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|--|--|---------------------------------|----------------------|------------------------------------|---|------------|---------------------------------------|-----------------------|------------------------------------|------------------------------------|-------|-------|-------|-----|
| Annex to Solar Keymark Certificate | | | | | Licence Number | | 011-7S1916 F | | | | | | | |
| | | | | | Date issued | | 2023-02-24 | | | | | | | |
| | | | | | Issued by | | DINCERTCO | | | | | | | |
| Licence holder | | BDR Thermea Group B.V. | | | Country | | NETHERLANDS | | | | | | | |
| Brand (optional) | | DeDietrich | | | Web | | www.bdrthermeagroup.com | | | | | | | |
| Street, Number | | MARCHANSTRAAT 55 | | | E-mail | | oleguer.fuertes@BDRThermea.com | | | | | | | |
| Postcode, City | | 7300 AA, APPELDOORN | | | Tel | | +34 902 89 89 89 | | | | | | | |
| Collector Type | | | | | Flat plate collector | | | | | | | | | |
| Collector name | | | | | Power output per collector | | | | | | | | | |
| | | | | | $G_b = 850 \text{ W/m}^2, G_d = 150 \text{ W/m}^2 \text{ \& } u = 1.3 \text{ m/s}$ | | | | | | | | | |
| | | | | | $\vartheta_m - \vartheta_a$ | | | | | | | | | |
| | | | | | 0 K | 10 K | 30 K | 50 K | 70 K | 100 K | | | | |
| | | | | | m ² | mm | mm | mm | mm | mm | | | | |
| | | | | | W | W | W | W | W | W | | | | |
| Dietrisol PRO D230 | | | | | 2.30 | 2 006 | 1 147 | 87 | 1 721 | 1 633 | 1 443 | 1 234 | 1 006 | 627 |
| | | | | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | |
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| | | | | | | | | | | | | | | |
| Power output per m² gross area | | | | | 748 | 710 | 627 | 537 | 437 | 273 | | | | |
| Performance parameters test method | | Steady state - outdoor | | | | | | | | | | | | |
| Performance parameters (related to A_G) | | η_0, b | a1 | a2 | a3 | a4 | a5 | a6 | a7 | a8 | Kd | | | |
| Units | | - | W/(m ² K) | W/(m ² K ²) | J/(m ³ K) | - | J/(m ² K) | s/m | W/(m ² K ⁴) | W/(m ² K ⁴) | - | | | |
| Test results | | 0.758 | 3.71 | 0.011 | 0.000 | 0.00 | 5 031 | 0.000 | 0.00 | 0.0E+00 | 0.91 | | | |
| Incidence angle modifier test method | | Quasi dynamic - outdoor | | | | | | | | | | | | |
| Incidence angle modifier | | Angle | 10° | 20° | 30° | 40° | 50° | 60° | 70° | 80° | 90° | | | |
| Transversal | | K _{GT, coll} | 1.00 | 0.99 | 0.98 | 0.95 | 0.92 | 0.85 | 0.71 | 0.35 | 0.00 | | | |
| Longitudinal | | K _{GL, coll} | 1.00 | 0.99 | 0.98 | 0.95 | 0.92 | 0.85 | 0.71 | 0.35 | 0.00 | | | |
| Heat transfer medium for testing | | | | | Water-Glycole | | | | | | | | | |
| Flow rate for testing (per gross area, A_G) | | | | | dm/dt | | 0.022 | kg/(sm ²) | | | | | | |
| Maximum temperature difference during thermal performance test | | | | | $(\vartheta_m - \vartheta_a)_{max}$ | | 70 | K | | | | | | |
| Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30 \text{ }^\circ\text{C}$) | | | | | ϑ_{stg} | | 210 | °C | | | | | | |
| Maximum operating temperature | | | | | $\vartheta_{max, op}$ | | 100 | °C | | | | | | |
| Maximum operating pressure | | | | | p _{max, op} | | 1000 | kPa | | | | | | |
| Testing laboratory | | TÜV Rheinland Solar GmbH | | | | | http://www.tuv.com/solar | | | | | | | |
| Test report(s) | | DE 235KAK.001 | | | | | Dated | | 27.02.2023 | | | | | |
| Comments of testing laboratory | | | | | Ver. 6.2 (13.01.2022) | | | | | | | | | |
| | | | | |  Genau. Richtig. TÜV Rheinland Solar GmbH Am Grauen Stein 51105 Köln | | | | | | | | | |
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|--|---------------|---|-------|----------------------|-------------------------|---|--|---------------------------------------|------|---|-------------------------|-------|------|------------------------------------|--|--|--|
| Supplementary Information | | Issued | | 2023-02-24 | | | | | | | | | | | | | |
| Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m | | | | | | | | | | | | | | | | | |
| Standard Locations | | Athens | | Davos | | Stockholm | | Würzburg | | | | | | | | | |
| Collector name | ϑ_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 | | | | |
| Dietrisol PRO D230 | | 2 715 | 1 910 | 1 236 | 2 045 | 1 399 | 875 | 1 507 | 974 | 586 | 1 642 | 1 052 | 623 | | | | |
| Gross Thermal Yield per m ² gross area | | 1 180 | 830 | 538 | 889 | 608 | 380 | 655 | 424 | 255 | 714 | 457 | 271 | | | | |
| Annual efficiency, η_a | | 67% | 47% | 30% | 55% | 37% | 23% | 56% | 36% | 22% | 57% | 37% | 22% | | | | |
| Fixed or tracking collector | | Fixed (slope = latitude - 15°; rounded to nearest 5°) | | | | | | | | | | | | | | | |
| Annual irradiation on collector plane | | 1765 kWh/m ² | | | 1630 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. 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 | | | | | | | | | | Yes | | | | | | | |
| The collector was tested successfully under the following conditions: | | | | | | | | | | | | | | | | | |
| Climate class (A+, A, B or C) | | | | | | | | | | A | | -- | | | | | |
| G (W/m ²) > | | 1000 | | ϑ_a (°C) > | | 20 | | H _x (MJ/m ²) > | | 600 | | | | | | | |
| Maximum tested positive load | | | | | | | | | | 3500 | | Pa | | | | | |
| Maximum tested negative load | | | | | | | | | | 2400 | | Pa | | | | | |
| Hail resistance using ice balls (diameter) | | | | | | | | | | 35 | | mm | | | | | |
| 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 | | | | | | Additional Informative Technical Data | | | | | | | | | | | |
| Reference Area, A _{sol} (m ²) | | | | | | Hydraulic Designation Code | | | | Aperture Area, A _a (m ²) | | | | | | | |
| Dietrisol PRO D230 | | | | | | 2.30 | | | | 1-H-12S-A:11.1,19100-C:0,0 | | | | 2.17 | | | |
| Data required for CDR (EU) No 811/2013 - Reference Area A _{sol} | | | | | | Data required for CDR (EU) No 812/2013 - Reference Area A _{sol} | | | | | | | | | | | |
| Collector efficiency (η_{col}) | | | | | | 58% | | Zero-loss efficiency (η_0) | | | | 0.75 | | -- | | | |
| 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 9806:2017. | | | | | | First-order coefficient (a ₁) | | | | 3.71 | | | | W/(m ² K) | | | |
| | | | | | | Second-order coefficient (a ₂) | | | | 0.011 | | | | W/(m ² K ²) | | | |
| | | | | | | Incidence angle modifier IAM (50°) | | | | 0.91 | | | | -- | | | |
| | | | | | | 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. | | | | | | | | | | | |
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