

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		011-7S2578 F							
					Date issued		2016-05-03							
					Issued by		DIN CERTCO							
Licence holder		ALTECH GmbH			Country		Germany							
Brand (optional)		-			Web		www.altech.de							
Street, Number		Am Mutterberg 4-6			E-mail		info@altech.de							
Postcode, City		D- 97833 Frammersbach			Tel		+49 935 599 834							
Collector Type					Flat plate collector, glazed									
Collector name					Power output per collector Gb = 850 W/m ² ; Gd = 150 W/m ² $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	85 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
EUROTHERM 4.0					2.32	2 037	1 137	80	1 772	1 689	1 503	1 291	1 053	857
Power output per m² gross area					764	728	648	557	454	370				
Performance parameters test method					Steady state - indoor									
Performance parameters (related to AG)					$\eta_{0,hem}$	a1	a2							
Units					-	W/(m ² K)	W/(m ² K ²)							
Test results					0.764	3.450	0.014							
Incidence angle modifier test method					Quasi dynamic - outdoor									
Bi-directional incidence angle modifiers					No									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					$K_{\theta T, coll}$	1.00	0.99	0.98	0.97	0.94	0.89			0.00
Longitudinal					$K_{\theta L, coll}$	1.00	0.99	0.98	0.97	0.94	0.89			0.00
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A_G)					dm/dt	0.036	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations					$(\vartheta_m - \vartheta_a)_{max}$	85	K							
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30^\circ\text{C}$)					ϑ_{stg}	209	°C							
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²	5.6	kJ/(Km ²)							
Maximum operating temperature					$\vartheta_{max, op}$	-	°C							
Maximum operating pressure					$p_{max, op}$	1000	kPa							
Testing laboratory					ISFH			www.isfh.de						
Test report(s)					38-15/KT 39-15/KT			Dated		09.11.2015 09.11.2015				
Comments of testing laboratory					Datashet version: 5.01, 2016-03-01									
<i>The performance parameters are related to G(DIF)/G(TOT)=0.15</i>					Institut für Solarenergieforschung GmbH Am Ohrberg 1 D-31860 Emmerthal 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														

Annex to Solar Keymark Certificate Supplementary Information		Licence Number		011-7S2578 F									
		Issued		2016-05-03									
Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
Collector name	Standard Locations ϑ_m	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
EUROTHERM 4.0		2 781	1 995	1 306	2 129	1 481	934	1 558	1 029	626	1 693	1 108	665
Annual output per m ² gross area		1 199	860	563	918	638	403	672	443	270	730	477	287
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc													
Additional Information													
Collector heat transfer medium		Water-Glycole											
Hybrid Thermal and Photo Voltaic collector		No											
The collector is deemed to be suitable for roof integration		No											
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:													
Climate class (A, B or C)		--			--			--			--		
Maximum tested positive load		--			--			--			Pa		
Maximum tested negative load		--			--			--			Pa		
Hail resistance using steel ball (maximum drop height)		--			--			--			m		
Energy Labelling Information													
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}											
EUROTHERM 4.0	2.32	Collector efficiency (η_{col})			60			%					
		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 9806:2013.											
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}											
		Zero-loss efficiency (η_0)			0.764			--					
		First-order coefficient (a_1)			3.45			W/(m ² K)					
		Second-order coefficient (a_2)			0.014			W/(m ² K ²)					
		Incidence angle modifier IAM (50°)			0.94			--					
		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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