



Certificate number	16083 Rev.3	Replaces	16083 Rev.2
Issued	06/08/2024	First edition	20/12/2018
Report number	PKC0002533	Expiry date	17/12/2028
Page	1 of 1	Contract number	PKC0002392

## Product Certificate Solar Thermal Products

<b>License holder:</b>	<b>Pleion S.p.A.</b> Via Venezia 11 – 37053 Cerea (VR), Italy
<b>Production site(s):</b>	Pleion S.p.A. Via Venezia 11 – 37053 Cerea (VR), Italy
<b>Product</b>	Solar thermal collector
<b>Model(s):</b>	X-RAY 14 R; X-RAY 15 R; X-RAY 16 R; X-RAY 17 R; X-RAY 18 R; X-RAY 19 R; X-RAY 20 R

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](mailto:energy@kiwacermet.it).*

*Any total or partial reproduction of this document in any form, without Kiwa Cermet Italia express authorization, is prohibited.*

# CERTIFICATE

**Kiwa Cermet Italia S.p.A.**  
**Società con socio unico, soggetta  
all'attività di direzione e  
coordinamento di Kiwa Italia  
Holding Srl**

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Industry Division Manager  
Maurizio Lorenzon



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		16083 Rev.3							
					Date issued		2024-08-06							
					Issued by		Kiwa Cermet Italia S.p.A.							
Licence holder		Pleion S.p.A.			Country		Italy							
Brand (optional)					Web		https://www.pleion.it							
Street, Number		Via Venezia, 11			E-mail		info@pleion.it							
Postcode, City		37053, Cerea (VR)			Tel		+39 0442320295							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector									
					Gb = 850 W/m <sup>2</sup> , Gd = 150 W/m <sup>2</sup> & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	92 K				
					W	W	W	W	W	W				
X-RAY 14 R					2.97	1,546	1,921	114	1,827	1,799	1,727	1,633	1,519	1,368
X-RAY 15 R					3.18	1,656	1,921	114	1,956	1,926	1,849	1,749	1,626	1,465
X-RAY 16 R					3.39	1,766	1,921	114	2,085	2,053	1,971	1,864	1,734	1,561
X-RAY 17 R					3.60	1,876	1,921	114	2,214	2,180	2,093	1,980	1,841	1,658
X-RAY 18 R					3.82	1,986	1,921	114	2,349	2,313	2,221	2,101	1,953	1,760
X-RAY 19 R					4.03	2,096	1,921	114	2,478	2,441	2,343	2,216	2,061	1,856
X-RAY 20 R					4.24	2,206	1,921	114	2,608	2,568	2,465	2,332	2,168	1,953
Power output per m <sup>2</sup> gross area					615	606	581	550	511	461				
Performance parameters test method		Steady state - outdoor												
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		0.617	0.850	0.009	0.000	0.00	50,900	0.000	0.00	0.0E+00	0.98			
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>	1.01	1.02	1.06	1.10	1.14	1.16	1.12	0.56	0.00			
Longitudinal		K <sub>θL, coll</sub>	1.00	0.99	0.98	0.95	0.91	0.84	0.69	0.35	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>	62	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30$ °C)					$\vartheta_{stg}$	279	°C							
Maximum operating temperature					$\vartheta_{max, op}$	130	°C							
Maximum operating pressure					p <sub>max, op</sub>	1000	kPa							
Testing laboratory		ENEA Centro Ricerche Trisaia					http://www.trisaia.enea.it							
Test report(s)		RP.2018.COL.202.1 RP.2018.COL.202b.1					Dated		18/12/2018 18/12/2018					
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
					<p style="text-align: center;"><b>ENEA</b> TERIN-SSI Dr. Vincenzo Sabatelli <i>Vincenzo Sabatelli</i></p>									
<p>Kiwa Cermet Italia S.p.A. • Via Cadriano, 23 • 40057 Granarolo dell'Emilia (BO) • Italy Tel: +39 0514593111 • Fax: +39 051763382 • E-Mail: info@kiwacermet.it • www.kiwa.it</p>														

Annex to Solar Keymark Certificate Supplementary Information		Licence Number		16083 Rev.3											
		Issued		2024-08-06											
<b>Gross Thermal Yield in kWh/collector at mean fluid temperature <math>\vartheta_m</math></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		
X-RAY 14 R		3,230	2,891	2,472	2,783	2,413	2,006	2,013	1,714	1,394	2,161	1,844	1,501		
X-RAY 15 R		3,459	3,096	2,647	2,980	2,583	2,148	2,155	1,835	1,492	2,314	1,975	1,607		
X-RAY 16 R		3,687	3,300	2,822	3,177	2,754	2,290	2,298	1,956	1,591	2,466	2,105	1,713		
X-RAY 17 R		3,915	3,505	2,997	3,374	2,925	2,432	2,440	2,077	1,689	2,619	2,236	1,819		
X-RAY 18 R		4,155	3,719	3,180	3,580	3,103	2,581	2,589	2,204	1,793	2,779	2,372	1,930		
X-RAY 19 R		4,383	3,923	3,354	3,777	3,274	2,723	2,731	2,325	1,891	2,932	2,503	2,036		
X-RAY 20 R		4,611	4,128	3,529	3,973	3,444	2,864	2,874	2,447	1,990	3,085	2,633	2,142		
Gross Thermal Yield per m <sup>2</sup> gross area		1,088	974	832	937	812	676	678	577	469	728	621	505		
Annual efficiency, $\eta_a$		62%	55%	47%	57%	50%	41%	58%	49%	40%	58%	50%	41%		
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. 6.2 (13.01.2022). A detailed description of the calculations is available at <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>															
<b>Additional Information</b>															
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)										B		--			
G (W/m <sup>2</sup> ) >		900		$\vartheta_a$ (°C) >		15		$H_x$ (MJ/m <sup>2</sup> ) >		540					
Maximum tested positive load										2416		Pa			
Maximum tested negative load										2014		Pa			
												m			
<b>Additional collector attribute(s)</b>															
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	
<b>Energy Labelling Information</b>						<b>Additional Informative Technical Data</b>									
		Reference Area, $A_{sol}$ (m <sup>2</sup> )		Hydraulic Designation Code				Aperture Area, $A_a$ (m <sup>2</sup> )							
X-RAY 14 R		2.97		14-V-1122S-A:X-C:X				2.68							
X-RAY 15 R		3.18		15-V-1122S-A:X-C:X				2.87							
X-RAY 16 R		3.39		16-V-1122S-A:X-C:X				3.06							
X-RAY 17 R		3.60		17-V-1122S-A:X-C:X				3.25							
X-RAY 18 R		3.82		18-V-1122S-A:X-C:X				3.45							
X-RAY 19 R		4.03		19-V-1122S-A:X-C:X				3.64							
X-RAY 20 R		4.24		20-V-1122S-A:X-C:X				3.83							
<b>Data required for CDR (EU) No 811/2013 - Reference Area</b>						<b>Data required for CDR (EU) No 812/2013 - Reference Area <math>A_{sol}</math></b>									
Collector efficiency ( $\eta_{col}$ )		57%				Zero-loss efficiency ( $\eta_0$ )		0.61		--					
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 9806:2017.		First-order coefficient ( $a_1$ )		0.85		Second-order coefficient ( $a_2$ )		0.009		W/(m <sup>2</sup> K)					
		Incidence angle modifier IAM (50°)		1.03				--		W/(m <sup>2</sup> K <sup>2</sup> )					
		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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