Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	**Certificate No.**	**OEM 9965/1/1**
	Date of issue	23/12/2013

Company	BSG CALDAIE A GAS S.P.A.	**Country**		Italy
Brand (optional)		**Website**		
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City	Verona	**Fax**	+0390	434238312

Collector Type (flat plate / evacuate tubular / un-glazed)	Flat plate collector
Integration in the roof possible ?	Yes

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]
15 SOL TOP	1,36	1.510	1.010	110	1,52	1.034	970	834	684	521
20 SOL TOP	1,82	2.010	1.010	110	2,03	1.383	1.298	1.116	915	698
26 SOL TOP	2,33	2.010	1.270	110	2,53	1.771	1.662	1.428	1.172	893

Collector efficiency parameters related to aperture area (Aa) Note 1	η_{0a}	0,76	-
	a_{1a}	4,54	W/(m²K)
	a_{2a}	0,012	W/(m²K²)
Stagnation temperature - Note 2	t_{stg}	173,83	°C
Effective thermal capacity	$c_{eff} = C/A_a$	7,86	kJ/(m²K)
Max. operation pressure - Note 3	p_{max}	1000	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°*
	0,16	0,26	$K_\theta(\theta_T)$	0,94	*1,00*	*0,99*	*0,98*	*0,97*	*0,90*	*0,81*
			$K_\theta(\theta_L)$	0,94	*1,00*	*0,99*	*0,98*	*0,97*	*0,90*	*0,81*
G_{DIF}/G_{TOT}: min&max - while measuring					***Optional values***					

Testing Laboratory	Demokritos
Website	www.solar.demokritos.gr
Test report id. number	4023DQ2, 4025DE12, 4026DE12, 4046DQ2
Date of test report	5/9/2013
Perf. test method	EN 12975-2 6.1.4 (outdoor/außen/extérieur)

Comments of testing laboratory :

Example data sheet

Note 1	**Test conditions**	**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**						

Stamp & signature of test lab

VERSION 3.4, 30-11-2011

Central Offices: Dragoumi 6, 145 61 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, http://www.dqshellas.gr, e-mail: ioannisalexiou@dqshellas.gr

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	OEM 9965/1/1
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Annual collector output kWh / Jährliche Kollektor Leistung kWh / Energie annuelle produite par le capteur

	Location and collector temperature (Tm)														
	Athens			Davos			Stockholm			Würzburg					
Collector name	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
15 SOL TOP	1.295	781	420	947	546	279	700	399	205	744	410	209			
20 SOL TOP	1.733	1.045	562	1.267	731	373	936	534	274	996	549	279			
26 SOL TOP	2.218	1.338	720	1.622	936	478	1.199	684	351	1.275	703	358			

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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VERSION 3.4, 30-11-2011
Calculation program version:
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