



CERTIFIKAT

Solar Keymark Certificate No. SP SC0673-14

Holder/Issued to

Company: SunMotion GmbH
Address: Am Fuhrenkamp 5, 29396 Groß Oesingen, Germany

Product name and description

Vacuum tube thermal solar collectors for water heating. For technical information see Appendix.

Models:	solarnorm VC10	solarnorm VC12	solarnorm VC15
	solarnorm VC18	solarnorm VC20	solarnorm VC22
	solarnorm VC24	solarnorm VC25	solarnorm VC30

Certificate

The product mentioned above is found to comply with requirements in EN 12975-1:2006+A1:2010 and the Specific CEN Keymark Scheme Rules for Solar Thermal Products, and are based on test results according to EN 12975-2:2006.

Marking

Products conforming to this certificate shall be marked in accordance with the requirements in the Specific CEN Keymark Scheme Rules for Solar Thermal Products. The marking shall, together with the Keymark logo, show the identification code of the empowered certification body (SP Technical Research Institute of Sweden, No. 012), also see CEN-CENELEC Internal Regulations Part 4 Certification, Annex A.

Validity

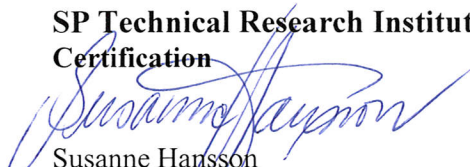
This certificate is valid until 2019-06-24 provided that the conditions in the Solar Keymark Rules are fulfilled and the standard or rules are not modified significantly. The validity of the certificate can be checked in the database, see Solar Keymark website <http://www.solarkeymark.org>

Miscellaneous

The manufacturer's factory production control procedures are under surveillance by the responsibility of SP. This is the first version of this certificate.

Borås, Sweden 2014-07-11

SP Technical Research Institute of Sweden
Certification


Susanne Hansson
Certification Officer



SP Technical Research Institute of Sweden

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Empowered Certification Body No. 012: SP Certification, Sweden
For more information of Solar Keymark visit: www.solarkeymar.org
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Annex to Solar Keymark Certificate

Page 1/2

						Licence Number		SP SC0673-14				
Annex Solar KEYMARK, summary of EN 12975 Test Results						Issued		2014-07-11				
Company holding the		SunMotion GmbH				Country		Germany				
Brand (optional)		solarnorm				Website		www.sunmotion-gmbh.com				
Street, street number		Am Fuhrenkamp 5				E-mail		info@sunmotion-gmbh.com				
Postal Code / City, province		29396		Groß Oesingen		Tel/Fax		49 (0)5838 991400/5838 2283274				
Collector Type (flat plate glazed/un-glazed; evacuate tubular)						Evacuated tubular collector						
Thermal / photo voltaic hybrid collector? (PVT collector)						No						
Integration in the roof possible ? (manufacturers declaration)						No						
Collector name	Aperture area (Aa) m ²	Gross length mm	Gross width mm	Gross height mm	Gross area (AG) m ²	Power output per collector module						
						G = 1000 W/m ²						
						Tm-Ta						
						0 K	10 K	30 K	50 K	70 K		
						W	W	W	W	W		
solarnorm VC10	0.94	1 990	845	137	1.68	744	731	687	620	529		
solarnorm VC12	1.13	1 990	1 090	137	2.17	892	877	824	743	634		
solarnorm VC15	1.41	1 990	1 330	137	2.65	1 115	1 095	1 029	928	793		
solarnorm VC18	1.70	1 990	1 570	137	3.12	1 338	1 314	1 235	1 114	951		
solarnorm VC20	1.89	1 990	1 730	137	3.44	1 487	1 461	1 373	1 239	1 057		
solarnorm VC22	2.07	1 990	1 890	137	3.76	1 636	1 607	1 511	1 363	1 163		
solarnorm VC24	2.26	1 990	2 050	137	4.08	1 785	1 753	1 648	1 486	1 269		
solarnorm VC25	2.36	1 990	2 130	137	4.24	1 859	1 826	1 716	1 548	1 322		
solarnorm VC30	2.83	1 990	2 455	137	4.89	2 231	2 192	2 060	1 858	1 586		
Performance test method						Glazed liquid heating collector - steady state - outdoor						
Performance parameters related to aperture		η ₀	a ₁	a ₂								
Units		-	W/(m ² K)	W/(m ² K ²)								
Test results - Flow rate and fluid see note 1		0.789	1.088	0.031								
Bi-directional incidence angle modifiers?		Yes	Kθ values are obligatory for 50°.									
Incidence angle modifiers Kθ(θT) transversal direction		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
		Kθ(θT)		1.06		1.18		1.47			0.00	
Incidence angle modifiers Kθ(θL) longitudinal direction		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
		Kθ(θL)					0.92				0.00	
Stagnation temperature - Weather conditions see note 2						Tstg	247.9	°C				
Effective thermal capacity						ceff = C/Ag	2.79	kJ/(m ² K)				
Max. intended operation temperature - see note 3						Tmax,op	226	°C				
Max. operation pressure - see note 3						pmax,op	600	kPa				
Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m ² aperture area												
Flow rate	kg/(s m ²)	0.005	0.011	0.017	0.024	0.030						
Pressure drop, ΔP	Pa	50	110	235	410	621						
Optional weather data		Location				Link						
Testing Laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch										
Website		www.intertek.com										
Test report id. number		130628151GZU-001				Date of test report		2014-03-27				
During the test GDIF/GTOT was always between		0.1	and	0.2								
Comments of testing laboratory:												
The "negative pressure test of the collector" according to EN 12975-2:2006,5.9.2 was not performed.												
Note 1	Flow rate	0.020	kg/(s m ²)	Fluid	Water							
Note 2	Irradiance, G = 1000 W/m ² ; Ambient temperature, Ta=30 °C											
Note 3	Given by manufacturer											
Pr/c 4P05050/OBLSC1413-13						Datasheet version: 4.06, 2014-01-15						
SP Technical Research Institute of Sweden Box 857, 501 15 Borås, Sweden												

Annex to Solar Keymark Certificate

Page 2/2

Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	SP SC0673-14
	Issued	2014-07-11

Annual collector output kWh/module													
Collector name	Location and collector temperature (T _m)												
	Athens			Davos			Stockholm			Würzburg			
	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	
solarnorm VC10	1 354	1 163	888	1 145	916	653	835	659	461	898	713	495	
solarnorm VC12	1 624	1 395	1 065	1 374	1 099	783	1 002	791	553	1 077	855	593	
solarnorm VC15	2 030	1 743	1 330	1 716	1 373	978	1 251	988	691	1 346	1 069	741	
solarnorm VC18	2 436	2 092	1 596	2 060	1 648	1 174	1 502	1 186	829	1 615	1 283	889	
solarnorm VC20	2 707	2 326	1 774	2 290	1 831	1 305	1 669	1 318	922	1 795	1 425	989	
solarnorm VC22	2 979	2 559	1 952	2 519	2 015	1 435	1 837	1 450	1 014	1 975	1 568	1 088	
solarnorm VC24	3 249	2 791	2 129	2 748	2 198	1 565	2 003	1 582	1 106	2 154	1 711	1 186	
solarnorm VC25	3 384	2 907	2 218	2 862	2 289	1 631	2 086	1 647	1 152	2 244	1 782	1 236	
solarnorm VC30	4 062	3 489	2 662	3 435	2 748	1 957	2 504	1 977	1 383	2 693	2 139	1 483	

Collector mounting: Fixed or tracking	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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Overview of locations				
Location	Latitude °	G _{tot} kWh/m ²	T _a °C	Collector orientation or tracking mode
Athens	38	1 765	18.5	South, 25°
Davos	47	1 714	3.2	South, 30°
Stockholm	59	1 166	7.5	South, 45°
Würzburg	50	1 244	9.0	South, 35°

G _{tot}	Annual total irradiation on collector plane	kWh/m ²
T _a	Mean annual ambient air temperature	°C
T _m	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (T_m). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

SP Technical Research Institute of Sweden Box 857, 501 15 Borås, Sweden	Datasheet version:	4.06, 2014-01-15
	ScenoCalc version:	Ver. 4.06 (Jan, 2014)