

**Holder/Issued to/Manufacturer**

## Värmebaronen AB

Arkelstorpsvägen 88, 291 94 Kristianstad

**Product name and description**

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

Model: K2 PLUS

**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 2023-06-30 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 2014-07-03. RISE certification rules SPCR 402 for Keymark – Solar Thermal Products applies.

Martin Tillander

Magnus Sturesson

Certificate No. SC0861-13 | issue 2 | 2019-07-05


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		SC0861-13				
						Date issued		2019-07-05				
						Issued by		RISE				
Licence holder		Värmebaronen AB				Country		Sweden				
Brand (optional)		K2 PLUS				Web		www.varmebaronen.com				
Street, Number		Arkelstorpvägen 88				E-mail		info@varmebaronen.se				
Postcode, City		291 94, Kristianstad				Tel		+46 44 22 63 20				
Collector Type						Flat plate collector						
Collector name		Gross height	Gross area (A <sub>G</sub> )	Gross length	Gross width	Aperture area (A <sub>a</sub> )	Power output per collector					
							G <sub>b</sub> = 850 W/m <sup>2</sup> , G <sub>d</sub> = 150 W/m <sup>2</sup> & u = 1.3 m/s $\vartheta_m - \vartheta_a$					
		mm	m <sup>2</sup>	mm	mm	m <sup>2</sup>	0 K W	10 K W	30 K W	50 K W	70 K W	99 K W
K2 PLUS		118	2,40	2 000	1 200	2,25	1 834	1 777	1 647	1 494	1 318	1 021
Power output per m <sup>2</sup> gross area							764	740	686	622	549	426
Performance parameters test method		Quasi dynamic										
Performance parameters (related to A <sub>G</sub> )		η <sub>0</sub> , b	a1	a2	a3	a4	a5	a6	a7	a8	Kd	
Units		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	J/(m <sup>2</sup> K)	s/m	W/(m <sup>2</sup> K <sup>4</sup> )	W/(m <sup>2</sup> K <sup>4</sup> )	-	
Test results		0,780	2,60	0,012	0,216	0,00	0	0,000	0,00	0,0E+00	0,86	
Incidence angle modifier test method		Quasi dynamic - outdoor										
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Transversal		K <sub>θT, coll</sub>	1,00	0,99	0,97	0,92	0,86	0,77	0,60	0,30	0,00	
Longitudinal		K <sub>θL, coll</sub>	1,00	0,99	0,97	0,92	0,86	0,77	0,60	0,30	0,00	
Heat transfer medium for testing						Water-Glycole						
Flow rate for testing (per gross area, A <sub>G</sub> )						dm/dt	0,020	kg/(sm <sup>2</sup> )				
Maximum temperature difference during thermal performance test						(ϑ <sub>m</sub> - ϑ <sub>a</sub> ) <sub>max</sub>	69	K				
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ϑ <sub>a</sub> = 30 °C)						ϑ <sub>stg</sub>	220	°C				
Maximum operating temperature						ϑ <sub>max, op</sub>	130	°C				
Maximum operating pressure						p <sub>max, op</sub>	1000	kPa				
Testing laboratory		SP Technical Research Institutes of Sweden				http://www.ri.se						
Test report(s)		PX26105				Dated		2013-04-12				
Comments of testing laboratory						Datasheet version: 6.0, 2018-10-30						
												
<p>RISE Research Institutes of Sweden AB   Certification</p> <p>Box 857, SE-501 15 Borås, Sweden, Phone: +46 10-516 50 00, certifiering@ri.se   www.ri.se</p>												

<b>Annex to Solar Keymark Certificate</b>	<b>Licence Number</b>	<b>SC0861-13</b>
<b>Supplementary Information</b>	<b>Issued</b>	<b>2019-07-05</b>

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$													
Collector name	Standard Locations $\vartheta_m$	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
K2 PLUS		2 835	2 211	1 614	2 296	1 761	1 271	1 658	1 218	847	1 794	1 322	911
Annual output per m <sup>2</sup> gross area		1 181	921	672	957	734	529	691	508	353	747	551	380
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1714 kWh/m <sup>2</sup>			1166 kWh/m <sup>2</sup>			1244 kWh/m <sup>2</sup>		
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  $\vartheta_m$  (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](http://www.solarkeymark.org/scenocalc)

Additional Information					
Collector heat transfer medium	Water-Glycole				
The collector is deemed to be suitable for roof integration	Yes				
The collector was tested successfully under the following conditions:					
Climate class (A+, A, B or C)			C	--	
G (W/m <sup>2</sup> ) >	800	$\vartheta_a$ (°C) >	10	$H_x$ (MJ/m <sup>2</sup> ) >	420
Maximum tested positive load			1500	Pa	
Maximum tested negative load			1000	Pa	
Hail resistance using steel ball (maximum drop height)			--	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 <sup>2</sup> )	Hydraulic Designation Code
K2 PLUS	2,40	1-H-12V-A:9,17868-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 ( $\eta_{col}$ )	66%	Zero-loss efficiency ( $\eta_0$ )	0,76	--
Remark: Collector efficiency ( $\eta_{col}$ ) 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 <sup>2</sup> , expressed in % and rounded to the nearest integer. Deviating from the regulation $\eta_{col}$ 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 ( $a_1$ )	2,23	W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0,012	W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0,85	--
		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.		