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| Annex to Solar Keymark Certificate | | Licence Number | 011-7S3021 R |
|---|---|---|---|
| | | Date issued | 2023-07-20 |
| | | Issued by | DIN CERTCO |

| | | | | | |
|---|---|---|---|---|---|
| **Licence holder** | Zhejiang shentai solar energy co.,ltd | **Country** | China | | |
| **Brand** (optional) | Suntask, SHENTAI | **Web** | www.suntasksolar.com | | |
| **Street, Number** | 199 lianhong road,yuanhua industry zone | **E-mail** | info@suntasksolar.com | | |
| **Postcode, City** | 314416 Haining City, Zhejiang Province | **Tel** | +86 | 573-87861111 | |

| | |
|---|---|
| **Collector Type** | Evacuated tubular collector |

| Collector name | Gross area ($A_G$) | Gross length | Gross width | Gross height | Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$ | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | 0 K | 10 K | 30 K | 50 K | 70 K | 100 K |
| | m² | mm | mm | mm | W | W | W | W | W | W |
| SCM10-01 | 1.56 | 1,915 | 815 | 106 | 634 | 617 | 574 | 517 | 446 | 316 |
| SCM12-01 | 1.85 | 1,915 | 965 | 106 | 751 | 731 | 680 | 612 | 528 | 374 |
| SCM15-01 | 2.28 | 1,915 | 1,190 | 106 | 925 | 901 | 838 | 755 | 651 | 462 |
| SCM16-01 | 2.42 | 1,915 | 1,265 | 106 | 984 | 958 | 891 | 802 | 692 | 491 |
| SCM18-01 | 2.71 | 1,915 | 1,415 | 106 | 1,100 | 1,072 | 997 | 897 | 774 | 549 |
| SCM20-01 | 3.00 | 1,915 | 1,565 | 106 | 1,217 | 1,185 | 1,102 | 993 | 857 | 607 |
| SCM22-01 | 3.28 | 1,915 | 1,715 | 106 | 1,334 | 1,299 | 1,208 | 1,088 | 939 | 665 |
| SCM24-01 | 3.57 | 1,915 | 1,865 | 106 | 1,450 | 1,413 | 1,313 | 1,183 | 1,021 | 723 |
| SCM25-01 | 3.72 | 1,915 | 1,940 | 106 | 1,509 | 2 (13.01 | 1,366 | 1,230 | 1,062 | 753 |
| SCM28-01 | 4.15 | 1,915 | 2,165 | 106 | 1,684 | 1,640 | 1,525 | 1,373 | 1,185 | 840 |
| SCM30-01 | 4.43 | 1,915 | 2,315 | 106 | 1,800 | 1,753 | 1,630 | 1,468 | 1,267 | 898 |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| **Power output per m² gross area** | | | | | 406 | 396 | 368 | 331 | 286 | 203 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Performance parameters test method** | Steady state - outdoor | | | | | | | | | |
| **Performance parameters (related to $A_G$)** | η0, b | a1 | a2 | a3 | a4 | a5 | a6 | a7 | a8 | Kd |
| **Units** | - | W/(m²K) | W/(m²K²) | J/(m³K) | - | J/(m²K) | s/m | W/(m²K⁴) | W/(m²K⁴) | - |
| **Test results** | 0.404 | 0.949 | 0.011 | 0.000 | 0.000 | 5,330 | 0.000 | 0.000 | 0.000 | 1.04 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Incidence angle modifier test method** | | Steady state - outdoor | | | | | | | | |
| **Incidence angle modifier** | Angle | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° |
| **Transversal** | $K_{\theta T,coll}$ | 1.02 | 1.04 | 1.14 | 1.24 | 1.36 | 1.46 | 0.97 | 0.49 | 0.00 |
| **Longitudinal** | $K_{\theta L,coll}$ | 1.00 | 0.99 | 0.97 | 0.95 | 0.91 | 0.84 | 0.69 | 0.23 | 0.00 |

| | | | |
|---|---|---|---|
| **Heat transfer medium for testing** | Water | | |
| **Flow rate for testing (per gross area, $A_G$)** | dm/dt | 0.020 | kg/(sm²) |
| **Maximum temperature difference during thermal performance test** | $(\vartheta_m-\vartheta_a)_{max}$ | 69.57 | K |
| **Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a$ = 30 °C)** | $\vartheta_{stg}$ | 210 | °C |
| **Maximum operating temperature** | $\vartheta_{max\ op}$ | 250 | °C |
| **Maximum operating pressure** | $p_{max,op}$ | 1000 | kPa |

| | | | |
|---|---|---|---|
| **Testing laboratory** | Intertek Testing Services Shenzhen Ltd. Guangzhou Branch | http://www.intertek.com | |
| **Test report(s)** | 161107081GZU-001 | **Dated** | 2018/5/2 |

**Comments of testing laboratory** Ver. 6.2 (13.01.2022)

*Above efficiency parameters come from test type SCM10-01;*

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| Annex to Solar Keymark Certificate | Licence Number | 011-7S3021 R |
|---|---|---|
| Supplementary Information | Issued | 2023-07-20 |

**Gross Thermal Yield in kWh/collector at mean fluid temperature $\vartheta_m$**

| Standard Locations | | Athens | | | Davos | | | Stockholm | | | Würzburg | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Collector name | $\vartheta_m$ | 25°C | 50°C | 75°C | 25°C | 50°C | 75°C | 25°C | 50°C | 75°C | 25°C | 50°C | 75°C |
| SCM10-01 | | 1,177 | 982 | 754 | 972 | 772 | 564 | 711 | 551 | 394 | 767 | 597 | 422 |
| SCM12-01 | | 1,393 | 1,163 | 892 | 1,151 | 914 | 668 | 842 | 653 | 466 | 908 | 707 | 500 |
| SCM15-01 | | 1,718 | 1,434 | 1,101 | 1,419 | 1,127 | 823 | 1,038 | 805 | 575 | 1,120 | 872 | 616 |
| SCM16-01 | | 1,826 | 1,525 | 1,170 | 1,508 | 1,198 | 875 | 1,103 | 856 | 611 | 1,190 | 927 | 655 |
| SCM18-01 | | 2,043 | 1,705 | 1,309 | 1,687 | 1,340 | 979 | 1,234 | 957 | 684 | 1,331 | 1,036 | 733 |
| SCM20-01 | | 2,259 | 1,886 | 1,447 | 1,866 | 1,482 | 1,083 | 1,365 | 1,059 | 756 | 1,473 | 1,146 | 810 |
| SCM22-01 | | 2,476 | 2,067 | 1,586 | 2,045 | 1,624 | 1,187 | 1,496 | 1,160 | 828 | 1,614 | 1,256 | 888 |
| SCM24-01 | | 2,692 | 2,248 | 1,725 | 2,224 | 1,766 | 1,291 | 1,627 | 1,262 | 901 | 1,755 | 1,366 | 966 |
| SCM25-01 | | 2,801 | 2,338 | 1,794 | 2,313 | 1,837 | 1,342 | 1,692 | 1,312 | 937 | 1,826 | 1,421 | 1,005 |
| SCM28-01 | | 3,125 | 2,609 | 2,002 | 2,582 | 2,050 | 1,498 | 1,888 | 1,465 | 1,046 | 2,037 | 1,586 | 1,121 |
| SCM30-01 | | 3,342 | 2,790 | 2,141 | 2,761 | 2,192 | 1,602 | 2,019 | 1,566 | 1,118 | 2,178 | 1,696 | 1,199 |
| Gross Thermal Yield per m² gross area | | 754 | 629 | 483 | 623 | 494 | 361 | 455 | 353 | 252 | 491 | 382 | 270 |
| Annual efficiency, $\eta_a$ | | 43% | 36% | 27% | 38% | 30% | 22% | 39% | 30% | 22% | 39% | 31% | 22% |
| Fixed or tracking collector | | Fixed (slope = latitude - 15°; rounded to nearest 5°) | | | | | | | | | | | |
| Annual irradiation on collector plane | | 1765 kWh/m² | | | 1630 kWh/m² | | | 1166 kWh/m² | | | 1244 kWh/m² | | |
| 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 ϑm (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) | | | | C | -- |
| G (W/m²) > | 800 | $\vartheta_a$ (°C) > | 10 | $H_x$ (MJ/m²) > | 420 |
| Maximum tested positive load | | | | 2400 | Pa |
| Maximum tested negative load | | | | 2400 | Pa |
| Hail resistance using steel ball (maximum drop height) | | | | 1.4 | 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

| | Reference Area, $A_{sol}$ (m²) |
|---|---|
| SCM10-01 | 1.56 |
| SCM12-01 | 1.85 |
| SCM15-01 | 2.28 |
| SCM16-01 | 2.42 |
| SCM18-01 | 2.71 |
| SCM20-01 | 3.00 |
| SCM22-01 | 3.28 |
| SCM24-01 | 3.57 |
| SCM25-01 | 3.72 |
| SCM28-01 | 4.15 |
| SCM30-01 | 4.43 |

**Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$**

| | |
|---|---|
| Collector efficiency ($\eta_{col}$) | 35% |

Remark: Collector efficiency (ηcol) 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/m², expressed in % and rounded to the nearest integer. Deviating from the regulation ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

## Additional Informative Technical Data

| Hydraulic Designation Code | Aperture Area, $A_a$ (m²) |
|---|---|
| 1-H-12S-C:19,891-D | 0.94 |
| 1-H-12S-C:19,1041-D | 1.12 |
| 1-H-12S-C:19,1266-D | 1.40 |
| 1-H-12S-C:19,1341-D | 1.49 |
| 1-H-12S-C:19,1491-D | 1.68 |
| 1-H-12S-C:19,1641-D | 1.87 |
| 1-H-12S-C:19,1791-D | 2.05 |
| 1-H-12S-C:19,1941-D | 2.24 |
| 1-H-12S-C:19,2016-D | 2.33 |
| 1-H-12S-C:19,2241-D | 2.61 |
| 1-H-12S-C:19,2391-D | 2.80 |

**Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$**

| | | |
|---|---|---|
| Zero-loss efficiency ($\eta_0$) | 0.41 | -- |
| First-order coefficient ($a_1$) | 0.95 | W/(m²K) |
| Second-order coefficient ($a_2$) | 0.011 | W/(m²K²) |
| Incidence angle modifier IAM (50°) | 1.16 | -- |

*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.*