



Number	KIP0001248/00	Replaces	-
Issued	21/12/2016	First edition	21/12/2016
Report number	PKC0001248	Expiry date	20/12/2021
Page	1 of 1	Contract number	KIP TH 1065

Product Certificate Solar Thermal Products

Kiwa Cermet Italia hereby declares that the **photovoltaic-thermal collector**, type

HNRG xxx

(where "xxx" suffix indicates the rated power, from 250Wp to 275Wp with 5Wp steps)

supplied by **Pegoraro Energia S.r.l.**
Via Marconi 112 – 31050 Veduggio (TV), Italy

Is entitled to use the Solar Keymark label.

The compliance is based on examination to:
ISO 9806:2013 and the
Specific Keymark Scheme Rules for Solar Thermal Products V28.00

A description of the test results is given in the appendix to this certificate.

This certificate is issued in accordance with the Kiwa Cermet Italia regulations for Product Certification. Publication of the certificate is allowed.

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The validity of this certificate is subject to the positive result of periodic surveillance visits.

Chief Operating Officer
Giampiero Belcredi



Kiwa Cermet Italia S.p.A.

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SGQ N° 007A SSI N° 006G
SGA N° 010D FSM N° 004I
PRD N° 069B

Licence holder	Pegoraro Energia S.r.l.	Issued by	Kiwa Cermet Italia S.p.A.
Brand (optional)		Country	Italy
Street, Number	Via Marconi 112	Web	www.pegoraroenergia.com
Postcode, City	31050 Veduggio (TV)	E-mail	pegorarogiorio@tin.it
		Tel	+39 423400433

Collector Type	Flat plate collector, unglazed
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Collector name	Gross area (A_g) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector					
					$G_b = 850 \text{ W/m}^2$; $G_d = 150 \text{ W/m}^2$; $\theta_m - \theta_a = 2 \text{ K}$ $u \text{ (m/s)}$					
					1.0 W		1.5 W		3.0 W	
HNRG xxx (xxx = 250Wp to 275Wp with 5Wp steps)	1,64	1.650	992	40	768		747		685	
Power output per m ² gross area					468		456		418	

Performance parameters test method		Steady state - outdoor									
Performance parameters (related to AG)		$\eta_{0,hem}$	b_1	b_2	b_u	ε/α					
Units		-	W/(m²K)	Ws/(m³K)	s/m	-					
Test results		0,516	11,044	1,124	0,045						
Incidence angle modifier test method		Steady state - outdoor									
Bi-directional incidence angle modifiers	No										
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal	$K_{GT, coll}$					0,94				0,00	
Longitudinal	$K_{GL, coll}$					0,94				0,00	

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	$\dot{m}/dt$	0,019	kg/(sm ²)
Maximum temperature difference for thermal performance calculations	$(\vartheta_m - \vartheta_a)_{\max}$	54,3	K
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ }^\circ\text{C}$)	ϑ_{stg}	77,8	$^\circ\text{C}$
Effective thermal capacity, incl. fluid (per gross area, A_G)	C/m^2	57,9	kJ/(Km ²)
Maximum operating temperature	$\vartheta_{\max, \text{op}}$	80	$^\circ\text{C}$
Maximum operating pressure	$p_{\max, \text{op}}$	300	kPa

Testing laboratory	ENEA - Centro Ricerche Trisaia	www.trisaia.enea.it	
Test report(s)	RP.2016.COL.187.1	Dated	29/11/2016

Comments of testing laboratory

Datasheet version: 5.01/2016-03-01

Thermal performance parameters are given for the PV-module working with max. electrical power output ('MPP mode'). Flow rate according to manufacturer specifications.

Stamp & signature of test lab

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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	KIP0001248/00
	Issued	2016-12-21

Annual collector output in kWh/collector at mean fluid temperature $\bar{\theta}_m$, based on ISO 9806:2013 test results

Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	ϕ_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
HNRG xxx (xxx = 250Wp to 275Wp with 5Wp steps)		1.085	107	0	392	14		378	22		443	34	
Annual output per m ² gross area		661	65	0	239	9		231	14		270	21	
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 T_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	Yes	
The collector is deemed to be suitable for roof integration	Yes	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	A	--
Maximum tested positive load	2400	Pa
Maximum tested negative load	2000	Pa
Hail resistance using steel ball (maximum drop height)	2	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
HNRG xxx (xxx = 250Wp to 275Wp with 5Wp steps)	1,64	Collector efficiency (η_{col})	1	%
		<i>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/m², 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.</i>		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
		Zero-loss efficiency (η_0)	0,493	--
		First-order coefficient (a_1)	12,17	W/(m ² K)
		Second-order coefficient (a_2)	0,000	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	0,94	--
		<i>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.</i>		

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