Annex to Solar Keymark Certificate

Licence Number	**011-7S3017 R**
Date issued	**2021-05-26**
Issued by	**DIN CERTCO**

Licence holder	**Prisma Pro**	**Country**	Netherlands
Brand (optional)	Prisma Pro	**Web**	www.Prisma-Pro.nl
Street, Number	Symon Spiersweg 7D10	**E-mail**	info@Prisma-pro.nl
Postcode, City	1506, RZ Zaandam	**Tel**	+3175 6703958

Collector Type	Evacuated tubular 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	94 K
	m²	mm	mm	mm	W	W	W	W	W	W
Prisma Pro 8	1.74	1,917	910	133	936	914	867	814	755	677
Prisma Pro 9	1.96	1,917	1,020	133	1,055	1,030	976	916	850	762
Prisma Pro 10	2.17	1,917	1,130	133	1,168	1,140	1,081	1,015	941	844
Prisma Pro 12	2.59	1,917	1,350	133	1,394	1,361	1,290	1,211	1,123	1,007
Prisma Pro 14	3.01	1,917	1,570	133	1,620	1,582	1,499	1,407	1,306	1,171
Prisma Pro 15	3.22	1,917	1,680	133	1,733	1,692	1,604	1,506	1,397	1,252
Prisma Pro 16	3.43	1,917	1,790	133	1,846	1,803	1,709	1,604	1,488	1,334
Prisma Pro 18	3.85	1,917	2,010	133	2,072	2,023	1,918	1,800	1,670	1,498
Prisma Pro 20	4.28	1,917	2,230	133	2,303	2,249	2,132	2,001	1,856	1,665
Prisma Pro 21	4.49	1,917	2,340	133	2,416	2,360	2,237	2,099	1,948	1,746
Prisma Pro 22	4.70	1,917	2,450	133	2,529	2,470	2,341	2,198	2,039	1,828
Prisma Pro 24	5.12	1,917	2,670	133	2,755	2,691	2,551	2,394	2,221	1,992
Power output per m² gross area					538	526	498	468	434	389

Performance parameters test method	Steady state - outdoor									
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	0.540	1.21	0.004	0.000	0.00	4	0.000	0.00	0.0	0.98

Incidence angle modifier test method		Steady state - outdoor							
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.02	1.03	1.04	1.05	1.12	1.18	0.79	0.39	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	0.99	0.99	0.97	0.95	0.91	0.83	0.57	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	$(\vartheta_m-\vartheta_a)_{max}$	64	K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)	ϑ_{stg}	280	°C
Maximum operating temperature	$\vartheta_{max\ op}$	120	°C
Maximum operating pressure	$p_{max,op}$	1000	kPa

Testing laboratory	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch	http://www.intertek.com	
Test report(s)	150824106GZU-001	**Dated**	2015-09-06

Comments of testing laboratory

Datasheet version: 6.1, 2019-09-26

The "negative pressure test of the collector" according to EN 12975-2:2006,5.9.2 was not performed.
Test were performed based on EN 12975-2:2006.

Total Quality. Assured.

Constant Zhao

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Supplementary Information	Issued	2021-05-26

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
Prisma Pro 8	1,628	1,401	1,175	1,370	1,157	957	988	810	651	1,066	875	701
Prisma Pro 9	1,834	1,578	1,324	1,544	1,304	1,078	1,113	913	733	1,200	986	789
Prisma Pro 10	2,031	1,748	1,466	1,709	1,443	1,194	1,232	1,011	812	1,329	1,092	874
Prisma Pro 12	2,424	2,086	1,749	2,040	1,723	1,425	1,470	1,206	969	1,586	1,303	1,043
Prisma Pro 14	2,817	2,424	2,033	2,370	2,002	1,656	1,709	1,402	1,126	1,843	1,514	1,212
Prisma Pro 15	3,013	2,593	2,175	2,536	2,142	1,772	1,828	1,500	1,205	1,972	1,620	1,297
Prisma Pro 16	3,210	2,762	2,317	2,701	2,281	1,887	1,947	1,598	1,283	2,101	1,725	1,382
Prisma Pro 18	3,603	3,101	2,600	3,032	2,561	2,118	2,186	1,793	1,441	2,358	1,937	1,551
Prisma Pro 20	4,005	3,447	2,891	3,371	2,847	2,355	2,430	1,994	1,602	2,621	2,153	1,724
Prisma Pro 21	4,202	3,616	3,033	3,536	2,986	2,470	2,549	2,091	1,680	2,750	2,258	1,808
Prisma Pro 22	4,399	3,785	3,174	3,701	3,126	2,586	2,668	2,189	1,759	2,878	2,364	1,893
Prisma Pro 24	4,792	4,123	3,458	4,032	3,405	2,817	2,906	2,385	1,916	3,135	2,575	2,062
Annual output per m² gross area	936	805	675	788	665	550	568	466	374	612	503	403
Annual efficiency, η_a	53%	46%	38%	48%	41%	34%	49%	40%	32%	49%	40%	32%
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)					C	--
G (W/m²) >	800	ϑ_a (°C) >	10	H_x (MJ/m²) >		420
Maximum tested positive load					2860	Pa
Maximum tested negative load					-	Pa
Hail resistance using steel ball (maximum drop height)					0.8	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)
Prisma Pro 8	1.74
Prisma Pro 9	1.96
Prisma Pro 10	2.17
Prisma Pro 12	2.59
Prisma Pro 14	3.01
Prisma Pro 15	3.22
Prisma Pro 16	3.43
Prisma Pro 18	3.85
Prisma Pro 20	4.28
Prisma Pro 21	4.49
Prisma Pro 22	4.70
Prisma Pro 24	5.12

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

Collector efficiency (η_{col})	48%

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	Aperature Area, A_a (m²)
1-H-12S-C:22,985-D	''1.41''
1-H-12S-C:22,1095-D	''1.59''
1-H-12S-C:22,1205-D	''1.78''
1-H-12S-C:22,1425-D	''2.16''
1-H-12S-C:22,1645-D	''2.53'
1-H-12S-C:22,1755-D	''2.72''
1-H-12S-C:22,1865-D	''2.91''
1-H-12S-C:22,2085-D	''3.28''
1-H-12S-C:22,2305-D	''3.66''
1-H-12S-C:22,2415-D	''3.84''
1-H-12S-C:22,2525-D	''4.03''
1-H-12S-C:22,2745-D	''4.41''

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

Zero-loss efficiency (η_0)	0.54	--
First-order coefficient (a_1)	1.21	W/(m²K)
Second-order coefficient (a_2)	0.004	W/(m²K²)
Incidence angle modifier IAM (50°)	1.01	--

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.