


Annex to Solar Keymark Certificate					Licence Number		011-7S1490 F							
					Date issued		2022-08-04							
					Issued by		DIN CERTCO							
Licence holder		DIMAS SA			Country	Greece								
Brand (optional)					Web	https://www.dimas-solar.gr/								
Street, Number		2nd km Argos – Nafplio			E-mail	info@dimas-solar.gr								
Postcode, City		Argos 21200			Tel	+30 27510 20920								
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	117 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
ENERGY+ARGO 15					1.51	1 503	1 007	85	1 102	1 051	937	809	667	275
ENERGY+ARGO 17					1.68	1 420	1 183	85	1 226	1 169	1 043	900	742	306
ENERGY+ARGO 19					1.96	1 503	1 305	85	1 430	1 364	1 217	1 050	866	357
ENERGY+ARGO 20					2.02	2 006	1 007	85	1 474	1 406	1 254	1 083	892	368
ENERGY+ARGO 23					2.24	1 893	1 183	85	1 635	1 559	1 390	1 201	989	408
ENERGY+ARGO 25					2.52	2 006	1 257	85	1 839	1 754	1 564	1 351	1 113	459
ENERGY+ARGO 27					2.67	2 261	1 183	85	1 949	1 858	1 657	1 431	1 179	486
ENERGY+ARGO 29					2.92	2 006	1 457	85	2 131	2 032	1 812	1 565	1 290	532
ENERGY+ARGO 15H					1.51	1 007	1 503	85	1 102	1 051	937	809	667	275
ENERGY+ARGO 17H					1.68	1 183	1 420	85	1 226	1 169	1 043	900	742	306
ENERGY+ARGO 19H					1.96	1 305	1 503	85	1 430	1 364	1 217	1 050	866	357
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ENERGY+ARGO 29H					2.92	1 457	2 006	85	2 131	2 032	1 812	1 565	1 290	532
Power output per m² 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	0.0E+00	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 W/m²; $\vartheta_a = 30$ °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)		22COL1642 22COL1643 22COL1643Q					Dated		04.08.2022 04.08.2022 04.08.2022					
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
Documented performance parameters are taken from 22COL1642 (ENERGY+ARGO 15). This data sheet replaces the data sheet issued on 02.07.2018.					 TzS Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)									
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Supplementary Information		Issued													
		011-7S1490 F													
		2022-08-04													
Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m															
Collector name	Standard Locations			Athens			Davos			Stockholm			Würzburg		
	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		
ENERGY+ARGO 15		1 776	1 289	860	1 364	959	618	998	666	412	1 088	722	441		
ENERGY+ARGO 17		1 976	1 434	957	1 517	1 067	688	1 110	741	459	1 211	803	491		
ENERGY+ARGO 19		2 306	1 673	1 117	1 770	1 245	802	1 295	864	535	1 412	937	573		
ENERGY+ARGO 20		2 376	1 724	1 151	1 824	1 283	827	1 334	890	552	1 456	966	590		
ENERGY+ARGO 23		2 635	1 912	1 276	2 023	1 423	917	1 480	987	612	1 614	1 071	654		
ENERGY+ARGO 25		2 964	2 151	1 436	2 276	1 601	1 032	1 665	1 111	688	1 816	1 205	736		
ENERGY+ARGO 27		3 141	2 279	1 521	2 411	1 696	1 093	1 764	1 177	729	1 924	1 276	780		
ENERGY+ARGO 29		3 435	2 493	1 664	2 637	1 855	1 195	1 929	1 287	797	2 104	1 396	853		
ENERGY+ARGO 15H		1 776	1 289	860	1 364	959	618	998	666	412	1 088	722	441		
ENERGY+ARGO 17H		1 976	1 434	957	1 517	1 067	688	1 110	741	459	1 211	803	491		
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ENERGY+ARGO 27H		3 141	2 279	1 521	2 411	1 696	1 093	1 764	1 177	729	1 924	1 276	780		
ENERGY+ARGO 29H		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						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)					
ENERGY+ARGO 15	1.51			8-V-1234S-14.1,1390-20.6,1060-D						1.36					
ENERGY+ARGO 17	1.68			10-V-1234S-14.1,1310-20.6,1240-D						1.52					
ENERGY+ARGO 19	1.96			11-V-1234S-14.1,1390-20.6,1370-D						1.79					
ENERGY+ARGO 20	2.02			8-V-1234S-14.1,1895-20.6,1060-D						1.83					
ENERGY+ARGO 23	2.24			10-V-1234S-14.1,1780-20.6,1240-D						2.05					
ENERGY+ARGO 25	2.52			11-V-1234S-14.1,1895-20.6,1310-D						2.32					
ENERGY+ARGO 27	2.67			10-V-1234S-14.1,2150-20.6,1240-D						2.46					
ENERGY+ARGO 29	2.92			12-V-1234S-14.1,1895-20.6,1510-D						2.71					
ENERGY+ARGO 15H	1.51			13-V-1234S-14.1,895-20.6,1566-D						1.36					
ENERGY+ARGO 17H	1.68			12-V-1234S-14.1,1070-20.6,1490-D						1.52					
ENERGY+ARGO 19H	1.96			13-V-1234S-14.1,1189-20.6,1568-D						1.79					
ENERGY+ARGO 20H	2.02			17-V-1234S-14.1,895-20.6,2080-D						1.83					
ENERGY+ARGO 23H	2.24			16-V-1234S-14.1,1070-20.6,1960-D						2.05					
ENERGY+ARGO 25H	2.52			17-V-1234S-14.1,1145-20.6,2070-D						2.32					
ENERGY+ARGO 27H	2.67			19-V-1234S-14.1,1070-20.6,2330-D						2.46					
ENERGY+ARGO 29H	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			W/(m ² K)					
				Second-order coefficient (a_2)			0.012			W/(m ² K ²)					
				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.															
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