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IGTE

Annex to Solar Keymark Certificate		Licence Number	011-7S2960 F
		Date issued	2019-12-18
		Issued by	DIN CERTCO

Licence holder	Solahart Australia Pty Ltd	Country	Australia
Brand (optional)		Web	www.rheem.com.au
Street, Number	55 Brodie Street	E-mail	Reena.Subramaniam@rheem.com.au
Postcode, City	2116, Rydalmere	Tel	+61 296 849 100

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	109 K
	m²	mm	mm	mm	W	W	W	W	W	W
CSA2612 Collector	2.58	2 285	1 130	82	1 868	1 783	1 588	1 360	1 099	496
Power output per m² gross area					724	691	616	527	426	192

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	0.733	3.14	0.016	0.000	0.00	10 210	0.000	0.00	0.0	0.92

Incidence angle modifier test method		Quasi dynamic - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	0.99	0.98	0.96	0.92	0.85	0.73	0.49	0.00	0.00
Longitudinal	$K_{\theta L,coll}$	0.99	0.98	0.96	0.92	0.85	0.73	0.49	0.00	0.00

Heat transfer medium for testing		Water-Glycole	
Flow rate for testing (per gross area, A_G)		dm/dt	0.020 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	79 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	186 °C
Maximum operating temperature		$\vartheta_{max\ op}$	n.a. °C
Maximum operating pressure		$p_{max,op}$	1400 kPa
Testing laboratory	Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)	http://www.igte.uni-stuttgart.de	
Test report(s)	14COL1228 14COL1228Q	Dated	10.11.2014 10.11.2014

Comments of testing laboratory	Datasheet version: 6.1, 2019-09-26
Thermal performance parameters are given from 14COL1228	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	2019-12-18

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
CSA2612 Collector	2 872	2 053	1 320	2 194	1 503	917	1 607	1 051	624	1 755	1 138	663
Annual output per m² gross area	1 113	796	512	850	583	356	623	407	242	680	441	257
Annual efficiency, η_a	63%	45%	29%	52%	36%	22%	53%	35%	21%	55%	35%	21%
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. 6.1 (September 2019). 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				2500	Pa
Hail resistance using steel ball (maximum drop height)				2	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
- ☐ Façade collector(s)

Energy Labelling Information

	Reference Area, A_{sol} (m²)
CSA2612 Collector	2.58

Additional Informative Technical Data

	Hydraulic Designation Code	Aperature Area, A_a (m²)
CSA2612 Collector	12-V-1234S-A:8,2140-C:24,1108-NoD	2.35

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

Collector efficiency (η_{col})	57%

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)	0.72	--
First-order coefficient (a_1)	3.14	W/(m²K)
Second-order coefficient (a_2)	0.016	W/(m²K²)
Incidence angle modifier IAM (50°)	0.86	--

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.