
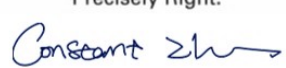


Annex to Solar Keymark Certificate					Licence Number		011-7S3209 R							
					Date issued		2023-09-18							
					Issued by		DIN CERTCO							
Licence holder		ZHEJIANG LINYAN NEW ENERGY CO., LTD			Country		China							
Brand (optional)		LINYAN			Web		www.linyansolar.com							
Street, Number		BUILDING 1, NO.200,XUQIAO ROAD, LIYUAN VILLAGE, YUANHUA TOWN			E-mail		Eric@linyansolar.com							
Postcode, City		314400, HAINING, JIAXING, ZHEJIANG			Tel		+86 13516739947							
Collector Type					Evacuated tubular collector									
Collector name					Power output per collector G _b = 850 W/m ² , G _d = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	92 K				
					m ²	mm	mm	mm	W	W	W	W	W	W
LY-HPC10					1.58	1962	803	160	717	697	651	594	527	441
LY-HPC12					1.86	1962	950	160	844	821	766	699	620	519
LY-HPC15					2.32	1962	1 178	160	1 050	1 022	953	870	772	647
LY-HPC16					2.46	1962	1 253	160	1 117	1 086	1 013	925	820	687
LY-HPC18					2.75	1962	1 400	160	1 248	1 214	1 132	1 033	917	768
LY-HPC20					3.04	1962	1 550	160	1 379	1 342	1 252	1 142	1 013	849
LY-HPC24					3.63	1962	1 850	160	1 647	1 602	1 495	1 364	1 210	1 014
LY-HPC25					3.79	1962	1 928	160	1 717	1 670	1 558	1 422	1 262	1 057
LY-HPC30					4.52	1962	2 303	160	2 051	1 995	1 861	1 698	1 507	1 262
Power output per m² gross area									454	441	412	376	333	279
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		0.449	1.16	0.008	0.000	0.00	5 450	0.000	0.00	0.00	1.07			
Incidence angle modifier test method		Steady state - outdoor												
Incidence angle modifier		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°			
Transversal		K _{θT, coll}	1.04	1.07	1.19	1.30	1.37	1.43	0.95	0.48	0.00			
Longitudinal		K _{θL, coll}	1.00	1.00	0.99	0.96	0.92	0.84	0.69	0.44	0.00			
Heat transfer medium for testing					Water									
Flow rate for testing (per gross area, A_G)					dm/dt	0.020	kg/(sm ²)							
Maximum temperature difference during thermal performance test					($\vartheta_m - \vartheta_a$) _{max}	62	K							
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)					ϑ_{stg}	230	°C							
Maximum operating temperature					$\vartheta_{max, op}$	98	°C							
Maximum operating pressure					p _{max, op}	600	kPa							
Testing laboratory		TÜV Rheinland (Guangdong) Ltd.					http://www.tuv.com							
Test report(s)		171031198GZU-001 R3 (issued by Intertek Testing Services Shenzhen Ltd. Guangzhou Branch) CN23LI2E 001 (Document check)					Dated		2023-08-14					
									2023-09-18					
Comments of testing laboratory					Ver. 6.2 (13.01.2022)									
1. Tests were performed based on ISO 9806:2013. 2. Above efficiency parameters come from test type LY-HPC10.					 Precisely Right. 									
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Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S3209 R
	Issued	2023-09-18

Gross Thermal Yield in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations	Athens			Davos			Stockholm			Würzburg		
	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
LY-HPC10		1 364	1 148	916	1 130	920	711	823	652	491	888	705	527
LY-HPC12		1 605	1 352	1 078	1 330	1 083	837	969	768	578	1 046	830	621
LY-HPC15		1 998	1 683	1 342	1 656	1 347	1 042	1 206	955	719	1 302	1 034	772
LY-HPC16		2 124	1 789	1 426	1 760	1 432	1 108	1 282	1 016	765	1 384	1 099	821
LY-HPC18		2 373	1 999	1 594	1 967	1 600	1 238	1 433	1 135	854	1 546	1 228	918
LY-HPC20		2 624	2 210	1 762	2 174	1 769	1 368	1 584	1 254	944	1 709	1 357	1 014
LY-HPC24		3 133	2 638	2 104	2 596	2 113	1 634	1 891	1 498	1 128	2 041	1 621	1 211
LY-HPC25		3 267	2 751	2 194	2 707	2 203	1 704	1 972	1 562	1 176	2 128	1 690	1 263
LY-HPC30		3 901	3 285	2 620	3 233	2 631	2 035	2 355	1 865	1 404	2 542	2 018	1 508
Gross Thermal Yield per m ² gross area													
Annual efficiency, η_a													
Fixed or tracking collector													
Annual irradiation on collector plane													
Mean annual ambient air temperature													
Collector orientation or tracking mode													

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)	C			--
G (W/m ²) >	800	ϑ_a (°C) >	10	H_x (MJ/m ²) >
Maximum tested positive load	2400		Pa	
Maximum tested negative load	2400		Pa	
Hail resistance using steel ball (maximum drop height)	0.8		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)
LY-HPC10	1.58	1-H-12S-C:24,900-D	0.94
LY-HPC12	1.86	1-H-12S-C:24,1050-D	1.13
LY-HPC15	2.32	1-H-12S-C:24,1275-D	1.41
LY-HPC16	2.46	1-H-12S-C:24,1350-D	1.51
LY-HPC18	2.75	1-H-12S-C:24,1500-D	1.70
LY-HPC20	3.04	1-H-12S-C:24,1650-D	1.88
LY-HPC24	3.63	1-H-12S-C:24,1950-D	2.26
LY-HPC25	3.79	1-H-12S-C:24,2025-D	2.36
LY-HPC30	4.52	1-H-12S-C:24,2400-D	2.83

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)	1.16
		Second-order coefficient (a_2)	0.008
		Incidence angle modifier IAM (50°)	1.22
		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.	