SpeedColl2

# Service Life Estimation

## for Solar Thermal Collectors and Components


Fraunhofer ISE

itw

Supported by:

Federal Ministry for Economic Affairs and Energy

on the basis of a decision by the German Bundestag

# Project Description

The project ***Speed***Coll2 researches the service life and the sustainability of solar thermal collectors, components and materials. The focus is on the influence of different climates and export markets.

***Speed***Coll2 continues the work of the previous project *Speed*Coll which exposed solar thermal collectors and their components in extreme climatic conditions and accelerated tests in the laboratory to study their behaviour over time. In addition, models for ageing processes were developed and significant knowledge regarding degradation due to climatic and operational influences has been gained.

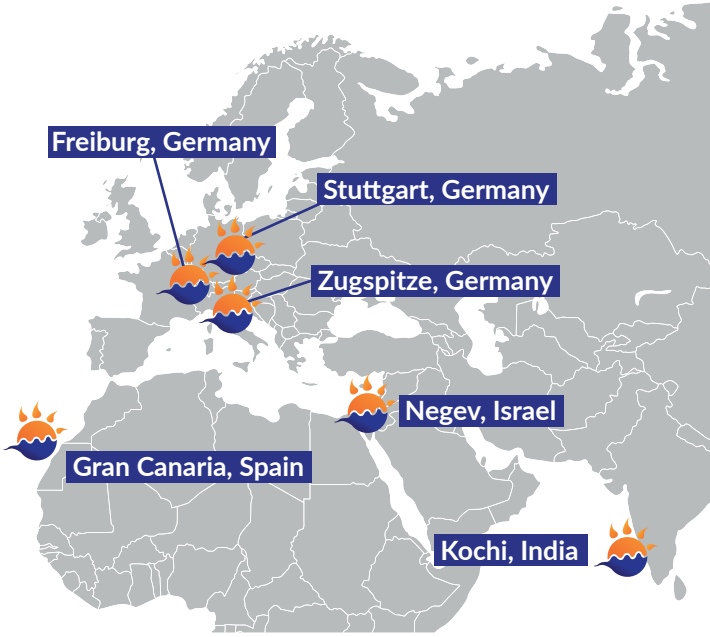
***Speed***Coll2 is a complementary addition to this research. The objective of the project is the estimation of service life for solar thermal collectors and components through definition of suitable testing methods. Furthermore, the sustainability of products will be analysed by means of ecological footprint analysis (LCA) under consideration of their service life.

„The German Federal Ministry for Economic Affairs and Energy (BMWi) sees the durability of solar thermal collectors – next to the further system cost reduction – as funding priority, especially in connection to aspects of building integration.

The research in *Speed*Coll2 is an important prerequisite for the quality assurance of this technology, thus fulfilling the users' expectation."

Dr. Peter Donat, former project supervisor at PTJ

# Outdoor Test Sites




**Freiburg, Germany**
Central European reference test site with moderate temperatures, humidity, UV radiation as well as snow and wind loads.

**Stuttgart, Germany**
Central European reference test site with moderate temperatures, humidity, UV radiation as well as snow and wind loads.

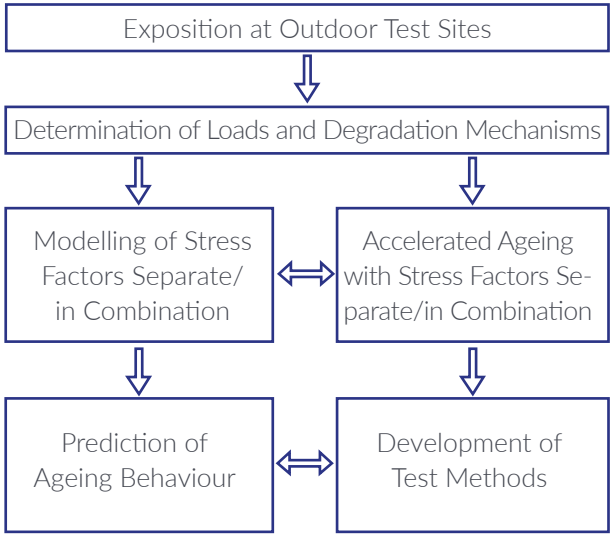
**Zugspitze, Germany**
Alpine test site with a cold-moderate mountain climate with big variations in temperature, high UV-loads as well as high snow and wind loads.

**Gran Canaria, Spain**
Maritime test site to examine the influence of sun, wind and salinity on the corrosiveness of solar collectors, especially on the absorber coating.

**Kochi, India**
Tropical test site to examine the influence of high humidity, temperatures, global and UV radiation.

**Negev, Israel**
Desert test site with high temperatures, big variations in temperature and high global and UV-radiation.

## Work Packages

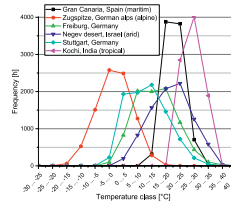


# Info Sheets

**Full texts available for download at www.speedcoll2.de**

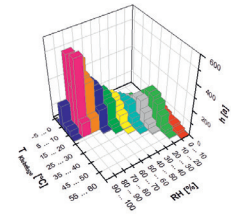
## Climatic Loads for Thermal Flat Plate Collectors

The stress profiles developed in SC2 allow conclusions about the effects of combined stress factors on the tested samples.



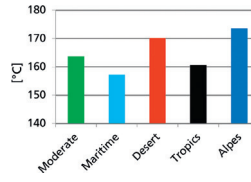

## Adhesive Materials in Solar Thermal Collectors

The adhesive properties of silicones were determined by the use of small test specimens. The material combinations aluminium raw, aluminium powder coated, aluminium anodized and solar glass were selected. Results are published on the SC2 homepage.



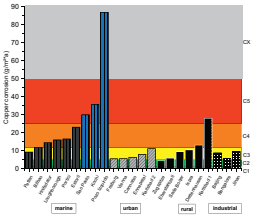

## Absorber Surface Durability

The comparison between the absorber surface durability standard testing ISO 22975-3 and the actual measured thermal stresses at the extremetest sites is summarised in Info Sheet No.3.




## Possible Damages and Weak Points

In the failure mode and effects analysis (FMEA) potential damages were assessed on the basis of the three categories “probability of occurrence”, “severity” and “probability of detection”.




## Determination of Corrosive Stress on Metals

The corrosivity of the exposure location is deduced from the corrosion rate for aluminium (Al), copper (Cu), steel (Fe) and zinc (Zn).

# Quiz

**I. Which exposition site shows the highest absorber temperatures?**

A: Gran Canaria, Spain
B: Negev desert, Israel
C: Kochi, India
D: Zugspitze, Germany

**II. At which exposition site do you find the highest corrosion rates?**

A: Gran Canaria, Spain
B: Freiburg, Germany
C: Negev desert, Israel
D: Zugspitze, Germany

**III. Which material shows the lowest corrosion rate in maritime climate?**

A: Iron
B: Copper
C: Zinc
D: Aluminum

**IV. If all data measured in *Speed*Coll and *Speed*Coll2 were printed, how high would the paper stack be (font size 10 pt, single-faced)?**

A: ~ 10 meters
B: ~ 20 meters
C: ~ 100 meters
D: ~ 200 meters

I. D, II. A, III. B, IV. D

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# Contact

**www.speedcoll2.de**

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*Speed*Coll2 is open to new partners –
if you would like to cooperate, please contact us.