CERTIFICATE

Certificate number	16223 Rev.1	Replaces	16223 Rev.0
Issued	07/10/2022	First edition	13/03/2019
Report number	PKC0003156	Expiry date	12/03/2024
Page	1 of 1	Contract number	PKC0011937

Product Certificate Solar Thermal Products

License holder: **Greenetica Distribution S.p.A.**
Via A. Volta 31/A, 35031 Abanoterme (PD), Italy

Production site(s): Idrocalor S.r.l.
Via L. Einaudi 38 – 35030 Saccolongo (PD), Italy

Product Solar thermal collector

Model(s): EOS TH

Kiwa Cermet Italia hereby declares that the product can be considered complying to the testing requirements and is entitled to use the Solar Keymark Label, based upon the following aspects:

Laboratory testing of the solar thermal products, which are performed by an accredited laboratory in accordance to EN ISO/IEC 17025:2005 -see annex-, using the following standards:

- ISO 9806:2013
  Solar Energy – Solar Thermal Collectors – Test Methods

Specific CEN Keymark Scheme Rules for Solar Thermal Products SKN_N0444R6.

Periodic Inspection of the Factory site(s) performed by Kiwa Cermet Italia.
A description of the test results is given in the annex to this certificate.

This certificate is issued in accordance with the Kiwa Cermet Italia regulations.
Publication of the certificate is allowed.
The validity of this certificate is subject to the positive result of periodic surveillance visits.
The validity of this certificate can be verified on request at the following e-mail address: energy@kiwacermet.it.
Any total or partial reproduction of this document in any form, without Kiwa Cermet Italia express authorization, is prohibited.

President
Giampiero Belcredi

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ACCREDIA
L'ENTE ITALIANO DI ACCREDITAMENTO

PRD N° 069B

Membro degli Accordi di Mutuo Riconoscimento EA, IAF e ILAC
Signatory of EA, IAF and ILAC Mutual Recognition Agreements

Annex to Solar Keymark Certificate

Licence Number	16223 Rev.1
Date issued	2022-10-07
Issued by	Kiwa Cermet Italia S.p.A.

Licence holder	Greenetica Distribution S.r.l.	Country	Italy
Brand (optional)		Web	https://greeneticadistribution.com
Street, Number	Via Alessandro Volta 31/A	E-mail	info@greeneticadistribution.com
Postcode, City	35031, Abano Terme (PD)	Tel	+39 0498668879

Collector Type	Flat plate collector

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
					0 K	10 K	30 K	50 K	70 K	101 K
	m²	mm	mm	mm	W	W	W	W	W	W
EOS TH	3.86	3,500	2,010	3,880	2,985	2,955	2,826	2,604	2,290	1,609
Power output per m² gross area					773	765	732	674	593	417

Performance parameters test method	Steady state - outdoor									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0.909	0.47	0.030	0.000	0.00	0	0.000	0.00	0.0E+00	0.00

Incidence angle modifier test method		Steady state - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)		dm/dt	0.043 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	71.4 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	196 °C
Maximum operating temperature		ϑ_{max_op}	100 °C
Maximum operating pressure		$p_{max,op}$	200 kPa
Testing laboratory	ENEA Centro Ricerche Trisaia	https://www.trisaia.enea.it	
Test report(s)	RP.2019.COL.204.2	Dated	20/02/2019

Comments of testing laboratory

Ver. 6.2 (13.01.2022)

Performance parameters refers to direct normal irradiance (DNI). Flow rate according to manufacturer specification.
Collector is provided of active protection controls that prevent damage in any climate class.

ENEA
TERIN-STSN
Dr. Vincenzo Sabatelli

Annex to Solar Keymark Certificate	Licence Number	16223 Rev.1
Supplementary Information	Issued	2022-10-07

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
EOS TH	5,215	4,776	3,978	4,465	3,855	3,051	3,689	3,204	2,487	3,444	3,008	2,372
Gross Thermal Yield per m² gross area	1,350	1,236	1,030	1,156	998	790	955	829	644	892	779	614
Annual efficiency, η_a	52%	47%	39%	56%	49%	38%	58%	51%	39%	55%	48%	38%
Fixed or tracking collector	2-axis tracking											
Annual irradiation on collector plane	2609 kWh/m²			2052 kWh/m²			1634 kWh/m²			1625 kWh/m²		
Mean annual ambient air temperature	18.5°C			3.2°C			7.5°C			9.0°C		
Collector orientation or tracking mode	Tracking			Tracking			Tracking			Tracking		

The collector is operated at constant temperature ϑm (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				No	
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)				--	--
G (W/m²) >		ϑ_a (°C) >		H_X (MJ/m²) >	
Maximum tested positive load					Pa
Maximum tested negative load					Pa
Hail resistance using steel ball (maximum drop height)					m

Additional collector attribute(s)

Using external power source(s) for normal operation	No	Active or passive measure(s) for self-protection	Yes
Co-generating thermal and electrical power	No	Façade collector(s)	No

Energy Labelling Information

	Reference Area, A_{sol} (m²)
EOS TH	3.86

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
1-H-LRS-AC:20,1200	3.72

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	71%

Remark: Collector efficiency (ηcol) 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/m², expressed in % and rounded to the nearest integer. Deviating from the regulation ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}

Zero-loss efficiency (η_0)	0.77	--
First-order coefficient (a_1)	0.47	W/(m²K)
Second-order coefficient (a_2)	0.030	W/(m²K²)
Incidence angle modifier IAM (50°)	0.85	--

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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