufacturer / Deliverer
- Material declaration
- Used heat transfer medium
- Fluid content
- Internal pressure

**Reflector**

- Manufacturer / Deliverer
- Material declaration
- Surface treatment (e.g. polished, coated, etc.)
- Reflectivity

**Heat conductive paste**

- Manufacturer / Deliverer
- Technical specifications

**Remarks:**

- If several sizes of the same collectors are certified, all documents have to be submitted for all the individual collectors.
- In case of special collector designs the delivery of additional documents might be required.
- The documents are kept strictly confidential by the inspector / test institute.
- The documents must be supplied to the inspector / test institute either in the language of the country that the inspector / test institute is located or in English.

### 3.3 Storage tank

**Parts list / Bill of Materials (BOM)**

For each of the storages of a certified series a part list / BOM must be made available to the inspector / test institute. The part list / BOM shall include **all** parts of the storage and shall be identifiable by a number or name and traceable by a date of revision.

**Engineering drawings**

For each of the storages of a certified series a set of engineering drawings must be made available to the inspector / test institute. The engineering drawings shall be fully dimensioned, identifiable by a drawing number or drawing name and traceable by a date of revision. These drawings have to include at least the following:

- General view
- Sectional view
- Location of heat exchangers
- Location(s) of sensor(s)

**Data Sheets**

The storage tanks of a certified series must be described and specified using data sheets (alternatively the specification can be documented in the corresponding drawing). The data sheets shall be traceable by a date of revision and shall contain at least the following information.

- Manufacturer / Deliverer
- Type and tank orientation
- Tank material
- Location of all tank connections
- Total tank volume
- Supplementary heated tank volume
- Inside coating
- Type of corrosion protection
- Heat loss coefficient of storage tank
- Insulation material according to
- Heat conductivity of insulation
- Heat loss coefficient of storage tank

**Remarks:**

- If several sizes of the same storage tank are certified, all documents have to be submitted for all the individual storage tanks.
- In case of special storage tank designs the delivery of additional documents might be required.
- The documents are kept strictly confidential by the inspector / test institute.
- The documents must be supplied to the inspector / test institute either in the language of the country that the inspector / test institute is located or in English.

### 3.4 Heat exchangers and supplementary heating

**Parts list / Bill of Materials (BOM)**

For all heat exchangers of a certified storage tank and / or system a part list / BOM must be made available to the inspector / test institute. The part list / BOM shall include **all** parts of the heat exchanger and shall be identifiable by a number or name and traceable by a date of revision.

**Engineering drawings**

For all heat exchangers of a certified storage tank and / or system a set of engineering drawings must be made available to the inspector / test institute. The engineering drawings shall be fully dimensioned, identifiable by a drawing number or drawing name and traceable by a date of revision. These drawings have to include at least the following:

- General view

**Data Sheets**

All heat exchangers used within a certified storage tank and / or system must be described and specified using data sheets (alternatively the specification can be documented in the corresponding drawing). The data sheets shall be traceable by a date of revision and shall contain at least the following information.

- Manufacturer / deliverer
- Type (mantel, spiral, external)
- Material(s)
- Heating power
- Dimensions
- Heat transfer coefficient (or at least heat exchanger surface)  
Settings
- Temperature limits

### 3.5 Measurement, control and regulation technology

#### Data Sheets

Each controller unit / sensor of a certified system must be described and specified using data sheets. The data sheets shall be traceable by a date of revision and shall contain at least the following information.

- Manufacturer / deliverer
- Type of controller(s) / Sensors
- Number and type of inputs and outputs
- Settings (control algorithm, overheating protection, flow-rate control,...)
- Specifications of power supply (operating voltage and frequency)
- Type of fuse(s)
- Power consumption (with/without activated display)
- Firmware version
- Type of sensor(s)
- Dimensions of sensor(s)
- Location(s) of sensor(s)
- Certifications

### 3.6 Solar thermal systems

#### 3.6.1 Flat plate collectors

All specifications in accordance to 1 have to be fulfilled

#### 3.6.2 Evacuated tubular collectors (ETC)

All specifications in accordance to 2 have to be fulfilled

#### 3.6.3 Storage tanks

All specifications in accordance to 3 have to be fulfilled

#### 3.6.4 Pipes / piping and pipe insulation

#### Data Sheets

The specifications listed below must be described using data. The data sheets shall be traceable by a date of revision and shall contain at least the following information.

- Manufacturer / Deliverer
- Type of pipes and insulation
- Material of pipes and insulation
- Dimensions of pipes and insulation
- Heat conductivity and density of insulation

### 3.7 Heat transfer fluid

#### Data Sheets

The specifications listed below must be described using data. The data sheets shall be traceable by a date of revision and shall contain at least the following information.

- Manufacturer / Deliverer
- Type of liquid

- Water mixing percentage
- Density
- Heat capacity
- Freeze protection

### 3.8 Pump stations

#### Engineering drawings

For all pumps of a certified system a set of engineering drawings must be made available to the inspector / test institute. The engineering drawings shall be fully dimensioned, identifiable by a drawing number or drawing name and traceable by a date of revision. These drawings have to include at least the following:

- General view
- Sectional view

#### Data Sheets

The specifications listed below must be described using data sheets (alternatively the specification can be documented in the corresponding drawing). The data sheets shall be traceable by a date of revision and shall contain at least the following information.

- Manufacturer / Deliverer
- Type
- Materials (housing, shaft, impeller, bearing,...)
- Pump characteristic curve(s) (flow rate/head/power input)
- Type of fluid(s)
- Temperature limits of fluid
- Pressure limits
- Settings (power level,...)
- Specifications of power supply (operating voltage and frequency)
- Power consumption (Min./Max. power consumption)
- Certifications

### 3.9 Hydraulics / safety equipment

#### Parts list / Bill of Materials (BOM)

For all hydraulic parts / safety equipment's of a certified storage tank and / or system a part list / BOM must be made available to the inspector / test institute. The part list / BOM shall include **all** parts of the heat exchanger and shall be identifiable by a number or name and traceable by a date of revision.

- Parts list of all pipes, valves, safety equipment

#### Engineering drawings

For all hydraulic parts / safety equipment's of a certified system a set of engineering drawings must be made available to the inspector / test institute. The engineering drawings shall be fully dimensioned, identifiable by a drawing number or drawing name and traceable by a date of revision. These drawings have to include at least the following:

- General view
- Sectional view

#### Data Sheets

The specifications listed below must be described using data sheets (alternatively the specification can be documented in the corresponding drawing). The data sheets shall be traceable by a date of revision and shall contain at least the following information.

- Manufacturer / Deliverer

- Temperature limits of all parts
- Pressure limits of all parts
- Settings (if applicable)
- Specifications of power supply (if applicable)
- Power consumption (if applicable)
- Certifications (if applicable)

### 3.10 Mounting frame

#### Parts list / Bill of Materials (BOM)

All parts of a mounting frame of a certified storage tank and / or system a part list / BOM must be made available to the inspector / test institute. The part list / BOM shall include **all** parts of the heat exchanger and shall be identifiable by a number or name and traceable by a date of revision.

#### Engineering drawings

For all parts of a mounting frame of a certified system a set of engineering drawings must be made available to the inspector / test institute. The engineering drawings shall be fully dimensioned, identifiable by a drawing number or drawing name and traceable by a date of revision.

#### Data Sheets

The specifications listed below must be described using data sheets (alternatively the specification can be documented in the corresponding drawing). The data sheets shall be traceable by a date of revision and shall contain at least the following information.

- Manufacturer / Deliverer
- Type of Installation / angle of inclination
- Basic schedule
- Material of frame
- surface treatment of frame
- static calculation documented evidence of conformity according to EN1993-1-1 (steel) or to prEN1999-1-1 (aluminium)

#### Remarks:

- If several sizes of the same system are certified, all documents have to be submitted for all the individual systems.
- In case of special system designs the delivery of additional documents might be required.
- The documents are kept strictly confidential by the inspector / test institute. If possible we ask you to submit these drawings by email in pdf format and as hard copy by mail.
- The documents must be supplied to the inspector / test institute either in the language of the country that the inspector / test institute is located or in English.



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## 1. General Information

Reference of the tested collector			
<b>Owner of License</b>			
Adress			
City			
Land			
Trade name of collector			
Reg. Nr.			
<b>Manufacturer</b>			
Adress			
City			
Land			
Trade name of collector			
Reg. Nr.		Test Reports number :	
<b>OEM Distributer 1</b>			
Adress			
City			
Land			
Trade name of collector			
Reg. Nr.		Test Reports number :	
<b>OEM Distributer 2</b>			
Adress			
City			
Land			
Trade name of collector			
Reg. Nr.		Test reports number:	

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## 2. List of performed Inspections

Please list all performed inspections for the relevant product, including the initial PI.

Number of Inspection	Date of inspection (DD/MM/YYYY)	Location (ref. Lizenz holder)	Inspector	Inspection Body	Products trade name

## 3. Declaration of changes

Please list all changes and their declarations and assessments.

Declaration of change	Handed in to inspection body	Checked and declared in test report number	Accepted by inspection body	Change in force for the product since:

## 4. Defining the Design

### 4.1 Part Lists

Please compare the part lists from the former Physical Inspection with the ones accessible during inspection and make sure that these are the latest version in use. Discrepancies will be documented in chapter 5.

Part list identification (e.g. revision no./date) during initial type test	Part list identification (e.g. revision no./date) during further inspections	Annotations (please describe the deviations from the initial design)
	Inspection 2 (2 years after the initial type test)	
	Inspection 3 (2 years after the 2. inspection)	
	...	

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## 4.2 Engineering Drawings

Please compare the drawings from the former Physical Inspection with the ones accessible during inspection and make sure that these are the latest version in use. Discrepancies will be documented in chapter 5.

Component	Drawing no./date during the initial type test	Revision no./dates during further inspections	Annotations (please describe the deviations from the initial design)
		Inspection 2 (2 years after the initial type test)	
		Inspection 3 (2 years after the 2. inspection)	
		...	

## 4.3 Data sheets

Please compare the data sheets from the former Physical Inspection with the ones accessible during inspection and make sure that these are the latest version in use. Discrepancies will be documented in chapter 5.

Component	Data Sheet no./date during the initial type test	Revision no./dates during further inspections	Annotations (please describe the deviations from the initial design)
		Inspection 2 (2 years after the initial type test)	
		Inspection 3 (2 years after the 2. inspection)	
		...	

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## 5. Declaration of discrepancies

Note: If possible indicate also the corrective actions the manufacturer intends to take.

– Non Conformities –	
1	<i>x.x – Paragraph: Actions of improval.</i>
2	<i>x.x – Paragraph: Actions of improval</i>
3	<i>x.x – Paragraph: Actions of improval.</i>
4	<i>x.x – Paragraph: Actions of improval.</i>

## 6. Recommendations of the Inspector / test institute

– Recommendations of the Inspector / test institute –			
<b>If discrepancies occurred please indicate which further action is needed to keep the certification</b>			
Impact of thermal performance	<input type="checkbox"/> no	<input type="checkbox"/> small	<input type="checkbox"/> Big, Performance Test necessary
Impact of service ability	<input type="checkbox"/> no	<input type="checkbox"/> small	<input type="checkbox"/> Big, revision necessary
Recommandations			
<input type="checkbox"/> Internal Pressure Test of Absorber	<input type="checkbox"/> External Thermal Shock Test		
<input type="checkbox"/> Exposure Test	<input type="checkbox"/> Rain Penetration Test		
<input type="checkbox"/> Internal Thermal Shock Test	<input type="checkbox"/> Performance Test		
<input type="checkbox"/> Mechanical Load Test	<input type="checkbox"/> Measurement of the stagnation temperature		
<input type="checkbox"/> Effective thermal capacity	<input type="checkbox"/> Final inspection		
<input type="checkbox"/> High Temperature Resistance Test			
Comments			

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	Degree of criticism	Required action
1.	<input type="checkbox"/> No criticisms	---
2.	<input type="checkbox"/> Limited number of minor criticisms	Manufacturer shall confirm corrective action to the inspector, certification proceeds. <b><i>From the presented documentation it will be decided if an extra inspection will be needed.</i></b>
3.	<input type="checkbox"/> Criticism(s) to the extent that conformity with the standard will be endangered	Repeat physical inspection required after manufacturer has confirmed implementation of corrective action.

The inspector should give a copy to the undersigned contact person, who should sign for its receipt.

Date: 2010-XX-XX

Name of inspector

Name of factory representative

\_\_\_\_\_  
**Name Name**

\_\_\_\_\_  
**Name Name**