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Fraunhofer ISE
TestLab Solar Thermal Systems

Summary of ISO 9806 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S2366 L
	Issued	2024-11-27

Company holding the	GRAMMER Solar GmbH	Country	Deutschland
Brand (optional)		Website	https://grammer-solar.com/de/
Street, street number	Oskar-von-Miller Straße 8	E-mail	info @ grammer-solar.de
Postal Code / City, province	92224, Amberg	Tel/Fax	09621-30857-0

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

Collector name	Gross length	Gross width	Gross height	Gross area (AG)	Power output per collector [W] wind speed, u = 1,3 m/s Ghem = 1000 W/m²				
					ṁ		80	121	143
	mm	mm	mm	m²	Tm - Ta (K)		18,4	14,6	13,1
TWINSOLAR 2.0	2.000	1.006	138	2,01	Power output (W)		824	985	1.040

Performance test method	Air heating collector - steady state - indoors		
Performance parameters related to gross area	$\eta_{hem}(\dot{m}_{min})$	$\eta_{hem}(\dot{m}_{mean})$	$\eta_{hem}(\dot{m}_{max})$
Units	-	-	-
Flow rate specific test results	0,410	0,490	0,518

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	1,00	0,99	0,97	0,93	0,85	0,71	0,45	0,00
Incidence angle modifier not bi-directional - leave fields blank										

Mass flow rate during testing ($\dot{m}_{min}$ / m_{mean} / m_{max})	80	121		143
Stagnation temperature	Tstg	120	°C	
Effective thermal capacity	ceff = C/Ag	12,5	kJ/(m²K)	
Max. intende operation temperature	Tmax,op	110	°C	

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

Flow rate	[kg/h]	59	87	115	144	215
Pressure drop, ΔP	Pa	22,0	43,0	70,0	104,0	183,0

Testing Laboratory	TestLab Solar Thermal Systems, Fraunhofer ISE		
Website			
Test report id. number	KTB 2024-05	Date of test report	2024.11.27

During the test GDIF/GTOT was always between	-	and	-

Comments of testing laboratory:

Only the Power Output values for the mean air mass flow are shown in this data sheet. The dependence of the Power Output on the air mass flow can be found in the underlying test report. The pressue drop was measured together with intstalled ventinator.

Stefan Mehnert

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