

# Solar Keymark Network

Experience exchange circle of test labs and certifiers  
working according to the Solar Keymark scheme rules



## Minutes

### 7. Solar Keymark Network Meeting September 3<sup>rd</sup> – 4<sup>th</sup>, 2009; Brussels

#### Item 1: Opening of the meeting

The chairman of the Solar Keymark Network (SNK), Harald Drück, opened the meeting and welcomed the participants. He thanked CEN and especially Hoang Liauw for hosting the meeting. Furthermore he thanked Jan Erik Nielsen as the Secretary of the Solar Keymark Network for the excellent preparation of the meeting.

As introduction Harald Drück gave a short explanation about the Solar Keymark Network. The main task of the SK-Network is to agree on uniform procedures between the different institutions (accredited solar thermal test labs, certifiers, inspectors and manufacturers) working according to the Solar Keymark scheme rules as well as the further development of Solar Keymark certification.

The meeting took place from Thursday, September. 3<sup>rd</sup>, 2009, 12:30 hrs till Friday September. 4<sup>th</sup>, 2009, 13:15 hrs in the premises of CEN at Brussels, Belgium.

The first invitation and the draft agenda of the meeting was sent out by email dated August 11<sup>th</sup>, 2009. In the following weeks updated versions of draft agendas were available via the Solar Keymark Internetsite ([www.solarkeymark.org](http://www.solarkeymark.org)). The latest version of the agenda was dated September 1<sup>st</sup>, 2009 with document number N0103R6 (File: SKN\_N0103R6.doc). The agenda was agreed on by the participants without any remarks. The final agenda is included as Annex B and also available via the Solar Keymark Internetsite as document number N0103R7 (File: SKN\_N0103R7.doc)

#### Item 2: Introduction of participants

The participants introduced themselves and mentioned their nominating organisation or institution respectively. The list of participants that registered for the meeting and the signatures of the ones present is attached as Annex A.

#### Item 3: Approval of the minutes of the 6. meeting

Harald Drück mentioned that the minutes of the 6<sup>th</sup> Solar Keymark Network meeting (File: SKN\_N0101R0.pdf 03/04/2009) were sent out by email dated April 3<sup>rd</sup>, 2009.

Since within 30 days after sending out the minutes no significant comments were sent out to the Solar Keymark Network the minutes are considered as approved. Additionally the minutes were approved again unanimously by the participants present.

#### **Item 4: Solar Keymark decision list**

Harald Drück mentioned that the current version of the Solar Keymark decision list is document N0100R1 (File SNK\_N0100R1.PDF). This version is dated March 28, 2009 and is containing all decisions made by the SKN up to now, including the ones of meeting held before this meeting at Pamplona, Spain.

The Solar Keymark decision list is available via [www.solarkeymark.org](http://www.solarkeymark.org).

#### **Item 5: Solar Keymark Network document list & Solar Keymark Network distribution list**

Jan Erik Nielsen presented the **SKN distribution** list (document N0001; file SKN\_N0001.xls) and mentioned that about 90 persons are included in the lists up to now. At present the members of the SKN are not based on nominations since the nomination procedure is still pending. A procedure for the nomination has to be agreed on during the discussion to be held at the next agenda item related to “Terms and conditions for the Solar Keymark Network Meetings”

Jan Erik Nielsen presented the **SKN document** list containing documents relevant for the Solar Keymark network. All documents are available via internet links to the Solar Keymark Internetsite ([www.solarkeymark.org](http://www.solarkeymark.org)).

In this context it was proposed **to send out the respective documents as an attachment to the email** informing about the availability of a new document in order to avoid the individual download of the documents by each participant. Furthermore a SKN document list shall be sent out with every new document.

#### **Item 6: Terms and conditions for the Solar Keymark Network Meetings**

The “Terms and conditions for the Solar Keymark Network Meetings” are laid down in a document named “Solar Keymark Network Internal Regulations”. The version of this document resulting from the discussions held at the Pamplona SKN meeting was sent out by Jan Erik Nielsen on April 3<sup>rd</sup>, 2009 as document number N0102R0 (File: SKN\_N0101R0.pdf dated 03/04/09). By the same email a vote was performed. As a result of the vote the Internal Regulations were accepted in the present version.

In addition to the vote, comments were received from CEN/CMC (Liauw Hoang), ENEA (Vinod Sharma), INETI (Maria Carvalho) and CERTIF (João Santos). These comments were included in the document number N0102R2 (File SKN\_N0102R2.doc dated 26/08/09) by Sören Scholz. This document is available via the Solar Keymark Internetsite.

The comments were discussed during the meeting. The document resulting from this discussion is number N0102R3 (File SKN\_N0102R3.doc). It will be made available at the Solar Keymark Internetsite within the next days.

## Decision D1.M7 – Solar Keymark Network Internal Regulations; Version September 3<sup>rd</sup>, 2009

The participants present agreed with the version of the “Solar Keymark Network Internal Regulations” as discussed at the meeting (Document N01002R3 (File SKN\_N0102R3.doc)).

*This decision was taken unanimously.*

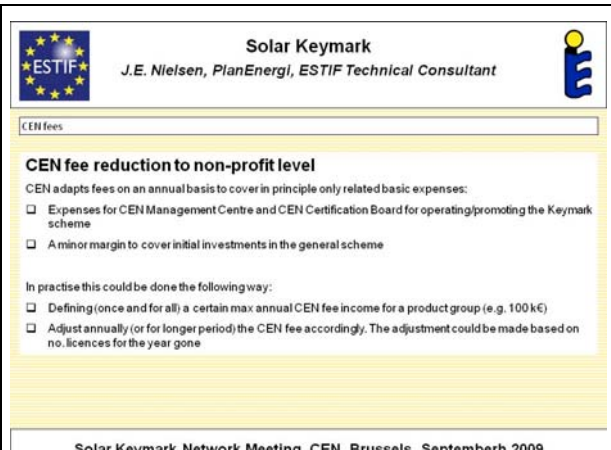
With regard to the procedure of the future meetings it was agreed that there is a need of the establishment of a formal voting and nomination procedure.

Jan Erik Nielsen will prepare tools (based on Excel) for that purpose.

## Item 7: CEN fees

Jan Erik Nielsen mentioned the ongoing “trialogue” with the aim to reach agreement within the parties: Solar Keymark Network, ESTIF and CEN Management Group on a proposal to be given to the CEN Certification Board at its meeting in October 2009.

He explained the content of the document number N0104R0 (File SKN\_N0104R0.doc) elaborated by him using the slides bellow. The document is basically describing two options how the fees for the operation and further development of the Solar Keymark, as well as for additional activities related to standardisation and certification, can be collected and distributed.



**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

**CEN fees**

**CEN fee reduction to non-profit level**

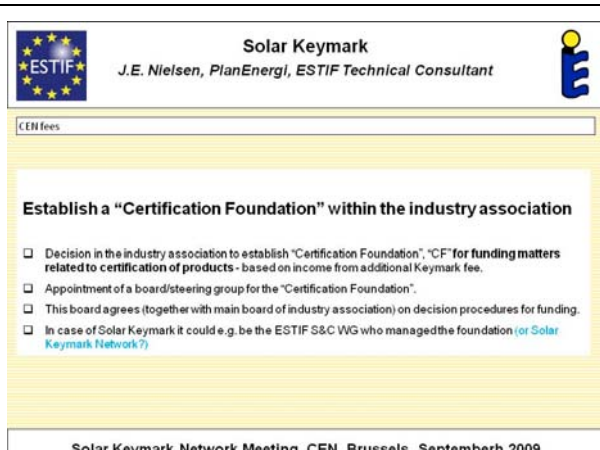
CEN adapts fees on an annual basis to cover in principle only related basic expenses:

- ☐ Expenses for CEN Management Centre and CEN Certification Board for operating/promoting the Keymark scheme
- ☐ A minor margin to cover initial investments in the general scheme

In practise this could be done the following way:

- ☐ Defining (once and for all) a certain max annual CEN fee income for a product group (e.g. 100 k€)
- ☐ Adjust annually (or for longer period) the CEN fee accordingly. The adjustment could be made based on no. licences for the year gone

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**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

**CEN fees**

**Establish a "Certification Foundation" within the industry association**

- ☐ Decision in the industry association to establish "Certification Foundation", "CF" for funding matters related to certification of products - based on income from additional Keymark fee.
- ☐ Appointment of a board/steering group for the "Certification Foundation".
- ☐ This board agrees (together with main board of industry association) on decision procedures for funding.
- ☐ In case of Solar Keymark it could e.g. be the ESTIF S&C WG who managed the foundation (or Solar Keymark Network?)

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**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

**CEN fees**

**Fees to CEN from Solar Keymark**

**Invoicing "Certification Foundation" fee**

Two options are given in this draft:

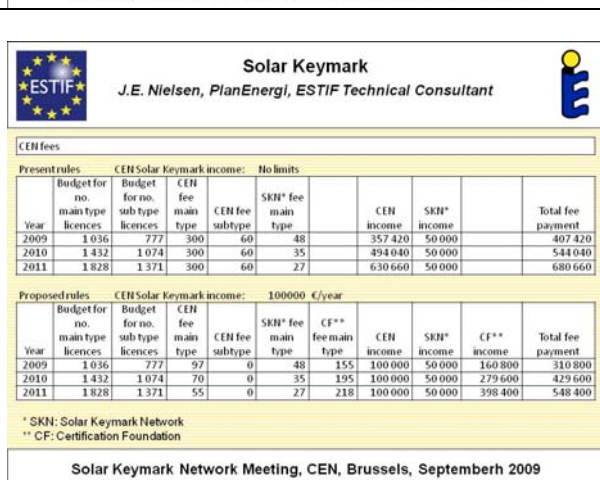
A. Industry Association invoices its members according to their saved fees on an individually basis

B. Invoice this fee through certification bodies: certification bodies invoice licensees → industry association invoices certification bodies

Conc. A: Only Industry Association members (direct or indirect members) will then pay - no possibility to have payment from licensees not member (direct or indirect) of the association. Administration of payments from (especially indirect) members requires some significant administration involving also national associations. There is a risk that members paying a significant amount of this special fee will unroll from association (or from national association which is member of umbrella association). **This solution creates extra administration and is risky for the association.**

Conc. B: With respect to Solar Keymark, an invoicing procedure is already established for collecting fees for the Network through certification bodies. The simple way is to use this procedure - compensation could be given to the certification bodies to cover administration expenses. **This solution creates NO EXTRA ADMINISTRATION. Solar Keymark Network is already authorised to collect fees.**

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**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

**CEN fees**

**Present rules**

Year	Budget for no. main type licences	Budget for no. sub type licences	CEN fee main type	CEN fee subtype	SKN* fee main type	SKN* fee subtype	CEN income	SKN* income	Total fee payment
2009	1 036	777	300	60	48		357 420	50 000	407 420
2010	1 432	1 074	300	60	35		494 040	50 000	544 040
2011	1 828	1 371	300	60	27		630 660	50 000	680 660

**Proposed rules**

CEN Solar Keymark income: 100 000 €/year

Year	Budget for no. main type licences	Budget for no. sub type licences	CEN fee main type	CEN fee subtype	SKN* fee main type	SKN* fee subtype	CF** fee main type	CF** fee subtype	CEN income	SKN* income	CF** income	Total fee payment
2009	1 036	777	97	0	48	155	100 000	50 000	100 000	160 800	310 800	310 800
2010	1 432	1 074	70	0	35	195	100 000	50 000	100 000	279 600	429 600	429 600
2011	1 828	1 371	55	0	27	218	100 000	50 000	100 000	398 400	548 400	548 400

\* SKN: Solar Keymark Network  
\*\* CF: Certification Foundation

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Liauw Hoang from CEN/CMC refereed to his email send out on July 3<sup>rd</sup>, 2009 to Jan Erik Nielsen et. al. (included as Note 7 in document N0103R7) and mentioned that his organisation established an internal working group in order to elaborate an appropriate proposal how to deal with the licence fees in the future. He also mentioned the legal ownership of the Keymark by CEN and the fact, that he needs an agreement from CEN related to general fee issues. The earliest date a proposal for a new fee scheme is expected to be at the beginning of 2010.

After a short discussion the following was decided

### Decision D2.M7 –CEN fees

The participants present decided to send the document N0104R0 related to “ CEN fees from Solar Keymark” to CEN and asks for acceptance until the end of 2009.

In case the proposal described in the document is not accepted or an appropriate other proposal is presented by CEN the initiation of a new certification scheme will be considered.

*This decision was taken with one abstention.*

## Item 8: Fees for the Solar Keymark Network and Secretariat

Jan Erik Nielsen presented the following slides related to the budget for the secretariat:

Solar Keymark		
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant		
Fees for the Solar Keymark Network and Secretariat (JEN)		
Expected total use	2009	
35 Hours	33 386 €	
5 Travels	2 400 €	
External services	3 708 €	
Expected total use	39 494 €	Database
Expected total income	30 000 €	44 800 € should come in?
Balance end of 2009	-9 494 €	-4 694 €?
Budget proposal	2010	
300 Hours	30 000 €	Expected number of Keymarks by end of 2009 is:
4 Travel	2 000 €	> 1 000
External services	1 000 €	Solar Keymark Network fee can drop from 70 € to:
Compensation 2009	4 694 €	> 50 €/licence
Total budget	37 694 €	Incl. Chairman: 10 000 € (SDG: 1 000 €/licence!)
Solar Keymark Network Meeting, CEN, Brussels, September 2009		

### Decision D3.M7 – Fees for the SKN and Secretariat in 2009 & 2010

The participants present decided that the budget of the SKN (including chairman) for 2010 is in total 47.694 €

Furthermore it was agreed that the budget for 2009 of 40.000 € for the SKN (including chairman) is increased by 4.800 €

In 2010 the SKN fee is reduced to a value of 50 € per licence.

In case the income based on the SKN fees will not be as high as expected the resulting difference will be compensated in the year after.

*This decision was taken unanimously.*

## Item 9: Solar Keymark Database

Concerning the new database Jan Erik mentioned the upload of the new data base:

<http://solarkey.dk/solarkeymarkdata/CollectorCertificates/solarkeymarkCollectorCertificates.aspx>

Up to now he received several positive feedback.

During the discussion related to the database it was agreed that there is no need to include also an option to sort the certificates according to the test labs that performed the test.

It was recommend that all Solar Keymark test labs should add on their homepage a link to the Solar Keymark website.

Within this item also the update procedure for the database as well as the handling of brand was discussed. As a result of the discussion the following decision was made:

### Decision D4.M7 – Solar Keymark Database: Update procedure and brand

The participants present decided the following:

As soon as a licence is issued the certification body shall send by e-mail the related data sheet in a harmonised Excel format and PDF format to the Solar Keymark Network Secretary (Email: [jen@solarkey.dk](mailto:jen@solarkey.dk))

Brands mentioned on the Solar Keymark certificate will be included in the database as part of the licensee name: LICENSEE NAME (BRAND)

A brand is the name of the product as given by the licensee. In principle it might be possible to have different brands for the same product (e.g. for different markets).

It was agreed that the update procedure will be included in the specific scheme rules.

*This decision was taken unanimously.*

## Item 10: Harmonised procedure for physical inspection

Stephan Fischer presented a form for performing physical inspections on collectors (document number N0110R0; File SKN\_N0110R0.doc) and a “Procedure for the physical inspection carried out by the inspectors of DINCERTCO” (document number N0111R0; File SKN\_N0111R0.doc).

The discussion related to the procedure resulted in the wish for a general precision of the surveillance procedures.

### Surveillance procedure working group

In order to elaborate surveillance procedures for solar collectors and solar thermal systems a working group under the lead of Francois Xavier Ball is established. Additionally a justification of the need of the procedures should be presented by the group.

Members of the group are

Andreas Bohren, Korbinian Kramer, Sören Scholz, Julien Heintz, Ralf Köbbemann-Rengers, Stephan Fischer, Volker Kallwellis

The group agreed to elaborate a proposal and to distribute this at latest by the end of 2009.

## Item 11: PV/T collectors

Joakim Byström gave a presentation related to the subject. This presentation is attached as Annex B.

One of the key questions is if the thermal performance of the solar collector is measured with or without electricity production.

### Decision D5.M7 – Solar Keymark Certification of PV/T collectors

The participants present decided that Solar Keymark Certification of PV/T collectors as a solar thermal product is possible provided the measurements of the thermal performance are performed with and without electricity production. For the electrical load applied for the electricity production a MPP Tracker shall be used.

In the Solar Keymark data sheet the thermal performance with and without electricity production shall be presented (see note below).

*This decision was taken with one abstention.*

Note: (Practical comment by the Secretary) In present version of the Solar Keymark collector data sheet there is no room for two values for the thermal performance parameters. Until further notice the two sets of values for a PV/T collector are given in the following way:

- Values for PV/T collector **without** electricity production: To be given in the normal way in the data sheet.
- Values for PV/T collector **with** electricity production: To be given with the following explanation in the comments field of the data sheet in the following way:  
*The thermal performance of the collector is reduced if electricity is produced simultaneously. A test was performed with simultaneous electricity production; results from this test show the following performance parameters: n0a: d.ddd; a1a: d.ddd w/(m<sup>2</sup>k); a2a: d.ddd w/(m<sup>2</sup>k<sup>2</sup>); tstg: ddd °C.*

## Item 12: Concentrating collectors

Joakim Byström gave a presentation related to the subject. This presentation is attached as Annex C.

The information presented was discussed. In this context Peter Kovacs referred to RESOLUTION 13/2009, taken by CEN/TC 312, on 2009-06-23 & 24, Athens / Greece mentioning that an error within the scope related to concentrating and tracking collectors was discovered in EN 12975-1:2006, that contradicts EN 12975-2:2006. He also mentioned that TC 312 WG 1 discussed this subject and decided to apply for a new work item in order to solve the problem.

The discussion showed that Solar Keymark certification of concentrating collectors with active overheating protection requires appropriate procedures of the treatment of the overheating protection mechanism. This procedure is not available up to now. It was agreed to ask TC 312 WG 1 to consider the aspect of Solar Keymark certification of concentrating collectors and to elaborate appropriate procedures.

### **Item 13: Changing a collector in a Solar Keymark certified system**

Sebastian Laipple presented the document N0112R0 (File SKN\_N0112R0.doc). This document is describing the conditions under which a collector in a Solar Keymark certified system can be changed without requiring a complete new Solar Keymark test of the system.

The document was discussed and minor changes were performed.

As a result of the discussion the following was decided:

#### **Decision D6.M7 – Changing a collector in a Solar Keymark certified system**

The participants present decided that a collector in a Solar Keymark certified system can be changed under the following conditions:

The original test report of the tested system configuration remains the reference for all kinds of modifications, even if a modification was accepted without retest. The procedure for an advice of amendment follows the four topics:

1. The manufacturer informs the Certification Body about the planned change of collector type.
2. The manufacturer delivers the test reports and Solar Keymark data sheets of both collectors and the system to the Certification Body.
3. Both the Certification Body and the test lab which has issued the system test report have to approve the system modification.
4. A negative decision can also be based on technical consideration out of the following few requirements.

#### **Minimum requirements on the collector:**

- The alternative collector is Solar Keymark certified.
- The original collector must be performance tested according to EN 12975
- The test reports of both collectors and the system are available to the Certification Body
- The change of the collector does not cause a change of the system configuration e.g. piping, inlet connections, controller, pump etc.
- Both collectors have to be “technical identical”

#### **Definition of “technical identical” Collector” (Data based on test report)**

- Tolerance of gross area  $\pm 10 \%$
- IAM (50°)  $\pm 3 \%$
- The pressure drop shall not differ by more than  $\pm 10 \%$  for the nominal flow rate as stated by the manufacture
- Total performance of the collector at 1000 W/m<sup>2</sup>:



- Integral from 0 to 100 °C, tolerance of 0 to 10 % (new collector being better than original)
- $W_{\text{peak}} \pm 10 \%$ , (Peak Power [ $G = 1000 \text{ W/m}^2$ ] per collector unit)

**No modifications allowed at:**

- Hydraulic flow type
- Maximal operating pressure
- Permitted heat transfer fluid

**Reporting**

The original test report of the tested system remains the reference for all kinds of modifications – cascading modifications are excluded. The original test report remains unchanged and valid. The use of alternative collectors is briefly reported as an addendum to the original test report.

*This decision was taken unanimously.*

**Item 14: Rain penetration test of vacuum tube collectors**

Malte Kottwitz presented the document no N0107R0 (File SKN\_N0107R0.doc) prepared by Ulrich Fritsche describing the subject.

The document was discussed and as a result it was agreed not to perform a decision related to this aspects since TC 312 WG 1 already started to elaborate advanced rain test procedures.

The participants expressed their wish that this procedure should especially take into account the aspect of re-testing of collectors that already failed a rain penetration test.

**Item 15: Performance testing of small vacuum tube collectors with regard to required minimum temperature difference**

Malte Kottwitz presented the document no N0108R0 (File SKN\_N0108R0.doc) prepared by Ulrich Fritsche describing the subject.

The document was discussed. During the discussion it was doubt that the presented differences in performance figures (especially the heat loss coefficients) are due to the small mass flow rate.

It was agreed that the influence of the mass flow on the collector performance should be investigate in more detail before a decision is made.



### **Item 16: Procedure for considering of thermal insulation and glass as the same**

Stephan Fischer presented the document N0108R0 (File SKN\_N0109R0.doc) prepared by Andreas Bohren , Daniel Eggert, Barry Johnston, Ralf Köbbeman-Rengers, Stefan Mehnert; the document included different options for voting.

The document was discussed and as a result of the discussion the following was decided:

#### **Decision D7.M7 – Procedure for considering glass as equivalent for flat plate collectors**

The participants present decided that glazing can be considered as equivalent if the following requirements are fulfilled:

- The solar transmission (AM 1,5) does not differ by more than  $\pm 1\%$  from the one of the glass used for the initial Solar Keymark collector test, provided that material (including tempered/non tempered), texture, surface treatment and thickness of the glass did not change. The change in transmission must be documented with a transmission measurement made by one of the Solar Keymark test labs or by labs accredited for transmission measurements.

and

- If the glass is toughened, no additional mechanical load test is required. For other materials, a collector must be sampled according to the rules of Solar Keymark. This collector has to pass the mechanical load test according to EN 12975-2 chapter 5.8 made by one of the Solar Keymark test labs.

and

- The impact resistance test according EN12975-2, chapter 5.9 has been passed successfully with at least the same result as in the initial test (only if the impact resistance test was performed during the initial test). The tests must be carried out by a Solar Keymark test lab.

*This decision was taken with one negative vote.*

### **Item 17: Solar Keymark Datasheets**

Jan Erik presented the latest version of the Solar Keymark data sheet for solar collectors as document N0114R0 (File SKN\_N0114R0.XLS).

It was agreed to include additionally the brand.

With regard to the data sheets for thermal solar systems no activities were performed up to now since the approach for certification of system families is still pending and should be reflected in an appropriate way in the new system data sheet.

## Item 18: Revised Solar Keymark scheme rules

As introduction to the topic Jan Erik presented the following slides:



**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

Revised scheme rules

**Flexible system certification based on EN 12976:**

- Test one system and certify whole system family (including extrapolation of annual output for each family member)

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**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

Revised scheme rules

**General problems of extrapolation**

- No absolute security that one/more system(s) in the system family is/are malfunctioning (one malfunctioning system seen during validation - smallest system in a thermo-siphon family).
- Some restrictions on variation in system configurations must be made
- Extrapolation - in general - problematic for bad performing systems, it is expected that some requirements will be made on e.g. max pipe heat loss and min HX size related to collector heat loss.

**Positive side effect:**

- Manufacturers will be forced to make well designed systems!

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**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

Revised scheme rules

**Two calculation methods:**

The performance of the system configurations which are not tested is determined using one of two calculation methods:

- Method I: Based on EN 15316-4-3 - in the following named "Method I (f-chart)"
- Method II: Based on EN 12976-2 / ISO 9459-5 in the following named "Method II (DST)"

Performance test method	Forced Circulation Systems	Thermo-siphon systems
ISO 9459-2 (CSTG)	Method I (f-chart)	No method available
ISO 9459-5 (DST)	Method I (f-chart) or Method II (DST)	Method II (DST)

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**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

Revised scheme rules

**Two methods will be proposed to Solar Keymark Network / CEN Certification Board**

- Method based on EN 15316-4-3 / SOLEN (CETIAT, CERTITA, CSTB)
- Method based on EN 12976 / ISO 9459-5 (DST) method using fixed collector parameters (PlanEnergi)

**General comment:**

Not an easy task to combine simplicity with accuracy!

Extrapolation only possible for "good systems"

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**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

Revised scheme rules

**New section in draft Solar Keymark scheme rules:**

**4.4 System "families"**

If the manufacturer produces the "same" system in different sizes the system is considered the same type (within the same system "family") - the different sizes of the system type are sub types. In this case only the system with the largest collector area to store volume ratio shall be type tested.

Performance indicators for the system sub types are determined according to procedure in Annex D.

Requirements for systems to be of the same type are given in Annex D.

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**Solar Keymark**  
J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant

Revised scheme rules

**Method I (f-chart)**

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graph TD
    A[Test reference system according to EN 12976-2 using ISO 9459-5 DST to obtain the solar heat delivered Qref and the heat demand Qref,d for 4 load atoms and several loads according to the Table B.1 in the appendix B of EN 12976-2] --> B[Calculation of collector loop efficiency factor and solar heat exchanger heat transfer value for the reference system corresponding to Qref - using EN 15316-4-3 - Method B]
    B --> C[Calculation of collector loop efficiency factor and solar heat exchanger heat transfer value for other systems of the family]
    C --> D[Calculation of the heat loss coefficient of the collector loop piping for each system]
    E[Area of solar heat exchanger of other systems of the family] --> C
    F[Characteristics of each system: collector aperture area, store volume, backup volume] --> G[Calculation of Qi and Qd for each system of the family]
    G --> H[Annual performance of whole system family]
    D --> H
  
```

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<p><b>Solar Keymark</b> J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant</p> <p>Revised scheme rules</p> <p><b>Method I (f-chart) / SOLEN, Validation</b></p> <p>1 system family • 3 members, pumped, no aux 5 locations 3 loads</p> <p>Solar Keymark Network Meeting, CEN, Brussels, September 2009</p>	<p><b>Solar Keymark</b> J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant</p> <p>Revised scheme rules</p> <p><b>Method II (DST)</b></p> <p>Solar Keymark Network Meeting, CEN, Brussels, September 2009</p>
<p><b>Solar Keymark</b> J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant</p> <p>Revised scheme rules</p> <p><b>Method II (DST), validation</b></p> <p>7 families 20 systems: • 14 thermo-siphon, no aux • 4 pumped, no aux • 2 pumped, aux 4 locations 5-6 loads</p> <p>Solar Keymark Network Meeting, CEN, Brussels, September 2009</p>	<p><b>Solar Keymark</b> J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant</p> <p>Revised scheme rules</p> <p><b>Future method III !? EN 12977:</b></p> <p>With an <b>EN 12977</b> in place, Solar Keymark can be given for systems (Combi-systems as well as DHW-systems) tested this way:</p> <p>Test:</p> <ul style="list-style-type: none"> <li>collectors EN 12975</li> <li>HWstores EN 12977-3</li> <li>SH/Combi stores (EN) 12977-4</li> <li>controller(s) EN 12977-5</li> </ul> <p>Calculate of system performance: (EN) 12977-2</p> <p>Requirements given in: (EN) 12977-1</p> <p>Status is that TC 312/VG3 now is starting work on revising the CEN/TS 12977 series into EN 12977's (EN 12977-3 for stores is actually already in place).</p> <p>Time schedule for published standards: 2 years ? Keymark could be avail. 1/2 year later.</p> <p>Solar Keymark Network Meeting, CEN, Brussels, September 2009</p>
<p><b>Solar Keymark</b> J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant</p> <p>Revised scheme rules</p> <p><b>Method IV !? NPR 7976:2009 (Dutch draft)</b></p> <p>In principle equal to Method II (f-chart) – many nice details - work to be co-ordinated between Va Consult and CETIAT/CSTB.</p> <p>Validation ?</p> <p>SKN_N0117R0</p> <p>Solar Keymark Network Meeting, CEN, Brussels, September 2009</p>	<p><b>Solar Keymark</b> J.E. Nielsen, PlanEnergi, ESTIF Technical Consultant</p> <p>Revised scheme rules</p> <p><b>Comments from CERTITA to “handling of complaints”:</b></p> <p>SKN_N0106R0_CCERTITA.doc</p> <p><b>Comments accepted?</b></p> <p>Solar Keymark Network Meeting, CEN, Brussels, September 2009</p>

In the following the relevant topics discussed as well as the results resulting from the discussion are presented:

### Certification of system families:

In this context it was discussed which configurations of system should be physically tested.

It was agreed on the following:

For thermal performance testing a typical medium system configuration has to be chosen. In case that this configuration does not reach stagnation conditions during the test, a stagnation test with the configuration with the “largest collector area to store volume ratio” has to be performed.

**System family working group for checking method I:**

In order to elaborate the details related to the certification of system families it was decided to establish the “System family working group”.

The WG is consisting of the following persons:

Julien Heintz (leader), Sebastian Laipple, Jan Erik Nielsen, Bouzid Khebchache, Gerard van Amerongen, Maria Carvalho.

The aim is to present a detailed procedure for the certification of system families based on the so-called method I within the coming week.

**System family working group for checking method II:**

In order to elaborate the details related to the certification of system families it was decided to establish the “System family working group”.

The WG is consisting of the following persons:

Jan Erik Nielsen (leader), Sebastian Laipple, Danjana Theiss, Bouzid Khebchache, Gerard van Amerongen, Julien Heintz, Ralf Köbbemann-Rengers, Maria Carvalho.

The aim is to present a detailed procedure for the certification of system families based on the so-called method II within the coming week.

**Selection of test samples**

With regard to the selection of test samples the document N0106R0\_CCERTITA entitled “Proposal for changes to Draft CEN Keymark Scheme Rules Version 11.1 July 2009” by CERTITA was discussed and slightly modified. The resulting document is named N0106R1\_CCERTITA and will be incorporated in the draft scheme rules (N0106.R1).

In the context of this topic Jan Erik presented also a revised version of the Solar Keymark scheme rules document as N0106.R0 (File SKN\_N0106.R0.doc). The document was discussed and some modifications were performed. The version resulting from this is document N0106.R1 (File SKN\_N0106.R1.doc).

Jan Erik presented a revised version of the Solar Keymark scheme rules document as N0106.R0 (File SKN\_N0106.R0.doc). The document was discussed and some modifications were performed. The version resulting from this is document N0106.R1 (File SKN\_N0106.R1.doc)

Also the following annexes were discussed and modified.

Annex C (Fees for the Solar Keymark Network) as document SKN\_N0106.R0annexC. Resulting document SKN\_N0106.R1annexC.

Annex D (Solar Keymark system families, including a guideline for pipe losses) as document SKN\_N0106.R1annexD. Resulting document SKN\_N0106.R2annexD.

Furthermore the “ Proposal for changes to Draft CEN Keymark Scheme Rules Version 11.1 July 2009” by CERTITA (document SKN\_N0106R0) was discussed.

**Decision D8.M7 – Solar Keymark scheme rules, Version Sept. 4<sup>th</sup>, 2009”**

The participants present agreed in principle with the documents for the “ Solar Keymark scheme rules” (Document SKN\_N0106.R1.doc) and the annexes C (Document SKN\_N0106.R1annexC) and annexes D (Document SKN\_N0106.R1annexD) as resulting from today’s discussion.

The detailed description of the extrapolation methods for the certification of system families will be finalised in the corresponding working groups before September 15<sup>th</sup>, 2009.

The final version of the scheme rules resulting from these activities will be submitted to CCB for approval and will be made available via internally via [www.solarkeymark.org](http://www.solarkeymark.org).

*This decision was taken unanimously.*

**Item 19: Listing of new absorber coatings**

Andreas Bohren presented document N0113R0 (File SKN\_N0113R0.pdf) related to a “Proof of equivalence of different coatings based on the Decision D1.M5 of the Solar Keymark Network” for the Tinox energy CU coating.

After a very short discussion the following decision was made base on the above mentioned document.

**Decision D9.M7 – Validity of Solar Keymark certificates in case of Tinox energy CU coating**

The participants present decided that in context with decision D1.M5 coatings on copper absorbers with the following brand names are considered as equivalent:

Tinox energy CU, Tinox classic, Blutec etaplus CU, Sunselect

Note: This decision extends decision D1.M5 and decision D5.M6 (Valdity of Solar Keymark certificates in case of absorbers selective coated by different manufacturers)

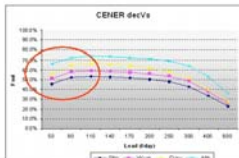
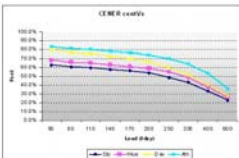



*This decision was taken unanimously.*

With regard to Tinox AL coating presented in document N0115R0 (SKN\_N0115R0.pdf) related to a “ Qualification Test of Solar Absorber Coating Durability” no decision was made because no test report related to durability testing according to decision D1.M5 was available.

**Item 20: Long term prediction calculation procedure based on ISO 9459-2**

Alberto Garcia de Jalon presented document N0116R0 (File SKN\_N0115R0.doc) prepared by Fabienne Salaberry describing the subject. For that purpose he used the following presentation



<p style="text-align: center;"><b>LONG TERM PREDICTION - ISO 9459-2</b>  <small>Eric Mateu, Fabienne Sallaberry, Alberto Garcia de Jalón</small></p> <p style="text-align: center;">SolarKeymark        Network Meeting        4th Septembre, Bruxelles</p>	<p><b>01 LONG TERM PREDICTION - ISO 9459-2</b></p> <ul style="list-style-type: none"> <li>Problem detected in the long term prediction calculation procedure of EN-12976 based on ISO 9459-2 related with the integration interval when calculating the daily energy draw-off (<math>Q_c</math>) for low daily loads.</li> </ul> <div style="display: flex; justify-content: space-around;">   </div> <p style="text-align: center;">Solar thermal energy </p>
<p><b>02 POSSIBLE SOLUTION</b></p> <ul style="list-style-type: none"> <li>In the EN 12976-2 Annex B, page 23 Reference conditions for performance prediction, there are already several considerations related with the calculation procedure implementation for the Long term Prediction based on the ISO 9459-2 (CSTG method):</li> </ul> <p><i>"For systems tested according to ISO 9459-2, the Long Term Performance Prediction, will be in agreement with the reference conditions of this Annex provided that the following changes in the calculation procedure are implemented:</i></p> <p><i>Changes in point 9 of ISO 9459-2 (pages 21, 22, 23 and 24), Step3 (Energy drawn off): ..."</i></p> <p style="text-align: center;">Solar thermal energy </p>	<p><b>03 PROPOSAL</b></p> <ul style="list-style-type: none"> <li>Include a note or warning in the next document revision of the EN12976, in the previous paragraph, informing that for an accurate determination of the annual solar fraction at low daily consumption volumes (<math>V_c</math>) the solving method for the energy draw off shall consider an integration interval of at least a hundredth of the solar storage volume (<math>V_s</math>) or implement a calculation method based on the interpolation between the integrated values of the <math>f(V)</math> draw-off profile.</li> <li>SKN will inform ISO about the problem detected in ISO 9459-2 (CSTG method), in next ISO TC180 meeting for example, in order to include also a note in Section 9: Prediction of long-term performance of the next ISO 9459-2 document revision.</li> </ul> <p style="text-align: center;">Solar thermal energy </p>

After a short discussion it was agreed that the SKN supports in general the approach to include the proposed changes during a revision of the corresponding standards.

## Item 21: Mandatory identification of the manufacturer

João Santos mentioned the following (email from him dated August 21<sup>st</sup>, 2009)

Recently, some of our OEM Customers have questioned us regarding the mandatory Identification of the Manufacturer in the labels of the Solar Collectors according to the specifications of EN 12975-1 – Clause 7.2, which clearly states "Name of manufacturer".

On the other hand, for Factory Made Systems, EN 12976-1 – Clause 4.7, states "Name of manufacturer or responsible supplier of the system".

On Decision D2.M2 taken 2007-02-15, it is stated that "The experts present decided that it is not possible to give a precise answer on this question", regarding "who is the manufacturer".

Based on the above statements, it would be most helpful if this situation could be clarified so that, for Solar Collectors and Factory Made Systems a common approach and specification could be implemented. According to our experience, for marketing reasons, our OEM Customers would prefer that only the "responsible supplier" of the Solar Collector or Factory Made System should be mentioned in the label.

I leave to you, the option for the best procedure for handling this situation, so that a clear decision can be taken.

In this context the following was decided:

### **Decision D10.M7 – Mandatory identification of the manufacture**

The participants present decided that for collectors, as the name of the manufacturer, also the name of the supplier of the collector can be mentioned.

Furthermore, the discrepancy in the information required related to the manufacture's name in EN 12975 and EN 12976 should be removed during the ongoing revision of EN 12975.

*This decision was taken unanimously.*

## **Item 22: Language/translation policy for official docs**

João Santos mentioned the following (email from him dated August 25<sup>th</sup>, 2009)

It would be most helpful if you could give an explanation of SKN's Policy, regarding the translation of Operational Documents (as, for example, the Factory Inspection Report and the Collector and System Data Sheets) to National Languages.

In CERTIF's case, we would like to issue a bilingual version (Portuguese and English) of the above mentioned documents.

During the discussion it was mentioned that some documents such as e.g. the data sheet are already tri-lingual (E,G,F) available.

### **Decision D11.M7 – Translation of Solar Keymark documents**

The participants present decided that certification bodies or test institutes can translate documents such as e.g. factory inspection reports or data sheets in other languages provided that always the original English text remain in the document.

This means that the preparation of a document using any language and English is possible.

In case of doubts, contradictions etc. the English text is the relevant one.

*This decision was taken unanimously.*

## **Item 23: Information from TC 312**

Harald Drück reported that the last TC 312 meeting took place on June 23<sup>rd</sup>, 2009 at Athens. The meeting was quite constructive and several important resolutions were taken. Furthermore Peter Kovacs was appointed as WG 1 convenor and the WGs were re-activated and already had first (informal) meetings and fixed dates for further official meetings.

The participants of the SKN expressed the wish that the Chairman and / or secretary of TC 312 attends the SKN meetings. This is especially relevant with regard to the next SKN meeting in Rapperswil, Switzerland since this meeting is directly followed by the TC 312 meeting.



## Item 24: Information from QAIST-Project

The Project QAIST (Quality assurance in solar thermal heating and cooling technology – keeping track with recent and upcoming developments) started officially on June 1<sup>st</sup>, 2009 and has a duration of 3 years. Project co-ordinator is Pedro Dias from ESTIF.

Information related to QAIST will soon be available at the SKN Homepage.

## Item 25: Eco-design and energy labelling

Jan Erik Nielsen thought that it is more important to present at this point the latest information related to CE-Marking. For that purpose he used the following slides:

The idea is that:

- the CE Mark shall cover safety and structural issues: Reaction to fire and structural loads (snow and wind)
- Solar Keymark shall cover quality issues: Thermal performance and durability)

## Item 26: IEA SH&C Task on “Rating and Certification Procedures”

With the Solar Heating and Cooling Programme (SH&C) of the International Energy Agency (IEA) new Task named “Solar Rating and Certification Procedures - Advanced Solar Thermal Testing and Characterisation for Certification of Collectors and Systems” was officially launched on June 1, 2009.

The operating agents of the Task are Les Nelson for the US and Jan Erik Nielsen for Europe. The first meeting will take place on October 16<sup>th</sup>, 2009 at the South African Bureau of Standards (SABS), Pretoria.

**Item 27: Any other business****Item 27.1: Obligatory declaration of the certification number**

Sören Scholz mentioned that at due time he will start an initiative aiming at the obligatory marking of Solar Keymark certified products with the certification number.

**Item 28: Date and place of next meetings**

It was decided that the next Solar Keymark Network Meeting will take place on

**March 15<sup>th</sup>, 2010; 12:00 hrs - March 16<sup>th</sup>, 2010; 13:00 hrs  
at SPF  
Rapperswil, Switzerland**

The autumn 2010 meeting is scheduled for

October 7<sup>th</sup> 12:00 hrs to October 8<sup>th</sup> 13:00 hrs

at Brussels.

**Item 29: End of meeting**

Harald Drück thanked the participants for attending the meeting and for their constructive discussions. He closed the meeting at 13:15 hrs.

The minutes were prepared by Harald Drück (Chairman of the Solar Keymark Network) in assistance with Jan Erik Nielsen (SKN Secretariat) and Maria João Carvalho (proof reading)

Stuttgart September 11<sup>th</sup>, 2009

**Contact address Solar Keymark Chairman:**

Harald Drück  
ITW, Stuttgart University  
Pfaffenwaldring 6  
70550 Stuttgart, Germany  
Email: [druECK@itw.uni-stuttgart.de](mailto:druECK@itw.uni-stuttgart.de)

**Contact address Solar Keymark Secretariat:**

Jan Erik Nielsen  
PlanEnergi  
Aggerup 1  
4330 Hvalsoe, DK  
Email: [jen@planenergi.dk](mailto:jen@planenergi.dk)

## **Annex A: List of participants**

### **SOLAR KEYMARK NETWORK**

**7<sup>th</sup> MEETING, BRUSSELS, SEPTEMBER 3<sup>RD</sup> & 4<sup>TH</sup>, 2009**

<b>NAME</b>	<b>ORGANISATION</b>
Gerard van Amerongen	vA Consult / Holland Solar (Netherlands)
Stamatios Babalis	Demokritos (Greece)
Francois Xavier Ball	CERTITA (France)
Andreas Bohren	SPF (Switzerland)
Teun Bokhoven	ESTIF (Netherlands)
Joakim Byström	Absolicon Solar Concentrator AB (Sweden)
Pedro Dias	ESTIF (Belgium)
Harald Drück	ITW (Germany)
Stephan Fischer	ITW (Germany)
Alberto Garcia de Jalon	CENER (Spain)
Susanne Hansson	SP CERT (Sweden)
Julien Heintz	CETIAT (France)

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Volker Kallwellis	Wagner (Germany)
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Bouزيد Khebchache	CSTB (France)
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Ralf Koebbemann-Rengers	BDH (Germany)
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Malte Kottwitz	TÜV Rheinland (Germany)
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Peter Kovacs	SP (Sweden)
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Korbinian Kramer	ISE (Germany)
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Sebastian Laipple	SPF (Switzerland)
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Hoang Liauw	CEN/CMC (Belgium)
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Richard Loyen	ESTIF (France)
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Ana Neves Sol	INETI-LECS (Portugal)
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Jan Erik Nielsen	ESTIF (Denmark)
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Pierluigi Premoli	ICIM (Italy)
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João Santos	CERTIF (Portugal)
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Sören Scholz	DIN CERTCO (Germany)
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Vinod Sharma	ENEA (Italy)
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Allard Slomp	KIWA (Netherlands)
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Christian Stadler	Sonnenkraft (Germany)
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Danjana Theis	IZES/TZSB (Germany)
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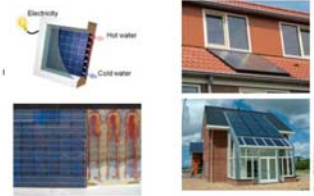

Tommy Williamson	Kingspan Renewables (United Kingdom)
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Hannes Zannantoni	ASiC (Austria)
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## Annex B: Presentation related to PV/T collectors

<p> </p> <p>Photovoltaic/Thermal system Measurement and Certification</p>	<p> </p> <p>Fototherm, Italy</p> <ul style="list-style-type: none"> <li>Fototherm PV1650</li> </ul> <p></p> <p></p> <ul style="list-style-type: none"> <li>EN12975, without PV production</li> </ul>
<p> </p> <p>Millennium Solar, Israel</p> <p></p>	<p> </p> <p>Zen Renewables</p> <ul style="list-style-type: none"> <li>PV Twin</li> </ul> <p></p>
<p> </p> <p>Absolicon Solar8 (prototype)</p> <ul style="list-style-type: none"> <li>Tested at SP 2008</li> </ul> <p></p>	<p> </p> <p>A PV/T system must be tested for both standards</p> <p>For solar thermal (liquid) collectors, the parameters tested in EN12975 are typically:</p> <ul style="list-style-type: none"> <li>Internal pressure of absorber</li> <li>Pressure drop</li> <li>High temperature resistance</li> <li>Stagnation temperature</li> <li>Exposure test</li> <li>Thermal shock tests</li> <li>Rain penetration</li> <li>Mechanical load</li> <li>Thermal performance</li> <li>Incidence angle modifier</li> <li>Freeze resistance</li> <li>Hail test</li> </ul> <p>For PV modules, the standard IEC 61215 prescribes a detailed procedure involving:</p> <ul style="list-style-type: none"> <li>Visual inspection</li> <li>Maximum Power Determination</li> <li>Insulation test</li> <li>Measurement of temperature coefficients</li> <li>Measurement of nominal operating cell temperature (NOCT)</li> <li>Performance at STC and NOCT</li> <li>Performance at low irradiance</li> <li>Outdoor exposure test</li> <li>Hot-spot endurance test</li> <li>UV test</li> <li>Thermal cycling test</li> <li>Humidity-freeze test</li> <li>Damp-heat test</li> <li>Robustness of terminations test</li> <li>Wet insulation test</li> <li>Mechanical load test</li> <li>Hail test</li> <li>Bypass diode thermal test</li> </ul> <p>Two parallel certifications!</p>

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### Typical PV/T production

- In the application, the PV production (when operating) reduces the thermal production directly

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### Measuring performance without the PV system extracting energy

- All tests in EN12975 can be carried out as normal
- If measuring without PV active, thermal production in operation is the calculated thermal production minus PV

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### The results from the two standards combines without conflicts

Thermal from EN12975

Electric from IEC 61215

Module Type	PVE-MTF1-170-S
Maximum power (Pmax)	170 Wp ±3%
voltage (Vmax)	35.80 V
current (Imax)	4.75 A
Open circuit voltage (Voc)	43.60 V
Short circuit current (Isc)	5.20 A
Maximum system voltage	850 V
NOCT (800 W/m²)	40°C
20 °C, AM 1.5, 1m/s)	40°C
Temperature coefficients	NOCT 40°C, TC Im 0.04%/°C, TC Vm - 0.38%/°C, TC Pm - 0.47%/°C

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### SP approach

- Measuring with and without PV electricity production
- Note in the protocol that any electric production will reduce the thermal output

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### Conclusion

- PV/T collectors can be tested with or without PV electricity production in EN12975.
- With no electricity output during testing, the thermal production need to be reduced by the PV production
- With PV electricity some considerations, labs should see report from PV Catapult, D8-6

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### Measuring PV/T with electricity production

- PV extract energy from the thermal system
- More complex testing
  - Shadowing the PV reduces the electric output
  - Need to check that the PV output is maximum
  - Different temperatures on cells and in medium

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### Method from PV catapult D8-5 – make a power matrix with different temperatures

- Advantages for the manufacturer:
  - Both PV and Thermal production parameters is determined simultaneously
  - Maybe some better thermal performance than measuring without PV production
- Disadvantages
  - Not an accepted PV standard
  - Few labs with the capacity to make measurements

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## Annex C: Presentation related to Concentrating Collectors

<div style="display: flex; justify-content: space-between; align-items: center;">   </div> <h3 style="text-align: center;">Concentrating system Measurement and Certification</h3> 	<div style="display: flex; justify-content: space-between; align-items: center;">   </div> <h3 style="text-align: center;">Absolicon X10 Thermal</h3> <ul style="list-style-type: none"> <li>• Modular design 6–18 m<sup>2</sup></li> <li>• Sun tracking, EW-axis</li> <li>• <math>\eta_{0\text{direkt}} = 0,7</math> <math>U_0 = 1,5</math></li> <li>• High performance spring, winter and autumn in clear weather</li> </ul> 
<div style="display: flex; justify-content: space-between; align-items: center;">   </div> <h3 style="text-align: center;">Procedures in EN12975</h3> <ul style="list-style-type: none"> <li>• Internal pressure of absorber</li> <li>• Pressure drop</li> <li>• High temperature resistance</li> <li>• Stagnation temperature</li> <li>• Exposure test</li> <li>• Thermal chock tests</li> <li>• Rain penetration</li> <li>• Mechanical load</li> <li>• Thermal performance</li> <li>• Incidence angle modifier</li> </ul>	<div style="display: flex; justify-content: space-between; align-items: center;">   </div> <h3 style="text-align: center;">Test approach, concentrating system</h3> <ul style="list-style-type: none"> <li>• Absolicon X10-10 m</li> <li>• Testing performance with tracking</li> <li>• Exposure test and stagnation temperature:             <ul style="list-style-type: none"> <li>– Tracking</li> <li>– 45 Degrees</li> <li>– Active over-heating protection</li> </ul> </li> </ul>
<div style="display: flex; justify-content: space-between; align-items: center;">   </div> <h3 style="text-align: center;">Active over-heating mechanism</h3> <ul style="list-style-type: none"> <li>• Proposed language in ISO9466:</li> <li>• 7.19 Collector with active over-heating protection  <i>“A collector designed to avoid high stagnation temperatures by employing an active mechanism that e.g. increases the thermal losses or decreases the solar radiation in the collector.”</i> </li> </ul>	<div style="display: flex; justify-content: space-between; align-items: center;">   </div> <h3 style="text-align: center;">SRCC Standard 600-09 approach</h3> <ul style="list-style-type: none"> <li>• If the collector assembly has active mechanism(s) which are intended to be functional during normal operation, those mechanism(s) shall be operational during testing.</li> <li>• A test cycle demonstrating all functions of all active mechanism(s) must be observed at least once during the exposure period, and shall operate in accordance with the manufacturer's specifications.</li> </ul>



### SP approach

- 30 day exposure test, with and without active system
- The system has a test cycle with activation of the active system as it is over-heated (once every hour), testing the function approximately 100 times during the exposure test
- The test also simulate power-loss as the grid is disconnected at 12:00 for 1 hour every day

7



### Conclusion

- Concentrating systems can be certified according to EN12975
- We are elaborating with how active systems can be tested during the 30 day exposure test

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