



<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>	<b>Certificate No.</b>	<b>OEM 9965/9/1</b>
	Date of issue	23/12/2013

Company	BSG CALDAIE A GAS S.P.A.	Country	Italy
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Collector Type (flat plate / evacuate tubular / un-glazed)	Flat plate collector
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Integration in the roof possible ?	Yes
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Collector name	Aperture area (A <sub>a</sub> ) [m <sup>2</sup> ]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A <sub>G</sub> ) [m <sup>2</sup> ]	Power output per collector unit G = 1000 W/m <sup>2</sup> T <sub>m</sub> -T <sub>a</sub> :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
15 SOL BLACK	1,40	1.530	1.030	80	1,58	900	834	696	550	396
20 SOL BLACK	1,88	2.030	1.030	80	2,09	1.209	1.120	934	738	531
26 SOL BLACK	2,37	2.030	1.283	80	2,60	1.524	1.412	1.178	930	670

Collector efficiency parameters related to <u>aperture area (A<sub>a</sub>)</u> Note 1	η <sub>0a</sub>	0,64	-
	a <sub>1a</sub>	4,66	W/(m <sup>2</sup> K)
	a <sub>2a</sub>	0,007	W/(m <sup>2</sup> K <sup>2</sup> )

Stagnation temperature - Note 2	t <sub>stg</sub>	138	°C
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Effective thermal capacity	C <sub>eff</sub> = C/A <sub>a</sub>	9,21	kJ/(m <sup>2</sup> K)
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Max. operation pressure - Note 3	p <sub>max</sub>	1000	kPa
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Incidence angle modifiers K <sub>θ</sub> (θ)	G <sub>DIF</sub> /G <sub>TOT</sub>		θ <sub>T</sub> / θ <sub>I</sub>	50°	10°	20°	30°	40°	60°	70°
	min	max								
	G <sub>DIF</sub> /G <sub>TOT</sub> : min&max - while measuring			K <sub>θ</sub> (θ <sub>L</sub> )	0,82	1,00	0,99	1,00	0,97	0,73
<i>Optional values</i>										

Testing Laboratory	Demokritos
Website	<a href="http://www.solar.demokritos.gr">www.solar.demokritos.gr</a>
Test report id. number	4080DE2, 4082DE2, 4086DQ2
Date of test report	5/9/2013
Perf. test method	EN 12975-2 6.1.4 (outdoor/außen/extérieur)

Comments of testing laboratory :

Note 1	Test conditions	Fluid	Water	Flow rate	0,020	kg/s per m <sup>2</sup>	Stamp & signature of test lab
Note 2	Irradiance, G <sub>s</sub> =1000 W/m <sup>2</sup> Ambient temperature , T <sub>a</sub> =30 °C						
Note 3	Given by manufacturer						



<b>Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>	<b>Certificate No.</b>	<b>OEM 9965/9/1</b>
	Issued	23/12/2013

Annual collector output kWh / Jährliche Kollektor Leistung kWh / Energie annuelle produite par le capteur															
Collector name	Location and collector temperature (T <sub>m</sub> )														
	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	25°C	50°C	75°C
15 SOL BLACK	1.301	773	414	961	559	286	673	370	185	734	394	195			
20 SOL BLACK	1.748	1.039	556	1.290	751	384	904	497	248	985	529	262			
26 SOL BLACK	2.203	1.309	701	1.626	947	484	1.140	627	312	1.242	667	331			

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

Overview of locations				
Location	Latitude °	Gtot kWh/m <sup>2</sup>	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/m <sup>2</sup>
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 (T<sub>m</sub>). Detailed description with all equations used is available from the Solar Keymark web site (direct link: <http://www.estif.org/solarkeymark/annexb1.php>)

<b>Central Offices: Dragoumi 6, 145 61 kifisia, Athens, Tel: +301 6233493-4 , Fax: +301 6233495, <a href="http://www.dqshellas.gr">http://www.dqshellas.gr</a>, e-mail: <a href="mailto:ioannisalexiou@dqshellas.gr">ioannisalexiou@dqshellas.gr</a></b>	Datasheet version: VERSION 3.4, 30-11-2011 Calculation program version: 3.07 October 2011
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