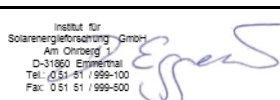


Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate						Licence Number		011-7S1404 F			
						Issued		2015-04-24			
Company holding the		Wagner Solar GmbH				Country		Germany			
Brand (optional)						Website		www.wagner-solar.com			
Street, street number		Sonnenallee 2				E-mail		info@wagner-solar.com			
Postal Code / City, province		D-35274		Kirchhain		Tel/Fax		+49 6421 8007-0 / -22			
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Flat plate collector - glazed					
Thermal / photo voltaic hybrid 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					
						T_m-T_a					
						0 K	10 K	30 K	50 K	70 K	
	m²	mm	mm	mm	m²	W	W	W	W	W	
EURO L20 MQ AR	2.37	2 151	1 215	110	2.62	1 996	1 906	1 704	1 472	1 209	
Performance test method		Glazed liquid heating collector - steady state - indoor									
Performance parameters related to aperture area		η_0	a1	a2							
Units		-	W/(m ² K)	W/(m ² K)							
Test results - Flow rate and fluid see note 1		0.842	3.620	0.016							
Bi-directional incidence angle modifiers?		No <i>Kθ values are obligatory for 50°.</i>									
Incidence angle modifiers Kθ(θ)		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
		Kθ(θ)	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.38	0.00
Incidence angle modifier not bi-directional - leave fields blank											
Stagnation temperature - Weather conditions see note 2						T_{stg}	207	°C			
Effective thermal capacity						ceff = C/Ag	6.8	kJ/(m²K)			
Max. intende operation temperature - see note 3						T_{max,op}	-	°C			
Max. operation pressure - see note 3						p_{max,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 m ²)	-									
Pressure drop, ΔP	Pa	-									
Optional weather data		Location				Link					
Testing Laboratory		ISFH - Institut für Solarenergieforschung Hameln									
Website		www.isfh.de									
Test report id. number		119-09/KD; 120-09/Q				Date of test report		2010-05-11; 2010-10-07			
During the test GDIF/GTOT was always between		0.1	and	0.3							
Comments of testing laboratory:											
The collector efficiency parameters are related to G(DIF)/G(TOT)=0.15.											
The incidence angle modifier was determined outdoor according to a quasi-dynamic test procedure.											
Note 1	Flow rate	0.020	kg/(s m ²)	Fluid	Water						
Note 2	Irradiance, G = 1000 W/m²; Ambient temperature , Ta=30 °C										
Note 3	Given by manufacturer										
						<small>Institut für Solarenergieforschung GmbH Am Ohreberg 1 D-31860 Emmerthal Tel.: 051-511/399-100 Fax: 051-511/399-600</small> 					
						Datasheet version: 4.06, 2014-01-15					
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany											
Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de											

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	011-7S1404 F
	Issued	24.04.2015

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
EURO L20 MQ AR	3 149	2 288	1 518	2 423	1 701	1 083	1 777	1 186	728	1 929	1 279	773

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

Overview of locations				
Location	Latitude °	Gtot kWh/m ²	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/m ²
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>.