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Annex to Solar Keymark Certificate		Licence Number	011-7S3218 P
		Date issued	2026-06-15
		Issued by	DINCERTCO

Licence holder	**Dualsun SAS**	**Country**	France
Brand (optional)		**Web**	www.dualsun.com
Street, Number	2 rue Marc Donadille - CS 800001	**E-mail**	contact@dualsun.fr
Postcode, City	13453 Marseille Cedex 13	**Tel**	+33 413 415 371

Collector Type	Isotropic WISCollector (flat swimming pool absorber)

Collector name	**Gross area (A_G)**	**Gross length**	**Gross width**	**Power output per collector** G_b = 850 W/m², G_d = 150 W/m² & u = 1.3 m/s $\vartheta_m - \vartheta_a$						
				-10 K	0 K	10 K	30 K	50 K	70 K	50 K
	m²	mm	mm	W	W	W	W	W	W	W
DSTN455-96G12RTB-03	1.99	1,762	1,134	1,337	941	545	0	0	--	0
Power output per m² gross area				672	473	274	0	0	--	0

Performance parameters test method	Quasi dynamic									
Performance parameters (related to A_G)	η0, b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	J/(m²K)	s/m	W/(m²K⁴)	W/(m²K⁴)	-
Test results	0.439	29.27	0.000	5.508	0.00	21,828	0.020	0.00	0.0	1.00

Incidence angle modifier test method		Quasi dynamic - outdoor								
Incidence angle modifier for G_b	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	1.00	1.00	1.00	0.99	0.96	0.88	0.65	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	1.00	1.00	0.99	0.96	0.88	0.65	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)	dm/dt	0.047	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	20	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	70	°C
Maximum operating temperature	$\vartheta_{max\ op}$	80	°C
Maximum operating pressure	$p_{max,op}$	600	kPa

Testing laboratory	TÜV Rheinland Solar GmbH	www.tuv.com/solar	
Test report(s)	DE23IF5L 001 (EN 9806) DE23KLQE 004 (IEC 61215/ 61730) 300103547_Declaration_Dualsun_DSTN	**Dated**	11.12.2023 27.05.2026 15.06.2026

Comments of testing laboratory Ver. 6.3 (12.01.2026)

Documented new performance parameters are taken from Declaration 300103547_Declaration_Dualsun_DSTN (202606-15). The intial type testing was performed with the old PV module version DSTN 425-108M10TB-03 with only 1.95 m² groß area and 420 Wpeak electrical power. The electrical issues for the current electrical power class 455 Wpeak and 1.99 m² gross area are covered by the certificate PV 60174698 0003 2026-05-28.

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Supplementary Information	Issued	2026-06-15

Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m

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	25°C	50°C	75°C
DSTN455-96G12RTB-03		1,381	17		252	0		338	1		419	6	
Gross Thermal Yield per m² gross area		694	8	--	126	0	--	170	1	--	211	3	--
Annual efficiency, η_a		39%	0%	--	8%	0%	--	15%	0%	--	17%	0%	--
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m²			1630 kWh/m²			1166 kWh/m²			1244 kWh/m²		
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 ϑm (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.3 (12.01.2026). A detailed description of the calculations is available at http://www.estif.org/solarkeymarknew/

Additional Information

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)				A	--
G (W/m²) >	1000	ϑ_a (°C) >	20	H_x (MJ/m²) >	600
Maximum tested positive load				6600	Pa
Maximum tested negative load				3600	Pa
Hail resistance using ice balls (diameter)				25	mm

Additional collector attribute(s)

Using external power source(s) for normal operation	No	Active or passive measure(s) for self-protection	No
Co-generating thermal and electrical power	Yes	Façade collector(s)	No

Energy Labelling Information

	Reference Area, A_{sol} (m²)
DSTN455-96G12RTB-03	1.99

Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}

Collector efficiency (η_{col})	-32%

Remark: Collector efficiency (ηcol) 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 ηcol is based on reference area (Asol) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2017.

Additional Informative Technical Data

Hydraulic Designation Code	Aperture Area, A_a (m²)
304-V-1234S-A:2.7,1640-C:18.0,1132	1.99

Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}

Zero-loss efficiency (η_0)	0.47	--
First-order coefficient (a_1)	19.91	W/(m²K)
Second-order coefficient (a_2)	0.000	W/(m²K²)
Incidence angle modifier IAM (50°)	1.00	--

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.