

Annex to Solar Keymark Certificate					Licence Number		011-7S3170 R				
					Date issued		2023-04-14				
					Issued by		DIN CERTCO				
Licence holder		EnergieWerk Ost GmbH			Country		Deutschland				
Brand (optional)		EnergieWerk Ost GmbH			Web		http://www.ofenseite.com				
Street, Number		Obercunnersdorfer Str. 3 - 4			E-mail		info@ofenseite.com				
Postcode, City		01774, Klingenberg			Tel		+49 03505569000				
Collector Type					Evacuated tubular collector						
Collector name	Gross area (A_G) m ²	Gross length mm	Gross width mm	Gross height mm	Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s θ _m - θ _a						
					0 K	10 K	30 K	50 K	70 K	120 K	
					W	W	W	W	W	W	
EnergieWerk Basic XS	1.87	1 970	951	161	834	812	764	710	650	474	
EnergieWerk Basic S	2.46	1 970	1 251	161	1 097	1 069	1 005	935	856	624	
EnergieWerk Basic M	2.76	1 970	1 401	161	1 231	1 199	1 128	1 048	960	700	
EnergieWerk Basic L	3.06	1 970	1 551	161	1 365	1 329	1 251	1 162	1 064	776	
EnergieWerk Basic XL	3.65	1 970	1 851	161	1 628	1 585	1 492	1 387	1 270	926	
EnergieWerk Basic XXL	4.53	1 970	2 301	161	2 020	1 968	1 852	1 721	1 576	1 149	
Power output per m² gross area					446	434	409	380	348	254	
Performance parameters test method		Steady state - outdoor									
Performance parameters (related to A_G)		η ₀ , b	a1	a2	a3	a4	a5	a6	a7	a8	Kd
Units		-	W/(m ² K)	W/(m ² K ²)	J/(m ³ K)	-	J/(m ² K)	s/m	W/(m ² K ⁴)	W/(m ² K ⁴)	-
Test results		0.437	1.12	0.004	0.000	0.00	14 500	0.000	0.00	0.0E+00	1.137
Incidence angle modifier test method		Quasi dynamic - outdoor									
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal		K _{θT, coll}	1.02	1.09	1.18	1.39	1.55	1.62	1.41	-	0.00
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.98	0.96	0.93	0.86	-	0.00
Heat transfer medium for testing					Water						
Flow rate for testing (per gross area, A_G)					dm/dt		0.020	kg/(sm²)			
Maximum temperature difference during thermal performance test					(θ_m - θ_a)_{max}		90	K			
Standard stagnation temperature (G = 1000 W/m²; θ_a = 30 °C)					θ_{stg}		267.6	°C			
Maximum operating temperature					θ_{max op}		99	°C			
Maximum operating pressure					p_{max op}		800	kPa			
Testing laboratory		TÜV Rheinland (Guangdong) Ltd.				http://www.tuv.com					
Test report(s)		154150039c_Linuo_R1830-58-75_ISO_Report_chen 154150039c_Linuo_R1812-58-75_ISO_Report_chen (Report issued by TÜV Rheinland (Shanghai) Co., Ltd.)				Dated		2018-04-20 2018-04-20			
Comments of testing laboratory					Ver. 6.2 (13.01.2022)						
No comment					 TÜVRheinland® Precisely Right. <i>Constant Zhu</i>						
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Annex to Solar Keymark Certificate Supplementary Information							Licence Number			011-7S3170 R			
							Issued			2023-04-14			
Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m													
Standard Locations		Athens			Davos			Stockholm			Würzburg		
Collector name	ϑ_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
EnergieWerk Basic XS		1 669	1 440	1 207	1 391	1 175	968	1 018	839	673	1 098	905	726
EnergieWerk Basic S		2 195	1 894	1 588	1 831	1 545	1 273	1 340	1 103	885	1 445	1 191	954
EnergieWerk Basic M		2 463	2 125	1 782	2 054	1 734	1 429	1 503	1 238	993	1 621	1 336	1 071
EnergieWerk Basic L		2 731	2 356	1 976	2 277	1 922	1 584	1 666	1 372	1 101	1 797	1 481	1 187
EnergieWerk Basic XL		3 258	2 811	2 357	2 716	2 293	1 889	1 988	1 637	1 313	2 143	1 767	1 416
EnergieWerk Basic XXL		4 043	3 488	2 925	3 371	2 845	2 345	2 467	2 031	1 630	2 660	2 192	1 758
Gross Thermal Yield per m ² gross area		892	770	646	744	628	518	545	448	360	587	484	388
Annual efficiency, η_a		51%	44%	37%	46%	39%	32%	47%	38%	31%	47%	39%	31%
Fixed or tracking collector		Fixed (slope = latitude - 15°; rounded to nearest 5°)											
Annual irradiation on collector plane		1765 kWh/m ²			1630 kWh/m ²			1166 kWh/m ²			1244 kWh/m ²		
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 ϑ_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 http://www.estif.org/solarkeymarknew/													
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 ²) >		900		ϑ_a (°C) >		15		H _x (MJ/m ²) >		540			
Maximum tested positive load										2630		Pa	
Maximum tested negative load										2000		Pa	
Hail resistance using steel ball (maximum drop height)										0.6		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 ²)				Hydraulic Designation Code					Aperture Area, A _a (m ²)			
EnergieWerk Basic XS					1-VH-12S-C:35,1035-D					1.12			
EnergieWerk Basic S					1-VH-12S-C:35,1335-D					1.50			
EnergieWerk Basic M					1-VH-12S-C:35,1485-D					1.68			
EnergieWerk Basic L					1-VH-12S-C:35,1635-D					1.87			
EnergieWerk Basic XL					1-VH-12S-C:35,1935-D					2.24			
EnergieWerk Basic XXL					1-VH-12S-C:35,2385-D					2.81			
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 (η_{col})		39%			Zero-loss efficiency (η_0)					0.45		--	
Remark: Collector efficiency (η_{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 ² , expressed in % and rounded to the nearest integer. Deviating from the regulation η_{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)					1.12		W/(m ² K)	
					Second-order coefficient (a_2)					0.004		W/(m ² K ²)	
					Incidence angle modifier IAM (50°)					1.33		--	
					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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