

## Holder/Issued to/Manufacturer

### Bosswerk GmbH & Co. KG

Herrenpfad 38, D-41334 Nettetal, Germany

## Product name and description

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

Models:           Bosswerk SunExtreme HighDensity 10  
                      Bosswerk SunExtreme HighDensity 20  
                      Bosswerk SunExtreme HighDensity 30

## 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 2024-01-13 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 2014-06-30. RISE certification rules SPCR 402 for Keymark – Solar Thermal Products applies.

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Certificate No. SC0358-14 | issue 2 | 2019-09-05

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2017-08-08



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<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>SC0358-14</b>
	<b>Issued</b>	<b>2019-09-05</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
Bosswerk SunExtreme HighDensity 10		1 368	1 193	941	1 164	953	709	848	685	500	912	740	537
Bosswerk SunExtreme HighDensity 20		2 640	2 300	1 814	2 245	1 838	1 367	1 636	1 322	964	1 758	1 428	1 036
Bosswerk SunExtreme HighDensity 30		3 914	3 410	2 689	3 329	2 725	2 027	2 425	1 960	1 429	2 606	2 117	1 536
Annual output per m <sup>2</sup> gross area		876	763	602	745	609	453	543	438	320	583	474	344
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	No
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	3200
Maximum tested negative load	--
Hail resistance using steel ball (maximum drop height)	1

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
Bosswerk SunExtreme HighDensity 10	1,56	1-H-12S-C:20,890-D
Bosswerk SunExtreme HighDensity 20	3,02	1-H-12S-C:20,1640-D
Bosswerk SunExtreme HighDensity 30	4,48	1-H-12S-C:20,2390-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 ( $\eta_{col}$ )	41%	Zero-loss efficiency ( $\eta_0$ )
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.		0,47
		First-order coefficient ( $a_1$ )
		0,63
		Second-order coefficient ( $a_2$ )
	0,016	
	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.	