




| Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results | | | | | | Licence Number | | OEM 9965/1/1 | | | |
|---|--|--|----------------------|------------------------------------|--|---|-----------|-------------------------------------|-----------|-----------|------|
| | | | | | | Date issued | | 2016-11-15 | | | |
| | | | | | | Issued by | | DQS Hellas | | | |
| Licence holder | | BSG CALDAIE A GAS S.P.A. | | | | Country | | Italy | | | |
| Brand (optional) | | | | | | Web | | | | | |
| Street, Number | | Via Leopoldo Biasi | | | | E-mail | | Daniele_Chiesurin@biasi.it | | | |
| Postcode, City | | 37175, Verona | | | | Tel | | +390 434238341 | | | |
| Collector Type | | | | | | Flat plate collector, glazed | | | | | |
| Collector name | Gross area (A _G) m ² | Gross length mm | Gross width mm | Gross height mm | Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² ϑ _m - ϑ _a | | | | | | |
| | | | | | 0 K W | 10 K W | 30 K W | 50 K W | 70 K W | 50 K W | |
| 15 SOL TOP | 1,52 | 1.510 | 1.010 | 110 | 1.053 | 991 | 859 | 716 | 563 | 716 | |
| 20 SOL TOP | 2,03 | 2.010 | 1.010 | 110 | 1.406 | 1.323 | 1.147 | 957 | 753 | 957 | |
| 26 SOL TOP | 2,53 | 2.010 | 1.270 | 110 | 1.752 | 1.649 | 1.429 | 1.192 | 938 | 1.192 | |
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| Power output per m ² gross area | | | | | 693 | 652 | 565 | 471 | 371 | 471 | |
| Performance parameters test method | | Steady state - outdoor | | | | | | | | | |
| Performance parameters (related to AG) | | η _{0,hem} | a ₁ | a ₂ | | | | | | | |
| Units | | - | W/(m ² K) | W/(m ² K ²) | | | | | | | |
| Test results | | 0,693 | 3,999 | 0,009 | | | | | | | |
| Incidence angle modifier test method | | Steady state - outdoor | | | | | | | | | |
| Bi-directional incidence angle modifiers | | No | | | | | | | | | |
| Incidence angle modifier | | Angle | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
| Transversal | | K _{θT, coll} | 1,00 | 0,99 | 0,98 | 0,97 | 0,94 | 0,90 | 0,81 | | 0,00 |
| Longitudinal | | K _{θL, coll} | 1,00 | 0,99 | 0,98 | 0,97 | 0,94 | 0,90 | 0,81 | | 0,00 |
| Heat transfer medium for testing | | Water | | | | | | | | | |
| Flow rate for testing (per gross area, A _G) | | dm/dt | 0,020 | | kg/(sm ²) | | | | | | |
| Maximum temperature difference for thermal performance calculations | | (ϑ _m -ϑ _a) _{max} | 50 | | K | | | | | | |
| Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C) | | ϑ _{stg} | 174 | | °C | | | | | | |
| Effective thermal capacity, incl. fluid (per gross area, A _G) | | C/m ² | 7,86 | | kJ/(Km ²) | | | | | | |
| Maximum operating temperature | | ϑ _{max, op} | 100 | | °C | | | | | | |
| Maximum operating pressure | | P _{max, op} | 1000 | | kPa | | | | | | |
| Testing laboratory | | NCSR Demokritos | | | | www.solar.demokritos.gr | | | | | |
| Test report(s) | | 4188DE1 4189DE1 4023DQ2, 4046DQ2 | | | | Dated | | 27/7/2016 27/7/2016 05/9/2013 | | | |
| Comments of testing laboratory | | Datashet version: 5.01, 2016-03-01 | | | | | | | | | |
| <i>This data sheet was issued based on data appeared in the first SKM certificate.</i> | | | | | |  | | | | | |
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|---|----------------|--------------|
| Annex to Solar Keymark Certificate Supplementary Information | Licence Number | OEM 9965/1/1 |
| | Issued | 2016-11-15 |

| Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results | | | | | | | | | | | | | |
|--|-------------------------------------|---|-------|-------|-------------------------|-------|------|-------------------------|------|------|-------------------------|------|------|
| Collector name | Standard Locations ϑ_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 |
| 15 SOL TOP | | 1.667 | 1.118 | 683 | 1.222 | 798 | 469 | 907 | 557 | 315 | 989 | 600 | 334 |
| 20 SOL TOP | | 2.226 | 1.493 | 913 | 1.632 | 1.066 | 626 | 1.211 | 744 | 420 | 1.321 | 801 | 446 |
| 26 SOL TOP | | 2.775 | 1.860 | 1.137 | 2.034 | 1.328 | 781 | 1.509 | 927 | 524 | 1.646 | 998 | 556 |
| Annual output per m ² gross area | | 1.097 | 735 | 450 | 804 | 525 | 309 | 597 | 366 | 207 | 651 | 395 | 220 |
| Fixed or tracking collector | | Fixed (slope = latitude - 15°; rounded to nearest 5°) | | | | | | | | | | | |
| Annual irradiation on collector plane | | 1765 kWh/m ² | | | 1714 kWh/m ² | | | 1166 kWh/m ² | | | 1244 kWh/m ² | | |
| Mean annual ambient air temperature | | 18,5°C | | | 3,2°C | | | 7,5°C | | | 9,0°C | | |
| Collector orientation or tracking mode | | South, 25° | | | South, 30° | | | South, 45° | | | South, 35° | | |
| The collector is operated at constant temperature ϑ_m (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc | | | | | | | | | | | | | |

| Additional Information | | |
|---|---------------|----|
| Collector heat transfer medium | Water-Glycole | |
| Hybrid Thermal and Photo Voltaic collector | No | |
| The collector is deemed to be suitable for roof integration | No | |
| The collector was tested successfully according to EN ISO 9806:2013 under the following conditions: | | |
| Climate class (A, B or C) | A | -- |
| Maximum tested positive load | 1000 | Pa |
| Maximum tested negative load | 1000 | Pa |
| Hail resistance using steel ball (maximum drop height) | - | m |

| Energy Labelling Information | | | |
|---|--|--|--|
| | Reference Area, A _{sol} (m ²) | Data required for CDR (EU) No 811/2013 - Reference Area A _{sol} | |
| APOLLON AL 1500 | 1,52 | Collector efficiency (η_{col}) | 52 % |
| APOLLON AL 2000 | 2,03 | Remark: Collector efficiency (η_{col}) is defined in CDR (EU) No 811/2013 as collector efficiency of the solar collector at a temperature difference between the solar collector and the surrounding air of 40 K and a global solar irradiance of 1000 W/m ² , expressed in % and rounded to the nearest integer. Deviating from the regulation η_{col} is based on reference area (A _{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013. | |
| APOLLON AL 2600 | 2,53 | | |
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| | | | |
| | | Data required for CDR (EU) No 812/2013 - Reference Area A _{sol} | |
| | | Zero-loss efficiency (η_0) | 0,693 -- |
| | | First-order coefficient (a ₁) | 4,00 W/(m ² K) |
| | | Second-order coefficient (a ₂) | 0,009 W/(m ² K ²) |
| | | Incidence angle modifier IAM (50°) | 0,94 -- |
| Remark: The data given in this section are related to collector reference area (A _{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806. Consistent data sets for either aperture or gross area can be used in calculations like in the regulation 811 and 812 and simulation programs. | | | |