


Annex to Solar Keymark Certificate					Licence Number		011-7S1929 F							
					Date issued		2022-10-10							
					Issued by		DIN CERTCO							
Licence holder		Hansa Öl- und Gasbrenner GmbH			Country		Deutschland							
Brand (optional)					Web		www.hansa-heiztechnik.de							
Street, Number		Burgdamm 3			E-mail		volker.haufler@hansa-heiztechnik.de							
Postcode, City		27404 Rhade			Tel		+49 (0)4285 930714							
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					$G_b = 850 \text{ W/m}^2$ , $G_d = 150 \text{ W/m}^2$ & $u = 1.3 \text{ m/s}$ $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	103 K				
					m <sup>2</sup>	mm	mm	mm	mm	mm	mm			
Hansa Col 2.1. (Mäander)					2.06	1954	1054	80	1514	1439	1279	1106	919	583
Power output per m <sup>2</sup> gross area					735	698	621	537	446	283				
Performance parameters test method		Quasi dynamic												
Performance parameters (related to A <sub>G</sub> )		η <sub>0, b</sub>	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		0.743	3.562	0.008	0.000	0.00	12 606	0.000	0.00	0.0	0.93			
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	0.98	0.96	0.93	0.87	0.76	0.40	0.00			
Longitudinal		K <sub>θL, coll</sub>	1.00	0.99	0.98	0.96	0.93	0.87	0.76	0.40	0.00			
Heat transfer medium for testing		Water												
Flow rate for testing (per gross area, A <sub>G</sub> )		dm/dt	0.018	kg/(sm <sup>2</sup> )										
Maximum temperature difference during thermal performance test		(ϑ <sub>m</sub> - ϑ <sub>a</sub> ) <sub>max</sub>	73	K										
Standard stagnation temperature (G = 1000 W/m <sup>2</sup> ; ϑ <sub>a</sub> = 30 °C)		ϑ <sub>stg</sub>	176	°C										
Maximum operating temperature		ϑ <sub>max, op</sub>	n.a.	°C										
Maximum operating pressure		p <sub>max, op</sub>	1000	kPa										
Testing laboratory		Institut für Gebäudeenergetik, Thermotechnik und Energiespeicherung (IGTE)					http://www.igte.uni-stuttgart.de							
Test report(s)		10COL869OEM02					Dated		16.07.2012					
Comments of testing laboratory		Ver. 6.2 (13.01.2022)												
This data sheet replaces the data sheet issued on 16.07.2012		 Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmetechnik Universität Stuttgart Pfaffenwaldring 8, 70569 Stuttgart (Vaihingen)												
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Supplementary Information		Issued												
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		2022-10-10												
Gross Thermal Yield in kWh/collector at mean fluid temperature $\vartheta_m$														
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg			
	$\vartheta_m$	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	25°C	50°C	75°C	
Hansa Col 2.1. (Mäander)		2 419	1 730	1 156	1 835	1 282	835	1 350	891	556	1 471	964	592	
Gross Thermal Yield per m <sup>2</sup> gross area		1 174	840	561	891	623	405	655	433	270	714	468	287	
Annual efficiency, $\eta_a$		67%	48%	32%	55%	38%	25%	56%	37%	23%	57%	38%	23%	
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. 6.2 (13.01.2022). 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											No			
The collector was tested successfully under the following conditions:														
Climate class (A+, A, B or C)											B		--	
G (W/m <sup>2</sup> ) >		900		$\vartheta_a$ (°C) >		15		$H_x$ (MJ/m <sup>2</sup> ) >		540				
Maximum tested positive load											3000		Pa	
Maximum tested negative load											3000		Pa	
Hail resistance using steel ball (maximum drop height)											1		m	
Additional collector attribute(s)														
Using external power source(s) for normal operation											No		Active or passive measure(s) for self-protection	No
Co-generating thermal and electrical power											No		Façade collector(s)	No
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> )					
Hansa Col 2.1. (Mäander)					2.06				1-VH-12345-A:12,1800- C:12,x					1.89
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 ( $\eta_{col}$ )					58%				Zero-loss efficiency ( $\eta_0$ )		0.73		--	
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 ( $a_1$ )				3.56		W/(m <sup>2</sup> K)			
					Second-order coefficient ( $a_2$ )				0.008		W/(m <sup>2</sup> K <sup>2</sup> )			
					Incidence angle modifier IAM (50°)				0.92		--			
					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.									
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