TÜVRheinland®
DIN CERTCO
Precisely Right.

Annex to Solar Keymark Certificate

Licence Number	**011-7S1677 F**
Date issued	**2019-05-21**
Issued by	**ISFH CalTeC**

Licence holder	**Sanitär-Heinze GmbH & Co. KG**	**Country**	Germany
Brand (optional)	-	**Web**	
Street, Number	Thomas-Dachser Straße 2	**E-mail**	stefan.gockel@sanitaer-heinze.com
Postcode, City	D-83404 Ainring	**Tel**	+49 8654 475 183

Collector Type	Flat plate collector

Collector name	**Gross height**	**Gross area (A_G)**	**Gross length**	**Gross width**	**Aperture area (A_a)**	**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	85 K
	mm	m²	mm	mm	m²	W	W	W	W	W	W
Clima Saphirline	73	2.35	2 225	1 056	2.20	1 735	1 652	1 467	1 258	1 024	833
Clima Saphirline Q	73	2.35	1 056	2 225	2.20	1 735	1 652	1 467	1 258	1 024	833
Power output per m² gross area						738	703	624	535	436	354

Performance parameters test method	Steady state - indoor									
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	0.754	3.41	0.013			5 530				0.86

Incidence angle modifier test method	Steady state - indoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	0.99	0.98	0.95	0.91	0.84	0.69	0.24	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.98	0.95	0.91	0.84	0.69	0.24	0.00

Heat transfer medium for testing	Water		
Flow rate for testing (per gross area, A_G)	dm/dt	0.052	kg/(sm²)
Maximum temperature difference during thermal performance test	$(\vartheta_m-\vartheta_a)_{max}$	55	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	200	°C
Maximum operating temperature	$\vartheta_{max\ op}$	-	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	ASiC	-	
Test report(s)	P-201012004_1-OEM2 P-201012004_1-OEM 34-19/B	**Dated**	22.06.2011 22.06.2011

Comments of testing laboratory — Datasheet version: 6.0, 2018-10-30

Test results determined according to ÖNORM EN 12975-2:2006 by ASiC. ISFH CalTeC is not responsible for the test report results.
The performance parameter a5 is calculated according to ÖNORM EN 12975-2:2006.

Institut für
Solarenergieforschung GmbH
Am Ohrberg 1
D-31860 Emmerthal
Tel.: 05151/999-100
Fax: 05151/999-500

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Supplementary Information	Issued	2019-05-21

Annual collector output 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
Clima Saphirline		2 693	1 915	1 244	2 050	1 414	885	1 504	985	594	1 633	1 059	629
Clima Saphirline Q		2 693	1 915	1 244	2 050	1 414	885	1 504	985	594	1 633	1 059	629
Annual output per m² gross area		1 146	815	529	872	602	377	640	419	253	695	451	268
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m²			1714 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. 6.0 (October 2018). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium				Water-Glycole	
The collector is deemed to be suitable for roof integration				Yes	
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)				C	--
G (W/m²) >	850	ϑ_a (°C) >	10	H_x (MJ/m²) >	787
Maximum tested positive load				1000	Pa
Maximum tested negative load				1000	Pa
Hail resistance using steel ball (maximum drop height)				-	m

Additional collector attribute(s)

- ☐ Using external power source(s) for normal operation
- ☐ Active or passive measure(s) for self-protection
- ☐ Co-generating thermal and electrical power
- ☐ Wind and/or infrared sensitive collector(s) (WISC)
- ☐ Façade collector(s)

Energy Labelling Information

	Reference Area, A_{sol} (m²)	Hydraulic Designation Code
Clima Saphirline	2.35	{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}
Clima Saphirline Q	2.35	{F}-{O}-{CL}-{A:Ø,L}-{C:Ø,L}-{D}

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

Collector efficiency (η_{col})	58%

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.

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

Zero-loss efficiency (η_0)	0.74	--
First-order coefficient (a_1)	3.41	W/(m²K)
Second-order coefficient (a_2)	0.013	W/(m²K²)
Incidence angle modifier IAM (50°)	0.90	--

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.

DIN CERTCO ● Alboinstraße 56 ● 12103 Berlin, Germany
Tel: +49 30 7562-1131 ● Fax: +49 30 7562-1141 ● E-Mail: info@dincertco.de ● www.dincertco.de