Minutes of the 5th Solar Keymark meeting
WP1D
Lisbon, Wednesday 5th of March 2003

The current status of the database was presented to the project participants (see Annex). Furthermore a draft version of a CD containing the "Databases for computer models and test sequences for solar collectors and hot water stores" was distributed to the participants of the meeting.

Details concerning the contents of the database, especially with regard to solar collectors (measured data and model validation) were presented and discussed.

In the present stage the database contains, as specified by the project description, two computer models (1 collector model and 2 storage models). Furthermore the database contains validation criteria and measured data for different types of collectors and stores. Since the input of measured data by the project participants was not that intensive, there is still room for a further extension of the database. ITW as the responsible institution for the database offers to take care for the database also after the termination of the present Solar Keymark project.

Harald Drück

Stuttgart, 24/03/2003

Annex: Presentation of database, Lisbon, (8 Pages)

FORSCHUNGS- UND TESTZENTRUM
FÜR SOLARANLAGEN
STUTTGART

Institut für Thermodynamik und Wärmetechnik
Universität Stuttgart
Prof. Dr.-Ing. H. Müller-Steinhagen

Databases for computer models and test sequences

Solar Keymark Subtask 1.D

Lisbon 05/03/2003

Dipl.- Ing. Harald Drück

Dipl.- Ing. Stephan Fischer

TZS • Pfaffenwaldring 6 • 70550 Stuttgart • Tel. (0711) 685-3536 • Fax (0711) 685-3503

Which computer models?

Collector model:

- model acc. EN 12975
  (TRNSYS Type 132)

Store models:

- TRNSYS Type 60 ?
  (1 in- and outlet, 2 heat exchangers)
- MULTIPORT (TRNSYS Type 140)
  (10 in and outlets, 4 heat exchangers ect..)
- other models?
  Maybe from Simon Furbo

Types of collectors included up to now

- Flat plate collector
  with non selective coating

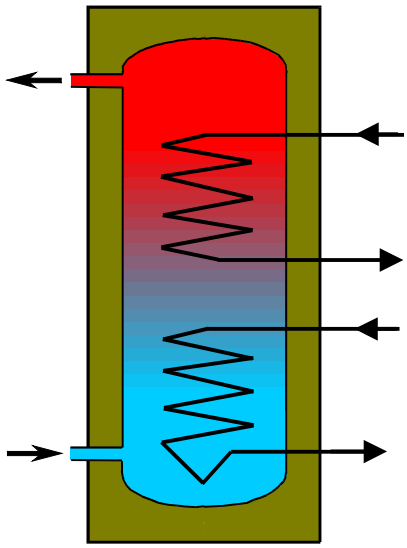
- Two Flat plate collectors
  with selective coating

- Evacuated tube collector

- CPC collector

Types of stores included up to now

- „Standard“ DHW store



Validation

how can this be done?

1. Comparision with results of analytical calculations ('analytical validation')

Examples:.

- Temperature in the store during stand-by
  (ENV 12977-3, Annex B.2, store model benchmark tests)

- Store considered as heat exchanger
  (ENV 12977-3, Annex B.3, store model benchmark tests)

2. Comparision with measured data

Problem:

Result calculated by a model depends on:

- the model itself (numerical equations ..)
  ---> *define model clearly*
- model parameters
  ---> *specify determination of parameters*
- input data
  ---> define validation sequences

Validation

Comparison of calculated results with measured data

Criteria for acceptance:

1. Difference in transferred energy

$$\varepsilon_{x,Q} = \frac{Q_{x,p} - Q_{x,m}}{Q_{x,m}} \cdot 100\%$$

p = predicted m = measured

2. Difference in transferred power

$$\Delta P_x = P_{x,p} - P_{x,m}$$

The mean difference in transferred power shall be calculated by

$$\Delta \overline{P} = \frac{\int_t \sum_x \Delta P_x \, dt}{\sum_x t_{x,t}}$$

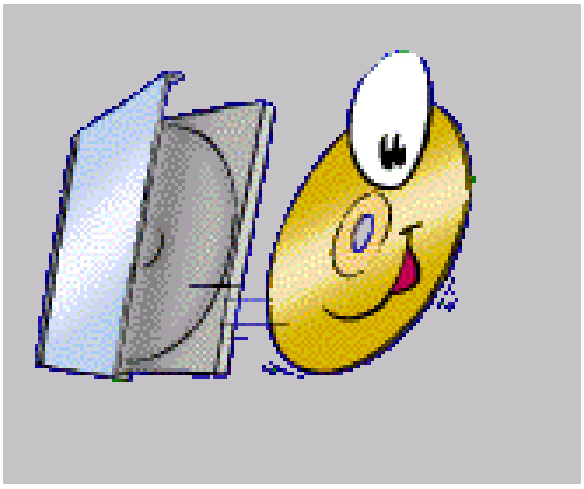
The mean transferred power shall be calculated by

$$\overline{P} = \frac{\int_t \sum_x P_x \, dt}{\sum_x t_{x,t}}$$

The relative error in mean transferred power ε_p shall be calculated by

$$\varepsilon_p = \frac{\Delta \overline{P}}{\overline{P}} \cdot 100\%$$

Databases on a CD



Altener Project

Solar Keymark

Databases for computer models and test sequences for solar collectors and hot water stores

Draft Version 0.1, March 2003

Deliverable of WP 1.D

With Input from: Arsenal, SP, ITW

Edited by:
Harald Drück & Stephan Fischer
ITW, Universität Stuttgart, Germany
Email: tzs@itw.uni-stuttgart.de

Contents
(up to now)