


Annex to Solar Keymark Certificate					Licence Number		011-7S2994 R							
					Date issued		2020-12-09							
					Issued by		ISFH CalTeC							
Licence holder		AkoTec Produktionsgesellschaft mbH			Country		Germany							
Brand (optional)					Web		http://www.akotec.eu							
Street, Number		Grundmühlenweg, 3			E-mail		info@akotec.eu							
Postcode, City		D-16278 Angermünde			Tel		+49 3331 2571640							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector									
					$G_b = 850 \text{ W/m}^2$, $G_d = 150 \text{ W/m}^2$ & $u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	92 K				
					m ²	mm	mm	mm	mm	mm	mm			
					W	W	W	W	W	W				
Weiser Power 800					1.57	2 110	745	128	763	750	715	672	620	553
Weiser Power 1200					2.35	2 110	1 115	128	1 143	1 122	1 071	1 006	928	827
Weiser Power 1600					3.15	2 110	1 495	128	1 532	1 504	1 436	1 349	1 244	1 109
Weiser Power 2400					4.74	2 110	2 245	128	2 301	2 259	2 156	2 026	1 869	1 665
Power output per m² gross area					486	477	455	428	395	351				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A_G)		η_0 , b	a1	a2	a3	a4	a5	a6	a7	a8	Kd			
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-			
Test results		0.495	0.80	0.007			4 060				0.88			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		$K_{\theta T, coll}$	1.01	1.02	1.03	1.04	1.07	1.08	0.83	0.42	0.00			
Longitudinal		$K_{\theta L, coll}$	1.00	0.99	0.98	0.96	0.93	0.87	0.75	0.38	0.00			
Heat transfer medium for testing		Water-Glycole												
Flow rate for testing (per gross area, A_G)		dm/dt		0.020	kg/(sm ²)									
Maximum temperature difference during thermal performance test		$(\vartheta_m - \vartheta_a)_{max}$		62	K									
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30 \text{ }^\circ\text{C}$)		ϑ_{stg}		280	°C									
Maximum operating temperature		$\vartheta_{max, op}$		100	°C									
Maximum operating pressure		$p_{max, op}$		1000	kPa									
Testing laboratory		ISFH CalTeC			http://www.isfh.de									
Test report(s)		016-20/KT			Dated		16.11.2020							
Comments of testing laboratory		The given collector efficiency parameters were determined at the collector type Weiser Power 2400. The power output for each subtype was calculated with the collector efficiency parameters from the Weiser Power 2400. At standard stagnation conditions a manifold temperature of 121 °C was determined at the empty collector.												
		Datasheet version: 6.1, 2019-07-11  Institut für Solarenergieforschung GmbH Am Ohrberg 1 D-37880 Emmetal Tel: 05151/999-100 Fax: 05151/999-500												
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														

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Supplementary Information		011-7S2994 R													
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Annual collector output in kWh/collector at mean fluid temperature ϑ_m															
Standard Locations		Athens			Davos			Stockholm			Würzburg				
Collector name	ϑ_m	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C		
Weiser Power 800		1 281	1 122	937	1 096	931	758	788	655	519	845	703	556		
Weiser Power 1200		1 918	1 679	1 402	1 641	1 393	1 135	1 180	980	777	1 265	1 052	832		
Weiser Power 1600		2 571	2 251	1 879	2 200	1 868	1 521	1 582	1 313	1 041	1 696	1 410	1 115		
Weiser Power 2400		3 861	3 381	2 822	3 304	2 805	2 285	2 375	1 972	1 564	2 546	2 118	1 675		
Annual output per m ² gross area		815	714	596	698	592	482	501	416	330	538	447	353		
Annual efficiency, η_a		46%	40%	34%	43%	36%	30%	43%	36%	28%	43%	36%	28%		
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)													
Annual irradiation on collector plane		1765 kWh/m ²			1630 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²				
Mean annual ambient air temperature		18.5°C			3.2°C			7.5°C			9.0°C				
Collector orientation or tracking mode		South, 25°			South, 30°			South, 45°			South, 35°				
The collector is operated at constant temperature ϑ_m (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.1 (July 2019). A detailed description of the calculations is available at http://www.estif.org/solarkeymarknew/															
Additional Information															
Collector heat transfer medium											Water-Glycole				
The collector is deemed to be suitable for roof integration											No				
The collector was tested successfully under the following conditions:															
Climate class (A+, A, B or C)											A		--		
G (W/m ²) >		1000		ϑ_a (°C) >		20		H _x (MJ/m ²) >			600				
Maximum tested positive load											4500		Pa		
Maximum tested negative load											3250		Pa		
Hail resistance using steel ball (maximum drop height)											2		m		
Additional collector attribute(s)															
<input type="checkbox"/> Using external power source(s) for normal operation <input type="checkbox"/> Active or passive measure(s) for self-protection															
<input type="checkbox"/> Co-generating thermal and electrical power <input type="checkbox"/> Façade collector(s)															
Energy Labelling Information						Additional Informative Technical Data									
	Reference Area, A _{sol} (m ²)					Hydraulic Designation Code				Aperture Area, A _a (m ²)					
Weiser Power 800	1.57					10-VH-12S-A:5,3880-C:13,745				1.01					
Weiser Power 1200	2.35					15-VH-12S-A:5,3880-C:13,1115				1.52					
Weiser Power 1600	3.15					20-VH-12S-A:5,3880-C:13,1495				2.03					
Weiser Power 2400	4.74					30-VH-12S-A:5,3880-C:13,2245				3.04					
Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}						Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}									
Collector efficiency (η_{col})						44%		Zero-loss efficiency (η_0)				0.49		--	
Remark: Collector efficiency (η_{col}) is defined in CDR (EU) No 811/2013 as collector efficiency of the solar collector at a temperature difference between the solar collector and the surrounding air of 40 K and a global solar irradiance of 1000 W/m ² , expressed in % and rounded to the nearest integer. Deviating from the regulation η_{col} is based on reference area (A _{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.						First-order coefficient (a ₁)				0.80				W/(m ² K)	
						Second-order coefficient (a ₂)				0.007				W/(m ² K ²)	
						Incidence angle modifier IAM (50°)				0.98				--	
						Remark: The data given in this section are related to collector reference area (A _{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs.									
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