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|---|-----------------------|---------------------|
| <b>Annex to Solar Keymark Certificate<br/>Supplementary Information</b> | <b>Licence Number</b> | <b>011-7S2794 F</b> |
|   | <b>Issued</b>         | <b>2017-11-15</b>   |

| Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results   |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|--|-------------------------------------|---|-------|-------|-------------------------|-------|-------|-------------------------|-------|------|-------------------------|-------|------|
| Collector name   | Standard Locations<br>$\vartheta_m$ | 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 |
| K721-MS  |                                     | 2,592   | 1,834 | 1,172 | 1,962                   | 1,335 | 811   | 1,443                   | 931   | 546  | 1,576                   | 1,011 | 584  |
| K727-MS  |                                     | 3,284   | 2,324 | 1,484 | 2,485                   | 1,691 | 1,027 | 1,828                   | 1,180 | 692  | 1,996                   | 1,280 | 740  |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
|  |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |
| Annual output per m <sup>2</sup> gross area  |                                     | 1,235   | 874   | 558   | 934                     | 636   | 386   | 687                     | 443   | 260  | 751                     | 481   | 278  |
| 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> |                                     |   |       |       |                         |       |       |                         |       |      |                         |       |      |

| 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  | 3000          | Pa |
| Maximum tested negative load  | 3000          | Pa |
| Hail resistance using steel ball (maximum drop height)  | 1.2           | m  |

| Energy Labelling Information |   |  |  |
|------------------------------|---|--|--|
|                              | Reference Area, $A_{sol}$ (m <sup>2</sup> ) | Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$  |  |
| K721-MS                      | 2.10  | Collector efficiency ( $\eta_{col}$ )  | 59 %                                     |
| K727-MS                      | 2.66  | 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 ( $\eta_0$ )  | 0.760 --                                 |
|                              |   | First-order coefficient ( $a_1$ )  | 3.67 W/(m <sup>2</sup> K)                |
|                              |   | Second-order coefficient ( $a_2$ )   | 0.015 W/(m <sup>2</sup> K <sup>2</sup> ) |
|                              |   | Incidence angle modifier IAM (50°)   | 0.96 --                                  |
|                              |   | 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.  |  |