

<b>Summary of EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>						<b>Licence Number</b>		<b>011-752264 R</b>			
						<b>Issued</b>		<b>1-Nov-2013</b>			
<b>Company holding the</b>		<b>Haining Oupairineng Solar Water Heater Co.,</b>				<b>Country</b>		<b>P.R. China</b>			
<b>Brand (optional)</b>		<b>ONOSI</b>				<b>Website</b>		<b>www.onosisolar.com</b>			
<b>Street, street number</b>		<b>Wanshou Industrial Zone</b>				<b>E-mail</b>		<b>onosi@onosisolar.com</b>			
<b>Postal Code / City, province</b>		<b>314412 Yanguan, Haining, Zhejiang</b>				<b>Tel/Fax</b>		<b>+86 573 87718911 / 87718900</b>			
<b>Collector Type (flat plate glazed/un-glazed; evacuate tubular)</b>						<b>Evacuated tubular collector</b>					
<b>Thermal / photo voltaic hybrid collector? (PVT collector)</b>						<b>No</b>					
<b>Integration in the roof possible ? (manufacturers declaration)</b>						<b>No</b>					
<b>Collector name</b>	<b>Aperture area (Aa) m<sup>2</sup></b>	<b>Gross length mm</b>	<b>Gross width mm</b>	<b>Gross height mm</b>	<b>Gross area (AG) m<sup>2</sup></b>	<b>Power output per collector module</b>					
						<b>G<sub>b</sub> = 850 W/m<sup>2</sup>; G<sub>d</sub> = 150 W/m<sup>2</sup></b>					
						<b>T<sub>m</sub>-T<sub>a</sub></b>					
						<b>0 K</b>	<b>10 K</b>	<b>30 K</b>	<b>50 K</b>	<b>70 K</b>	
						<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>	<b>W</b>	
<b>ONS-HPC-10</b>	<b>0.95</b>	<b>2 010</b>	<b>805</b>	<b>158</b>	<b>1.62</b>	669	658	625	579	519	
<b>ONS-HPC-12</b>	<b>1.14</b>	<b>2 010</b>	<b>955</b>	<b>158</b>	<b>1.92</b>	803	789	750	695	623	
<b>ONS-HPC-15</b>	<b>1.42</b>	<b>2 010</b>	<b>1 180</b>	<b>158</b>	<b>2.37</b>	1 003	986	938	868	778	
<b>ONS-HPC-16</b>	<b>1.51</b>	<b>2 010</b>	<b>1 255</b>	<b>158</b>	<b>2.52</b>	1 070	1 052	1 000	926	830	
<b>ONS-HPC-18</b>	<b>1.70</b>	<b>2 010</b>	<b>1 405</b>	<b>158</b>	<b>2.82</b>	1 204	1 184	1 125	1 042	934	
<b>ONS-HPC-20</b>	<b>1.89</b>	<b>2 010</b>	<b>1 555</b>	<b>158</b>	<b>3.13</b>	1 338	1 315	1 250	1 158	1 038	
<b>ONS-HPC-22</b>	<b>2.08</b>	<b>2 010</b>	<b>1 705</b>	<b>158</b>	<b>3.43</b>	1 471	1 447	1 375	1 273	1 142	
<b>ONS-HPC-24</b>	<b>2.27</b>	<b>2 010</b>	<b>1 855</b>	<b>158</b>	<b>3.73</b>	1 605	1 578	1 500	1 389	1 246	
<b>ONS-HPC-25</b>	<b>2.37</b>	<b>2 010</b>	<b>1 930</b>	<b>158</b>	<b>3.88</b>	1 672	1 644	1 563	1 447	1 297	
<b>ONS-HPC-30</b>	<b>2.84</b>	<b>2 010</b>	<b>2 305</b>	<b>158</b>	<b>4.63</b>	2 006	1 973	1 875	1 736	1 557	
<b>Performance test method</b>						<b>Liquid heating collector - quasi-dynamic - outdoor</b>					
<b>Performance parameters related to aperture</b>		<b>η<sub>0b</sub></b>	<b>c1</b>	<b>c2</b>	<b>c3</b>	<b>c4</b>	<b>c6</b>	<b>Kθ<sub>d</sub></b>			
<b>Units</b>		-	W/(m <sup>2</sup> K)	W/(m <sup>2</sup> K)	J/(m <sup>3</sup> K)	-	s/m	-			
<b>Test results - Flow rate and fluid see note 1</b>		<b>0.684</b>	<b>1.001</b>	<b>0.018</b>	<b>0.000</b>	<b>0.000</b>	<b>0.000</b>	<b>1.219</b>			
<b>Bi-directional incidence angle</b>		<b>Yes</b>	<i>Kθ values are obligatory for 50°.</i>								
<b>Incidence angle modifiers Kθ(θ<sub>L</sub>) longitudinal direction</b>		<b>Angle</b>	<b>10°</b>	<b>20°</b>	<b>30°</b>	<b>40°</b>	<b>50°</b>	<b>60°</b>	<b>70°</b>	<b>80°</b>	<b>90°</b>
		<b>Kθ(θ<sub>L</sub>)</b>	<b>1.00</b>	<b>1.00</b>	<b>0.99</b>	<b>0.98</b>	<b>0.97</b>	<b>0.94</b>	<b>0.88</b>	<b>0.00</b>	<b>0.00</b>
<b>Incidence angle modifiers Kθ(θ<sub>T</sub>) transversal direction</b>		<b>Angle</b>	<b>10°</b>	<b>20°</b>	<b>30°</b>	<b>40°</b>	<b>50°</b>	<b>60°</b>	<b>70°</b>	<b>80°</b>	<b>90°</b>
		<b>Kθ(θ<sub>T</sub>)</b>	<b>1.03</b>	<b>1.07</b>	<b>1.20</b>	<b>1.34</b>	<b>1.50</b>	<b>1.53</b>	<b>1.51</b>	<b>1.40</b>	<b>0.00</b>
<b>Stagnation temperature - Weather conditions see note 2</b>						<b>T<sub>stg</sub></b>	<b>201.9 °C</b>				
<b>Effective thermal capacity</b>						<b>ceff = C/Ag</b>	<b>97.97 kJ/(m<sup>2</sup>K)</b>				
<b>Max. intended operation temperature - see note 3</b>						<b>T<sub>max,op</sub></b>	<b>99 °C</b>				
<b>Max. operation pressure - see note 3</b>						<b>p<sub>max,op</sub></b>	<b>600 kPa</b>				
<b>Pressure drop table - for a collector family, the values shall be for the module with highest ΔP per m<sup>2</sup> aperture area</b>											
<b>Flow rate</b>	<b>kg/(s m<sup>2</sup>)</b>	-	-	-	-	-	-	-	-	-	
<b>Pressure drop, ΔP</b>	<b>Pa</b>	-	-	-	-	-	-	-	-	-	
<b>Optional weather data</b>		<b>Location</b>				<b>Link</b>					
<b>Testing Laboratory</b>		<b>TUV Rheinland (Shanghai) Co., Ltd.</b>									
<b>Website</b>		<b>www.tuv.com</b>									
<b>Test report id. number</b>		<b>154026306_EN_30_Report_Gao;</b>				<b>Date of test report</b>		<b>28-Oct-2013</b>			
<b>During the test GDI<sub>f</sub>/GTOT was always between</b>		<b>0.11</b>	<b>and</b>	<b>0.92</b>							
<b>Comments of testing laboratory:</b>											
<b>Pressure drop test not performed</b>											
<b>Note 1</b>	<b>Flow rate</b>	<b>0.021 kg/(s m<sup>2</sup>)</b>	<b>Fluid</b>	<b>Water</b>							
<b>Note 2</b>	<b>Irradiance, G = 1000 W/m<sup>2</sup>; Ambient temperature, T<sub>a</sub>=30 °C</b>										
<b>Note 3</b>	<b>Given by manufacturer</b>										
<b>Datasheet version: 4.04, 2013-04-22</b>											

<b>Annual collector output based on EN 12975 Test Results, annex to Solar KEYMARK Certificate</b>	<b>Licence Number</b>	<b>011-752264 R</b>
	Issued	1-Nov-2013

<b>Annual collector output kWh/module</b>												
<b>Collector name</b>	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
ONS-HPC-10	1 268	1 119	914	1 102	926	724	770	632	477	848	702	533
ONS-HPC-12	1 522	1 343	1 097	1 322	1 111	868	924	758	572	1 017	843	640
ONS-HPC-15	1 903	1 679	1 371	1 653	1 389	1 085	1 155	948	716	1 272	1 054	800
ONS-HPC-16	2 029	1 790	1 462	1 763	1 482	1 158	1 232	1 011	763	1 356	1 124	854
ONS-HPC-18	2 283	2 014	1 645	1 984	1 667	1 302	1 386	1 137	859	1 526	1 264	960
ONS-HPC-20	2 537	2 238	1 828	2 204	1 852	1 447	1 540	1 264	954	1 695	1 405	1 067
ONS-HPC-22	2 791	2 462	2 011	2 424	2 038	1 592	1 694	1 390	1 049	1 865	1 545	1 174
ONS-HPC-24	3 044	2 686	2 194	2 645	2 223	1 737	1 848	1 516	1 145	2 034	1 686	1 280
ONS-HPC-25	3 171	2 798	2 285	2 755	2 316	1 809	1 925	1 580	1 193	2 119	1 756	1 334
ONS-HPC-30	3 805	3 357	2 742	3 306	2 779	2 171	2 309	1 896	1 431	2 543	2 107	1 600

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

<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

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 (T<sub>m</sub>). A detailed description of the calculations is available at <http://www.sp.se/en/index/services/solar/ScenoCalc/Sidor/default.aspx>.

<b>DIN CERTCO • Alboinstraße 56 • 12103 Berlin</b> <b>Tel: +49 30 7562-1131 • Fax: +49 30 7562-1141 • E-Mail: info@dincertco.de •</b> <b>www.dincertco.de</b>	Datasheet version:
	4.04, 2013-04-22
	ScenoCalc version:
	Ver. 4.04 (Jun, 2013)