



# CERTIFICATE

## Solar Keymark Certificate No. SP SC1357-16

### Holder/Issued to/Manufacturer

Company: HAYA SOLAR GROUP LIMITED

Address: 509 of West Tower Of Urban Development International Center, No.800, Yinxiu Road, Binhu District, Wuxi, China, 214072

### Product name and description

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

Models:	<b>HY-E58-10</b>	<b>HY-E58-12</b>	<b>HY-E58-15</b>
	<b>HY-E58-18</b>	<b>HY-E58-20</b>	<b>HY-E58-22</b>
	<b>HY-E58-24</b>	<b>HY-E58-25</b>	<b>HY-E58-30</b>

### Certificate

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 ISO 9806:2013 Solar thermal collectors – 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 (SP Technical Research Institute of Sweden, No. 012), also see CEN-CENELEC Internal Regulations Part 4 Certification, Annex A.

### Validity

This certificate is valid until 2022-01-17 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 SP. This certificate was first issued 2017-01-17. This is issue no. 2.

Borås, Sweden 2017-03-02

### SP Technical Research Institute of Sweden Certification

Lennart Aronsson  
Certification Manager

Magnus Sturesson  
Certification Officer



## Annex to Solar Keymark Certificate

<b>Annex to Solar Keymark Certificate - Summary of EN 12975 Test Results</b>					<b>Licence Number</b>		<b>SP SC1357-16</b>									
					<b>Date issued</b>		<b>2017-03-02</b>									
					<b>Issued by</b>		<b>SP</b>									
<b>Licence holder</b>		HAYA SOLAR GROUP LIMITED			<b>Country</b>		China									
<b>Brand (optional)</b>		HAYA			<b>Web</b>		www.hayasolar.com									
<b>Street, Number</b>		509 of West Tower Of Urban Development International			<b>E-mail</b>		info@hayasolar.com									
<b>Postcode, City</b>		214072 Wuxi			<b>Tel</b>		+86 510-85160845									
<b>Collector Type</b>					Evacuated tubular collector											
					<b>Power output per collector</b> Gb = 850 W/m <sup>2</sup> ; Gd = 150 W/m <sup>2</sup> $\vartheta_m - \vartheta_a$											
					Collector name	Gross area (A <sub>G</sub> ) m <sup>2</sup>	Gross length mm	Gross width mm	Gross height mm	0 K W	10 K W	30 K W	50 K W	70 K W	53 K W	
					HY-E58-10	1,51	1 940	780	123	663	648	610	563	506	555	
					HY-E58-12	1,80	1 940	930	123	790	772	728	671	603	662	
					HY-E58-15	2,24	1 940	1 155	123	981	959	904	834	749	822	
					HY-E58-18	2,68	1 940	1 380	123	1 173	1 146	1 080	996	895	982	
					HY-E58-20	2,97	1 940	1 530	123	1 300	1 270	1 197	1 104	993	1 089	
					HY-E58-22	3,26	1 940	1 680	123	1 428	1 395	1 314	1 213	1 090	1 196	
					HY-E58-24	3,55	1 940	1 830	123	1 555	1 520	1 432	1 321	1 187	1 302	
					HY-E58-25	3,70	1 940	1 905	123	1 619	1 582	1 490	1 375	1 236	1 356	
					HY-E58-30	4,42	1 940	2 280	123	1 937	1 893	1 784	1 646	1 479	1 623	
<b>Power output per m<sup>2</sup> gross area</b>						438	428	403	372	334	367					
<b>Performance parameters test method</b>					Steady state - outdoor											
<b>Performance parameters (related to AG)</b>					η <sub>0,hem</sub>	a <sub>1</sub>	a <sub>2</sub>									
<b>Units</b>					-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )									
<b>Test results</b>					0,438	0,919	0,008									
<b>Incidence angle modifier test method</b>					Steady state - outdoor											
<b>Bi-directional incidence angle modifiers</b>					Yes											
<b>Incidence angle modifier</b>					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°		
<b>Transversal</b>					K <sub>θT, coll</sub>	1,02	1,04	1,15	1,26	1,32	1,53	1,02	0,51	0,00		
<b>Longitudinal</b>					K <sub>θL, coll</sub>	0,98	0,97	0,95	0,94	0,92	0,69	0,46	0,23	0,00		
<b>Heat transfer medium for testing</b>					Water											
<b>Flow rate for testing (per gross area, A<sub>G</sub>)</b>					dm/dt		0,020		kg/(sm <sup>2</sup> )							
<b>Maximum temperature difference for thermal performance calculations</b>					$(\vartheta_m - \vartheta_a)_{max}$		52,99		K							
<b>Standard stagnation temperature (G = 1000 W/m<sup>2</sup>; <math>\vartheta_a = 30</math> °C)</b>					$\vartheta_{stg}$		240		°C							
<b>Effective thermal capacity, incl. fluid (per gross area, A<sub>G</sub>)</b>					C/m <sup>2</sup>		5,49		kJ/(Km <sup>2</sup> )							
<b>Maximum operating temperature</b>					$\vartheta_{max, op}$		120		°C							
<b>Maximum operating pressure</b>					p <sub>max, op</sub>		800		kPa							
<b>Testing laboratory</b>					Intertek Testing Services Shenzhen Ltd. Guangzhou Branch					<a href="http://www.intertek.com">http://www.intertek.com</a>						
<b>Test report(s)</b>					160728042GZU-001					<b>Dated</b>		2017-02-21				
<b>Comments of testing laboratory</b>					Datasheet version: 5.01, 2016-03-01											
<b>Certification Body: SP Technical Research Institute of Sweden Box 857, 501 15 Borås, Sweden</b> www.sp.se info@sp.se tel +4610 516 5000																

## Annex to Solar Keymark Certificate

<b>Annex to Solar Keymark Certificate Supplementary Information</b>	<b>Licence Number</b>	<b>SP SC1357-16</b>
	<b>Issued</b>	<b>2017-03-02</b>

Annual collector output in kWh/collector at mean fluid temperature $\vartheta_m$ , based on ISO 9806:2013 test results													
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
HY-E58-10		1 220	1 047	849	1 022	845	664	744	602	461	802	650	496
HY-E58-12		1 454	1 248	1 012	1 218	1 008	792	887	718	550	956	775	591
HY-E58-15		1 806	1 550	1 257	1 513	1 252	983	1 102	891	683	1 187	963	734
HY-E58-18		2 158	1 852	1 502	1 808	1 496	1 175	1 316	1 065	816	1 418	1 150	877
HY-E58-20		2 392	2 053	1 665	2 004	1 658	1 302	1 459	1 181	904	1 572	1 275	973
HY-E58-22		2 627	2 254	1 828	2 201	1 821	1 430	1 602	1 296	993	1 726	1 400	1 068
HY-E58-24		2 861	2 455	1 992	2 397	1 983	1 558	1 745	1 412	1 082	1 881	1 525	1 163
HY-E58-25		2 979	2 556	2 073	2 495	2 065	1 622	1 817	1 470	1 126	1 958	1 588	1 211
HY-E58-30		3 565	3 059	2 481	2 987	2 471	1 941	2 175	1 759	1 348	2 343	1 901	1 449
Annual output per m <sup>2</sup> gross area		806	692	561	675	559	439	492	398	305	530	430	328
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. 5.01 (March 2016). 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
Hybrid Thermal and Photo Voltaic collector	No
The collector is deemed to be suitable for roof integration	No
The collector was tested successfully according to EN ISO 9806:2013 under the following conditions:	
Climate class (A, B or C)	B      --
Maximum tested positive load	2400      Pa
Maximum tested negative load	2400      Pa
Hail resistance using steel ball (maximum drop height)	0,6      m

### Energy Labelling Information

	Reference Area, A <sub>sol</sub> (m <sup>2</sup> )	Data required for CDR (EU) No 811/2013 - Reference Area A <sub>sol</sub>	
HY-E58-10	1,51	Collector efficiency ( $\eta_{col}$ )	39      %
HY-E58-12	1,80	<i>Remark: Collector efficiency (<math>\eta_{col}</math>) 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 <math>\eta_{col}</math> is based on reference area (A<sub>sol</sub>) which is aperture area for values according to EN 12975-2 or gross area for ISO 9806:2013.</i>	
HY-E58-15	2,24		
HY-E58-18	2,68		
HY-E58-20	2,97		
HY-E58-22	3,26		
HY-E58-24	3,55		
HY-E58-25	3,70		
HY-E58-30	4,42	Data required for CDR (EU) No 812/2013 - Reference Area A <sub>sol</sub>	
		Zero-loss efficiency ( $\eta_0$ )	0,438      --
		First-order coefficient (a <sub>1</sub> )	0,92      W/(m <sup>2</sup> K)
		Second-order coefficient (a <sub>2</sub> )	0,008      W/(m <sup>2</sup> K <sup>2</sup> )
		Incidence angle modifier IAM (50°)	1,18      --
<i>Remark: The data given in this section are related to collector reference area (A<sub>sol</sub>) 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.</i>			