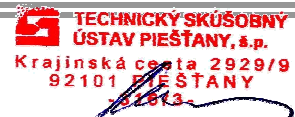




Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate					Licence number	TSU 006-12									
					Date of issue	28.11.2012									
Company holding the licence			THERMO/SOLAR Žiar s.r.o.		Country			Slovak republic							
Brand (optional)					Website			www.thermosolar.sk							
Street, number			Na vartičke 14		E-mail			info@thermosolar.sk							
Postal Code			965 01		Tel.			+421	(0)456016080						
City			Žiar nad Hronom		Fax			+421	(0)456716244						
Collector Type (flat plate / evacuate tubular / un-g glazed)					Flat plate collector										
Integration in the roof possible ?					Yes										
						Power output per collector unit G = 1000 W/m ² T _m -T _a :									
						0 K 10 K 30 K 50 K 70 K									
Collector name						[m ²]	[mm]	[mm]	[mm]	[m ²]	[W]	[W]	[W]	[W]	[W]
TS 400H						1,85	1 009	2 009	75	2,03	1 486	1 429	1 310	1 184	1 051
Collector efficiency parameters related to <u>aperture area (A_a)</u> Type of fluid and flow rate see note 1					η _{0a}	0,805	-								
					a _{1a}	3,017	W/(m ² K)								
					a _{2a}	0,005	W/(m ² K ²)								
Stagnation temperature - Weather conditions see note 2					t _{stg}	224	°C								
Effective thermal capacity					C _{eff} = C/A _a	5,64	kJ/(m ² K)								
Max. operation pressure - see note 3					p _{max}	600	kPa								
Incidence angle modifiers K _θ (θ)						G _{DIF} /G _{TOT}		θ _T / θ _L	50°	10°	20°	30°	40°	60°	70°
						min	max	K _θ (θ _T)	0,95	1,00	0,99	0,99	0,97	0,91	0,83
						0,11	0,12	K _θ (θ _L)	0,95	1,00	0,99	0,99	0,97	0,91	0,83
G _{DIF} /G _{TOT} : min&max - while measuring						<i>Optional values</i>									
Testing Laboratory					Technický skúšobný ústav Piešťany, š.p.										
Website					www.tsu.eu										
Test report id. number					120700003/2/P, 2.04.00479.1.0-5										
Date of test report					30.10.2012										
Perf. test method					EN 12975-2 6.1.4 (outdoor)										
Comments of testing laboratory :															
Note 1	Fluid	Water		Flow rate	0,018		kg/s per m ²								
Note 2	Irradiance, G _s =1000 W/m ² ; Ambient temperature, T _a =30 °C														
Note 3	Given by manufacturer														



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	Licence number	TSU 006-12
	Issued	28.11.2012

Annual collector output kWh														
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		
TS 400H	2 417	1 877	1 411	2 052	1 572	1 154	1 398	1 019	724	1 513	1 102	773		

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

Calculation of the annual collector performance is done by the official Solar Keymark spreadsheet tool. Hour by hour the collector output is calculated according to the efficiency parameters from the Keymark test using constant collector operating temperature (T_m). Detailed description with all equations used is available from the Solar Keymark web site (direct link: <http://www.estif.org/solarkeymark/annexb1.php>)

Technický skúšobný ústav Piešťany, š.p. Address: Krajinská cesta 2929/9, 92101 Piešťany, Slovak Republic Phone: +421 33 79 57 111, Fax: +421 33 77 23 716, E-mail: sv@tsu.sk, web: www.tsu.eu	Datasheet version:
	VERSION 3.6, 2012.01.20
	Calculation program version:
	3.07, October 2011 (SP)