


Annex to Solar Keymark Certificate					Licence Number		011-7S3066 F							
					Date issued		2021-08-27							
					Issued by		Din Certco							
Licence holder		BENEFITS ASCEND INTERNATIONAL LIMITED					Country		P.R China					
Brand (optional)		BENEFITS ASCEND					Web		-					
Street, Number		ROOM 1304, NO. 729, PUJIAN ROAD,					E-mail		adwardwu@vip.163.com					
Postcode, City		200127, SHANGHAI					Tel		+86 13601828063					
Collector Type					Flat plate collector									
Collector name					Power output per collector									
					Gb = 850 W/m ² , Gd = 150 W/m ² & u = 1.3 m/s $\vartheta_m - \vartheta_a$									
					0 K	10 K	30 K	50 K	70 K	81 K				
					W	W	W	W	W	W				
FPB-ZT-2.0					2.00	2,000	1,000	80	1,318	1,251	1,068	821	510	314
FPB-ZT-2.5					2.50	2,000	1,250	80	1,648	1,564	1,335	1,026	637	393
Power output per m² gross area					659	625	534	410	255	157				
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					0.671	2.976	0.040	0.000	0.000	5.500	0.000	0.000	0.000	0.883
Incidence angle modifier test method					Steady state - outdoor									
Incidence angle modifier					Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°
Transversal					K _{θT,col}	1.00	1.00	0.99	0.96	0.92	0.84	0.69	0.44	0.00
Longitudinal					K _{θL,col}	1.00	1.00	0.99	0.96	0.92	0.84	0.69	0.44	0.00
Heat transfer medium for testing					Water-Glycole									
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}	50.86							K	
Standard stagnation temperature (G = 1000 W/m²; $\vartheta_a = 30$ °C)					ϑ_{stg}	170							°C	
Maximum operating temperature					$\vartheta_{max,op}$	120							°C	
Maximum operating pressure					p _{max,op}	1000							kPa	
Testing laboratory					Intertek Testing Services Shenzhen Ltd. Guangzhou			http://www.intertek.com						
Test report(s)					200827020GZU-001			Dated		2020/10/13				
Comments of testing laboratory					Datasheet version: 6.1, 2019-09-26 <i>Above efficiency parameters come from test type FPB-ZT-2.0.</i>									
					 <i>Stamp & signature</i>									
DIN CERTCO ● Alboinstraße 56 ● D-12103 Berlin Tel: +49 30 7562-1131 ● Fax: +49 30 7562-1141 ● E-Mail: info@dincertco.de ● www.dincertco.de														

Annex to Solar Keymark Certificate Supplementary Information	Licence Number	011-7S3066 F
	Issued	2021-08-27

Annual collector output in kWh/collector at mean fluid temperature ϑ_m													
Collector name	Standard Locations ϑ_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
FPB-ZT-2.0		2,066	1,363	683	1,531	904	376	1,139	651	277	1,240	702	297
FPB-ZT-2.5		2,582	1,704	853	1,913	1,130	469	1,424	814	346	1,551	878	371
Annual output per m ² gross area		1,033	682	341	765	452	188	570	326	139	620	351	148
Annual efficiency, η_a		59%	39%	19%	47%	28%	12%	49%	28%	12%	50%	28%	12%
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. 6.1 (September 2019). 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	Yes
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	2,400 Pa
Maximum tested negative load	2,400 Pa
Hail resistance using steel ball (maximum drop height)	2 m

Additional collector attribute(s)

- Using external power source(s) for normal operation
 Active or passive measure(s) for self-protection
 Co-generating thermal and electrical power
 Façade collector(s)

Energy Labelling Information		Additional Informative Technical Data	
	Reference Area, A_{sol} (m ²)	Hydraulic Designation Code	Aperture Area, A_a (m ²)
FPB-ZT-2.0	2.00	9-VH-1234S-A:8,1887-C:22,1056-D	1.81
FPB-ZT-2.5	2.50	11-VH-1234S-A:8,1887-C:22,1306-D	2.31

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})	48%	Zero-loss efficiency (η_0)	0.66
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)	2.98
		Second-order coefficient (a_2)	0.040
		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.	