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Annex to Solar Keymark Certificate		Licence Number	011-7S2971 R
		Date issued	2020-05-13
		Issued by	DIN CERTCO

Licence holder	Bio Energie op Maat BV	Country	Netherlands
Brand (optional)	SolCol	Web	www.solcol.nl
Street, Number	Julianaweg 4	E-mail	info@solcol.nl
Postcode, City	6265 AJ Sint Geertruid	Tel	+31 46 711 12 13

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	104 K
	m²	mm	mm	mm	W	W	W	W	W	W
SolCol CPC 6	1.16	1 640	707	103	644	636	618	595	569	516
Power output per m² gross area					555	548	532	513	490	445

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	0.559	0.646	0.004	0.000	0.00	7 914	0.000	0.00	0.0	0.96

Incidence angle modifier test method		Quasi dynamic - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.01	1.01	1.02	1.02	0.98	1.05	1.14	0.57	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.95	0.89	0.76	0.38	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)		dm/dt	0.172 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	74 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	301 °C
Maximum operating temperature		$\vartheta_{max\ op}$	160 °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)	14COL1031OEM09 14COL1032Q/2OEM09 06COL456/7	Dated	13.05.2020 13.05.2020 25.06.2015

Comments of testing laboratory	Datasheet version: 6.1, 2019-09-26
Documented performance parameters are taken from test report 06COL456/7	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	011-7S2971 R
Supplementary Information	Issued	2020-05-13

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
SolCol CPC 6		1 113	1 021	916	974	878	774	699	618	536	751	665	577
Annual output per m² gross area		959	881	790	840	757	667	603	533	462	647	574	497
Annual efficiency, η_a		54%	50%	45%	52%	46%	41%	52%	46%	40%	52%	46%	40%
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				2400	Pa
Maximum tested negative load				3000	Pa
Hail resistance using ice balls (diameter)				35	mm

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)
SolCol CPC 6	1.16

Additional Informative Technical Data

Hydraulic Designation Code	Aperature Area, A_a (m²)
6-V-12S-	1.00

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

Collector efficiency (η_{col})	52%

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)	0.56	--
First-order coefficient (a_1)	0.65	W/(m²K)
Second-order coefficient (a_2)	0.004	W/(m²K²)
Incidence angle modifier IAM (50°)	0.99	--

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.

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Annex to Solar Keymark Certificate		Licence Number	011-7S2971 R
		Date issued	2020-05-13
		Issued by	DIN CERTCO

Licence holder	Bio Energie op Maat BV	Country	Netherlands
Brand (optional)	SolCol	Web	www.solcol.nl
Street, Number	Julianaweg 4	E-mail	info@solcol.nl
Postcode, City	6265 AJ Sint Geertruid	Tel	+31 46 711 12 13

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	104 K
	m²	mm	mm	mm	W	W	W	W	W	W
SolCol CPC 6XL	1.45	2 057	707	103	831	821	797	768	735	668
Power output per m² gross area					573	566	550	530	507	461

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	0.577	0.666	0.004	0.000	0.00	8 167	0.000	0.00	0.0	0.96

Incidence angle modifier test method		Quasi dynamic - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.01	1.01	1.02	1.02	0.98	1.05	1.14	0.57	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.95	0.89	0.76	0.38	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)		dm/dt	0.172 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	74 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	301 °C
Maximum operating temperature		$\vartheta_{max\ op}$	160 °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)	14COL1031OEM09 14COL1032Q/2OEM09 06COL456/7	Dated	13.05.2020 13.05.2020 25.06.2015

Comments of testing laboratory	Datasheet version: 6.1, 2019-09-26
Documented performance parameters are taken from test report 06COL456/7	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	011-7S2971 R
Supplementary Information	Issued	2020-05-13

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
SolCol CPC 6XL		1 436	1 319	1 184	1 258	1 134	1 002	902	799	694	969	859	746
Annual output per m² gross area		990	909	817	867	782	691	622	551	478	668	593	515
Annual efficiency, η_a		56%	52%	46%	53%	48%	42%	53%	47%	41%	54%	48%	41%
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				2400	Pa
Maximum tested negative load				3000	Pa
Hail resistance using ice balls (diameter)				35	mm

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)
SolCol CPC 6XL	1.45

Additional Informative Technical Data

Hydraulic Designation Code	Aperature Area, A_a (m²)
6-V-12S-	1.29

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

Collector efficiency (η_{col})	54%

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)	0.57	--
First-order coefficient (a_1)	0.67	W/(m²K)
Second-order coefficient (a_2)	0.004	W/(m²K²)
Incidence angle modifier IAM (50°)	0.99	--

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.

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Licence holder	Bio Energie op Maat BV	Country	Netherlands
Brand (optional)	SolCol	Web	www.solcol.nl
Street, Number	Julianaweg 4	E-mail	info@solcol.nl
Postcode, City	6265 AJ Sint Geertruid	Tel	+31 46 711 12 13

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	104 K
	m²	mm	mm	mm	W	W	W	W	W	W
SolCol CPC 12	2.29	1 640	1 397	103	1 288	1 272	1 234	1 190	1 138	1 033
Power output per m² gross area					562	555	539	520	497	451

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	0.566	0.654	0.004	0.000	0.00	8 017	0.000	0.00	0.0	0.96

Incidence angle modifier test method		Quasi dynamic - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.01	1.01	1.02	1.02	0.98	1.05	1.14	0.57	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.95	0.89	0.76	0.38	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)		dm/dt	0.172 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	74 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	301 °C
Maximum operating temperature		$\vartheta_{max\ op}$	160 °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)	14COL1031OEM09 14COL1032Q/2OEM09 06COL456/7	Dated	13.05.2020 13.05.2020 25.06.2015

Comments of testing laboratory	Datasheet version: 6.1, 2019-09-26
Documented performance parameters are taken from test report 06COL456/7	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	011-7S2971 R
Supplementary Information	Issued	2020-05-13

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
SolCol CPC 12	2 224	2 042	1 832	1 948	1 755	1 549	1 398	1 237	1 072	1 500	1 330	1 154
Annual output per m² gross area	971	892	800	851	767	676	610	540	468	655	581	504
Annual efficiency, η_a	55%	51%	45%	52%	47%	41%	52%	46%	40%	53%	47%	41%
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				2400	Pa
Maximum tested negative load				3000	Pa
Hail resistance using ice balls (diameter)				35	mm

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)
SolCol CPC 12	2.29

Additional Informative Technical Data

Hydraulic Designation Code	Aperature Area, A_a (m²)
6-V-12S-	2.00

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

Collector efficiency (η_{col})	53%

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)	0.56	--
First-order coefficient (a_1)	0.65	W/(m²K)
Second-order coefficient (a_2)	0.004	W/(m²K²)
Incidence angle modifier IAM (50°)	0.99	--

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.

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Brand (optional)	SolCol	Web	www.solcol.nl
Street, Number	Julianaweg 4	E-mail	info@solcol.nl
Postcode, City	6265 AJ Sint Geertruid	Tel	+31 46 711 12 13

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	104 K
	m²	mm	mm	mm	W	W	W	W	W	W
SolCol CPC 12XL	2.87	2 057	1 397	103	1 656	1 636	1 588	1 531	1 465	1 332
Power output per m² gross area					577	570	553	534	511	464

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	0.581	0.671	0.004	0.000	0.00	8 220	0.000	0.00	0.0	0.96

Incidence angle modifier test method		Quasi dynamic - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.01	1.01	1.02	1.02	0.98	1.05	1.14	0.57	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.95	0.89	0.76	0.38	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)		dm/dt	0.172 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	74 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	301 °C
Maximum operating temperature		$\vartheta_{max\ op}$	160 °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)	14COL1031OEM09 14COL1032Q/2OEM09 06COL456/7	Dated	13.05.2020 13.05.2020 25.06.2015

Comments of testing laboratory	Datasheet version: 6.1, 2019-09-26
Documented performance parameters are taken from test report 06COL456/7	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	011-7S2971 R
Supplementary Information	Issued	2020-05-13

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
SolCol CPC 12XL	2 862	2 628	2 361	2 506	2 260	1 997	1 799	1 592	1 383	1 930	1 713	1 488
Annual output per m² gross area	997	916	823	873	788	696	627	555	482	673	597	519
Annual efficiency, η_a	56%	52%	47%	54%	48%	43%	54%	48%	41%	54%	48%	42%
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				2400	Pa
Maximum tested negative load				3000	Pa
Hail resistance using ice balls (diameter)				35	mm

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)
SolCol CPC 12XL	2.87

Additional Informative Technical Data

Hydraulic Designation Code	Aperature Area, A_a (m²)
6-V-12S-	2.57

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

Collector efficiency (η_{col})	54%

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)	0.58	--
First-order coefficient (a_1)	0.67	W/(m²K)
Second-order coefficient (a_2)	0.004	W/(m²K²)
Incidence angle modifier IAM (50°)	0.99	--

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.

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Annex to Solar Keymark Certificate		Licence Number	011-7S2971 R
		Date issued	2020-05-13
		Issued by	DIN CERTCO

Licence holder	Bio Energie op Maat BV	Country	Netherlands
Brand (optional)	SolCol	Web	www.solcol.nl
Street, Number	Julianaweg 4	E-mail	info@solcol.nl
Postcode, City	6265 AJ Sint Geertruid	Tel	+31 46 711 12 13

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	104 K
	m²	mm	mm	mm	W	W	W	W	W	W
SolCol CPC 18	3.42	1 640	2 087	103	1 933	1 909	1 853	1 787	1 709	1 551
Power output per m² gross area					565	558	542	522	500	454

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	0.569	0.657	0.004	0.000	0.00	8 053	0.000	0.00	0.0	0.96

Incidence angle modifier test method		Quasi dynamic - outdoor								
Incidence angle modifier	Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal	$K_{\theta T,coll}$	1.01	1.01	1.02	1.02	0.98	1.05	1.14	0.57	0.00
Longitudinal	$K_{\theta L,coll}$	1.00	1.00	0.99	0.98	0.95	0.89	0.76	0.38	0.00

Heat transfer medium for testing		Water	
Flow rate for testing (per gross area, A_G)		dm/dt	0.172 kg/(sm²)
Maximum temperature difference during thermal performance test		$(\vartheta_m-\vartheta_a)_{max}$	74 K
Standard stagnation temperature (G = 1000 W/m²; ϑ_a = 30 °C)		ϑ_{stg}	301 °C
Maximum operating temperature		$\vartheta_{max\ op}$	160 °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)	14COL1031OEM09 14COL1032Q/2OEM09 06COL456/7	Dated	13.05.2020 13.05.2020 25.06.2015

Comments of testing laboratory	Datasheet version: 6.1, 2019-09-26
Documented performance parameters are taken from test report 06COL456/7	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	011-7S2971 R
Supplementary Information	Issued	2020-05-13

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
SolCol CPC 18	3 340	3 066	2 752	2 924	2 636	2 327	2 099	1 857	1 611	2 253	1 998	1 734
Annual output per m² gross area	977	897	805	855	771	680	614	543	471	659	584	507
Annual efficiency, η_a	55%	51%	46%	52%	47%	42%	53%	47%	40%	53%	47%	41%
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				2400	Pa
Maximum tested negative load				3000	Pa
Hail resistance using ice balls (diameter)				35	mm

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)
SolCol CPC 18	3.42

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

Collector efficiency (η_{col})	53%

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)
6-V-12S-	3.00

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

Zero-loss efficiency (η_0)	0.57	--
First-order coefficient (a_1)	0.66	W/(m²K)
Second-order coefficient (a_2)	0.004	W/(m²K²)
Incidence angle modifier IAM (50°)	0.99	--

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.