



Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence number	011-7S1979 R
	Date of issue	05.03.2013

Company holding the licence	Pleion Industries S.r.l.on	Country	Italy
Brand (optional)		Website	www.pleion.it
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City	Verona	Fax	+39 0442 327 742

Collector Type (flat plate / evacuate tubular / un-glazed)	Evacuated tubular collector
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Integration in the roof possible ?	No
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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	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
X-Ray 10	1,91	2	1	120	2,20	1.265	1.250	1.207	1.149	1.077

Collector efficiency parameters related to <u>aperture area (Aa)</u> Type of fluid and flow rate see note 1	$\eta_{0a}$	0,662	-
	$a_{1a}$	0,735	W/(m²K)
	$a_{2a}$	0,0096	W/(m²K²)

Stagnation temperature - Weather conditions see note 2	tstg	316	°C
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Effective thermal capacity	Ceff = C/Aa	12,56	kJ/(m²K)
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Max. operation pressure - see note 3	pmax	10 bar	kPa
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Incidence angle modifiers $K_{\theta}(\theta)$	$G_{DIF}/G_{TOT}$		$\theta_T / \theta_L$	50°	10°	20°	30°	40°	60°	70°
	min	max	$K_{\theta}(\theta_T)$	1,12	1,00	1,02	1,06	1,05	1,16	1,13
	0,08		0,101	$K_{\theta}(\theta_L)$	0,92	1,00	1,00	0,99	0,96	0,83

$G_{DIF}/G_{TOT}$ : min&max - while measuring

**Optional values**

Testing Laboratory	Fraunhofer ISE, TestLab Solar Thermal Systems,
Website	<a href="http://www.kollektortest.de">www.kollektortest.de</a>
Test report id. number	ktb-2012-04-k
Date of test report	20.07.2012
Perf. test method	EN 12975-2 6.1.4 (outdoor)

Comments of testing laboratory :

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			

TestLab  
Solar Thermal  
Systems



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VERSION 3.7, 2012.03.22

<b>Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>	<b>Licence number</b>	011-7S1979 R
	<b>Issued</b>	05.03.2013

<b>Annual collector output kWh</b>															
<b>Collector name</b>	<b>Location and collector temperature (T<sub>m</sub>)</b>														
	<b>Athens</b>			<b>Davos</b>			<b>Stockholm</b>			<b>Würzburg</b>					
	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C			
X-Ray 10	2.236	2.034	1.769	2.075	1.846	1.570	1.404	1.218	1.009	1.506	1.310	1.087			

**Collector mounting: Fixed or tracking** **No tracking; Slope = latitude - 15° (rounded to nearest 5°)**

<b>Overview of locations</b>				
<b>Location</b>	<b>Latitude °</b>	<b>Gtot kWh/m<sup>2</sup></b>	<b>Ta °C</b>	<b>Collector orientation or tracking mode</b>
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>)

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	VERSION 3.7, 2012.03.22
	Calculation program version:
	3.07, October 2011 (SP)