Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2528 F
	Issued	2015-06-09

Company holding the	Müba Energietechnik	Country	Switzerland
Brand (optional)		Website	http://www.muegeli-metalltechnik.ch
Street, street number	Leimenstrasse 89	E-mail	p.muegeli@muegeli.com
Postal Code / City, province	2575 Tauffelen	Tel/Fax	41323960646

Collector Type (flat plate glazed/un-glazed; evacuate tubular)	Flat plate collector - glazed
Thermal / photo voltaic hybid collector? (PVT collector)	No
Integration in the roof possible ? (manufacturers declaration)	No

Collector name	Aperture area (Aa)	Gross length	Gross width	Gross height	Gross area (AG)	Power output per collector module G = 1000 W/m² Tm-Ta 0 K	10 K	30 K	50 K	70 K
	m²	mm	mm	mm	**m²**	W	W	W	W	W
Müba-Sun	1,92	1.731	1.170	84	**2,03**	1.460	1.390	1.232	1.048	840

Performance test method	Glazed liquid heating collector - steady state - outdoor									
Performance parameters related to aperture area		η0	a1	a2						
Units		-	W/(m²K)	W/(m²K²)						
Test results - Flow rate and fluid see note 1		0,759	3,480	0,016						

Bi-directional incidence angle modifiers?	No	*Kϑ values are obligatory for 50°.*								
Incidence angle modifiers Kθ(θ)	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
	Kθ(θ)	1,00	0,99	0,98	0,95	0,90	0,81	0,66	0,41	0,00
Incidence angle modifier not bi-directional - leave fields blank										

Stagnation temperature - Weather conditions see note 2	Tstg	184	°C
Effective thermal capacity	ceff = C/Ag	5,72	kJ/(m²K)
Max. intended operation temperature - see note 3	Tmax,op	n.d.	°C
Max. operation pressure - see note 3	pmax,op	1000	kPa

Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m² aperture area

Flow rate	kg/(s m²)	0,000	0,014	0,029	0,043	0,058	0,072	0,087	0,101	0,116	0,130
Pressure drop, ΔP	Pa	0	60	150	260	390	550	730	930	1160	1410

Testing Laboratory	TestLab Solar Thermal Systems, Fraunhofer ISE		
Website	www.collectortest.com		
Test report id. number	ktb-2006-39-e-en	Date of test report	2015.06.09

During the test GDIF/GTOT was always between 0,17 and 0,27

Comments of testing laboratory:

n.d. = no declaration

Note 1	Flow rate	0,020	kg/(s m²)	Fluid	Water
Note 2	Irradiance, G = 1000 W/m²; Ambient temperature , Ta=30 °C				
Note 3	Given by manufacturer				

TestLab
Solar Thermal
Systems
Heidenhofstraße 2
D-79110 Freiburg
Tel: +49 (0)761 4588 5354

Version: 4.06, 2014-01-15

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2528 F
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Annual collector output kWh/module

Collector name	Location and collector temperature (Tm)											
	Athens			Davos			Stockholm			Würzburg		
	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
Müba-Sun	2.259	1.597	1.016	1.716	1.169	711	1.261	815	480	1.369	877	507

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations

Location	Latitude °	Gtot kWh/m²	Ta °C	Collector orientation or tracking mode
Athens	38	1.765	18,5	South, 25°
Davos	47	1.714	3,2	South, 30°
Stockholm	59	1.166	7,5	South, 45°
Würzburg	50	1.244	9,0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m²
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx.

DIN CERTCO • Alboinstraße 56 • 12103 Berlin
Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de •
www.dincertco.de

Datasheet version: 4.06, 2014-01-15

ScenoCalc version: Ver. 4.06 (Jan, 2014)