


Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate							Licence Number		TSU 009-13			
							Issued		2013-12-10			
Company holding the		T.W.I. spol. s r.o.					Country		Czech republic			
Brand (optional)							Website		www.twi.cz			
Street, street number		Mnichov 146					E-mail		z.pravda@twi.cz			
Postal Code / City, province		793 26	Vrbno pod Pradědem			Tel/Fax		420 737258600				
Collector Type (flat plate glazed/un-glazed; evacuate tubular)							Flat plate collector - glazed					
Thermal / photo voltaic hybrid collector? (PVT collector)							No					
Integration in the roof possible ? (manufacturers declaration)							No					
Collector name	Aperture area (Aa) m ²	Gross length mm	Gross width mm	Gross height mm	Gross area (AG) m ²	Power output per collector module						
						G = 1000 W/m ²						
						Tm-Ta						
						0 K W	10 K W	30 K W	50 K W	70 K W		
SUNG WING T4 Cu 1,9	1,81	1 774	1 092	82	1,90	1 491	1 421	1 268	1 100	915		
SUNG WING T4 Cu 2,2	2,10	2 015	1 092	82	2,20	1 730	1 649	1 471	1 276	1 062		
Performance test method		Glazed liquid heating collector - steady state - outdoor										
Performance parameters related to aperture area		η_0	a1	a2								
Units		-	W/(m ² K)	W/(m ² K ²)								
Test results - Flow rate and fluid see note 1		0,824	3,780	0,011								
Bi-directional incidence angle modifiers?		No	<i>Kθ values are obligatory for 50°.</i>									
Incidence angle modifiers K θ (θ)		Angle	10°	20°	30°	40°	50°	60°	70°	80°	90°	
Incidence angle modifier not bi-directional - leave fields blank		K θ (θ)					0,95				0,00	
Stagnation temperature - Weather conditions see note 2		Tstg		201		°C						
Effective thermal capacity		ceff = C/Ag		4,36		kJ/(m ² K)						
Max. intended operation temperature - see note 3		Tmax,op		110		°C						
Max. operation pressure - see note 3		pmax,op		600		kPa						
Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m ² aperture area												
Flow rate	kg/(s m ²)	0,008	0,012	0,015	0,030	0,083						
Pressure drop, ΔP	Pa	120	200	300	1500	3300						
Optional weather data		Location				Link						
Testing Laboratory		Technický skúšobný ústav Piešťany, s.p.										
Website		www.tsu.eu										
Test report id. number		130700008/1/PQ, 130700008/2/P				Date of test report		2013.12.06				
During the test GDIF/GTOT was always between		0,1		and		0,2						
Comments of testing laboratory:												
Example comment.												
Note 1	Flow rate	0,020	kg/(s m ²)	Fluid	Water							
Note 2	Irradiance, G = 1000 W/m ² ; Ambient temperature, Ta=30 °C											
Note 3	Given by manufacturer											
						 TECHNICKÝ SKÚŠOBNÝ ÚSTAV PIEŠŤANY, s.p. Krajinská cesta 2929/9 92101 PIEŠŤANY -316/3-						
Datasheet version: 4.05, 2013-11-07												
Technický skúšobný ústav Piešťany, s.p.												
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Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence Number	TSU 009-13
	Issued	10.12.2013

Annual collector output kWh/module														
Collector name	Location and collector temperature (T _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		
SUNG WING T4 Cu 1,9	2 400	1 740	1 174	1 835	1 296	846	1 351	901	565	1 467	975	601		
SUNG WING T4 Cu 2,2	2 785	2 018	1 362	2 129	1 503	982	1 567	1 045	655	1 702	1 131	697		

Collector mounting: Fixed or tracking Fixed; slope = latitude - 15° (rounded to nearest 5°)

Overview of locations				
Location	Latitude °	G _{tot} kWh/m ²	T _a °C	Collector orientation or tracking mode
Athens	38	1 765	18,5	South, 25°
Davos	47	1 714	3,2	South, 30°
Stockholm	59	1 166	7,5	South, 45°
Würzburg	50	1 244	9,0	South, 35°

G _{tot}	Annual total irradiation on collector plane	kWh/m ²
T _a	Mean annual ambient air temperature	°C
T _m	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (T_m). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.