



CERTIFICATE

Solar Keymark Certificate No. SP SC0533-13

Holder/Issued to/Manufacturer

Company: Hark GmbH & Co. KG
Address: Hochstraße 197213, DE47228, DUISBURG, GERMANY

Product name and description

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

Models:	HARK-VRK-58/1800-12-C	HARK-VRK-58/1800-15-C	HARK-VRK-58/1800-18-C
	HARK-VRK-58/1800-20-C	HARK-VRK-58/1800-22-C	HARK-VRK-58/1800-24-C
	HARK-VRK-58/1800-30-C		

Certificate

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 (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 2022-05-10 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 certificate was first issued 2013-05-24. This is issue number 2.

Borås, Sweden 2017-08-17

SP Technical Research Institute of Sweden Certification

Lennart Aronsson
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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
This certificate may not be reproduced other than in full, except with the prior written approval by SP. SP Certification rules SPCR402 applies.

Annex to Solar Keymark Certificate - Summary of ISO 9806:2013 Test Results						Licence Number		SP SC0533-13			
						Date issued		2017-08-17			
						Issued by		SP			
Licence holder		Hark GmbH & Co. KG				Country		Germany			
Brand (optional)		HARK				Web		www.hark.de			
Street, Number		Hochstrasse 197-213				E-mail		k.esmatullah@hark.de			
Postcode, City		47228		Duisburg		Tel		+49 341-4615842			
Collector Type						Evacuated tubular collector					
Collector name	Gross area (A _G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² ; G _d = 150 W/m ² ϑ _m - ϑ _a						
					0 K W	10 K W	30 K W	50 K W	70 K W	55 K W	
HARK-VRK-58/1800-12-C	2,09	1983	1056	100	815	794	731	637	513	606	
HARK-VRK-58/1800-15-C	2,57	1983	1296	100	1000	975	897	782	630	744	
HARK-VRK-58/1800-18-C	3,05	1983	1536	100	1185	1155	1063	927	746	882	
HARK-VRK-58/1800-20-C	3,36	1983	1696	100	1308	1275	1173	1023	824	974	
HARK-VRK-58/1800-22-C	3,68	1983	1856	100	1432	1396	1284	1120	902	1065	
HARK-VRK-58/1800-24-C	4,00	1983	2016	100	1555	1516	1395	1216	980	1157	
HARK-VRK-58/1800-30-C	4,95	1983	2496	100	1925	1877	1727	1506	1213	1433	
Power output per m ² gross area					389	379	349	304	245	289	
Performance parameters test method		Steady state - outdoor									
Performance parameters (related to AG)		η _{0,hem}	a ₁	a ₂							
Units		-	W/(m ² K)	W/(m ² K ²)							
Test results		0,389	0,796	0,018							
Incidence angle modifier test method		Quasi dynamic - outdoor									
Bi-directional incidence angle modifiers		Yes									
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal		K _{θT, coll}	1,05	1,09	1,17	1,25	1,35	1,44	0,96	0,48	0,00
Longitudinal		K _{θL, coll}	0,98	0,96	0,94	0,92	0,90	0,68	0,45	0,23	0,00
Heat transfer medium for testing		Water									
Flow rate for testing (per gross area, A _G)		dm/dt	0,011	kg/(sm ²)							
Maximum temperature difference for thermal performance calculations		(ϑ _m -ϑ _a) _{max}	55,46	K							
Standard stagnation temperature (G = 1000 W/m ² ; ϑ _a = 30 °C)		ϑ _{stg}	230	°C							
Effective thermal capacity, incl. fluid (per gross area, A _G)		C/m ²	12,15	kJ/(Km ²)							
Maximum operating temperature		ϑ _{max, op}	95	°C							
Maximum operating pressure		p _{max, op}	600	kPa							
Testing laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch				www.intertek.com					
Test report(s)		GZ11121720-1				Dated		2012-05-11			
Comments of testing laboratory		The "negative pressure test of the collector" according to EN12975-2:2006,5.9.2 was not performed.				Datashet version: 5.01, 2016-03-01					
		Tests were performed based on EN 12975-2:2006.									
Certification Body: SP Technical Research Institute of Sweden Box 857, 501 15 Borås, Sweden											
www.sp.se info@sp.se tel +4610 516 5000											

Annex to Solar Keymark Certificate

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	SP SC0533-13
	Issued	2017-08-17

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
HARK-VRK-58/1800-12-C		1490	1220	865	1227	928	604	900	669	431	970	724	459
HARK-VRK-58/1800-15-C		1829	1497	1061	1506	1139	741	1105	821	529	1190	889	563
HARK-VRK-58/1800-18-C		2168	1774	1258	1785	1349	879	1310	973	627	1411	1053	667
HARK-VRK-58/1800-20-C		2393	1959	1389	1970	1490	970	1446	1075	692	1558	1163	737
HARK-VRK-58/1800-22-C		2619	2144	1520	2156	1631	1062	1582	1176	757	1705	1273	806
HARK-VRK-58/1800-24-C		2845	2328	1651	2342	1771	1153	1719	1277	822	1852	1383	876
HARK-VRK-58/1800-30-C		3522	2883	2044	2900	2193	1428	2128	1581	1018	2293	1712	1084
Annual output per m ² gross area		712	582	413	586	443	288	430	320	206	463	346	219
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. 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)	C	--
Maximum tested positive load	2500	Pa
Maximum tested negative load	--	Pa
Hail resistance using steel ball (maximum drop height)	--	m

Energy Labelling Information

	Reference Area, A_{sol} (m ²)	Data required for CDR (EU) No 811/2013 - Reference Area A_{sol}	
SPA-58/1800-12	2,09	Collector efficiency (η_{col})	33 %
SPA-58/1800-15	2,57	<i>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.</i>	
SPA-58/1800-18	3,05		
SPA-58/1800-20	3,36		
SPA-58/1800-22	3,68		
SPA-58/1800-24	4,00		
SPA-58/1800-30	4,95		
		Data required for CDR (EU) No 812/2013 - Reference Area A_{sol}	
		Zero-loss efficiency (η_0)	0,389 --
		First-order coefficient (a_1)	0,80 W/(m ² K)
		Second-order coefficient (a_2)	0,018 W/(m ² K ²)
		Incidence angle modifier IAM (50°)	1,15 --
<i>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.</i>			