

# AENOR

## Keymark Certificate Solar thermal energy



**078/000381**

AENOR certifies that the organization

### **SYRIUS SOLAR INDUSTRY, S.A.S.**

registered office 15 RUE DU PERPIGNAN - ZAC DESCARTES 34880 LAVÉRUNE (Francia)

supplies Solar collectors

in compliance with UNE-EN 12975-1:2006+A1:2011 (EN 12975-1:2006+A1:2010)

Trade Mark C2000D12c  
Technical information Specified in Annexes to the Certificate

Production site 15 RUE DU PERPIGNAN - ZAC DESCARTES 34880 LAVÉRUNE (Francia)

Certification scheme In order to grant this Certificate, AENOR has tested the product and has verified the quality system implemented for its manufacture. AENOR performs these tasks periodically while the Certificate has not been cancelled, in accordance with Specific Rules RP 078.01.

First issued on 2021-11-05

Validity date 2026-11-05


Rafael GARCÍA MEIRO  
Chief Executive Officer

Original Electronic Certificate

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Product certification body accredited by ENAC, number 1/C-PR271



|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|--|--|---|----------------------|------------------------------------|---|-------|---|-------|------------------------------------|------------------------------------|-------|-----|-----|-----|
| Annex to Solar Keymark Certificate   |  |   |                      |                                    | Licence Number  |       | 078/000381  |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    | Date issued   |       | 2021-11-05  |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    | Issued by   |       | AENOR   |       |                                    |                                    |       |     |     |     |
| Licence holder   |  | SYRIUS SOLAR INDUSTRY, S.A.S.   |                      |                                    | Country   |       | FRANCE  |       |                                    |                                    |       |     |     |     |
| Brand (optional)   |  | --  |                      |                                    | Web   |       | <a href="https://syrius-solar.fr">https://syrius-solar.fr</a> |       |                                    |                                    |       |     |     |     |
| Street, Number   |  | 15 Rue du Perpignan - ZAC Descartes   |                      |                                    | E-mail  |       | contact@syrius-solar.fr                                       |       |                                    |                                    |       |     |     |     |
| Postcode, City   |  | 34880 Lavérune  |                      |                                    | Tel   |       | +33 04 67 82 00 18  |       |                                    |                                    |       |     |     |     |
| Collector Type   |  |   |                      |                                    | Flat plate collector  |       |   |       |                                    |                                    |       |     |     |     |
| Collector name   |  |   |                      |                                    | Power output per collector  |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    | Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s<br>$\vartheta_m - \vartheta_a$ |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    | 0 K   | 10 K  | 30 K  | 50 K  | 70 K                               | 80 K                               |       |     |     |     |
|  |  |   |                      |                                    | m <sup>2</sup>  | mm    | mm  | mm    | mm                                 | mm                                 | mm    |     |     |     |
| C2000D12c  |  |   |                      |                                    | 2,06  | 2.033 | 1.015   | 98    | 1.399                              | 1.317                              | 1.133 | 923 | 687 | 558 |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
| Power output per m <sup>2</sup> gross area   |  |   |                      |                                    | 679   | 639   | 550   | 448   | 333                                | 271                                |       |     |     |     |
| Performance parameters test method   |  | Steady state - indoor   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
| Performance parameters (related to A <sub>G</sub> )  |  | $\eta_0, b$   | a1                   | a2                                 | a3  | a4    | a5  | a6    | a7                                 | a8                                 | Kd    |     |     |     |
| Units  |  | -   | W/(m <sup>2</sup> K) | W/(m <sup>2</sup> K <sup>2</sup> ) | J/(m <sup>3</sup> K)  | -     | J/(m <sup>2</sup> K)  | s/m   | W/(m <sup>2</sup> K <sup>4</sup> ) | W/(m <sup>2</sup> K <sup>4</sup> ) | -     |     |     |     |
| Test results   |  | 0,699   | 3,82                 | 0,016                              | 0,000   | 0,00  | 6.361   | 0,000 | 0,00                               | 0,0E+00                            | 0,81  |     |     |     |
| Incidence angle modifier test method   |  | Steady state - outdoor  |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
| Incidence angle modifier   |  | Angle   | 10°                  | 20°                                | 30°   | 40°   | 50°   | 60°   | 70°                                | 80°                                | 90°   |     |     |     |
| Transversal  |  | K <sub>θT, coll</sub>   | 1,00                 | 0,98                               | 0,96  | 0,93  | 0,86  | 0,76  | 0,53                               | 0,00                               | 0,00  |     |     |     |
| Longitudinal   |  | K <sub>θL, coll</sub>   | 1,00                 | 0,98                               | 0,96  | 0,93  | 0,86  | 0,76  | 0,53                               | 0,00                               | 0,00  |     |     |     |
| Heat transfer medium for testing   |  | Water   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
| Flow rate for testing (per gross area, A <sub>G</sub> )  |  | dm/dt   | 0,020                | kg/(sm <sup>2</sup> )              |   |       |   |       |                                    |                                    |       |     |     |     |
| Maximum temperature difference during thermal performance test   |  | ( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>  | 50                   | K                                  |   |       |   |       |                                    |                                    |       |     |     |     |
| Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30$ °C)  |  | $\vartheta_{stg}$   | 180                  | °C                                 |   |       |   |       |                                    |                                    |       |     |     |     |
| Maximum operating temperature  |  | $\vartheta_{max, op}$   | 204                  | °C                                 |   |       |   |       |                                    |                                    |       |     |     |     |
| Maximum operating pressure   |  | p <sub>max, op</sub>  | 1000                 | kPa                                |   |       |   |       |                                    |                                    |       |     |     |     |
| Testing laboratory   |  | Fundación CENER, LEST   |                      |                                    |   |       | <a href="http://www.cener.com">http://www.cener.com</a>       |       |                                    |                                    |       |     |     |     |
| Test report(s)   |  | 30.3878.0-001<br>30.3878.0-002  |                      |                                    |   |       | Dated   |       | 30/08/2021                         |                                    |       |     |     |     |
| Comments of testing laboratory   |  | Datasheet version: 6.1, 2019-09-26  |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
|  |  |  |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |
| <p>AENOR INTERNACIONAL, S.A.U. - Génova, 6. - 28004 - Madrid, España - Tel. 91 432 60 00 - <a href="http://www.aenor.com">www.aenor.com</a></p> <p>Product certification body accredited by ENAC, number 1/C-PR271</p> |  |   |                      |                                    |   |       |   |       |                                    |                                    |       |     |     |     |



|   |                |            |
|---|----------------|------------|
| Annex to Solar Keymark Certificate<br>Supplementary Information | Licence Number | 078/000381 |
|   | Issued         | 2021-11-05 |

| Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ |                                     |   |       |      |                         |      |      |                         |      |      |                         |      |      |
|--|-------------------------------------|---|-------|------|-------------------------|------|------|-------------------------|------|------|-------------------------|------|------|
| 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 |
| C2000D12c  |                                     | 2.069   | 1.341 | 760  | 1.509                   | 944  | 498  | 1.116                   | 661  | 345  | 1.214                   | 707  | 361  |
|  |                                     |   |       |      |                         |      |      |                         |      |      |                         |      |      |
|  |                                     |   |       |      |                         |      |      |                         |      |      |                         |      |      |
|  |                                     |   |       |      |                         |      |      |                         |      |      |                         |      |      |
|  |                                     |   |       |      |                         |      |      |                         |      |      |                         |      |      |
|  |                                     |   |       |      |                         |      |      |                         |      |      |                         |      |      |
|  |                                     |   |       |      |                         |      |      |                         |      |      |                         |      |      |
| Annual output per m <sup>2</sup> gross area                                      |                                     | 1.004   | 651   | 369  | 732                     | 458  | 242  | 542                     | 321  | 167  | 590                     | 343  | 175  |
| Annual efficiency, $\eta_a$  |                                     | 57%   | 37%   | 21%  | 45%                     | 28%  | 15%  | 46%                     | 28%  | 14%  | 47%                     | 28%  | 14%  |
| Fixed or tracking collector  |                                     | Fixed (slope = latitude - 15°; rounded to nearest 5°) |       |      |                         |      |      |                         |      |      |                         |      |      |
| Annual irradiation on collector plane  |                                     | 1765 kWh/m <sup>2</sup>                               |       |      | 1630 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. 6.1 (September 2019). 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 <sup>2</sup> ) >   | 1000          | $\vartheta_a$ (°C) > | 20 | H <sub>x</sub> (MJ/m <sup>2</sup> ) > | 600 |
| Maximum tested positive load  | 3000          |                      | Pa |                                       |     |
| Maximum tested negative load  | 3000          |                      | Pa |                                       |     |
| Hail resistance using ice balls (diameter)                            | 25            |                      | mm |                                       |     |

| Additional collector attribute(s)  |   |
|--|---|
| <input type="checkbox"/> Using external power source(s) for normal operation | <input type="checkbox"/> Active or passive measure(s) for self-protection |
| <input type="checkbox"/> Co-generating thermal and electrical power          | <input type="checkbox"/> Façade collector(s)                              |

| Energy Labelling Information |  | Additional Informative Technical Data |   |
|------------------------------|--|---------------------------------------|---|
|                              | Reference Area, A <sub>sol</sub> (m <sup>2</sup> ) | Hydraulic Designation Code            | Aperture Area, A <sub>a</sub> (m <sup>2</sup> ) |
| C2000D12c                    | 2,06   | 8-V-1234S-A:11.2,1866-C:20,6,1060-D   | 1,89  |
|                              |  |                                       |   |
|                              |  |                                       |   |
|                              |  |                                       |   |
|                              |  |                                       |   |
|                              |  |                                       |   |

| Data required for CDR (EU) No 811/2013 - Reference Area A <sub>sol</sub>   |     | Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>  |       |
|--|-----|---|-------|
| Collector efficiency ( $\eta_{col}$ )  | 50% | Zero-loss efficiency ( $\eta_0$ )   | 0,68  |
| 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 <sub>sol</sub> ) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017. |     | First-order coefficient (a <sub>1</sub> )   | 3,82  |
|  |     | Second-order coefficient (a <sub>2</sub> )  | 0,016 |
|  |     | Incidence angle modifier IAM (50°)  | 0,86  |
|  |     |   | --    |
|  |     | Remark: The data given in this section are related to collector reference area (A <sub>sol</sub> ) 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. |       |