

Collector Test No. C196

Sunda Solartechnik GmbH, SEIDO 5-16

1. The following tests have been performed

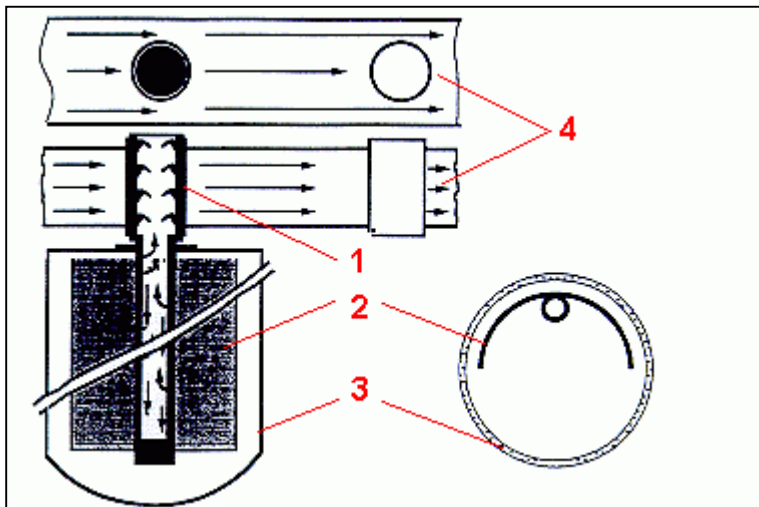
Test	Carried out	Section	Report*
Durability test according to ISO	No	3	LTS C196
Durability test according to prEN	No	3	
Measurement of stagnation temperature	No	3.1	
Efficiency measurement acc. SPF	Yes	4.1	
Efficiency measurement acc ISO, DIN, prEN	No	4.1	
Incidence angle modifier (IAM)	Yes	4.4	
Measurement of pressure drop	No	4.5	
Measurement of thermal capacity	No	4.6	
Measurement of time constant	No	4.6	

* = contact manufacturer for details!

2. Collector description

Contact	Sunda Solartechnik GmbH, D-89420 Höchstädt Tel. +49 (09074) 92 03 97, Fax +49 (09074) 92 03 99
Distributed in *	CH,DE,AT,BE,GB,FR,IL,IT,ES
Type	Evacuated tube collector, heat pipe, dry connection
Assembly	Cylindrically shaped absorber.
Installation *	Installation on sloping roof, Flat roof with support
Rated flowrate *	260 l/h
Absorber coating *	No specification
Dimensions (absorber, gross)	2.592 m ² , 3.988 m ²
Gross dimensions: l , w , h (in m)	2.110 x 1.890
Weight including glazing *	100 kg

* = manufacturer information



Legend

- 1 Dry connection
- 2 Absorber
- 3 Glazing
- 4 Header

3. Durability test and Swiss quality label

The collector has not been tested for durability.

3.1 Stagnation temperature

Standard values ISO 9806-2 and prEN 12975-2: 30°C / 1000 W/m ²
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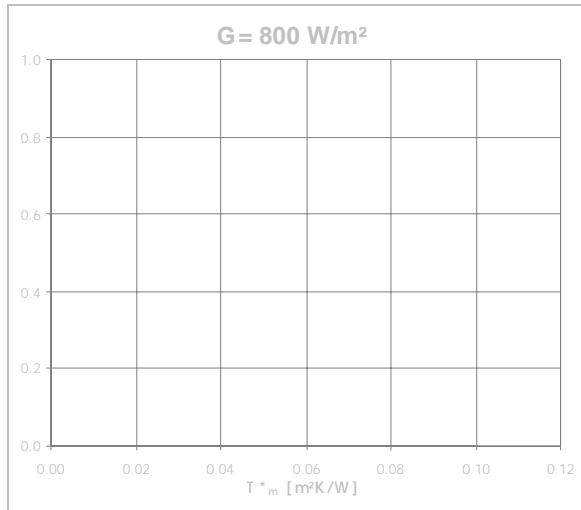
4. Thermal performance (flowrate at test: 300 l/h)

4.1 Efficiency characteristic curve

Measurement with wind (acc. to ISO, DIN, prEN)

Bezugsfläche:	Absorber	Apertur	Brutto
η_0 (-)			
a_1 (W/m ² K)			
a_2 (W/m ² K ²)			

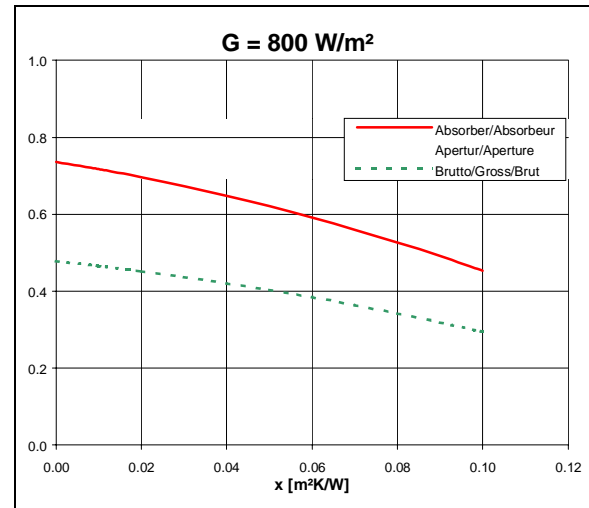
$\eta(T_m^*) = \eta_0 - a_1 \cdot T_m^* - a_2 \cdot G \cdot T_m^{*2}$ [$T_m^* = (t_m - t_a)/G$]
 t_m : avg. fluid temp, t_a : ambient temperature, G: irradiance



Measurement without wind (acc. to SPF)

Reference area	Absorber	Aperture	Gross
c_0 (-)	0.736		0.478
c_1 (W/m ² K)	1.78		1.16
c_2 (W/m ² K ²)	0.0130		0.0084

$\eta(x) = c_0 - c_1 \cdot x - c_2 \cdot G \cdot x^2$ [$x = (t_m - t_a)/G$]
 t_m : avg. fluid temp, t_a : ambient temperature, G: irradiance



4.2 Characteristic efficiency values (normal incidence, G = 800 W/m²)

Bezugsfläche:	Absorber	Apertur	Brutto
η ($T_m^* = 0.00$)			
η ($T_m^* = 0.05$)			
η ($T_m^* = 0.10$)			

Reference area	Absorber	Aperture	Gross
η ($x = 0.00$)	0.74		0.48
η ($x = 0.05$)	0.62		0.40
η ($x = 0.10$)	0.45		0.29

4.3 Power output (power in watts per collector, normal incidence, beam irradiation)

	400 W/m ²	700 W/m ²	1000 W/m ²
$t_m - t_a = 10$ K			
$t_m - t_a = 30$ K			
$t_m - t_a = 50$ K			

Irradiation	400 W/m ²	700 W/m ²	1000 W/m ²
$t_m - t_a = 10$ K	714	1'286	1'858
$t_m - t_a = 30$ K	594	1'167	1'739
$t_m - t_a = 50$ K	448	1'020	1'593

4.4 Incidence angle modifier (IAM)

	0°	10°	20°	30°	40°	50°	60°	70°	80°	90°
$K(\Theta)_{,long}$	1.0					0.92				0.0
$K(\Theta)_{,trans}$	1.0	1.02	1.06	1.12	1.18	1.27	1.38	1.50	1.63	0.0

4.5 Pressure drop in Pa (test fluid 33.3% Ethylenglykol)

	100 l/h	150 l/h	250 l/h	350 l/h	500 l/h
20°C					
60°C					
80°C					

4.6 Thermal capacity and time constant

Thermal capacity (kJ/K)	Time constant (s)

SPF
Hochschule Rapperswil (HSR)
Oberseestr. 10
CH-8640 Rapperswil
<http://www.solarenergy.ch>