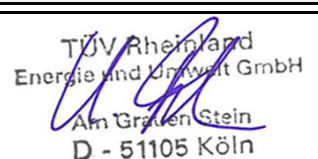


<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>						<b>Licence Number</b>		<b>011-7S2340 F</b>			
						<b>Issued</b>		<b>2014-09-04</b>			
<b>Company holding the licence</b>						<b>Country</b>		<b>Germany</b>			
<b>Brand (optional)</b>						<b>Website</b>		<b>www.vaillant.com</b>			
<b>Street, street number</b>						<b>E-mail</b>		<b>info@vaillant.com</b>			
<b>Postal Code / City, province</b>						<b>Tel/Fax</b>		<b>49 (0)2191 180-0</b>			
<b>Collector Type (flat plate glazed/un-glazed; evacuate tubular)</b>						<b>Flat plate collector - glazed</b>					
<b>Thermal / photo voltaic hybrid collector? (PVT collector)</b>						<b>No</b>					
<b>Integration in the roof possible ? (manufacturers declaration)</b>						<b>Yes</b>					
<b>Collector name</b>	<b>Aperture area (Aa)</b>	<b>Gross length</b>	<b>Gross width</b>	<b>Gross height</b>	<b>Gross area (AG)</b>	<b>Power output per collector module</b>					
						<b>G = 1000 W/m<sup>2</sup></b>					
						<b>Tm-Ta</b>					
						<b>0 K</b>	<b>10 K</b>	<b>30 K</b>	<b>50 K</b>	<b>70 K</b>	
	<b>m<sup>2</sup></b>	<b>mm</b>	<b>mm</b>	<b>mm</b>	<b>m<sup>2</sup></b>	<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>	
VFK 125/3 s	2.352	2 033	1 233	80	2.51	1 731	1 634	1 417	1 170	893	
<b>Performance test method</b>						<b>Glazed liquid heating collector - steady state - indoor</b>					
<b>Performance parameters related to aperture area</b>						$\eta_0$	a1	a2			
<b>Units</b>						-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K <sup>2</sup> )			
<b>Test results - Flow rate and fluid see note 1</b>						0.736	3.973	0.016			
<b>Bi-directional incidence angle modifiers?</b>						<b>No</b>					
<b>Incidence angle modifiers K<math>\theta</math>(<math>\theta</math>)</b>						<i>K<math>\theta</math> values are obligatory for 50°.</i>					
<b>Angle</b>						10°	20°	30°	40°	50°	60°
<b>K<math>\theta</math>(<math>\theta</math>)</b>						1.00	0.99	0.98	0.96	0.93	0.87
<b>Incidence angle modifier not bi-directional - leave fields blank</b>											
<b>Stagnation temperature - Weather conditions see note 2</b>						<b>Tstg</b>		<b>180 °C</b>			
<b>Effective thermal capacity</b>						<b>ceff = C/Ag</b>		<b>5.66 kJ/(m<sup>2</sup>K)</b>			
<b>Max. intended operation temperature - see note 3</b>						<b>Tmax,op</b>		<b>180 °C</b>			
<b>Max. operation pressure - see note 3</b>						<b>pmax,op</b>		<b>1000 kPa</b>			
<b>Pressure drop table - for a collector family, the values shall be for the module with highest <math>\Delta P</math> per m<sup>2</sup> aperture area</b>											
<b>Flow rate</b>	kg/(s m <sup>2</sup> )										
<b>Pressure drop, <math>\Delta P</math></b>	Pa										
<b>Optional weather data</b>						<b>Location</b>		<b>Link</b>			
<b>Testing Laboratory</b>						<b>TÜV Rheinland Energie und Umwelt GmbH</b>					
<b>Website</b>						<b>www.tuv.com/solarthermal</b>					
<b>Test report id. number</b>						<b>21224917.001_125-3 s</b>		<b>Date of test report</b>		<b>2014-09-04</b>	
<b>During the test GDIF/GTOT was always between</b>						<b>0.1</b>	<b>and</b>	<b>0.2</b>			
<b>Comments of testing laboratory:</b>											
<b>Note 1</b>	<b>Flow rate</b>	0.021	kg/(s m <sup>2</sup> )	<b>Fluid</b>	<b>Water</b>						
<b>Note 2</b>	<b>Irradiance, G = 1000 W/m<sup>2</sup>; Ambient temperature, Ta=30 °C</b>										
<b>Note 3</b>	<b>Given by manufacturer</b>										
<b>Datasheet version: 4.05, 2013-11-07</b>											
<b>DIN CERTCO • Alboinstraße 56 • 12103 Berlin, Germany</b> <b>Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de • www.dincertco.de</b>											



Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate	<b>Licence Number</b>	<b>011-7S2340 F</b>
	Issued	04.09.2014

Annual collector output kWh/module														
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		
VFK 125/3 s	2 708	1 819	1 079	1 997	1 287	717	1 480	903	490	1 612	972	519		

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

Overview of locations				
Location	Latitude °	Gtot kWh/m <sup>2</sup>	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/m <sup>2</sup>
Ta	Mean annual ambient air temperature	°C
Tm	Constant collector operating temperature (mean of in- and outlet temperatures)	°C

The calculation of the annual collector performance is performed with the official Solar Keymark spreadsheet tool ScenoCalc. The collector output is calculated hour by hour according to the efficiency parameters from the Keymark test using constant collector operating temperature (Tm). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.