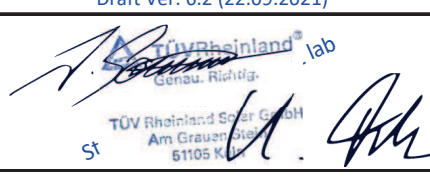


Annex to Solar Keymark Certificate					Licence Number		011-7S2729 F							
					Date issued		2023-12-07							
					Issued by		DINCertco							
Licence holder		ITALTHERM S.p.A			Country		Italy							
Brand (optional)					Web		www.italtherm.it							
Street, Number		Via Salvo D'Acquisto 10			E-mail		info@italtherm.it							
Postcode, City		29010 Pontenure (PC)			Tel		+39 523 575 611							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	110 K				
					m ²	mm	mm	mm	mm	mm				
Slim Solar 2.0					2.01	1 675	1 200	50	1 451	1 365	1 180	980	763	281
Slim Solar 2.0H					2.01	1 200	1 675	50	1 451	1 365	1 180	980	763	281
Slim Solar 2.5					2.51	2 090	1 200	55	1 812	1 705	1 474	1 223	953	351
Slim Solar 2.5H					2.51	1 200	2 090	55	1 812	1 705	1 474	1 223	953	351
Power output per m ² gross area					722	679	587	487	380	140				
Performance parameters test method		Steady state - indoor												
Performance parameters (related to A _G)		$\eta_{0, b}$	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		0.728	4.19	0.010	0.000	0.00	6 553	0.000	0.00	0.0E+00	0.95			
Incidence angle modifier test method		Quasi dynamic - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{GT, coll}	1.00	0.99	0.97	0.95	0.90	0.82	0.65	0.33	0.00			
Longitudinal		K _{GL, coll}	1.00	0.99	0.97	0.95	0.90	0.82	0.65	0.33	0.00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A _G)					dm/dt	0.023	kg/(sm ²)							
Maximum temperature difference during thermal performance test					($\vartheta_m - \vartheta_a$) _{max}	80	K							
Standard stagnation temperature (G = 1000 W/m ² ; $\vartheta_a = 30$ °C)					ϑ_{stg}	200	°C							
Maximum operating temperature					$\vartheta_{max, op}$	200	°C							
Maximum operating pressure					p _{max, op}	600	kPa							
Testing laboratory		TÜV Rheinland Solar GmbH			www.tuv.com/solar									
Test report(s)		DE23KTBK 001 DE23G9LG 001 DE23QSMU 001 (Doc-check)			Dated		04.07.2023 28.08.2023 07.12.2023							
Comments of testing laboratory					Draft Ver. 6.2 (22.09.2021)									
														
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Annex to Solar Keymark Certificate							Licence Number		011-7S2729 F					
Supplementary Information							Issued		2023-12-07					
Gross Thermal Yield 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	
Slim Solar 2.0		2 286	1 521	915	1 668	1 075	616	1 239	752	419	1 357	813	443	
Slim Solar 2.0H		2 286	1 521	915	1 668	1 075	616	1 239	752	419	1 357	813	443	
Slim Solar 2.5		2 855	1 899	1 142	2 083	1 342	770	1 547	939	523	1 694	1 016	554	
Slim Solar 2.5H		2 855	1 899	1 142	2 083	1 342	770	1 547	939	523	1 694	1 016	554	
Gross Thermal Yield per m ² gross area		1 137	757	455	830	535	307	616	374	208	675	405	221	
Annual efficiency, η_a		64%	43%	26%	51%	33%	19%	53%	32%	18%	54%	33%	18%	
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 Draft Ver. 6.2 (22.09.2021). 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										2000		Pa		
Maximum tested negative load										1750		Pa		
Hail resistance using ice balls (diameter)										35		mm		
Additional collector attribute(s)														
Using external power source(s) for normal operation						No		Active or passive measure(s) for self-protection				No		
Co-generating thermal and electrical power						No		Façade collector(s)				No		
Energy Labelling Information						Additional Informative Technical Data								
						Reference Area, A_{sol} (m ²)		Hydraulic Designation Code			Aperture Area, A_a (m ²)			
Slim Solar 2.0						2.01		1-H-12345-A:9.2,14800-C:20.6,1130			1.87			
Slim Solar 2.0H						2.01		1-H-12345-A:9.2,15200-C:20.6,1625			1.87			
Slim Solar 2.5						2.51		1-H-12345-A:9.2,19700-C:20.6,1130			2.35			
Slim Solar 2.5H						2.51		1-H-12345-A:9.2,18900-C:20.6,2020			2.35			
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})						54%		Zero-loss efficiency (η_0)			0.72		--	
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)			4.19			W/(m ² K)		
						Second-order coefficient (a_2)			0.010			W/(m ² K ²)		
						Incidence angle modifier IAM (50°)			0.91			--		
						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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