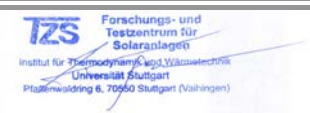




<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>						<b>Certificate No.</b>	<b>011-7S2429 F</b>				
						Date of issue	29.10.2014				
<b>Company</b>	Thermic Energy RZ GmbH					<b>Country</b>	Deutschland				
<b>Brand (optional)</b>						<b>Website</b>	<a href="http://www.thermic-energy.com">www.thermic-energy.com</a>				
<b>Street, number</b>	Abtsweg 9					<b>E-mail</b>	<a href="mailto:info@thermic-energy.com">info@thermic-energy.com</a>				
<b>Postal Code</b>	96114					<b>Tel.</b>	+49	9543 - 44371 0			
<b>City</b>	Hirschaid/Röbersdorf					<b>Fax</b>	+49	9543 - 44371 21			
<b>Collector Type</b> (flat plate / evacuate tubular / un-glazed)						Flat plate collector					
<b>Integration in the roof possible ?</b>						No					
<b>Collector name</b>	<b>Aperture area (Aa)</b> [m <sup>2</sup> ]	<b>Gross length</b> [mm]	<b>Gross width</b> [mm]	<b>Gross height</b> [mm]	<b>Gross area (Ag)</b> [m <sup>2</sup> ]	<b>Power output per collector unit</b> G = 1000 W/m <sup>2</sup> Tm-Ta :					
						0 K	10 K	30 K	50 K	70 K	
Flachkollektor FK 206 ME-2A	1.88	1951	1051	80	2.05	1542	1463	1292	1103	896	
<b>Collector efficiency parameters related to aperture area (Aa)</b>						$\eta_{0a}$	0.820	-			
Type of fluid and flow rate see note 1						$a_{1a}$	4.068	W/(m <sup>2</sup> K)			
						$a_{2a}$	0.012	W/(m <sup>2</sup> K <sup>2</sup> )			
<b>Stagnation temperature</b> - Weather conditions see note 2						$t_{stg}$	198	°C			
<b>Effective thermal capacity</b>						$c_{eff} = C/Aa$	15.2	kJ/(m <sup>2</sup> K)			
<b>Max. operation pressure</b> - see note 3						$p_{max}$	1000	kPa			
<b>Incidence angle modifiers <math>K_{\theta}(\theta)</math></b>	$G_{DIF}/G_{TOT}$		$\theta_T / \theta_L$	50°	10°	20°	30°	40°	60°	70°	
	min	max									$K_{\theta}(\theta_T)$
		-	$K_{\theta}(\theta_L)$	0.94	1.00	0.99	0.98	0.97	0.89	0.80	
$G_{DIF}/G_{TOT}$ : min&max - while measuring						<i>Optional values</i>					
<b>Testing Laboratory</b>						TZS, ITW University of Stuttgart					
<b>Website</b>						<a href="http://www.tzs.uni-stuttgart.de">www.tzs.uni-stuttgart.de</a>					
<b>Test report id. number</b>						10COL870/1OEM02					
<b>Date of test report</b>						29.10.2014					
<b>Perf. test method</b>						EN 12975-2 6.1.4 (outdoor)					
<b>Comments of testing laboratory :</b>											
Note 1	<b>Fluid</b>	Water		<b>Flow rate</b>	0.020 kg/s per m <sup>2</sup>						
Note 2	<b>Irradiance, <math>G_s=1000 \text{ W/m}^2</math></b>										
Note 2	<b>Ambient temperature, <math>T_a=30 \text{ °C}</math></b>										
Note 3	<b>Given by manufacturer</b>										

VERSION 3.6, 2012.01.13





**Annual collector output based on EN 12975 Test Results,  
annex to Solar KEYMARK Certificate**

Certificate No.

**011-7S2429 F**

Issued

**29.10.2014**

**Annual collector output kWh**

**Location and collector temperature (T<sub>m</sub>)**

Collector name	Location and collector temperature (T <sub>m</sub> )														
	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			
Flachkollektor FK 206 ME-2A	2446	1721	1112	1978	1343	827	1359	878	526	1478	948	559			

Collector mounting: Fixed or tracking

Fixed; slope = latitude - 15° (rounded to nearest 5°)

**Overview of locations**

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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Datasheet version:
VERSION 3.6, 2012.01.13
Calculation program version:
3.07, October 2011 (SP)