



# CERTIFICATE

## Solar Keymark Certificate

No. SP SC0840-14

### Holder/Issued to/Manufacturer

Company: Arcon-Sunmark A/S

Address: Skørping Nord 3, DK-9520 Skørping, Denmark

### Product name and description

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

Models:	<b>HTHEATboost 35/08</b>
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### 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 ISO 9806:2013 Solar thermal collectors – 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 2019-10-31 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 SP. This certificate was first issued 2014-10-31. This is issue 3.

Borås, Sweden 2016-07-14

### SP Technical Research Institute of Sweden Certification

Lennart Månsson  
Certification Manager

Lennart Aronsson  
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](http://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

<b>Annex to Solar Keymark Certificate - Summary of EN ISO 9806:2013 Test Results</b>					<b>Licence Number</b>		<b>SP SC0840-14</b>				
					<b>Date issued</b>		<b>2016-07-14</b>				
					<b>Issued by</b>		<b>SP</b>				
<b>Licence holder</b>	<b>Arcon-Sunmark A/S</b>				<b>Country</b>	Denmark					
<b>Brand (optional)</b>	HTHEATboost 35/08				<b>Web</b>	http://arcon-sunmark.com/					
<b>Street, Number</b>	Skørping Nord 3				<b>E-mail</b>	info@arcon-sunmark.com					
<b>Postcode, City</b>	DK-9520 Skørping				<b>Tel</b>	+45 9839 1477					
<b>Collector Type</b>					Flat plate collector, glazed						
<b>Collector name</b>	<b>Gross area (A<sub>G</sub>)</b> m <sup>2</sup>	<b>Gross length</b> mm	<b>Gross width</b> mm	<b>Gross height</b> mm	<b>Power output per collector</b> G <sub>b</sub> = 850 W/m <sup>2</sup> ; G <sub>d</sub> = 150 W/m <sup>2</sup> ; u = 3 m/s ϑ <sub>m</sub> - ϑ <sub>a</sub>						
					0 K W	10 K W	30 K W	50 K W	70 K W	70 K W	
<b>HTHEATboost 35/08</b>	13.57	5 973	2 272	1 450	10 634	10 219	9 317	8 317	7 219	7 219	
<b>Power output per m<sup>2</sup> gross area</b>					784	753	687	613	532	532	
<b>Performance parameters test method</b>		Quasi dynamic									
<b>Performance parameters (related to AG)</b>		η <sub>0,b</sub>	c1	c2	c3	c4	c6	Kd			
<b>Units</b>		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )	J/(m <sup>3</sup> K)	-	s/m	-			
<b>Test results</b>		0.786	2.965	0.009	0.000	0.000	0.000	0.980			
<b>Incidence angle modifier test method</b>		Quasi dynamic - outdoor									
<b>Bi-directional incidence angle modifiers</b>		No									
<b>Incidence angle modifier</b>		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
<b>Transversal</b>		K <sub>θT, coll</sub>	1.00	0.99	0.97	0.95	0.90	0.82	0.66	0.33	0.00
<b>Longitudinal</b>		K <sub>θL, coll</sub>	1.00	0.99	0.97	0.95	0.90	0.82	0.66	0.33	0.00
<b>Heat transfer medium for testing</b>					Water						
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>					dm/dt	0.041	kg/(sm <sup>2</sup> )				
<b>Maximum temperature difference for thermal performance calculations</b>					(ϑ <sub>m</sub> -ϑ <sub>a</sub> ) <sub>max</sub>	70	K				
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; ϑ<sub>a</sub> = 30 °C)</b>					ϑ <sub>stg</sub>	220	°C				
<b>Effective thermal capacity, incl. fluid (per gross area, A<sub>G</sub>)</b>					C/m <sup>2</sup>	7.564	kJ/(Km <sup>2</sup> )				
<b>Maximum operating temperature</b>					ϑ <sub>max, op</sub>	110	°C				
<b>Maximum operating pressure</b>					p <sub>max, op</sub>	1000	kPa				
<b>Testing laboratory</b>		SP Technical Research Institute of Sweden				http://www.sp.se/en					
<b>Test report(s)</b>		6P02267-B-Rev 1 4P04266-B-Rev 2				<b>Dated</b>		2016-07-06 2015-11-10			
<b>Comments of testing laboratory</b>					Datasheet version: 5.01, 2016-03-01						
Certification Body: <b>SP Technical Research Institute of Sweden</b> Box 857, 501 15 Borås, Sweden www.sp.se info@sp.se phone: +46(0) - 10 516 50 00											



# Annex to Solar Keymark Certificate

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	SP SC0840-14
	Issued	2016-07-14

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
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
HTHEATboost 35/08		17 208	13 180	9 548	13 555	10 123	7 152	9 889	7 035	4 782	10 773	7 656	5 137
Annual output per m <sup>2</sup> gross area		1 268	971	704	999	746	527	729	518	352	794	564	379
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. 5.01 (March 2016). 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	
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)	A	--
Maximum tested positive load	1000	Pa
Maximum tested negative load	1000	Pa
Hail resistance using steel ball (maximum drop height)	2.2	m

Energy Labelling Information			
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area $A_{sol}$	
HTHEATboost 35/08	13.57	Collector efficiency ( $\eta_{col}$ )	65 %
		<i>Remark: Collector efficiency (<math>\eta_{col}</math>) 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 <math>\eta_{col}</math> is based on reference area (<math>A_{sol}</math>) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.</i>	
		Data required for CDR (EU) No 812/2013 - Reference Area $A_{sol}$	
		Zero-loss efficiency ( $\eta_0$ )	0.784 --
		First-order coefficient ( $a_1$ )	2.965 W/(m <sup>2</sup> K)
		Second-order coefficient ( $a_2$ )	0.009 W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	0.90 --
		<i>Remark: The data given in this section are related to collector reference area (<math>A_{sol}</math>) 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>	