

University of Stuttgart  
Institute for Building Energetics, Thermotechnology and Energy Storage (IGTE)



# Standards for Global Solar Collector Certification - Current Tests and Upcoming Changes

Dr. Stephan Fischer

Webinar  
IEA SHC Solar Academy:  
Global Solar Certification Network (GSCN) and SOLERGY  
21 March 2023 / 23 March 2023

in cooperation with  
 **SWT**

 **IGTE**

- Introduction to Global Solar Certification Network
- Current certification schemes and Standards
- Collector tests overview
- Upcoming changes and additions in collector standard ISO 9806
- Summary

### **Aim**

The aim of Global Solar Certification is to facilitate cross-border trading of solar thermal products by minimizing the need for re-testing and re-certification in each new country where products are to be sold.

### **Scope**

The concept of “Global Solar Certification” is being implemented for solar thermal collectors and is based on the test procedures given in the ISO 9806 standard.

### **Concept**

The “Global Solar Certification Network” is a cooperation between solar certification bodies/schemes around the world. When a product has been certified by one of the participating certification bodies/schemes, the product can obtain certification from other participating certification schemes without re-testing of the.



# Global Solar Certification

## Recognised Certification Schemes



### Solar Keymark

The Solar Keymark was developed by the Solar Heat Europe/ESTIF and CEN (European Committee for Standardisation) in close co-operation with leading European test labs and with the support of the European Commission. It is the main quality label for solar thermal products and is widely spread across the European market and beyond.



### Solar Rating & Certification Corporation (SRCC)

The Solar Rating & Certification Corporation (ICC-SRCC) is a third-party certification body specializing in solar heating and cooling products. ICC-SRCC's certifications, ratings and listings are accepted throughout North America.



## Solar Keymark

EUROPEAN STANDARD **EN 12975**  
NORME EUROPÉENNE  
EUROPÄISCHE NORM  
March 2022  
ICS 27.140 Supersedes EN 12975-1:2006+A1:2010

English Version  
**Solar collectors -  
General requirements**

Capteurs solaires -  
Exigences générales

Sonnenkollektoren -  
Allgemeine Anforderungen

This European Standard was approved by CEN on 31 January 2022.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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Ref. No. EN 12975:2022 E

INTERNATIONAL STANDARD **ISO 9806**

Second edition  
2017-09

**Solar energy — Solar thermal  
collectors — Test methods**

Énergie solaire — Capteurs thermiques solaires — Méthodes d'essai



Reference number  
ISO 9806:2017(E)

© ISO 2017

## Solar Rating & Certification Corporation (SRCC)



### 1. Tests related to the thermal performance of the collector



Collector parameters to calculate yearly energy yields

### 2. Tests related to the durability, reliability and safety of the collector



Ensure that the collector fulfils the minimum requirements on durability, reliability and safety

- Thermal performance test (power curve)
- Incidence angle modifier for beam and diffuse irradiance
- Thermal capacity / (Time constant)
- (Pressure drop)

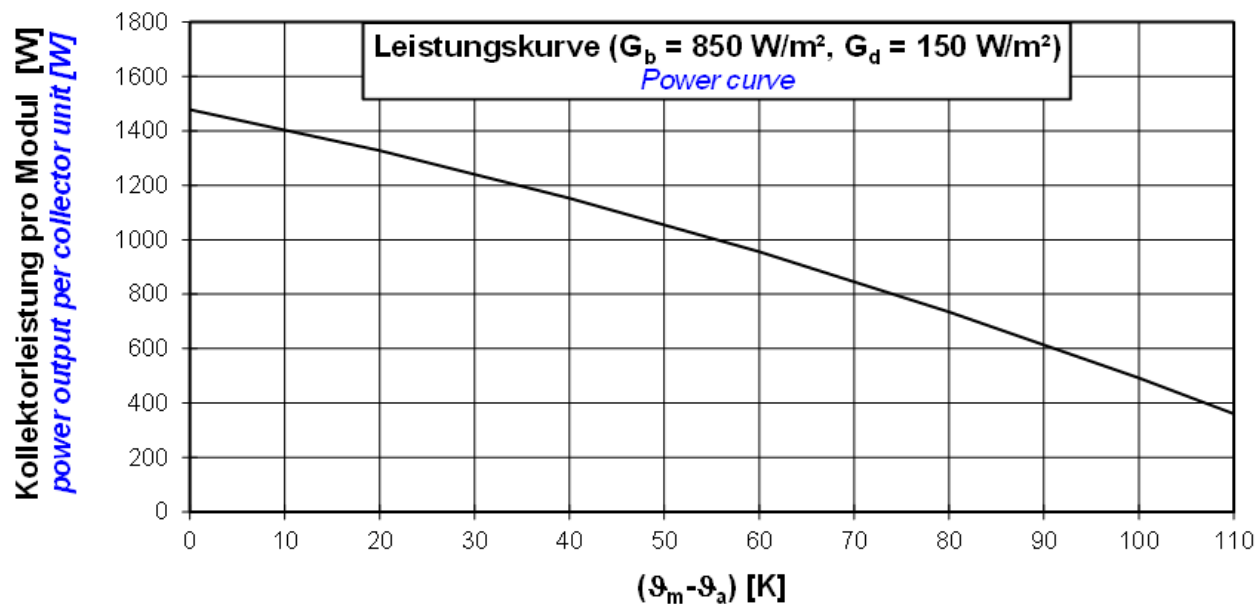
Test in (...) are optional

- Thermal performance test (power curve)




Describes the peak performance and the performance loss with raising temperature difference between collector and ambient

Indoor and outdoor test possible

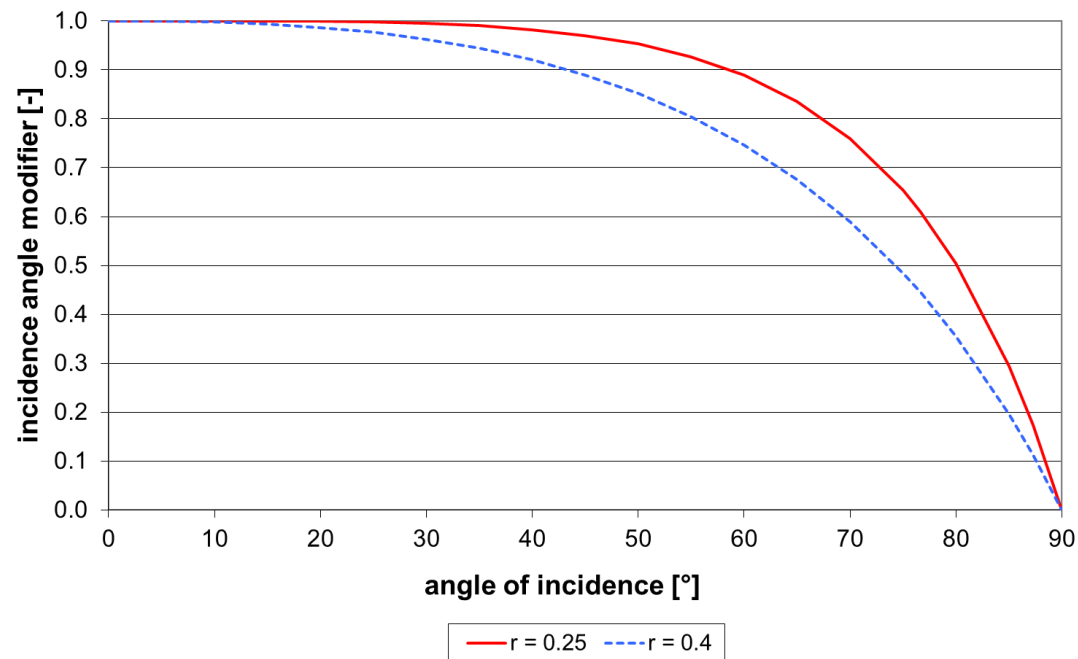




- Incidence angle modifier for beam and diffuse irradiance

 Describes the thermal performance dependency on the angle of incidence of the solar radiation

Can only be performed outdoors

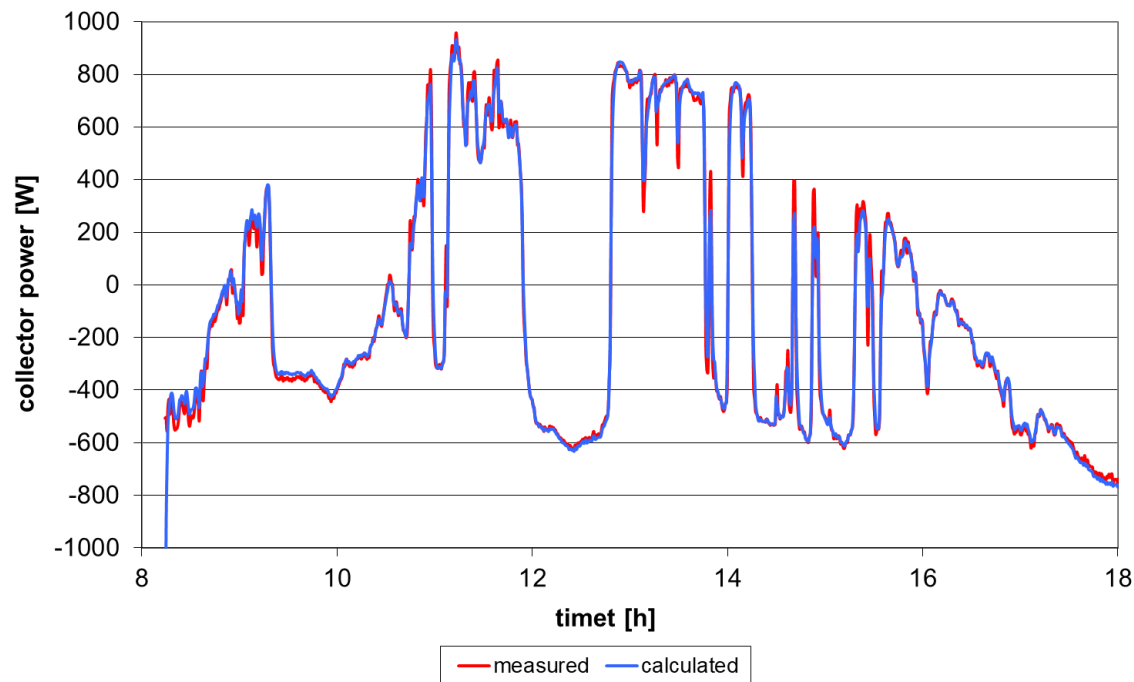


- Thermal capacity / (Time constant)




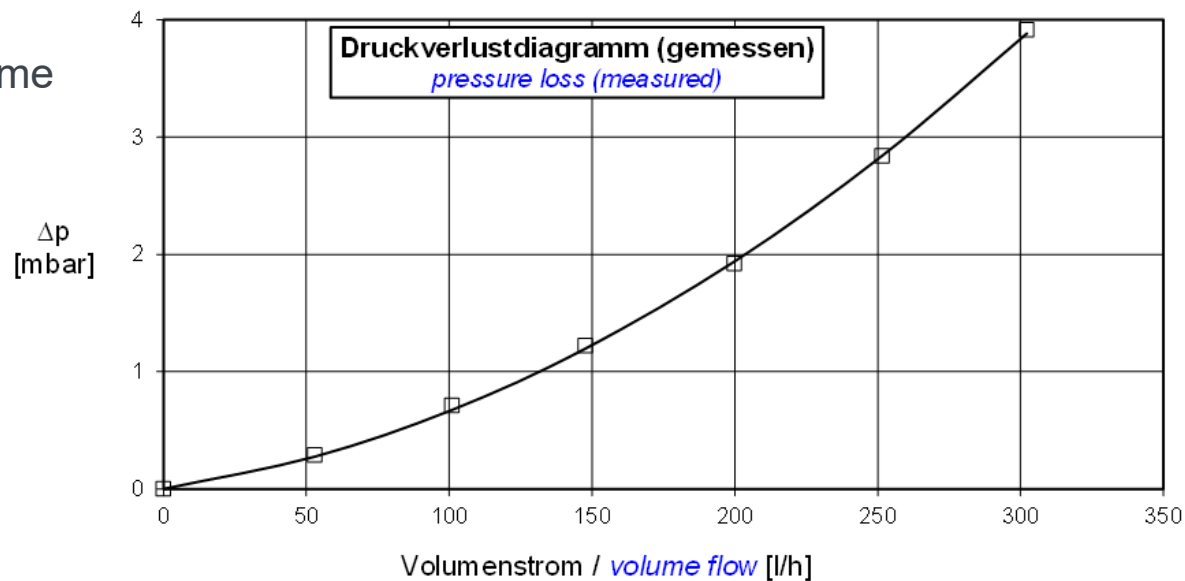
Enables collector power calculations under transient conditions

Can be calculated from material data or derived from measurements



- Pressure drop

 Describes the pressure drop of the collector in dependency of the volume flow



# Global Solar Certification

## Durability, reliability and safety tests



in co-operation with



- Exposure test
- Determination of standard stagnation temperature
- Thermal shock test (internal & external)
- Mechanical load test (positive & negative)
- Rain penetration test
- Internal pressure test
- Impact resistance test

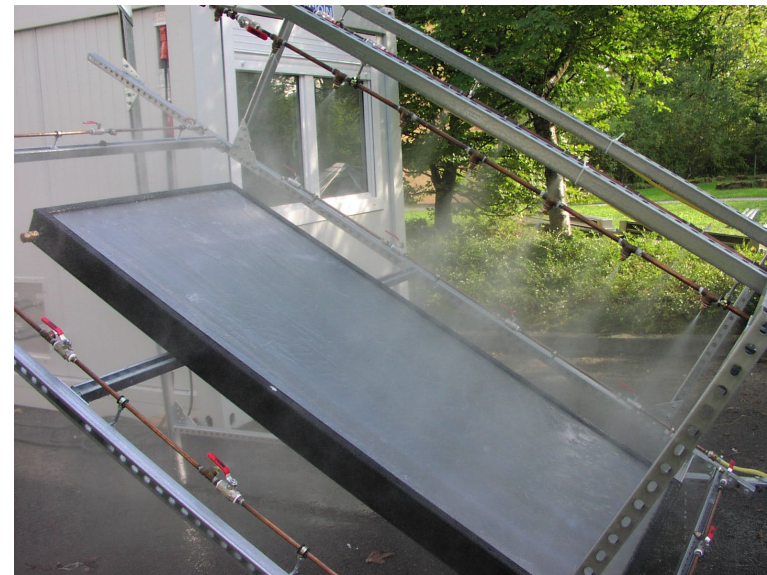
- Exposure test
- Determination of standard stagnation temperature
- 30 days exposure
- 32 h @  $G > 1000 \text{ W/m}^2$   
(class A)
- Irradiation sum  $H > 600 \text{ MJ/m}^2$   
(class A)



- Thermal shock test (internal & external)




Flushing the hot collector with cold water




Spraying the hot collector with cold water

- Mechanical load test (positive & negative)

 Applying positive and negative pressure on the collector to check the resistance of casing and transparent cover to wind and snow loads



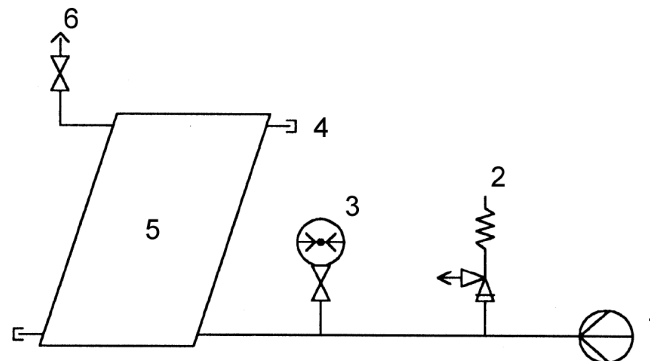
- Rain penetration test

 Spaying the collector for 4 h to detect water ingress if any

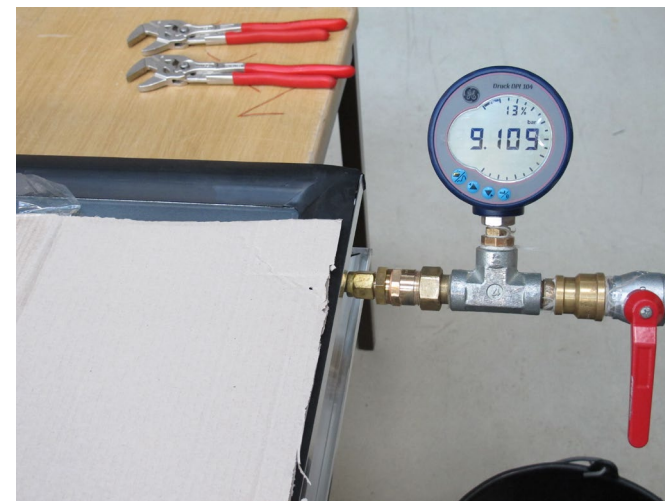




- Internal pressure test



➔ Applying 1.5 x max. operating pressure to check for leakage



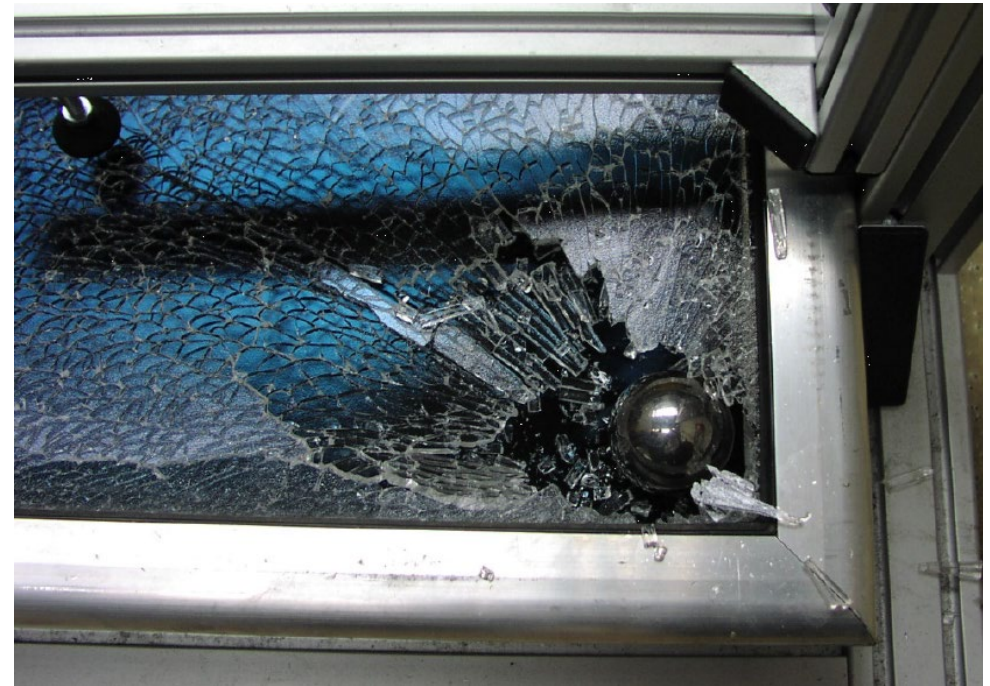
# Global Solar Certification

## Durability reliability and safety tests



- Impact resistance test

➔ Using steel ball or ice ball to determine impact resistance of transparent cover



Expected : Draft in 2023 - Publication in 2024

1. Introduction of gross solar yield (= gross thermal yield + gross electrical yield)
2. Including topics related to LCA, reparability, material use, etc.
3. Review of thermal performance model for WISCollectors,  $u'$ ,  $a_6$ ,  $a_7$ , etc.
4. Review of durability tests
5. Clarifying IAM topics (models, L and T, Input from SKN WG, etc.)
6. Implementing test procedures for air-brine-collectors being heat source for heat pumps (night time tests, tests below ambient temperature)

- Global Solar Certification Network is established and working
- 2 Certification schemes (Solar Keymark and Solar Rating & Certification Corporation (SRCC)) are recognised
- Standard ISO 9806 is the basis for both certification schemes
- Standard ISO 9806 is under revision, publication expected in 2024
- Solar Keymark scheme will take over revised ISO 9806 with usually 1 year transition time
- The takeover of the ISO 9806 into SRCC scheme usually will take more time



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**Stephan Fischer**

e-mail [stephan.fischer@igte.uni-stuttgart.de](mailto:stephan.fischer@igte.uni-stuttgart.de)

phone +49 (0) 711 685 - 63231

[www.igte.uni-stuttgart.de](http://www.igte.uni-stuttgart.de)

University of Stuttgart  
Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung  
Pfaffenwaldring 6  
70569 Stuttgart

