Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	SKM 9965/10
	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
Integration in the roof possible ?	Yes

Collector name	Aperture area (Aa) [m²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A_G) [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]
APOLLON AL12 - 2000	1,81	2.010	1.010	110	2,03	1.387	1.320	1.173	1.007	823
APOLLON AL12 - 2600	2,32	2.010	1.260	110	2,53	1.775	1.689	1.500	1.288	1.052

Collector efficiency parameters related to aperture area (Aa) Note 1	η_{0a}	0,77	-
	a_{1a}	3,58	W/(m²K)
	a_{2a}	0,0125	W/(m²K²)
Stagnation temperature - Note 2	t_{stg}	204,00	°C
Effective thermal capacity	c_{eff} = C/Aa	7,14	kJ/(m²K)
Max. operation pressure - Note 3	p_{max}	1000	kPa

Incidence angle modifiers $K_\theta(\theta)$	G_{DIF}/G_{TOT} min	max	θ_T / θ_L	50°	*10°*	*20°*	*30°*	*40°*	*60°*	*70°*
			$K_\theta(\theta_T)$	0,84	*1,00*	*0,99*	*0,96*	*0,91*	*0,74*	*0,58*
	0,13	0,17	$K_\theta(\theta_L)$	0,84	*1,00*	*0,99*	*0,96*	*0,91*	*0,74*	*0,58*
G_{DIF}/G_{TOT}: min&max - while measuring					***Optional values***					

Testing Laboratory	Fraunhofer ISE, Test Lab Solar Thermal Syst
Website	www.kollektortest.de
Test report id. number	ktb-2011-35-k3, ktb-2011-36-k3
Date of test report	11/6/2012
Perf. test method	EN 12975-2 6.1.4 (outdoor/außen/extérieu

Comments of testing laboratory :

Example data sheet

Note 1	**Test conditions**	**Fluid**	Water	**Flow rate**	0,020	kg/s per m²	Stamp & signature of test lab
Note 2	**Irradiance, Gs=1000 W/m²** **Ambient temperature , Ta=30 °C**						
Note 3	**Given by manufacturer**						

VERSION 3.4, 30-11-2011

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Certificate No.	SKM 9965/10
	Issued	30/10/2013

Annual collector output kWh / Jährliche Kollektor Leistung kWh / Energie annuelle produite par le capteur

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	25°C	50°C	75°C
APOLLON AL12 - 2000															
APOLLON AL12 - 2600															

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)

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

Datasheet version:
VERSION 3.4, 30-11-2011
Calculation program version:
3.07 October 2011