
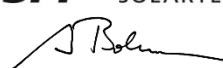


Annex to Solar Keymark Certificate					Licence Number		011-7S924 F							
					Date issued		2019-11-27							
					Issued by		DIN CERTCO							
Licence holder		ROTEX Heating Systems GmbH			Country		Germany							
Brand (optional)		-			Web		www.rotex.de							
Street, Number		Langwiesenstrasse 10			E-mail		info@rotex.de							
Postcode, City		DE-74363 Güglingen			Tel		+49 7135 103 -0							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					Gb = 850 W/m <sup>2</sup> , Gd = 150 W/m <sup>2</sup> & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	120 K				
					W	W	W	W	W	W				
V21P					2.01	2'000	1'006	85	1'426	1'338	1'156	963	762	215
V26P					2.60	2'000	1'300	85	1'844	1'731	1'495	1'246	985	278
H26P					2.60	1'300	2'000	85	1'844	1'731	1'495	1'246	985	278
Power output per m <sup>2</sup> gross area					709	666	575	479	379	107				
Performance parameters test method		Steady state - outdoor												
Performance parameters (related to A <sub>G</sub> )		$\eta_0, b$	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		0.719	4.30	0.006	0.000	0.00	5'051	0.000	0.00	0.0E+00	0.91			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K <sub>θT, coll</sub>	1.00	0.99	0.99	0.98	0.95	0.89	0.69	0.37	0.00			
Longitudinal		K <sub>θL, coll</sub>	1.00	1.00	1.00	0.99	0.97	0.93	0.82	0.57	0.00			
Heat transfer medium for testing					Water-Glycole									
Flow rate for testing (per gross area, A <sub>G</sub> )					dm/dt	0.023	kg/(sm <sup>2</sup> )							
Maximum temperature difference during thermal performance test					( $\vartheta_m - \vartheta_a$ ) <sub>max</sub>	90	K							
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; $\vartheta_a = 30$ °C)					$\vartheta_{stg}$	200	°C							
Maximum operating temperature					$\vartheta_{max, op}$	98	°C							
Maximum operating pressure					p <sub>max, op</sub>	600	kPa							
Testing laboratory		SPF Testing, CH-8640 Rapperswil, Switzerland					www.spf.ch							
Test report(s)		C1796ISO C1797ISO C1798ISO					Dated		27.11.2019 27.11.2019 27.11.2019					
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26									
					 INSTITUT FÜR SOLARTECHNIK 									
DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de														

<b>Annex to Solar Keymark Certificate</b> <b>Supplementary Information</b>	<b>Licence Number</b>	<b>011-7S924 F</b>
	<b>Issued</b>	<b>2019-11-27</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
V21P		2'264	1'505	922	1'653	1'080	643	1'222	747	426	1'336	805	453
V26P		2'929	1'946	1'193	2'139	1'396	832	1'581	966	551	1'729	1'042	586
H26P		2'929	1'946	1'193	2'139	1'396	832	1'581	966	551	1'729	1'042	586
Annual output per m <sup>2</sup> gross area		1'127	749	459	823	537	320	608	372	212	665	401	225
Annual efficiency, $\eta_a$		64%	42%	26%	50%	33%	20%	52%	32%	18%	53%	32%	18%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m <sup>2</sup>			1630 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. 6.1 (September 2019). A detailed description of the calculations is available at <a href="http://www.estif.org/solarkeymarknew/">http://www.estif.org/solarkeymarknew/</a>													

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)			A
G (W/m <sup>2</sup> ) >	1000	$\vartheta_a$ (°C) >	20
			$H_x$ (MJ/m <sup>2</sup> ) >
Maximum tested positive load			2400
Maximum tested negative load			2400
Hail resistance using ice balls (diameter)			35

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"/>	Façade collector(s)

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, $A_{sol}$ (m <sup>2</sup> )	Hydraulic Designation Code	Aperture Area, $A_a$ (m <sup>2</sup> )
V21P	2.01	9-V-1234S-A:7.2,1840-C:20.4,990-D	1.80
V26P	2.60	12-V-1234S-A:7.2,1840-C:20.4,1290-D	2.37
H26P	2.60	19-V-1234S-A:7.2,1140-C:20.4,1990-D	2.36

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 ( $\eta_{col}$ )	53%	Zero-loss efficiency ( $\eta_0$ )	0.71
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 ( $a_1$ )	4.30
		Second-order coefficient ( $a_2$ )	0.006
		Incidence angle modifier IAM (50°)	0.96
		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.	