



Certificate number	16458 Rev.2	Replaces	16458 Rev.1
Issued	30/04/2020	First edition	12/12/2019
Report number	PKC0003438/B	Expiry date	11/12/2024
Page	1 of 1	Contract number	PKC0004007

## Product Certificate Solar Thermal Products

<b>License holder:</b>	<b>DualSun SAS</b> 2 rue Marc Donadille, 13013 Marseille, France
<b>Production site(s):</b>	DualSun SAS ZA du Grand Champ 01640 Jujurieux, France
<b>Product</b>	Photovoltaic thermal collector
<b>Model(s):</b>	DualSun xxxM – 60 – 3BBPI (where "xxx" = rated power from 285W to 315W in steps of 5W)

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 ISO/IEC 17025 -see annex-, using the following standards:

- ISO 9806:2017  
Solar Energy – Solar Thermal Collectors – Test Methods

Specific CEN Keymark Scheme Rules for Solar Thermal Products SKN\_N0444R3.

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.

Additional information according to the SKN\_N0444\_Annex P5.1 PVT\_R1 of Solar Keymark Scheme Rules:

- PV module tested and certified according to the standards IEC 61215 and IEC 61730;
- Test reports nr.: L0003438/A rev.00;
- Certificate of Conformity nr.: 16429 Rev.2;
- PV module: size 1650x991x35 mm; power range from 285W to 315W; backsheet colour black.

*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).*

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Chief Operating Officer  
Giampiero Belcredi



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Annex to Solar Keymark Certificate					Licence Number		16458 Rev.2							
					Date issued		2020-04-30							
					Issued by		Kiwa Cermet Italia S.p.A.							
Licence holder		DualSun SAS			Country		France							
Brand (optional)					Web		http://www.dualsun.com							
Street, Number		2 Rue Marc Donadille			E-mail		contact@dualsun.fr							
Postcode, City		13013 Marseille			Tel		+33 413415371							
Collector Type					WISC (Wind and/or infrared sensitive collector)									
Collector name					Power output per collector									
					$G_b = 850 \text{ W/m}^2$ , $G_d = 150 \text{ W/m}^2$ & $u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	80 K				
					m <sup>2</sup>	mm	mm	mm	W	W	W			
DualSun xxxM - 60 - 3BBPI (xxx = 285W to 315W in steps of 5W)					1,64	1.650	991	35	838	657	295	0	0	0
Power output per m <sup>2</sup> gross area					512	402	181	0	0	0				
Performance parameters test method		Steady state - indoor												
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		0,488	12,76	0,000	0,999	0,48	17,515	0,047	0,04	0,000	0,99			
Incidence angle modifier test method		Steady state - indoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		$K_{\theta T, coll}$	0,97	0,98	1,01	1,09	1,10	1,07	0,80	0,40	0,00			
Longitudinal		$K_{\theta L, coll}$	0,97	0,98	1,01	1,09	1,10	1,07	0,80	0,40	0,00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0,033	kg/(sm <sup>2</sup> )							
Maximum temperature difference during thermal performance test					$(\vartheta_m - \vartheta_a)_{max}$	50	K							
Standard stagnation temperature ( $G = 1000 \text{ W/m}^2$ ; $\vartheta_a = 30 \text{ °C}$ )					$\vartheta_{stg}$	80	°C							
Maximum operating temperature					$\vartheta_{max, op}$	80	°C							
Maximum operating pressure					$p_{max, op}$	150	kPa							
Testing laboratory		CTCV			http://www.ctcv.pt									
Test report(s)		R05.1/2019 R06.1/2019			Dated		30/04/2020 30/04/2020							
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
Thermal performance parameters are given for the PV-module working with max. electrical power output ('MPP mode')					 <small>CENTRO TECNOLOGICO DA CERÁMICA E DO VIDRO Rua Coronel Vega S/N. 4705 - 30° COMBRA</small>									
<p align="center">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	16458 Rev.2
	Issued	2020-04-30

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$													
Collector name	Standard Locations $\vartheta_m$	Athens			Davos			Stockholm			Würzburg		
		25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C
DualSun xxxM - 60 - 3BBPI (xxx = 285W to 315W in steps of 5W)		1.023	147	2	472	33		409	43		486	62	0
Annual output per m <sup>2</sup> gross area		626	90	1	288	20		250	27		297	38	0
Annual efficiency, $\eta_a$		35%	5%	0%	18%	1%		21%	2%		24%	3%	0%
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. 6.1 (September 2019). A detailed description of the calculations is available at <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>													

Additional Information			
Collector heat transfer medium	Water		
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)	A		--
G (W/m <sup>2</sup> ) >	1000	$\vartheta_a$ (°C) >	20
		$H_x$ (MJ/m <sup>2</sup> ) >	600
Maximum tested positive load	2500		Pa
Maximum tested negative load	2500		Pa
Hail resistance using steel ball (maximum drop height)	0,8		m

Additional collector attribute(s)			
<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection		
<input checked="" type="checkbox"/> Co-generating thermal and electrical power	<input type="checkbox"/> Façade collector(s)		

Energy Labelling Information	Additional Informative Technical Data		
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Hydraulic Designation Code	Aperture Area, $A_a$ (m <sup>2</sup> )
DualSun xxxM - 60 - 3BBPI (xxx = 285W to 315W in steps of 5W)	1,64	163-VH-24R-A:4.5,1456-C:220,890	1,58

Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$		
Collector efficiency ( $\eta_{col}$ )	7%	Zero-loss efficiency ( $\eta_0$ )	0,51
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 ( $a_1$ )	11,06
		Second-order coefficient ( $a_2$ )	0,000
		Incidence angle modifier IAM (50°)	1,16
		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.	