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-glazed)	Flat plate collector
Integration in the roof possible ?	Yes

Collector name	Aperture area (Aa) [m²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (AG) [m²]	Power output per collector unit G = 1000 W/m² Tm-Ta : 0 K [W]	10 K [W]	30 K [W]	50 K [W]	70 K [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 aperture area (Aa) Type of fluid and flow rate see note 1	η_{0a}	0,805	-
	a_{1a}	3,017	W/(m²K)
	a_{2a}	0,005	W/(m²K²)
Stagnation temperature - Weather conditions see note 2	tstg	224	°C
Effective thermal capacity	ceff = C/Aa	5,64	kJ/(m²K)
Max. operation pressure - see note 3	pmax	600	kPa

Incidence angle modifiers $K_\theta(\theta)$	G_{DIF}/G_{TOT} min	G_{DIF}/G_{TOT} max	θ_T / θ_L	50°	10°	20°	30°	40°	60°	70°
	0,11	0,12	$K_\theta(\theta_T)$	0,95	*1,00*	*0,99*	*0,99*	*0,97*	*0,91*	*0,83*
			$K_\theta(\theta_L)$	0,95	*1,00*	*0,99*	*0,99*	*0,97*	*0,91*	*0,83*
G_{DIF}/G_{TOT}: min&max - while measuring					***Optional values***					

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 m²
Note 2	**Irradiance, Gs=1000 W/m²; Ambient temperature , Ta=30 °C**				
Note 3	**Given by manufacturer**				

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Krajinská cesta 2929/9
92101 PIEŠŤANY

VERSION 3.6, 2012.01.20

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 (Tm)														
	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 °)

Overview of locations

Location	Latitude °	Gtot kWh/m²	Ta °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°

Gtot	Annual total irradiation on collector plane	kWh/m²
Ta	Mean annual ambient air temperature	°C
Tm	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 (Tm). Detailed description with all equations used is available from the Solar Keymark web site (direct link: http://www.estif.org/solarkeymark/annexb1.php)

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Datasheet version:
VERSION 3.6, 2012.01.20
Calculation program version:
3.07, October 2011 (SP)