

# Test Report

## Test of the thermal performance, durability and reliability of a liquid heating collector

Report Nr.: KT05\_02EN  
Translation  
Saarbrücken, 31.01.2007



Testzentrum Saarbrücken

in der



**Customer:** Sunda Solartechnik GmbH  
Schurwaldstraße 13  
71332 Waiblingen  
Germany

### Description of the examined collector:

**Manufacturer:** Beijing Sunda Solar Energy Technology Co., Ltd  
No. 3 Huayan Road, Haidian District  
100083 Beijing City  
People's Republic of China

**Type:** Seido 2-16

**Reference code of  
the TZSB:** KT05\_02

**Testing method:** Complete test according to DIN EN 12975-1,2 "Thermal solar systems and components – Solar Collectors"

**Notes:** This test report contains the results of the preliminary test report KT04\_07V from 02.12.2004 published by the TZSB. This test report KT05\_02EN is an updated and translated version of the test report KT05\_02 from 06.10.2005.

## 7 Summary report

### Identification:

Distribution: Sunda Solartechnik GmbH  
Manufacturer: Beijing Sunda Solar Energy Technology Co., Ltd  
Trade name: Seido 2-16  
collector type: Vacuum tubes collector with direct flow connection heat pipes to the manifold.  
Serial number: n/a  
Reference number: KT05\_02

### Dimension of collector:

Length:	2160	mm
Width:	1919	mm
Height:	151	mm
Gross area:	4.15	m <sup>2</sup>
Absorber area:	2.78	m <sup>2</sup> (projected area)
Aperture area:	2.93	m <sup>2</sup>

### General specifications:

Mass (empty):	97 kg (with assembly material)
Heat transfer fluid:	Water/water glycol mixture
Nominal volume flow rate:	110 l/m <sup>2</sup> <sub>gross</sub>
pressure drop:	7.4 mbar at 100 l/h
Maximum operating pressure:	6 bar
Stagnationtemperature:	276 °C

### Testing method:

Outdoor under steady state conditions according to DIN EN 12975-2

### Coefficients of the efficiency curve:

<u>Reference aperture area:</u>	<u>Reference (projected) absorber area:</u>
$\eta_{0a}$ : 0.798	$\eta_{0A}$ : 0.841
$a_{1a}$ : 0.9937 W/(m <sup>2</sup> K)	$a_{1A}$ : 1.0473 W/(m <sup>2</sup> K)
$a_{2a}$ : 0.0097 W/(m <sup>2</sup> K <sup>2</sup> )	$a_{2A}$ : 0.0102 W/(m <sup>2</sup> K <sup>2</sup> )

**Peak power ( $G=1000 \text{ W/m}^2$ ) per collector unit  $W_{\text{peak}}$  [W]: 2339**

**Power output [W] per collector unit (module with  $2.93 \text{ m}^2$  aperture area) at varying solar irradiance [ $\text{W/m}^2$ ].**

$t_m - t_a$	Solar irradiation		
	400 $\text{W/m}^2$	700 $\text{W/m}^2$	1000 $\text{W/m}^2$
10 K	904 W	1605 W	2307 W
30 K	823 W	1525 W	2226 W
50 K	719 W	1421 W	2123 W

**Annotation:** The calculated values are valid for normal incident angles.

**Incident angle modifier:**

Incident angle $\phi$	Transversal $K_t(\phi)$	Longitudinal $K_l(\phi)$
0°	1	1
30°	1.000	0.999
40°	1.022	0.976
50°	1.072	0.950
55°	1.064	-
60°	0.963	0.916
70°	-	0.849

### Results of the examinations of the durability and reliability

0 - no problem; 1 - minor problem; 2 - severe problem; \* - inspection to establish the conditions was not possible

Examination	Result	Evaluation
Internal pressure test	No major failure (according to 4.1) max. pressure: 1000 kPa	0
Examination of the high temperature stability	No major failure (according to 4.1) Detected stagnation temperature: 276 °C	0
Exposition test	No major failure (according to 4.1)	0
External thermal shock test	No major failure (according to 4.1)	0
Internal thermal shock test	No major failure (according to 4.1)	0
Rain penetration test	No major failure (according to 4.1) no visual appearance of penetrated water	0
Positiv pressure test of the collector cover	The assembly rails are slightly deformed Breakage of a vacuum tube No major failure (according to 4.1) Max. pressure load: 1000 Pa	1
Negative pressure test of fixings between the cover and the collector frame	No major failure (according to 4.1) Max. negative pressure: 1000 Pa	0
Negative pressure test of collector mountings	No major failure (according to 4.1) Max. negative pressure: 1000 Pa	0
Impact resistance test (optional)	No major failure (according to 4.1) max. speed of ice ball: 26.1 m/s	0
Final inspection	No major failure (according to 4.1)	1

**Overall result:** No major failure (according to 4.1)

## 8 Testing method

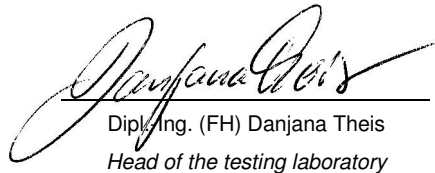
Test according to DIN EN 12975-2: December 2002 "Thermal solar systems and components – Solar collectors – Part 2: Test methods". Determination of the efficiency curve and the incident angle modifiers is made outdoor under steady state conditions.

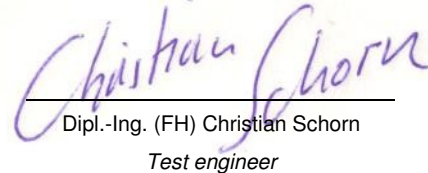
Test criteria according to DIN EN 12975-1: March 2001 "Thermal solar systems and components – Solar collectors – Part 1: General requirements".

**Test period:** 05.05.2005 – 06.10.2005

**Test engineers:** Dipl.-Ing. (FH) Thomas Bischoff, Dipl.-Ing. (FH) Christian Schorn

Saarbrücken, 31.01.2007

  
Dipl.-Ing. (FH) Danjana Theis  
Head of the testing laboratory

  
Dipl.-Ing. (FH) Christian Schorn  
Test engineer

### For customers information:



DEUTSCHES  
AKKREDITIERUNGSSYSTEM  
PRÜFWESEN GMBH  
**DAP**  
**DAP-PL-3450.00**

**DIN CERTCO**  
Approved Testing Laboratory

The TZSB holds the accreditation according to **DIN EN ISO/IEC 17025:2005** by **DAP GmbH**.

The scope of the accreditation contains the test for thermal solar systems and its components according to DIN 4757 - 2, DIN EN 12975-1,2, DIN EN 12976-1,2, DIN V ENV 12977-1,2,3, ISO 9806 – 1, 2, 3, AS/NZS 2535.1 and AS/NZS 2712 Section 4 and 6. The accreditation is registered under number **DAP-PL-3450.00**. The TZSB is an approved testing laboratory of DIN CERTCO.

**Our tests are valid in the following countries:** Australia – Belgium – Brasil - China –Denmark – Germany – Finland – France – Great Britain – Hongkong – India – Ireland – Italy –Japan – Canada – Republic of Korea – New Zealand – Netherlands – Norway – Austria – Portugal –Sweden – Switzerland – Singapore – Spain – South Africa – Taiwan – Czechia – USA - Vietnam.