Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S1491 F
	Date of issue	17.07.2013

Company	DIMAS SA Solar Energy Systems	**Country**		Greece
Brand (optional)		**Website**		www.dimas-solar.gr
Street, number	2nd klm, Argos-Nafplion	**E-mail**		info@dimas-solar.gr
Postal Code	21200	**Tel.**	+30	27 510 209 110
City	Argos	**Fax**	+30	2 751 062 671

Collector Type (flat plate / evacuate tubular / un-glazed)	Flat plate collector
Integration in the roof possible ?	No

Collector name	Aperture area (Aa) [m²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (Ag) [m²]	Power output per collector unit G = 1000 W/m² Tm-Ta : 0 K [W]	10 K [W]	30 K [W]	50 K [W]	70 K [W]
ENERGY + EVO 25	2.31	2 008	1 258	85	2.53	1 765	1 672	1 474	1 262	1 035
ENERGY + EVO 23 *	2.03	1 893	1 183	85	2.24	1 551	1 469	1 296	1 109	910
ENERGY + EVO 20 *	1.83	2 006	1 007	85	2.02	1 398	1 324	1 168	1 000	820
ENERGY + EVO 19 *	1.79	1 503	1 305	85	1.96	1 368	1 295	1 142	978	802
ENERGY + EVO 17 *	1.51	1 420	1 183	85	1.68	1 154	1 093	964	825	677
ENERGY + EVO 15	1.35	1 501	1 007	87	1.51	1 031	977	862	738	605
ENERGY + EVO 29	2.72	2 007	1 458	85	2.93	2 078	1 968	1 736	1 486	1 219
ENERGY + EVO 27 *	2.51	2 260	1 183	85	2.67	1 918	1 816	1 602	1 371	1 125
ENERGY + EVO 25H *	2.33	1 257	2 006	85	2.52	1 780	1 686	1 487	1 273	1 044

Collector efficiency parameters related to aperture area (Aa) Type of fluid and flow rate see note 1	η_{0a}	0.764	-
	a_{1a}	3.953	W/(m²K)
	a_{2a}	0.008	W/(m²K²)
Stagnation temperature - Weather conditions see note 2	t_{stg}	199	°C
Effective thermal capacity	$c_{eff} = C/A_a$	12.88	kJ/(m²K)
Max. operation pressure - see note 3	p_{max}	1600	kPa

Incidence angle modifiers $K_\theta(\theta)$	G_{DIF}/G_{TOT} min	G_{DIF}/G_{TOT} max	θ_T / θ_L	50°	*10°*	*20°*	*30°*	*40°*	*60°*	*70°*
			$K_\theta(\theta_T)$	0.92	1.00	0.99	0.98	0.96	0.86	0.73
	-	-	$K_\theta(\theta_L)$	0.92	1.00	0.99	0.98	0.96	0.86	0.73
G_{DIF}/G_{TOT}: min&max - while measuring					***Optional values***					

Testing Laboratory	TZS, ITW University of Stuttgart
Website	www.tzs.uni-stuttgart.de
Test report id. number	10COL933/2, 10COL934/2, 10COL934Q/2
Date of test report	06.06.2013
Perf. test method	EN 12975-2 6.1.4 (outdoor)

Comments of testing laboratory :

* dimensions according to manufacturer

Note 1	**Fluid**	Water	**Flow rate**	0.020	kg/s per m²
Note 2	**Irradiance, Gs=1000 W/m²** **Ambient temperature , Ta=30 °C**				
Note 3	**Given by manufacturer**				

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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	011-7S1491 F
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Annual collector output kWh

Collector name	Location and collector temperature (Tm)											
	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
ENERGY + EVO 25	2 765	1 929	1 253	2 224	1 508	945	1 528	984	598	1 661	1 059	633
ENERGY + EVO 23 *	2 430	1 695	1 101	1 954	1 325	830	1 343	865	526	1 460	931	556
ENERGY + EVO 20 *	2 190	1 528	993	1 762	1 195	749	1 210	780	474	1 316	839	501
ENERGY + EVO 19 *	2 143	1 495	971	1 723	1 169	732	1 184	762	463	1 287	821	491
ENERGY + EVO 17 *	1 807	1 261	819	1 454	986	618	999	643	391	1 086	692	414
ENERGY + EVO 15	1 616	1 127	732	1 300	881	552	893	575	349	971	619	370
ENERGY + EVO 29	3 256	2 271	1 475	2 619	1 776	1 113	1 799	1 159	704	1 956	1 247	745
ENERGY + EVO 27 *	3 004	2 096	1 361	2 417	1 639	1 027	1 660	1 069	650	1 805	1 151	688
ENERGY + EVO 25H *	2 789	1 946	1 264	2 243	1 521	953	1 541	993	603	1 675	1 068	638

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations

Location	Latitude °	Gtot kWh/m²	Ta °C	Collector orientation or tracking mode
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

Gtot	Annual total irradiation on collector plane	kWh/m²
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

Calculation of the annual collector performance is done by the official Solar Keymark spreadsheet tool. Hour by hour the collector output is calculated according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). Detailed description with all equations used is available from the Solar Keymark web site (direct link: http://www.estif.org/solarkeymark/annexb1.php)

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Calculation program version:
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