

Holder/Issued to/Manufacturer

Westech-Solar Energy GmbH

Robert-Koch-Strasse 3a, 82 152 Planegg, Germany

Product name and description

Vacuum tube solar thermal collector for water heating.
For technical information see Appendix (2 pages).

Model: Sunworker Extreme-20

Performance specification

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

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 (RISE Research Institutes of Sweden AB, No. 012), also see CEN-CENELEC Internal Regulations Part 4 Certification, Annex A.

Validity

This certificate is valid until 2019-12-31 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 RISE. This certificate was first issued 2015-04-28. RISE certification rules SPCR 402 for Keymark – Solar Thermal Products applies.

Johan Åkesson

Magnus Sturesson

Certificate No. SC0319-15 | issue 2 | 2019-04-03


RISE Research Institutes of Sweden AB | Certification
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2017-08-08



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Annex to Solar Keymark Certificate						Licence Number		SC0319-15				
						Date issued		2019-04-03				
						Issued by		RISE				
Licence holder		Westech-Solar Energy GmbH				Country		Germany				
Brand (optional)		Westech-Solar Energy GmbH				Web		www.westech-solar.com				
Street, Number		Robert-Koch-Strasse 3a				E-mail		info@westech-solar.com				
Postcode, City		82152 Planegg				Tel		+49 8 989 545 770				
Collector Type						Evacuated tubular collector						
Collector name						Power output per collector						
						$G_b = 850 \text{ W/m}^2$, $G_d = 150 \text{ W/m}^2$ & $u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$						
		Gross height	Gross area (A_G)	Gross length	Gross width	Aperture area (A_a)	0 K	10 K	30 K	50 K	70 K	90 K
		mm	m ²	mm	mm	m ²	W	W	W	W	W	W
Sunworker Extreme-20		132	3,02	1 944	1 554	1,89	1 405	1 381	1 304	1 189	1 034	838
Power output per m ² gross area						465	457	432	393	342	277	
Performance parameters test method		Steady state - outdoor										
Performance parameters (related to A_G)		$\eta_{0, b}$	a1	a2	a3	a4	a5	a6	a7	a8	Kd	
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-	
Test results		0,462	0,631	0,016	0,000	0,000	0,000	0,000	0,000	0,000	1,04	
Incidence angle modifier test method		Steady state - outdoor										
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal		$K_{\theta T, coll}$	1,03	1,06	1,16	1,26	1,37	1,47	0,98	0,49	0,00	
Longitudinal		$K_{\theta L, coll}$	1,00	0,99	0,97	0,94	0,89	0,80	0,62	0,31	0,00	
Heat transfer medium for testing						Water						
Flow rate for testing (per gross area, A_G)						dm/dt	0,012	kg/(sm ²)				
Maximum temperature difference during thermal performance test						$(\vartheta_m - \vartheta_a)_{max}$	60,39	K				
Standard stagnation temperature ($G = 1000 \text{ W/m}^2$; $\vartheta_a = 30 \text{ }^\circ\text{C}$)						ϑ_{stg}	220	°C				
Maximum operating temperature						$\vartheta_{max, op}$	125	°C				
Maximum operating pressure						$p_{max, op}$	1200	kPa				
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou				http://www.intertek.com						
Test report(s)		150316080GZU-001				Dated		2015-04-10				
Comments of testing laboratory						Datasheet version: 6.0, 2018-10-30						
The "negative pressure test of the collector" according to EN 12975-2:2006, 5.9.2 was not performed.						 <i>William zheng</i>						
Tests were performed based on EN 12975-2:2006.												
<p align="center">RISE Research Institutes of Sweden AB Certification Box 857, SE-501 15 Borås, Sweden, Phone: +46 10-516 50 00, certifiering@ri.se www.ri.se</p>												

Annex to Solar Keymark Certificate	Licence Number	SC0319-15
Supplementary Information	Issued	2019-04-03

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
Sunworker Extreme-20	2 640	2 300	1 814	2 245	1 838	1 367	1 636	1 322	964	1 758	1 428	1 036	
Annual output per m ² gross area		874	761	600	743	608	453	542	438	319	582	473	343
Fixed or tracking collector	Fixed (slope = latitude - 15°; rounded to nearest 5°)												
Annual irradiation on collector plane	1765 kWh/m ²			1714 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²			
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 ϑ_m (mean of in- and outlet temperatures). The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool Scenocalc Ver. 6.0 (October 2018). A detailed description of the calculations is available at www.solarkeymark.org/scenocalc

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/m ²) >	800	ϑ_a (°C) >	10
		H_x (MJ/m ²) >	420
Maximum tested positive load			3200 Pa
Maximum tested negative load			-- Pa
Hail resistance using steel ball (maximum drop height)			1,0 m

Additional collector attribute(s)	
<input type="checkbox"/> Using external power source(s) for normal operation	<input type="checkbox"/> Active or passive measure(s) for self-protection
<input type="checkbox"/> Co-generating thermal and electrical power	<input type="checkbox"/> Wind and/or infrared sensitive collector(s) (WISC)
<input type="checkbox"/> Façade collector(s)	

Energy Labelling Information		
	Reference Area, A _{sol} (m ²)	Hydraulic Designation Code
Sunworker Extreme-20	3,02	1-H-12S-C:20,1640-D

Data required for CDR (EU) No 811/2013 - Reference Area A _{sol}	Data required for CDR (EU) No 812/2013 - Reference Area A _{sol}			
Collector efficiency (η_{col})	41%	Zero-loss efficiency (η_0)	0,47	--
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/m ² , 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 9806:2017.		First-order coefficient (a_1)	0,63	W/(m ² K)
		Second-order coefficient (a_2)	0,016	W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1,16	--
		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.		