



Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	SKM 9965/4
	Date of issue	30/10/2013

Company	NOBEL INTERNATIONAL EAD	Country	BULGARIA
Brand (optional)		Website	
Street, number	48, VITOSHA BLV	E-mail	info1@nobel.gr
Postal Code	2100	Tel.	+0359 2 4210232
City	SOFIA BULGARIA	Fax	+0359

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 (Aa) [m ²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (Ag) [m ²]	Power output per collector unit G = 1000 W/m ² Tm-Ta :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
APOLLON AL S.I. HOR 2000	1,84	1.010	2.010	110	2,03	1.435	1.357	1.175	961	715
APOLLON AL S.I. HOR 2600	2,32	1.260	2.010	110	2,53	1.810	1.711	1.482	1.212	902

Collector efficiency parameters related to aperture area (Aa) Note 1	η_{0a}	0,78	-
	a_{1a}	4,05	W/(m ² K)
	a_{2a}	0,022	W/(m ² K ²)

Stagnation temperature - Note 2	tstg	159,00 °C
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Effective thermal capacity	Ceff = C/Aa	9,75 kJ/(m ² K)
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Max. operation pressure - Note 3	pmax	1000 kPa
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Incidence angle modifiers $K_{\theta}(\theta)$	G_{DIF}/G_{TOT}		θ_T / θ_L	50°	10°	20°	30°	40°	60°	70°
	min	max								
	G_{DIF}/G_{TOT} : min&max - while measuring	0,12	0,26	$K_{\theta}(\theta_L)$	0,94	1,00	0,99	0,98	0,97	0,90

Optional values

Testing Laboratory	Demokritos
Website	www.solar.demokritos.gr
Test report id. number	4065DE5, 4066DQ2, 4068DE4, 4071DE2, 4103DE2, 4104DE2
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 m ²	Stamp & signature of test lab
Note 2	Irradiance, Gs=1000 W/m ² Ambient temperature, Ta=30 °C						
Note 3	Given by manufacturer						



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	SKM 9965/4
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Collector name	Location and collector temperature (T _m)														
	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
APOLLON AL S.I. HOR 2000	2.278	1.538	894	1.811	1.144	603	1.252	759	397	1.364	819	422			
APOLLON AL S.I. HOR 2600	2.872	1.939	1.127	2.283	1.442	761	1.579	957	500	1.720	1.033	532			

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

Overview of locations				
Location	Latitude °	Gtot kWh/m ²	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 ²
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_m). 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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