

Annex to Solar Keymark Certificate					Licence Number		011-7S2963 F				
					Date issued		2025-03-19				
					Issued by		DINCERTCO				
Licence holder		THERMIC SPLLC			Country		GREECE				
Brand (optional)					Web		https://www.thermicsol.com/				
Street, Number		LOUTSAS & MESOLOGGIOU			E-mail		alkis.metzalis@thermicsol.com				
Postcode, City		19600, MANDRA, INDUSTRIAL ZONE, ATHENS			Tel		+30 6989 0000 80				
Collector Type					Flat plate collector						
Collector name	Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	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	117 K	
					W	W	W	W	W	W	
HECTOR 1.5	1.51	1 503	1 007	85	1 102	1 051	937	809	667	275	
HECTOR 1.7	1.68	1 420	1 183	85	1 226	1 169	1 043	900	742	306	
HECTOR 1.9	1.96	1 503	1 305	85	1 430	1 364	1 217	1 050	866	357	
HECTOR 2.0	2.02	2 006	1 007	85	1 474	1 406	1 254	1 083	892	368	
HECTOR 2.3	2.24	1 893	1 183	85	1 635	1 559	1 390	1 201	989	408	
HECTOR 2.5	2.52	2 006	1 257	85	1 839	1 754	1 564	1 351	1 113	459	
HECTOR 2.7	2.67	2 261	1 183	85	1 949	1 858	1 657	1 431	1 179	486	
HECTOR 2.9	2.92	2 006	1 457	85	2 131	2 032	1 812	1 565	1 290	532	
HECTOR 1.5H	1.51	1 007	1 503	85	1 102	1 051	937	809	667	275	
HECTOR 1.7H	1.68	1 183	1 420	85	1 226	1 169	1 043	900	742	306	
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HECTOR 2.9H	2.92	1 457	2 006	85	2 131	2 032	1 812	1 565	1 290	532	
Power output per m ² gross area					730	696	621	536	442	182	
Performance parameters test method		Quasi dynamic									
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		0.736	3.28	0.012	0.000	0.00	20 060	0.000	0.00	0.0	0.94
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	0.99	0.98	0.95	0.87	0.61	0.31	0.00
Longitudinal		$K_{GL, coll}$	1.00	0.99	0.99	0.98	0.95	0.87	0.61	0.31	0.00
Heat transfer medium for testing					Water						
Flow rate for testing (per gross area, A_G)					dm/dt		0.020		kg/(sm ²)		
Maximum temperature difference during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$		87		K		
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ °C}$)					ϑ_{stg}		210		°C		
Maximum operating temperature					$\vartheta_{max, op}$		k.A.		°C		
Maximum operating pressure					$p_{max, op}$		1000		kPa		
Testing laboratory		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					http://www.igte.uni-stuttgart.de				
Test report(s)		22COL1642OEM01 22COL1643OEM01 22COL1643QOEM01					Dated		19.03.2025 19.03.2025 19.03.2025		
Comments of testing laboratory					Ver. 6.2 (13.01.2022)						
Documented performance parameters are taken from 22COL1642OEM01 (HECTOR 1.5H)					 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)						
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Supplementary Information	Issued	2025-03-19

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
HECTOR 1.5		1 776	1 289	860	1 364	959	618	998	666	412	1 088	722	441
HECTOR 1.7		1 976	1 434	957	1 517	1 067	688	1 110	741	459	1 211	803	491
HECTOR 1.9		2 306	1 673	1 117	1 770	1 245	802	1 295	864	535	1 412	937	573
HECTOR 2.0		2 376	1 724	1 151	1 824	1 283	827	1 334	890	552	1 456	966	590
HECTOR 2.3		2 635	1 912	1 276	2 023	1 423	917	1 480	987	612	1 614	1 071	654
HECTOR 2.5		2 964	2 151	1 436	2 276	1 601	1 032	1 665	1 111	688	1 816	1 205	736
HECTOR 2.7		3 141	2 279	1 521	2 411	1 696	1 093	1 764	1 177	729	1 924	1 276	780
HECTOR 2.9		3 435	2 493	1 664	2 637	1 855	1 195	1 929	1 287	797	2 104	1 396	853
HECTOR 1.5H		1 776	1 289	860	1 364	959	618	998	666	412	1 088	722	441
HECTOR 1.7H		1 976	1 434	957	1 517	1 067	688	1 110	741	459	1 211	803	491
HECTOR 1.9H		2 306	1 673	1 117	1 770	1 245	802	1 295	864	535	1 412	937	573
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HECTOR 2.3H		2 635	1 912	1 276	2 023	1 423	917	1 480	987	612	1 614	1 071	654
HECTOR 2.5H		2 964	2 151	1 436	2 276	1 601	1 032	1 665	1 111	688	1 816	1 205	736
HECTOR 2.7H		3 141	2 279	1 521	2 411	1 696	1 093	1 764	1 177	729	1 924	1 276	780
HECTOR 2.9H		3 435	2 493	1 664	2 637	1 855	1 195	1 929	1 287	797	2 104	1 396	853
Gross Thermal Yield per m ² gross area		1 176	854	570	903	635	409	661	441	273	721	478	292
Annual efficiency, η_a		67%	48%	32%	55%	39%	25%	57%	38%	23%	58%	38%	23%
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. 6.2 (13.01.2022). 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				2500	Pa
Maximum tested negative load				1500	Pa
Hail resistance using steel ball (maximum drop height)				2	m

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	Facade 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)
HECTOR 1.5	1.51	8-V-1234S-14.1,1390-20.6,1060-D	1.36
HECTOR 1.7	1.68	10-V-1234S-14.1,1310-20.6,1240-D	1.52
HECTOR 1.9	1.96	11-V-1234S-14.1,1390-20.6,1370-D	1.79
HECTOR 2.0	2.02	8-V-1234S-14.1,1895-20.6,1060-D	1.83
HECTOR 2.3	2.24	10-V-1234S-14.1,1780-20.6,1240-D	2.05
HECTOR 2.5	2.52	11-V-1234S-14.1,1895-20.6,1310-D	2.32
HECTOR 2.7	2.67	10-V-1234S-14.1,2150-20.6,1240-D	2.46
HECTOR 2.9	2.92	12-V-1234S-14.1,1895-20.6,1510-D	2.71
HECTOR 1.5H	1.51	13-V-1234S-14.1,1895-20.6,1566-D	1.36
HECTOR 1.7H	1.68	12-V-1234S-14.1,1070-20.6,1490-D	1.52
HECTOR 1.9H	1.96	13-V-1234S-14.1,1189-20.6,1568-D	1.79
HECTOR 2.0H	2.02	17-V-1234S-14.1,895-20.6,2080-D	1.83
HECTOR 2.3H	2.24	16-V-1234S-14.1,1070-20.6,1960-D	2.05
HECTOR 2.5H	2.52	17-V-1234S-14.1,1145-20.6,2070-D	2.32
HECTOR 2.7H	2.67	19-V-1234S-14.1,1070-20.6,2330-D	2.46
HECTOR 2.9H	2.92	17-V-1234S-14.1,1348-20.6,2070-D	2.71

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})	58%	Zero-loss efficiency (η_0)	0.73
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)	3.28
		Second-order coefficient (a ₂)	0.012
		Incidence angle modifier IAM (50°)	0.96
		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.	