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|---|--|--|--------------------|-------------------|--|----------------------|------------------------------------|---|-----------|-----------|-----------|
| Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results | | | | | Licence Number | | 011-7S2808 F | | | | |
| | | | | | Date issued | | 2019-05-14 | | | | |
| | | | | | Issued by | | DINCERTCO | | | | |
| Licence holder | | Hewalex Sp. z.o.o. Sp. Kom. | | | Country | | POLAND | | | | |
| Brand (optional) | | -- | | | Web | | www.hewalex.pl | | | | |
| Street, Number | | Slowackiego 33 | | | E-mail | | przemyslaw.tyrala@hewalex.pl | | | | |
| Postcode, City | | 43-502 - Czechowice-Dziedzice | | | Tel | | +32 214 17 10 | | | | |
| Collector Type | | | | | Flat plate collector, glazed | | | | | | |
| | | | | | Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² θ _m - θ _a | | | | | | |
| Collector name | | Gross area (A _G) m ² | Gross length mm | Gross width mm | Gross height mm | 0 K W | 10 K W | 30 K W | 50 K W | 70 K W | 59 K W |
| KS 2100F TP ACRm | | 2,06 | 2.020 | 1.018 | 90 | 1.644 | 1.570 | 1.407 | 1.224 | 1.022 | 1.136 |
| KS 2100F TLP ACRm | | 2,06 | 2.020 | 1.018 | 90 | 1.644 | 1.570 | 1.407 | 1.224 | 1.022 | 1.136 |
| KS 2200F TP ACRm | | 2,25 | 2.022 | 1.100 | 90 | 1.796 | 1.715 | 1.537 | 1.337 | 1.116 | 1.240 |
| KS 2200F TLP ACRm | | 2,25 | 2.022 | 1.100 | 90 | 1.796 | 1.715 | 1.537 | 1.337 | 1.116 | 1.240 |
| KS 2400F TP ACRm | | 2,43 | 2.022 | 1.202 | 90 | 1.939 | 1.852 | 1.660 | 1.444 | 1.205 | 1.340 |
| KS 2400F TLP ACRm | | 2,43 | 2.022 | 1.202 | 90 | 1.939 | 1.852 | 1.660 | 1.444 | 1.205 | 1.340 |
| KS 2550F TP ACRm | | 2,55 | 2.185 | 1.166 | 90 | 2.035 | 1.943 | 1.742 | 1.516 | 1.265 | 1.406 |
| KS 2550F TLP ACRm | | 2,55 | 2.185 | 1.166 | 90 | 2.035 | 1.943 | 1.742 | 1.516 | 1.265 | 1.406 |
| Power output per m ² gross area | | | | | | 798 | 762 | 683 | 594 | 496 | 554 |
| Performance parameters test method | | | | | Steady state - indoor | | | | | | |
| Performance parameters (related to AG) | | | | | η _{0,hem} | a1 | a2 | | | | |
| Units | | | | | - | W/(m ² K) | W/(m ² K ²) | | | | |
| Test results | | | | | 0,798 | 3,473 | 0,012 | | | | |
| 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} | | | | | 0,95 | | | | 0,00 |
| Longitudinal | | K _{θL, coll} | | | | | 0,95 | | | | 0,00 |
| Heat transfer medium for testing | | | | | Water | | | | | | |
| Flow rate for testing (per gross area, A _G) | | | | | dm/dt | 0,021 | kg/(sm ²) | | | | |
| Maximum temperature difference for thermal performance calculations | | | | | (θ _m -θ _a) _{max} | 59 | K | | | | |
| Standard stagnation temperature (G = 1000 W/m ² ; θ _a = 30 °C) | | | | | θ _{stg} | 199,5 | °C | | | | |
| Effective thermal capacity, incl. fluid (per gross area, A _G) | | | | | C/m ² | 6,738 | kJ/(Km ²) | | | | |
| Maximum operating temperature | | | | | θ _{max, op} | 250 | °C | | | | |
| Maximum operating pressure | | | | | p _{max, op} | 1000 | kPa | | | | |
| Testing laboratory | | | | | Fundación CENER- CIEMAT, LEST | | | http://www.cener.com | | | |
| Test report(s) | | | | | 30.3182.1-1-1 30.3115.0-1-1 R3 / 30,3115.0-2-1 R3 30.3486.0 30.3566.0-1 | | | Dated 31/10/2017 09/08/2017 21/12/2018 10/05/2019 | | | |
| Comments of testing laboratory | | | | | Datashet version: 5.01, 2016-03-01 | | | | | | |
| <p>- The only difference between the TLP ACRm and TP ACRm collectors is the collector box coating colour.</p> <p>- The collectors models KS 2100F TP ACRm and KS 2550F TP ACRm were tested according to ISO 9806:2013. According to SKM rules, the results of the collector model KS 2550F TP ACRm are representative for the whole KS-ACRm family.</p> <p>-The glass KSF ACRm family has the same quality glass as collector family KSF ACR which was tested in SPF laboratory with ice balls up to 45 mm in diameter.</p> | | | | |  | | | | | | |
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| Annex to Solar Keymark Certificate Supplementary Information | Licence Number | 011-7S2808 F |
| | Issued | 2019-05-14 |

| 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 |
| KS 2100F TP ACRm | | 2.657 | 1.950 | 1.329 | 2.047 | 1.459 | 959 | 1.505 | 1.016 | 642 | 1.633 | 1.100 | 683 |
| KS 2100F TLP ACRm | | 2.657 | 1.950 | 1.329 | 2.047 | 1.459 | 959 | 1.505 | 1.016 | 642 | 1.633 | 1.100 | 683 |
| KS 2200F TP ACRm | | 2.902 | 2.130 | 1.452 | 2.236 | 1.593 | 1.047 | 1.644 | 1.110 | 701 | 1.784 | 1.201 | 746 |
| KS 2200F TLP ACRm | | 2.902 | 2.130 | 1.452 | 2.236 | 1.593 | 1.047 | 1.644 | 1.110 | 701 | 1.784 | 1.201 | 746 |
| KS 2400F TP ACRm | | 3.134 | 2.301 | 1.568 | 2.414 | 1.721 | 1.131 | 1.775 | 1.198 | 757 | 1.927 | 1.298 | 805 |
| KS 2400F TLP ACRm | | 3.134 | 2.301 | 1.568 | 2.414 | 1.721 | 1.131 | 1.775 | 1.198 | 757 | 1.927 | 1.298 | 805 |
| KS 2550F TP ACRm | | 3.289 | 2.414 | 1.645 | 2.534 | 1.806 | 1.187 | 1.863 | 1.257 | 794 | 2.022 | 1.362 | 845 |
| KS 2550F TLP ACRm | | 3.289 | 2.414 | 1.645 | 2.534 | 1.806 | 1.187 | 1.863 | 1.257 | 794 | 2.022 | 1.362 | 845 |
| Annual output per m ² gross area | | 1.290 | 947 | 645 | 994 | 708 | 466 | 731 | 493 | 312 | 793 | 534 | 331 |
| 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 | Yes |
| 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 | 2400 Pa |
| Maximum tested negative load | 2400 Pa |
| Hail resistance using ice balls (diameter) | 45 mm |

Energy Labelling Information

| | Reference Area, A_{sol} (m ²) | Data required for CDR (EU) No 811/2013 - Reference Area A_{sol} | |
|--------------------|---|--|--|
| KS 2100F TP ACRm | 2,06 | Collector efficiency (η_{col}) | 64 % |
| KS 2100 F TLP ACRm | 2,06 | 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. | |
| KS 2200F TP ACRm | 2,25 | | |
| KS 2200F TLP ACRm | 2,25 | | |
| KS 2400F TP ACRm | 2,43 | | |
| KS 2400F TLP ACRm | 2,43 | | |
| KS 2550F TP ACRm | 2,55 | | |
| KS 2550F TLP ACRm | 2,55 | | |
| | | Data required for CDR (EU) No 812/2013 - Reference Area A_{sol} | |
| | | Zero-loss efficiency (η_0) | 0,798 -- |
| | | First-order coefficient (a_1) | 3,47 W/(m ² K) |
| | | Second-order coefficient (a_2) | 0,012 W/(m ² K ²) |
| | | Incidence angle modifier IAM (50°) | 0,95 -- |
| | | 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. | |