



Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate		Certificate No.	011-7S2101 F
		Date of issue	26.02.2013
Company	KODSAN A.Ş.	Country	Türkei
Brand (optional)		Website	www.kodsan.com.tr
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Collector Type (flat plate / evacuate tubular / un-glazed)	Flat plate collector
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Integration in the roof possible ?	Yes
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Collector name	Aperture area (A _a) [m ²]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A _c) [m ²]	Power output per collector unit G = 1000 W/m ² T _m -T _a :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
GSE	1.62	1929	933	91	1.80	1272	1209	1073	922	754
GSS*	1.92	1988	1041	90	2.07	1507	1433	1272	1092	894
GSL	2.23	1990	1222	91	2.43	1751	1665	1477	1269	1038

Collector efficiency parameters related to aperture area (A_a)	η _{0a}	0.785	-
Type of fluid and flow rate see note 1	a _{1a}	3.722	W/(m ² K)
	a _{2a}	0.012	W/(m ² K ²)

Stagnation temperature - Weather conditions see note 2	t _{stg}	203	°C
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Effective thermal capacity	C _{eff} = C/A _a	9.54	kJ/(m ² K)
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Max. operation pressure - see note 3	p _{max}	1000	kPa
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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)	0.94	1.00	0.99	0.98	0.97	0.90	0.80
	-	-	K _θ (θ _L)	0.94	1.00	0.99	0.98	0.97	0.90	0.80

G_{DIF}/G_{TOT}: min&max - while measuring

Testing Laboratory	TZS, ITW University of Stuttgart
Website	www.tzs.uni-stuttgart.de
Test report id. number	12COL1078OEM07, 12COL1079OEM07, 12COL1079QOEM07
Date of test report	26.02.2013
Perf. test method	EN 12975-2 6.1.4 (outdoor)

Comments of testing laboratory :
* dimensions according to manufacturer

Note 1	Fluid	Water	Flow rate	0.020 kg/s per m ²	 <p>Forschungs- und Testzentrum für Solaranlagen Institut für Thermodynamik und Wärmelehre Universität Stuttgart Pfaffenwaldring 6, 70560 Stuttgart (Vaihingen)</p>
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**

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Annual collector output kWh

Location and collector temperature (T_m)

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
GSE	2061	1476	974	1678	1158	725	1154	757	461	1256	821	492
GSS*	2443	1749	1154	1989	1372	859	1368	897	546	1489	973	583
GSL	2837	2032	1341	2310	1594	998	1589	1042	635	1729	1130	677

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

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>)

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Datasheet version:

VERSION 3.6, 2012.01.13

Calculation program version:

3.07, October 2011 (SP)