| **Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate** | **Certificate No.** | **OEM 9965/10/1** |
|---|---|---|
| | Date of issue | 15/12/2013 |

| | | | | |
|---|---|---|---|---|
| **Company** | SYRIUS SOLAR INDUSTRY | **Country** | | France |
| **Brand** (optional) | | **Website** | | |
| **Street, number** | 565, Avenue du Prado | **E-mail** | | |
| **Postal Code** | 13008 | **Tel.** | +033 | 04 86 68 40 81 |
| **City** | Marseille | **Fax** | +033 | |

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|---|---|
| **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] |
|---|---|---|---|---|---|---|---|---|---|---|
| C2000 D12 | 1,81 | 2.010 | 1.010 | 110 | 2,03 | 1.387 | 1.320 | 1.173 | 1.007 | 823 |
| C2500 D12 | 2,32 | 2.010 | 1.260 | 110 | 2,53 | 1.775 | 1.689 | 1.500 | 1.288 | 1.052 |

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|---|---|---|---|
| **Collector efficiency parameters related to aperture area (Aa)** Note 1 | $\eta_{0a}$ | 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** | $c_{eff} = C/A_a$ | 7,14 | 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 | $\theta_T$ / $\theta_l$ | 50° | *10°* | *20°* | *30°* | *40°* | *60°* | *70°* |
|---|---|---|---|---|---|---|---|---|---|---|
| | 0,13 | 0,17 | $K_\theta(\theta_T)$ | 0,84 | *1,00* | *0,99* | *0,96* | *0,91* | *0,74* | *0,58* |
| | | | $K_\theta(\theta_L)$ | 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 |
| 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 9965/10/1 |
|---|---|---|
| | Issued | 15/12/2013 |

## 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 |
| C2000 D12 | | | | | | | | | | | | | | | |
| C2500 D12 | | | | | | | | | | | | | | | |
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| 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° |
| | | | | |
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| | | |
|---|---|---|
| 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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Datasheet version:
VERSION 3.4, 30-11-2011
Calculation program version:
3.07 October 2011