



|   |                       |                     |
|---|-----------------------|---------------------|
| <b>Annex to Solar Keymark Certificate<br/>Supplementary Information</b> | <b>Licence Number</b> | <b>011-7S2729 F</b> |
|   | <b>Issued</b>         | <b>2016-12-15</b>   |

| <b>Annual collector output in kWh/collector at mean fluid temperature <math>\vartheta_m</math>, based on EN ISO 9806:2013 test results</b>   |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|--|---------------|---|-------|-------|-------------------------|-------|------|-------------------------|------|------|-------------------------|------|------|
| 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 |
| Slim Solar 2.0   |               | 2 141   | 1 427 | 850   | 1 580                   | 1 024 | 582  | 1 167                   | 714  | 398  | 1 266                   | 762  | 415  |
| Slim Solar 2.5   |               | 2 672   | 1 780 | 1 061 | 1 972                   | 1 277 | 726  | 1 456                   | 891  | 496  | 1 580                   | 951  | 517  |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
|  |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |
| Annual output per m <sup>2</sup> gross area  |               | 1 065   | 710   | 423   | 786                     | 509   | 289  | 581                     | 355  | 198  | 630                     | 379  | 206  |
| Fixed or tracking collector  |               | Fixed (slope = latitude - 15°; rounded to nearest 5°) |       |       |                         |       |      |                         |      |      |                         |      |      |
| Annual irradiation on collector plane  |               | 1765 kWh/m <sup>2</sup>                               |       |       | 1714 kWh/m <sup>2</sup> |       |      | 1166 kWh/m <sup>2</sup> |      |      | 1244 kWh/m <sup>2</sup> |      |      |
| 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 $\vartheta_m$ (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 <a href="http://www.solarkeymark.org/scenocalc">www.solarkeymark.org/scenocalc</a> |               |   |       |       |                         |       |      |                         |      |      |                         |      |      |

| <b>Additional Information</b>   |               |    |
|---|---------------|----|
| 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)   | B             | -- |
| Maximum tested positive load  | 5400          | Pa |
| Maximum tested negative load  | 2400          | Pa |
| Hail resistance using ice balls (diameter)  | -             | mm |

| <b>Energy Labelling Information</b> |   |  |       |                                    |
|-------------------------------------|---|--|-------|------------------------------------|
|                                     | Reference Area, $A_{sol}$ (m <sup>2</sup> ) | Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$  |       |                                    |
| Slim Solar 2.0                      | 2.01  | Collector efficiency ( $\eta_{col}$ )  | 54    | %                                  |
| Slim Solar 2.5                      | 2.51  | Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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. |       |                                    |
|                                     |   | Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$  |       |                                    |
|                                     |   | Zero-loss efficiency ( $\eta_0$ )  | 0.719 | --                                 |
|                                     |   | First-order coefficient ( $a_1$ )  | 3.85  | W/(m <sup>2</sup> K)               |
|                                     |   | Second-order coefficient ( $a_2$ )   | 0.014 | W/(m <sup>2</sup> K <sup>2</sup> ) |
|                                     |   | Incidence angle modifier IAM (50°)   | 0.86  | --                                 |
|                                     |   | 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.  |       |                                    |