



CERTIFICATE

Certificate number	16082 Rev.0	Replaces	-
Issued	20/12/2018	First edition	20/12/2018
Report number	PKC0002533	Expiry date	19/12/2023
Page	1 of 1	Contract number	PKC0002392

Product Certificate Solar Thermal Products

License holder:	Pleion Industries S.r.l. Via Venezia 11 – 37053 Cerea (VR), Italy
Production site(s):	Pleion Industries S.r.l. Via Venezia 11 – 37053 Cerea (VR), Italy
Product	Solar thermal collector
Model(s):	X-RAY 21 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 R.31.

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.

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Chief Operating Officer
Giampiero Belcredi



Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results					Licence Number		16082 Rev.0																	
					Date issued		2018-12-20																	
					Issued by		Kiwa Cermet Italia S.p.A.																	
Licence holder		Pleion Industries S.r.l.			Country		Italy																	
Brand (optional)					Web		http://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					Gross area (A_G)		Gross length		Gross width		Gross height		Power output per collector $G_b = 850 \text{ W/m}^2$; $G_d = 150 \text{ W/m}^2$ $\vartheta_m - \vartheta_a$											
					m ²		mm		mm		mm		0 K		10 K		30 K		50 K		70 K		64 K	
X-RAY 21 R					4.45		2,316		1,921		114		2,710		2,677		2,598		2,501		2,386		2,421	
Power output per m ² gross area					609		602		584		562		536		544									
Performance parameters test method					Steady state - outdoor																			
Performance parameters (related to A_G)					$\eta_{0,hem}$		a1		a2															
Units					-		W/(m ² K)		W/(m ² K ²)															
Test results					0.609		0.690		0.005															
Incidence angle modifier test method					Steady state - outdoor																			
Bi-directional incidence angle modifiers					Yes																			
Incidence angle modifier					Angle		10°		20°		30°		40°		50°		60°		70°		80°		90°	
Transversal					$K_{\theta T, coll}$		1.01		1.02		1.06		1.10		1.14		1.16		1.12				0.00	
Longitudinal					$K_{\theta L, coll}$		1.00		0.99		0.98		0.95		0.91		0.84		0.69				0.00	
Heat transfer medium for testing					Water																			
Flow rate for testing (per gross area, A_G)					dm/dt		0.020		kg/(sm ²)															
Maximum temperature difference for thermal performance calculations					$(\vartheta_m - \vartheta_a)_{max}$		64.3		K															
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ °C}$)					ϑ_{stg}		279		°C															
Effective thermal capacity, incl. fluid (per gross area, A_G)					C/m ²		50.9		kJ/(Km ²)															
Maximum operating temperature					$\vartheta_{max, op}$		130		°C															
Maximum operating pressure					$p_{max, op}$		1000		kPa															
Testing laboratory		ENEA Centro Ricerche Trisaia			http://www.trisaia.enea.it																			
Test report(s)		RP.2018.COL.202.1			Dated		18/12/2018																	
Comments of testing laboratory					Datasheet version: 5.01, 2016-03-01																			
																								
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Annex to Solar Keymark Certificate		Licence Number		16082 Rev.0									
Supplementary Information		Issued		2018-12-20									
Annual collector output in kWh/collector at mean fluid temperature ϑ_m , based on ISO 9806:2013 test results													
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			
X-RAY 21 R		4,807	4,421	3,965	4,205	3,790	3,336	3,030	2,685	2,325	3,247	2,884	2,499
Annual output per m ² gross area		1,080	994	891	945	852	750	681	603	523	730	648	561
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1714 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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc													
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)										B		--	
Maximum tested positive load										2416		Pa	
Maximum tested negative load										2014		Pa	
												m	
Energy Labelling Information													
	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}											
X-RAY 21 R	4.45	Collector efficiency (η_{col})										57	%
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 9806:2013.													
Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}													
Zero-loss efficiency (η_0)										0.609		--	
First-order coefficient (a_1)										0.69		W/(m ² K)	
Second-order coefficient (a_2)										0.005		W/(m ² K ²)	
Incidence angle modifier IAM (50°)										1.05		--	
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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