

Certificate number	17514 Rev.0	Replaces	-
Issued	27/02/2024	First edition	27/02/2024
Report number	PKC0012159	Expiry date	26/02/2027
Page	1 of 1	Contract number	PKC0012967

Product Certificate Solar Thermal Products

License holder: **Cordivari S.r.l.**
Zona Industriale Pagliare, 64020 - Morro D'Oro (TE), Italy

Production site(s): Cordivari S.r.l.
Zona Industriale Pagliare, 64020 - Morro D'Oro (TE), Italy

Product Solar thermal system

Model(s): Sistema term.solare Favignana 150/12
Sistema term.solare Favignana 200/15
Sistema term.solare Favignana 300/20

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:

- EN 12976-1:2021
Thermal solar systems and components – Factory made systems – Part 1: General requirements
- EN 12976-2:2019
Thermal solar systems and components – Factory made systems – Part 2: Test Methods

Specific CEN Keymark Scheme Rules for Solar Thermal Products SKN_N0444R7.

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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Industry Division Manager
Maurizio Lorenzon



PRD N° 0069PRD

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



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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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www.kiwa.it

Summary of	EN12976-2	SOLAR SYSTEM test results	Licence Number	17514 Rev.0
Annex to Solar KEYMARK Certificate			Issued	2024-02-07

Company	CORDIVARI srl	Country	Italy
Brand (optional)	Favignana	Website	www.cordivari.it
Street	Z. I. Pagliare	E-mail	info@cordivari.it
Postal Code	64020	Morro D'Oro	Tel. / Fax +39 085.80.40.1

System classification

Application(s)	Hot water
Solar loop, circulation principle	Thermosyphon
Direct solar loop / heat exchanger	Direct
Open, vented or closed solar loop	Closed
Drain back/down	Always filled (no drain)
Store location	Outdoor
Store orientation (of main axis)	Horizontal
Type of auxiliary heating (internal back-up heat)	Electric
If other auxiliary/internal back-up heating, please specify:	-
Solar+supplementary OR Solar-only / Solar pre-heat	Solar + supplementary


Collector(s)				Heat store(s)							
Company	CORDIVARI srl			Company	EN12976-2						
Keymark lic.no. if available	N/A			Keymark lic.no. if available	N/A						
Collector name	Per module			Store name	Total nominal volume	Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power	
	Gross Area (Ag)	Gross length	Gross width								
	m ²	mm	mm								
12	2.28	1755	1300	150	150	467	1532	-	0	1.2	
15	2.78	1755	1585	200	200	467	1862	-	0	1.2	
20	3.87	1755	2195	300	300	467	2412	-	0	1.2	

Solar loop controller			Solar loop fluid		
Keymark lic.no. if available	-		Recommended/required	Recommended	
Company Name	-		Company Name	-	
Solar loop pump - power range	- W	to - W	Freezing point	0	°C

System family overview

Collector name	Number of collectors in each configuration for each store											
	Store name											
	150			200			300					
12	1											
15			1									
20						1						

Testing Laboratory	TZS/IGTE
Website	www.igte.uni-stuttgart.de
Test report id. number	23SYS151
Date of test report	2023-12-15

Comments of test lab	
No comments	

Summary of		EN12976-2		test results		Certification No.		17514 Rev.0	
Annex to Solar KEYMARK Certificate						Issued		2024-02-07	
Company				CORDIVARI srl		Country		Italy	
Brand (optional)						Website		www.cordivari.it	
Street				Z. I. Pagliare		E-mail		info@cordivari.it	
Postal Code		64020		Morro D'Oro		Tel. / Fax		+39 085.80.40.1	
Parameters for systems extrapolation (Annex D)									
Collector of measured system					Storage tank of measured system				
$A_{ref} [m^2]$		2.77			Volume [l]		178		
η_0		-			$A_{hx} [m^2]$		-		
$a_1 [W/Km^2]$		-			Piping				
$a_2 [W/Km^2]$		-							
IAM (50°)		-			$U_{loop,p}$		-		
System parameters									
Name of System Configuration	Tested/Extrapol	A_c^* [m ²]	u_c^* [W/Km ²]	U_s [W/K]	C_s [MJ/K]	S_c [-]	D_L [-]	f_{aux} [-]	
150/12	Extrapol	0.999	1.980	1.624	0.553	0.007	0.059	0.00	
200/15	Tested	1.219	2.416	1.981	0.675	0.007	0.059	0.00	
300/20	Extrapol	1.694	3.358	2.754	0.938	0.007	0.059	0.00	
Testing Laboratory		TZS/IGTE							
Website		www.igte.uni-stuttgart.de							
Test report id. number		23SYS151							
Date of test report		2023-12-15							
Test method		ISO 9459-5 (DST)							
Comments of test lab		Stamp & signature of test lab							
No comments									

 All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of $\pm 5\%$ to $\pm 15\%$

Version 4.5, 2017-10-24

Summary of		EN12976-2		test results		Certification No.		17514 Rev.0									
Annex to Solar KEYMARK Certificate						Issued		2024-02-07									
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Brand (optional)						Website		www.cordivari.it									
Street		Z. I. Pagliare				E-mail		info@cordivari.it									
Postal Code		64020		Morro D'Oro		Tel. / Fax		+39 085.80.40.1									
System family overview																	
For each storage and collector size, give number of collectors																	
Collector name	150			200			300										
12	1																
15			1														
20					1												
Name of system configuration						150/12											
Collector name		12		No. Collectors		1		Storage name		150							
Calculated annual results for "solar-only / preheat system"																	
Location	Qd,sh	Daily drawoff 110				Daily drawoff 140				Daily drawoff 170							
		Qd,hw		QL		Qpar		fsol		Qd,hw		QL		Qpar		fsol	
		MJ/y	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%			
Stockholm SE	-	6107	3133	0	51	7772	3459	0	45	9437	3586	0	38				
WürzburgDE	-	5854	3261	0	56	7450	3651	0	49	9047	3818	0	42				
Davos CH	-	6628	4686	0	71	8435	5069	0	60	10243	5183	0	51				
Athens GR	-	4545	3836	0	84	5784	4442	0	77	7023	4881	0	70				
Perf. indicators for the table above																	
Qd,sh	MJ/y	Not relevant for solar domestic hot water system															
Qd	MJ/y	Annual heat demand for domestic hot water															
QL	MJ/y	Annual heat energy delivered by the solar system															
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)															
f _{sol} =Q _L /Q _d	-	Solar fraction															
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR												
	G	1 157	1 230	1 684	1 736												
	T _{a,ave}	7.5	9.0	3.2	18.5												
	T _{c,ave}	8.5	10.0	5.4	17.8												
	± ΔTc	6.4	3.0	0.8	7.4												
G	kWh/m ²	Annual irradiation South, 45°															
T _{a,ave}	°C	Annual average outdoor air temperature															
T _{c,ave}	°C	Annual average mains cold water temp.															
ΔTc	K	Seasonal variation of Tc															
Th	45 °C	Desired hot water temperature (mixing valve temperature).															
Max. operating press. - collector side				400 kPa		Max. operating press. - tank side				600 kPa							
Testing Laboratory						TZS/IGTE											
Website						www.igte.uni-stuttgart.de											
Test report id. number						23SYS151											
Date of test report						2023-12-15											
Test method						ISO 9459-5 (DST)											
Comments of test lab																	
No comments																	

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Stamp & signature of test lab

Summary of	EN12976-2	test results	Certification No.	17514 Rev.0
Annex to Solar KEYMARK Certificate			Issued	2024-02-07

Company	CORDIVARI srl		Country	Italy	
Brand (optional)			Website	www.cordivari.it	
Street	Z. I. Pagliare		E-mail	info@cordivari.it	
Postal Code	64020	Morro D'Oro	Tel. / Fax	+39	085.80.40.1

System family overview

Collector name	For each storage and collector size, give number of collectors												
	150			200			300						
12	1												
15			1										
20						1							

Name of system configuration **200/15**

Collector name **15** No. Collectors **1** Storage name **200**

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 170 l				Daily drawoff 200 l				Daily drawoff 250 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	-	9437	3586	0	45	11103	4430	0	40	13878	4510	0	33
WürzburgDE	-	9047	3818	0	50	10643	4704	0	44	13304	4816	0	36
Davos CH	-	10243	5183	0	61	12050	6423	0	53	15063	6492	0	43
Athens GR	-	7023	4881	0	78	8263	5925	0	72	10328	6496	0	63

Perf. indicators for the table above

Qd,sh	MJ/y	Not relevant for solar domestic hot water system
Qd	MJ/y	Annual heat demand for domestic hot water
QL	MJ/y	Annual heat energy delivered by the solar system
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)
$f_{sol}=Q_L/Q_d$	-	Solar fraction

Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR
	G	1 157	1 230	1 684	1 736
	T _{a,ave}	7.5	9.0	3.2	18.5
	T _{c,ave}	8.5	10.0	5.4	17.8
	± ΔT _c	6.4	3.0	0.8	7.4

G	kWh/m ²	Annual irradiation South, 45°
T _{a,ave}	°C	Annual average outdoor air temperature
T _{c,ave}	°C	Annual average mains cold water temp.
ΔT _c	K	Seasonal variation of T _c
Th	45 °C	Desired hot water temperature (mixing valve temperature).

Max. operating press. - collector side **400** kPa Max. operating press. - tank side **600** kPa

Testing Laboratory	TZS/IGTE
Website	www.igte.uni-stuttgart.de
Test report id. number	23SYS151
Date of test report	2023-12-15
Test method	ISO 9459-5 (DST)

Comments of test lab	Stamp & signature of test lab
No comments	

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of		EN12976-2		test results		Certification No.		17514 Rev.0					
Annex to Solar KEYMARK Certificate						Issued		2024-02-07					
Company		CORDIVARI srl				Country		Italy					
Brand (optional)						Website		www.cordivari.it					
Street		Z. I. Pagliare				E-mail		info@cordivari.it					
Postal Code		64020		Morro D'Oro		Tel. / Fax		+39 085.80.40.1					
System family overview													
For each storage and collector size, give number of collectors													
Collector name	150			200			300						
12	1												
15			1										
20						1							
Name of system configuration						300/20							
Collector name		20		No. Collectors		1		Storage name		300			
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff 250				Daily drawoff 300				Daily drawoff 400			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
		MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	-	13878	4510	0	41	16654	5879	0	35	22206	5929	0	27
WürzburgDE	-	13304	4816	0	46	15965	6274	0	39	21287	6344	0	30
Davos CH	-	15063	6492	0	55	18076	8460	0	47	24101	8508	0	35
Athens GR	-	10328	6496	0	73	12394	8242	0	67	16525	8924	0	54
Perf. indicators for the table above													
Qd,sh	MJ/y	Not relevant for solar domestic hot water system											
Qd	MJ/y	Annual heat demand for domestic hot water											
QL	MJ/y	Annual heat energy delivered by the solar system											
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)											
f _{sol} =Q _L /Q _d	-	Solar fraction											
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR								
	G	1 157	1 230	1 684	1 736								
	T _{a,ave}	7.5	9.0	3.2	18.5								
	T _{c,ave}	8.5	10.0	5.4	17.8								
	± ΔTc	6.4	3.0	0.8	7.4								
G	kWh/m ²	Annual irradiation South, 45°											
T _{a,ave}	°C	Annual average outdoor air temperature											
T _{c,ave}	°C	Annual average mains cold water temp.											
ΔTc	K	Seasonal variation of Tc											
Th	45 °C	Desired hot water temperature (mixing valve temperature).											
Max. operating press. - collector side				400 kPa		Max. operating press. - tank side				600 kPa			
Testing Laboratory						TZS/IGTE							
Website						www.igte.uni-stuttgart.de							
Test report id. number						23SYS151							
Date of test report						2023-12-15							
Test method						ISO 9459-5 (DST)							
Comments of test lab										Stamp & signature of test lab			
No comments													

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	17514 Rev.0
Annex to Solar KEYMARK Certificate			Issued	2024-02-07

Company	CORDIVARI srl		Country	Italy	
Brand (optional)			Website	www.cordivari.it	
Street	Z. I. Pagliare		E-mail	info@cordivari.it	
Postal Code	64020	Morro D'Oro	Tel. / Fax	+39	085.80.40.1

System family overview

Collector name	For each storage and collector size, give number of collectors												
	150			200			300						
12	1												
15			1										
20						1							

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Name of system configuration				150/12	
Collector name	12	No. Collectors	1	Storage name	150

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Load profile	M	L	XL	XXL	
Annual heat demand (kWh)	1523	2799	4427	5626	
Auxiliary heat contribution	Q _{nonsol}				section 5.9.3.6, see note 1
Average climate (kWh)	163	640	1459	2126	Strasbourg
Cold climate (kWh)	403	955	1818	2494	Helsinki
Hot climate (kWh)	0	289	1161	1872	Athens
Q _{aux} (kWh)	-	-	-	-	section 5.9.3.4, see note 1
Comply to the load profile (Yes/No)	-	-	-	-	section 5.10.6, see note 1
η _{wh_nonsol} (%)	-	-	-	-	section 5.9.3.5, see note 1
Q _{elec} (kWh)	-	-	-	-	section 5.9.3.5, see note 1
Q _{fuel} (kWh)	-	-	-	-	section 5.9.3.5, see note 1
V ₄₀ , measured (l)	-	-	-	-	section 5.10.7, see note 1

Auxiliary thermostat setting	-	°C	Effective power of auxiliary heater	-	kW
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Note 1: Clause of EN 12976-2:2017

Testing Laboratory	TZS/IGTE
Website	www.igte.uni-stuttgart.de
Test report id. number	23SYS151
Date of test report	2023-12-15
Test method	ISO 9459-5 (DST)

Comments of test lab	Stamp & signature of test lab
No comments	

Summary of	EN12976-2	test results	Certification No.	17514 Rev.0
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Company	CORDIVARI srl		Country	Italy	
Brand (optional)			Website	www.cordivari.it	
Street	Z. I. Pagliare		E-mail	info@cordivari.it	
Postal Code	64020	Morro D'Oro	Tel. / Fax	+39	085.80.40.1

System family overview

Collector name	For each storage and collector size, give number of collectors											
	150			200			300					
12	1											
15				1								
20									1			

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Name of system configuration				200/15	
Collector name	15	No. Collectors	1	Storage name	200

Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013

Load profile	M	L	XL	XXL	
Annual heat demand (kWh)	1523	2799	4427	5626	
Auxiliary heat contribution	Qnonsol				section 5.9.3.6, see note 1
Average climate (kWh)	76	482	1328	2021	Strasbourg
Cold climate (kWh)	328	824	1696	2389	Helsinki
Hot climate (kWh)	0	0	741	1425	Athens
Qaux (kWh)	-	-	-	-	section 5.9.3.4, see note 1
Comply to the load profile (Yes/No)	-	-	-	-	section 5.10.6, see note 1
η_{wh_nonsol} (%)	-	-	-	-	section 5.9.3.5, see note 1
Qelec (kWh)	-	-	-	-	section 5.9.3.5, see note 1
Qfuel (kWh)	-	-	-	-	section 5.9.3.5, see note 1
V40, measured (l)	-	-	-	-	section 5.10.7, see note 1

Auxiliary thermostat setting	-	°C	Effective power of auxiliary heater	-	kW
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Note 1: Clause of EN 12976-2:2017

Testing Laboratory	TZS/IGTE
Website	www.igte.uni-stuttgart.de
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Test method	ISO 9459-5 (DST)

Comments of test lab	Stamp & signature of test lab
No comments	

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Postal Code	64020	Morro D'Oro	Tel. / Fax	+39 085.80.40.1	
System family overview					
For each storage and collector size, give number of collectors					
Collector name	150	200	300		
12	1				
15		1			
20			1		
Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013					
Name of system configuration			300/20		
Collector name	20	No. Collectors	1	Storage name	300
Annual performance parameters in the frame of the EU regulation CDR 811, 812 and 813 dated 2013					
Load profile	M	L	XL	XXL	
Annual heat demand (kWh)	1523	2799	4427	5626	
Auxiliary heat contribution	Qnonsol				section 5.9.3.6, see note 1
Average climate (kWh)	6	219	898	1548	Strasbourg
Cold climate (kWh)	277	631	1380	2047	Helsinki
Hot climate (kWh)	0	0	119	751	Athens
Qaux (kWh)	-	-	-	-	section 5.9.3.4, see note 1
Comply to the load profile (Yes/No)	-	-	-	-	section 5.10.6, see note 1
η_{wh_nonsol} (%)	-	-	-	-	section 5.9.3.5, see note 1
Qelec (kWh)	-	-	-	-	section 5.9.3.5, see note 1
Qfuel (kWh)	-	-	-	-	section 5.9.3.5, see note 1
V40, measured (l)	-	-	-	-	section 5.10.7, see note 1
Auxiliary thermostat setting	-	°C	Effective power of auxiliary heater	-	kW
Note 1: Clause of EN 12976-2:2017					
Testing Laboratory	TZS/IGTE				
Website	www.igte.uni-stuttgart.de				
Test report id. number	23SYS151				
Date of test report	2023-12-15				
Test method	ISO 9459-5 (DST)				
Comments of test lab	Stamp & signature of test lab				
No comments					