



Test Report: KTB Nr. 2005-22-k

## **Mechanical load test up to 2400 Pa according to EN 12975-2:2002**

**for:**

IFF Kollmannsberger KG

**Brand Name:**

thermo|solar 300N2P

**Responsible for Testing:**

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**Date:**

9th January 2006

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Accredited according to DIN EN ISO/IEC 17025:2000



Registration No.:  
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## 1 Purpose for the test

The Mechanical load test, documented in this report, is a test additional to KTB No. 2003-17-en from 2nd September 2003. The test was performed to reach the requirements for the french solar thermal collector market.

## 2 Test Center

Test Center for Thermal Solar Systems of Fraunhofer ISE  
Heidenhofstraße 2, D-79110 Freiburg  
Tel.: +49-761-4588-5354 or -5141; Fax.: +49-761-4588-9354  
E-mail: arim.schaefer@ise.fraunhofer.de; rommel@ise.fraunhofer.de  
Internet: <http://www.kollektortest.de>

## 3 Orderer

IFF Kollmannsberger KG  
Regierungsplatz 539, 84028 Landshut  
Tel: +49 0871 274103  
Fax: +49 0871 274104

## 4 Description of the Collector

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Expeller:	IFF Kollmannsberger KG Regierungsplatz 539 84028 Landshut Tel: +49 0871 274103 Fax: +49 0871 274104 E-mail: <a href="mailto:info@thermosolar.com">info@thermosolar.com</a>
Manufacturer:	Thermosolar s.r.o. Na varticke, P.O.Box 45 96501 Ziar nad Hronom, Slovakia Tel: +421-45-6016080 Fax: +421-45-6722844 E-mail: <a href="mailto:info@thermosolar.sk">info@thermosolar.sk</a>

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#### 4.1 Collector

(MS):	Manufacturer Specification
Type:	Flat plat collector
Brand name:	thermo solar 300N2P
Serial no.:	61480/1125120027
Year of construction:	2005
Number of test collectors:	1
Collector reference number:	2 KT 18 010 112005
Total area:	2,007 m * 1,008 m = 2,023 m <sup>2</sup>
Aperture area:	1,923 m * 0,924 m = 1.777 m <sup>2</sup>
Absorber area:	1.780 m <sup>2</sup> (MS)
Material of the cover:	ESG white glass
Number of covers:	1
Transmission of the cover:	90,5 %
Thickness of the cover:	4 mm
Weight empty:	39.9 kg
Volume of the fluid:	1.57 l (MS)
Heat transfer fluid:	Propylenglykol (MS)

#### 4.2 Absorber

Material of the absorber sheet:	Aluminium (MS)
Thickness of the absorber sheets:	0,4 mm (MS)
Kind of the selective coating:	Galvanic selectiv (MS)
Absorptivity coefficient $\alpha$ :	95 % (MS)
Emissivity coefficient $\varepsilon$	16 % (MS)
Material of the absorber pipes:	Copper (MS)
Layout of the absorber pipes:	Meander (MS)
Number of absorber pipes:	1 (MS)
Outer diameter:	10 mm (MS)
Inner diameter:	0,7 mm (MS)
Distance between the pipes:	87 mm (MS)
Material of the header pipe:	V2A steel (MS)
Outer diameter of the header pipe:	18 mm (MS)
Wall thickness of the header pipe:	1 mm (MS)

#### 4.3 Insulation and Casing

Collector dimensions	
Height, width, depth:	2,007 m; 1,008 m; 0,075 m
Thickness of the insulation at the back:	40 mm
Thickness of the insulation at the sides:	15 mm
Material:	Mineral wool (MS)
Material of the casing:	Aluminium (MS)

#### 4.4 Limitations

Maximum pressure:	20 bar (MS)
Operating pressure:	4,5 bar (MS)
Maximum temperature:	170 °C
Flow range recommendation:	30 l/m <sup>2</sup> h (MS)

#### 4.5 Kind of mounting

Flat roof, mounted on the roof:	no
Flat roof, integrated:	no
Tilted roof, mounted on the roof:	yes
Tilted roof, integrated:	yes
Free mounting:	yes
Fassade:	no

#### 4.6 Picture of the collector



Figure 1: Picture of the collector thermo|solar 300N2P mounted on the efficiency test facility (Tracker) of Fraunhofer ISE

4.7 Drawing of the collector

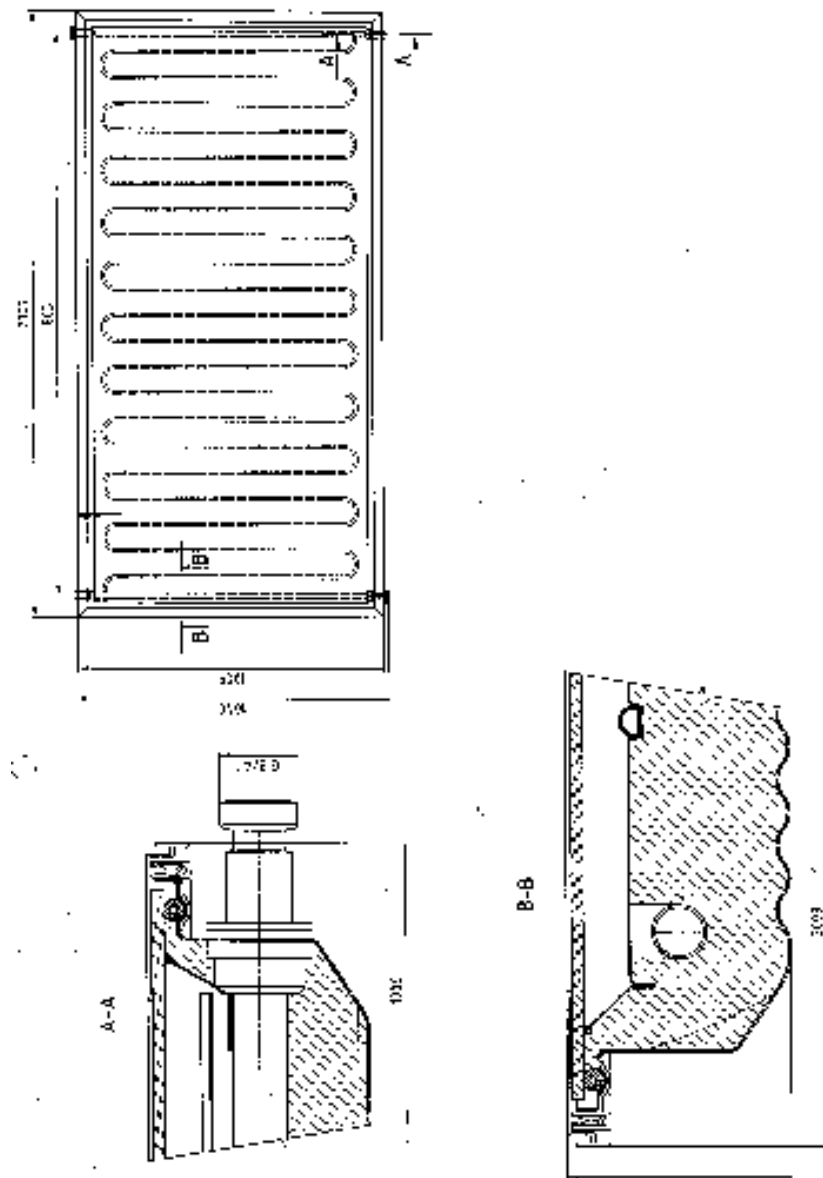


Figure 2: Drawing of the collector-thermo|solar 300N2P

## 5 Mechanical load test

### 5.1 Positive pressure test of the collector cover

The positive pressure (according to a positive pressure load caused by snow or wind) was increased in steps of 100 Pa up to the maximum pressure load.

Method used to apply pressure:	suction cups, pressed
Maximum pressure load:	2400 Pa



Figure 3: Positive pressure test of the collector cover

Result:

During and after the test no damage at the cover of the collector was observed.

### 5.2 Negative pressure test of fixings between the cover and the collector box

The negative pressure (according to a negative pressure load caused by wind) was increased in steps of 100 Pa up to the maximum pressure load.

Method used to apply pressure:	suction cups
Maximum pressure load:	2400 Pa



Figure 4: Negative pressure test of fixings between the cover and the collector box

Result:

During and after the test no damage at the cover or at the cover fixings of the collector was observed.

### 5.3 Negative pressure test of mountings

Three different mounting systems were tested:

- Mountings for a angular roof, on the roof; special screw installation
- Mountings for a angular roof, integrated; special fixings for regions with high wind speed
- Mountings for free mounting; frame for regions with high wind speed



### 5.3.1 Mountings for a angular roof, on the roof

The tested mounting system for a angular roof, on the roof, for the collector thermo|solar 300N2P is a system with Stockschraube.

The negative pressure (according to a negative pressure load caused by wind) was increased in steps of 100 Pa up to the maximum pressure load.

Method used to apply pressure:	suction cups
Maximum pressure load:	2400 Pa



Figure 5: Mountings for a angular roof, on the roof; special screw installation

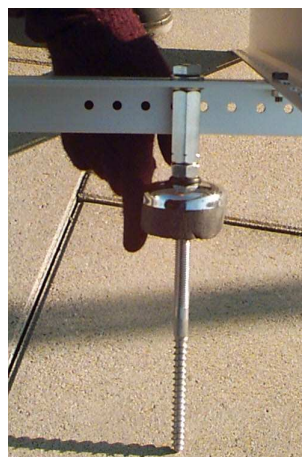


Figure 6: Mountings for a angular roof, on the roof; special screw installation

**Result:**

During and after the test no damage at the collector mounting fixtures or fixing points was observed.

### 5.3.2 Mountings for a angular roof, integrated

The tested mounting system for a angular roof, integrated, for the collector thermo|solar 300N2P has special fixings for regions with high wind speed. Four of these additional fixings belong to each side of the collector, see Figure 9 and 8.

The negative pressure (according to a negative pressure load caused by wind) was increased in steps of 100 Pa up to the maximum pressure load.

Method used to apply pressure:	suction cups
Maximum pressure load:	2400 Pa



Figure 7: Mountings for a angular roof, integrated

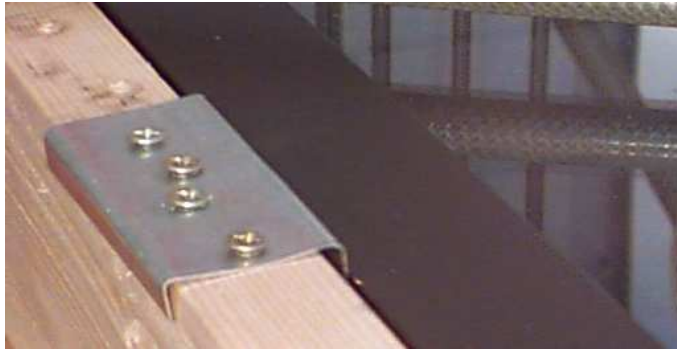


Figure 8: Additional fixings for regions with high wind speed



Figure 9: Position of additional fixings for regions with high wind speed

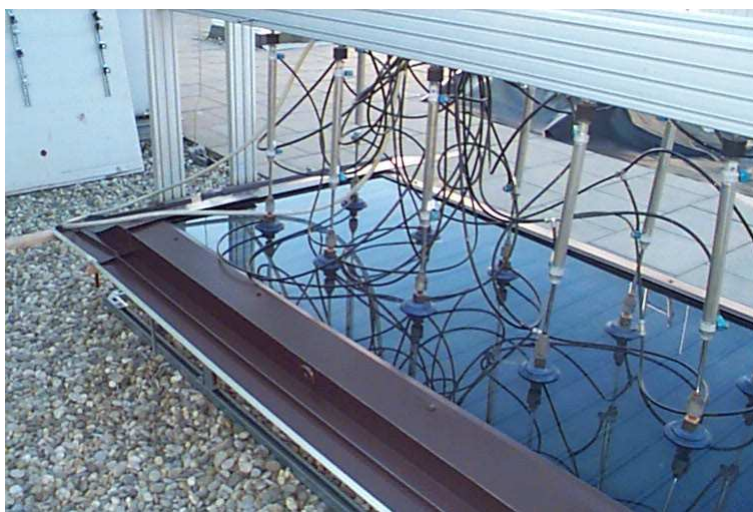


Figure 10: Test of mountings for a angular roof, integrated

Result:

During and after the test no damage at the collector mounting fixtures or fixing points was observed.

### 5.3.3 Mountings for free mounting

The tested mounting system for a free mounting for the collector thermo|solar 300N2P is a special system of the company Thermosolar s.r.o. for regions with high wind. The frame has rods on the sides, see figure 11.

The negative pressure (according to a negative pressure load caused by wind) was increased in steps of 100 Pa up to the maximum pressure load.

Method used to apply pressure:	suction cups
Maximum pressure load:	2400 Pa

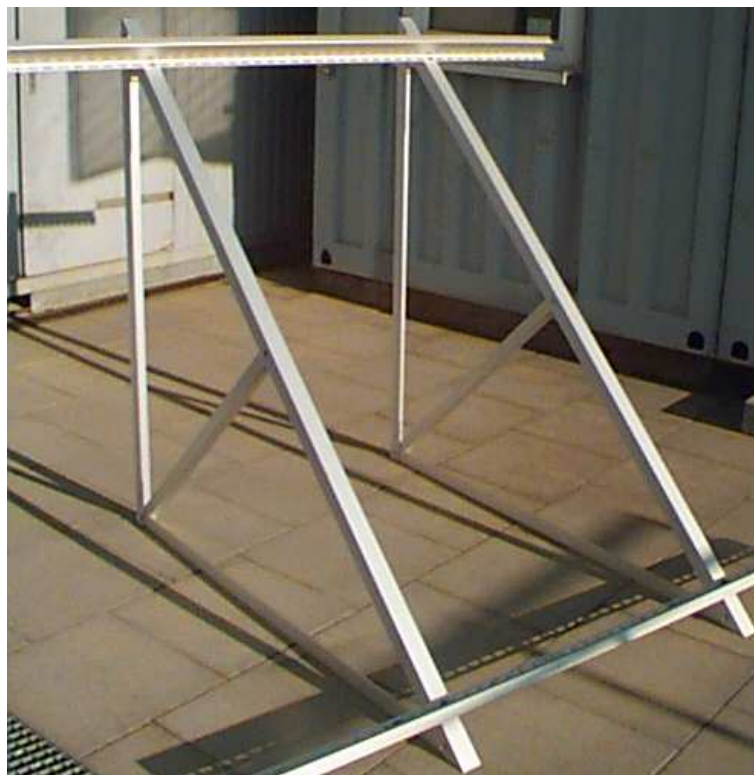


Figure 11: Mountings for free mounting

Result:



During and after the test no damage at the collector mounting fixtures or fixing points was observed.

## 6 Summary statement

The measurements were carried out in November 2005.

No problems or distinctive observations occurred during the measurements.

## 7 Annotation to the test report

The results described in this test report refer only to the test collector. It is not allowed to make extract copies of this test report.

Test report: KTB Nr. 2005-22-k

Freiburg, 9th January 2006

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