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IGTE

Annex to Solar Keymark Certificate		Licence Number	011-7S2044 F
		Date issued	2023-11-16
		Issued by	DIN CERTCO

Licence holder	DOMUSA CALEFACCION S.COOP.	Country	ESPAÑA
Brand (optional)		Web	https://www.domusateknik.com
Street, Number	SAN ESTEBAN AUZOA Z/G	E-mail	info@domusateknik.com
Postcode, City	20737 ERREZIL (GIPUZKOA)	Tel	+34 943 81 38 99

Collector Type	Flat plate collector

Collector name	Gross area (A_G)	Gross length	Gross width	Gross height	Power output per collector Gb = 850 W/m2, Gd = 150 W/m2 & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
					0 K	10 K	30 K	50 K	70 K	115 K
	m²	mm	mm	mm	W	W	W	W	W	W
DS DRAIN 2.11	2.07	1'988	1'041	90	1'468	1'401	1'246	1'062	850	271
DS DRAIN 2.51	2.42	1'988	1'218	90	1'716	1'638	1'456	1'241	994	317
Power output per m² gross area					709	677	602	513	411	131

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	0.713	3.08	0.017	0.000	0.00	11'843	0.000	0.00	0.0E+00	0.97

Incidence angle modifier test method		Quasi dynamic - outdoor							
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	1.00	1.00	0.99	0.96	0.88	0.70	0.35	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	1.00	0.99	0.96	0.88	0.70	0.35	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)		dm/dt	0.020 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	85 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	200 °C
Maximum operating temperature		$\vartheta_{max\ op}$	135 °C
Maximum operating pressure		$p_{max,op}$	1000 kPa

Testing laboratory	Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)	http://www.igte.uni-stuttgart.de	
Test report(s)	23COL1695OEM01 23COL1696OEM01 23COL1696QOEM01	Dated	14.11.2023 14.11.2023 14.11.2023

Comments of testing laboratory	Ver. 6.2 (13.01.2022)
Documented performance parameters are taken from 23COL1695OEM01 (DS DRAIN 2.11)	TZS Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)

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Supplementary Information	Issued	2023-11-16

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
DS DRAIN 2.11	2'404	1'743	1'132	1'847	1'280	786	1'354	893	530	1'477	971	568
DS DRAIN 2.51	2'810	2'038	1'324	2'160	1'496	919	1'583	1'044	619	1'727	1'135	664
Gross Thermal Yield per m² gross area	1'161	842	547	892	618	380	654	431	256	714	469	274
Annual efficiency, η_a	66%	48%	31%	55%	38%	23%	56%	37%	22%	57%	38%	22%
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. 6.2 (13.01.2022). 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				3000	Pa
Maximum tested negative load				2750	Pa
Hail resistance using steel ball (maximum drop height)				2	m

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	No	Façade collector(s)	No

Energy Labelling Information

	Reference Area, A_{sol} (m²)
DS DRAIN 2.11	2.07
DS DRAIN 2.51	2.42

Data required for CDR (EU) No 811/2013 - Reference Area

Collector efficiency (η_{col})	56%

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)
1-H-1234S-9.1,18350-16.6,1095-D	1.89
1-H-1234S-9.1,21750-16.6,1272-D	2.24

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

Zero-loss efficiency (η_0)	0.71	--
First-order coefficient (a_1)	3.08	W/(m²K)
Second-order coefficient (a_2)	0.017	W/(m²K²)
Incidence angle modifier IAM (50°)	0.98	--

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.