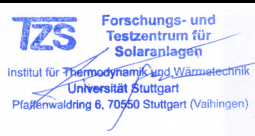


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|---|--|--|----------------------|------------------------------------|-------------------------------------|--|---|--|------------------------------------|------------------------------------|-------|
| Annex to Solar Keymark Certificate | | | | | Licence Number | | 011-7S3250 F | | | | |
| | | | | | Date issued | | 2024-05-27 | | | | |
| | | | | | Issued by | | DINCERTCO | | | | |
| Licence holder | | SUNLIFE SRL | | | Country | | ITALY | | | | |
| Brand (optional) | | | | | Web | | | | | | |
| Street, Number | | VIA E. FERRARI 119 | | | E-mail | | info@sunlifesrl.it | | | | |
| Postcode, City | | 45038 POLESELLA (RO) | | | Tel | | +39 348 521 7947 | | | | |
| Collector Type | | Isotropic collector (e.g. flat plate collector) | | | | | | | | | |
| Collector name | | Gross area (A_G) | Gross length | Gross width | Gross height | Power output per collector | | | | | |
| | | | | | | G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$ | | | | | |
| | | | | | | 0 K | 10 K | 30 K | 50 K | 70 K | 112 K |
| | | m ² | mm | mm | mm | W | W | W | W | W | W |
| CS 3300 | | 2.02 | 2 006 | 1 007 | 85 | 1 462 | 1 388 | 1 232 | 1 066 | 890 | 490 |
| CS 4300 | | 2.52 | 2 006 | 1 257 | 85 | 1 824 | 1 731 | 1 536 | 1 330 | 1 111 | 612 |
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| Power output per m² gross area | | | | | | 724 | 687 | 610 | 528 | 441 | 243 |
| Performance parameters test method | | Quasi dynamic | | | | | | | | | |
| Performance parameters (related to A_G) | | η_0, b | a1 | a2 | a3 | a4 | a5 | a6 | a7 | a8 | Kd |
| Units | | - | W/(m ² K) | W/(m ² K ²) | J/(m ³ K) | - | J/(m ² K) | s/m | W/(m ² K ⁴) | W/(m ² K ⁴) | - |
| Test results | | 0.725 | 3.62 | 0.006 | 0.000 | 0.00 | 13 600 | 0.000 | 0.00 | 0.0 | 0.99 |
| Incidence angle modifier test method | | Quasi dynamic - outdoor | | | | | | | | | |
| Incidence angle modifier | | Angle | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
| Transversal | | $K_{\theta T, coll}$ | 1.00 | 1.00 | 1.00 | 0.99 | 0.96 | 0.87 | 0.63 | 0.32 | 0.00 |
| Longitudinal | | $K_{\theta L, coll}$ | 1.00 | 1.00 | 1.00 | 0.99 | 0.96 | 0.87 | 0.63 | 0.32 | 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 during thermal performance test | | | | | $(\vartheta_m - \vartheta_a)_{max}$ | 82 | K | | | | |
| Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C) | | | | | ϑ_{stg} | 230 | °C | | | | |
| Maximum operating temperature | | | | | $\vartheta_{max, op}$ | - | °C | | | | |
| Maximum operating pressure | | | | | $p_{max, op}$ | 1000 | kPa | | | | |
| Testing laboratory | | Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE) | | | | | http://www.igte.uni-stuttgart.de | | | | |
| Test report(s) | | 21COL1631OEM26 21COL1632OEM27 | | | | | Dated | | 14.05.2024 14.05.2024 | | |
| Comments of testing laboratory | | | | | | | | Ver. 6.2 (13.01.2022) | | | |
| Documented performance parameters are taken from 21COL1632OEM27 (CS 3300) | | | | | | | |  Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70569 Stuttgart (Vaihingen) | | | |
| DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de | | | | | | | | | | | |

| Annex to Solar Keymark Certificate | | | | | | | Licence Number | | 011-7S3250 F | | | | |
|--|---------------|---|-------|----------------------|---------------------------------|--|--|---------------------------------------|---|----------------------|-------------------------|-------|------|
| Supplementary Information | | | | | | | Issued | | 2024-05-27 | | | | |
| Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m | | | | | | | | | | | | | |
| Standard Locations | | Athens | | | Davos | | | Stockholm | | | Würzburg | | |
| Collector name | ϑ_m | 25°C | 50°C | 75°C | 25°C | 50°C | 75°C | 25°C | 50°C | 75°C | 25°C | 50°C | 75°C |
| CS 3300 | | 2 398 | 1 720 | 1 163 | 1 821 | 1 282 | 850 | 1 334 | 885 | 560 | 1 460 | 962 | 601 |
| CS 4300 | | 2 992 | 2 146 | 1 451 | 2 272 | 1 599 | 1 060 | 1 664 | 1 104 | 699 | 1 821 | 1 200 | 750 |
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| Gross Thermal Yield per m ² gross area | | 1 187 | 851 | 576 | 901 | 635 | 421 | 660 | 438 | 277 | 723 | 476 | 298 |
| Annual efficiency, η_a | | 67% | 48% | 33% | 55% | 39% | 26% | 57% | 38% | 24% | 58% | 38% | 24% |
| Fixed or tracking collector | | Fixed (slope = latitude - 15°; rounded to nearest 5°) | | | | | | | | | | | |
| Annual irradiation on collector plane | | 1765 kWh/m ² | | | 1630 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. 6.2 (13.01.2022). A detailed description of the calculations is available at http://www.estif.org/solarkeymarknew/ | | | | | | | | | | | | | |
| Additional Information | | | | | | | | | | | | | |
| Collector heat transfer medium | | | | | | | | | | | Water-Glycole | | |
| The collector is deemed to be suitable for roof integration | | | | | | | | | | | No | | |
| The collector was tested successfully under the following conditions: | | | | | | | | | | | | | |
| Climate class (A+, A, B or C) | | | | | | | | | | | A | | -- |
| G (W/m ²) > | | 1000 | | ϑ_a (°C) > | | 20 | | H _x (MJ/m ²) > | | 600 | | | |
| Maximum tested positive load | | | | | | | | | | | 2750 | | Pa |
| Maximum tested negative load | | | | | | | | | | | 2400 | | Pa |
| Hail resistance using steel ball (maximum drop height) | | | | | | | | | | | 2 | | m |
| Additional collector attribute(s) | | | | | | | | | | | | | |
| Using external power source(s) for normal operation | | | | | No | | Active or passive measure(s) for self-protection | | | | | No | |
| Co-generating thermal and electrical power | | | | | No | | Façade collector(s) | | | | | No | |
| Energy Labelling Information | | | | | | | Additional Informative Technical Data | | | | | | |
| | | Reference Area, A _{sol} (m ²) | | | Hydraulic Designation Code | | | | Aperture Area, A _a (m ²) | | | | |
| CS 3300 | | 2.02 | | | 8-V-1234S-7.2,1888-20.6,1060-D | | | | 1.83 | | | | |
| CS 4300 | | 2.52 | | | 11-V-1234S-7.2,1888-20.6,1310-D | | | | 2.32 | | | | |
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| Data required for CDR (EU) No 811/2013 - Reference Area A_{sol} | | | | | | | Data required for CDR (EU) No 812/2013 - Reference Area A_{sol} | | | | | | |
| Collector efficiency (η_{col}) | | 57% | | | | | Zero-loss efficiency (η_0) | | 0.72 | | -- | | |
| 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 9806:2017. | | First-order coefficient (a ₁) | | 3.62 | | Second-order coefficient (a ₂) | | 0.006 | | W/(m ² K) | | | |
| | | Incidence angle modifier IAM (50°) | | 0.98 | | | | W/(m ² K ²) | | | | | |
| | | | | | | | | -- | | | | | |
| | | | | | | | | | | | | | |
| 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. | | | | | | | | | | | | | |
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