



<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>	<b>Certificate No.</b>	<b>011-7S1915 F</b>
	Date of issue	04-12-2015

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<b>Collector Type</b> (flat plate / evacuate tubular / un-glazed)	Flat plate collector
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<b>Integration in the roof possible ?</b>	Yes
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Collector name	Aperture area (A <sub>a</sub> ) [m <sup>2</sup> ]	Gross length [mm]	Gross width [mm]	Gross height [mm]	Gross area (A <sub>G</sub> ) [m <sup>2</sup> ]	Power output per collector unit G = 1000 W/m <sup>2</sup> T <sub>m</sub> -T <sub>a</sub> :				
						0 K	10 K	30 K	50 K	70 K
						[W]	[W]	[W]	[W]	[W]
FKF 200 V CuCu	1.830	1 746	1 200	85	2.095	1 475	1 397	1 229	1 043	839
FKF 240 V CuCu	2.220	2 100	1 200	85	2.520	1 789	1 695	1 491	1 265	1 018
FKF 270 V CuCu	2.520	2 373	1 200	85	2.850	2 031	1 924	1 692	1 436	1 156
FKF 200 H CuCu	1.830	1 200	1 746	85	2.095	1 475	1 397	1 229	1 043	839
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<b>Collector efficiency parameters related to aperture area (A<sub>a</sub>)</b> Type of fluid and flow rate see note 1	η <sub>0a</sub>	0.806	-
	α <sub>1a</sub>	4.123	W/(m <sup>2</sup> K)
	α <sub>2a</sub>	0.012	W/(m <sup>2</sup> K <sup>2</sup> )

<b>Stagnation temperature</b> - Weather conditions see note 2	t <sub>stg</sub>	183.4	°C
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<b>Effective thermal capacity</b>	C <sub>eff</sub> = C/A <sub>a</sub>	6.81	kJ/(m <sup>2</sup> K)
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<b>Max. operation pressure</b> - see note 3	p <sub>max</sub>	600	kPa
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Incidence angle modifiers K <sub>θ</sub> (θ)	G <sub>DIF</sub> /G <sub>TOT</sub>		θ <sub>T</sub> / θ <sub>L</sub>	50°	10°	20°	30°	40°	60°	70°
	min	max								
	G <sub>DIF</sub> /G <sub>TOT</sub> : min&max - while measuring	0.16	0.89	K <sub>θ</sub> (θ <sub>L</sub> )	0.90	1.00	0.99	0.97	0.95	0.83

<b>Testing Laboratory</b>	TÜV Energie und Umwelt GmbH
<b>Website</b>	www.eco-tuv.de
<b>Test report id. number</b>	21219827_P1_CuCu; 21219827_PO; 21219827_R0_ALCu
<b>Date of test report</b>	24.05.2013; (all)
<b>Perf. test method</b>	EN 12975-2 6.1.5 (indoor)

**Comments of testing laboratory :**

Note 1	<b>Fluid</b>	Water	<b>Flow rate</b>	0.021 kg/s per m <sup>2</sup>
Note 2	<b>Irradiance, G<sub>s</sub>=1000 W/m<sup>2</sup> Ambient temperature, T<sub>a</sub>=30 °C</b>			
Note 3	<b>Given by manufacturer</b>			



<b>Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>	<b>Certificate No.</b>	<b>011-7S1915 F</b>
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<b>Annual collector output kWh</b>															
<b>Collector name</b>	<b>Location and collector temperature (T<sub>m</sub>)</b>														
	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			
FKF 200 V CuCu	2 271	1 569	992	1 821	1 215	734	1 252	797	469	1 360	855	495			
FKF 240 V CuCu	2 755	1 903	1 203	2 209	1 474	891	1 518	966	569	1 650	1 037	601			
FKF 270 V CuCu	3 128	2 160	1 366	2 507	1 673	1 011	1 724	1 097	646	1 873	1 177	682			
FKF 200 H CuCu	2 271	1 569	992	1 821	1 215	734	1 252	797	469	1 360	855	495			
FKF 240 H CuCu	2 755	1 903	1 203	2 209	1 474	891	1 518	966	569	1 650	1 037	601			
FKF 270 H CuCu	3 128	2 160	1 366	2 507	1 673	1 011	1 724	1 097	646	1 873	1 177	682			

<b>Collector mounting: Fixed or tracking</b>	Fixed; slope = latitude - 15° (rounded to nearest 5°)
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<b>Overview of locations</b>				
Location	Latitude °	G <sub>tot</sub> kWh/m <sup>2</sup>	T <sub>a</sub> °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 <sub>tot</sub>	Annual total irradiation on collector plane	kWh/m <sup>2</sup>
T <sub>a</sub>	Mean annual ambient air temperature	°C
T <sub>m</sub>	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<sub>m</sub>). 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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