TÜVRheinland®
DIN CERTCO
Precisely Right.

Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results		Licence Number	011-7S2484 F
		Date issued	2017-08-09
		Issued by	DIN CERTCO

Licence holder	CORDIVARI SRL	Country	Italien
Brand (optional)		Web	www.cordivari.it
Street, Number	Zona Industriale Pagliare	E-mail	info@cordivari.it
Postcode, City	64020 Morro D'Oro (TE)	Tel	+39 8 580 401

Collector Type	Flat plate collector, glazed

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 = 3 m/s ϑm - ϑa					
					0 K	10 K	30 K	50 K	70 K	112 K
	m²	mm	mm	mm	W	W	W	W	W	W
PAN	2.02	2 006	1 007	85	1 404	1 331	1 175	1 007	829	417
Power output per m² gross area					695	659	582	499	410	206

Performance parameters test method	Quasi dynamic								
Performance parameters (related to AG)	η0,b	c1	c2	c3	c4	c6	Kd		
Units	-	W/(m²K)	W/(m²K²)	J/(m³K)	-	s/m	-		
Test results	0.696	3.581	0.007	0.000	0.000	0.000	0.993		

Incidence angle modifier test method	Quasi dynamic - outdoor								
Bi-directional incidence angle modifiers	No								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.00	0.99	0.98	0.96	0.92	0.86	0.73	0.34	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.98	0.96	0.92	0.86	0.73	0.34	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)		dm/dt	0.018	kg/(sm²)
Maximum temperature difference for thermal performance calculations		$(\vartheta_m-\vartheta_a)_{max}$	112	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	199	°C
Effective thermal capacity, incl. fluid (per gross area, A_G)		C/m²	11.669	kJ/(Km²)
Maximum operating temperature		ϑ_{max_op}	n.a.	°C
Maximum operating pressure		$p_{max,op}$	1000	kPa

Testing laboratory	TZS, ITW University Stuttgart	www.itw.uni-stuttgart.de	
Test report(s)	15COL1251/1 15COL1252Q/1	Dated	09.08.2017 09.08.2017

Comments of testing laboratory

Datasheet version: 5.01, 2016-03-01

This data sheet replaces the data sheet issuded on 04.03.2015
Documented performance parameters are taken from 15COL1251/1
The test reports were updated.
The max. operating pressue was changed from 1600 kPa to 1000 kPa

TZS Forschungs- und Testzentrum für Solaranlagen
Institut für Thermodynamik und Wärmetechnik
Universität Stuttgart
Pfaffenwaldring 6, 70550 Stuttgart (Vaihingen)

Annex to Solar Keymark Certificate	Licence Number	011-7S2484 F
Supplementary Information	Issued	2017-08-09

Annual collector output in kWh/collector at mean fluid temperature ϑ_m, based on ISO 9806:2013 test results

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
PAN	2 277	1 605	1 055	1 708	1 174	747	1 260	817	499	1 380	889	534
Annual output per m² gross area	1 127	795	522	846	581	370	624	405	247	683	440	264
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. 5.01 (March 2016). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

Additional Information

Collector heat transfer medium	Water-Glycole	
Hybrid Thermal and Photo Voltaic collector	No	
The collector is deemed to be suitable for roof integration	No	
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:		
Climate class (A, B or C)	B	--
Maximum tested positive load	2500	Pa
Maximum tested negative load	2250	Pa
Hail resistance using steel ball (maximum drop height)	n.a.	m

Energy Labelling Information

	Reference Area, A_{sol} (m^2)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}		
PAN	2.02	Collector efficiency (η_{col})	54	%
		Remark: Collector efficiency (η_{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/m², expressed in % and rounded to the nearest integer. Deviating from the regulation η_{col} is based on reference area (A_{sol}) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}		
		Zero-loss efficiency (η_0)	0.695	--
		First-order coefficient (a_1)	3.58	W/(m²K)
		Second-order coefficient (a_2)	0.007	W/(m²K²)
		Incidence angle modifier IAM (50°)	0.92	--
		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.		