





<b>Summary of</b>	<b>EN12976-2</b>	<b>SOLAR SYSTEM test results</b>	<b>Licence Number</b>	<b>011-7S2888 A</b>						
<b>Annex to Solar KEYMARK Certificate</b>			<b>Issued</b>	<b>2018-10-11</b>						
<b>Company</b>	Sistem Enerji Üretim San.ve Tic Ltd. Sti.		<b>Country</b>	Turkey						
<b>Brand (optional)</b>	Sistem Tubular		<b>Website</b>	www.sistemtubular.com						
<b>Street</b>	Organize Sanayi Bölgesi 8 Sk No 17		<b>E-mail</b>	info@sistemtubular.com						
<b>Postal Code</b>	TR-09900	Nazilli Aydın	<b>Tel. / Fax</b>	+90 0 256 316 2003/-2						
<b>System classification</b>										
<b>Application(s)</b>	Hot water									
<b>Solar loop, circulation principle</b>	Thermosyphon									
<b>Direct solar loop / heat exchanger</b>	Direct									
<b>Open, vented or closed solar loop</b>	Closed									
<b>Drain back/down</b>	Always filled (no drain)									
<b>Store location</b>	Outdoor									
<b>Store orientation (of main axis)</b>	Horizontal									
<b>Type of auxiliary heating (internal back-up heat)</b>	Electric									
<b>If other auxiliary/internal back-up heating, please specify:</b>	Optional									
<b>Solar+supplementary OR Solar-only / Solar pre-heat</b>	Solar only / Solar preheat									
<b>Collector(s)</b>			<b>Heat store(s)</b>							
<b>Company</b>	Sistem Enerji		<b>Company</b>	Sistem Enerji						
<i>Keymark lic.no. if available</i>	--		<i>Keymark lic.no. if available</i>	--						
<b>Collector name</b>	<b>Per module</b>			<b>Store name</b>	<b>Total nominal volume</b>	<b>Gross height</b>	<b>Gross width</b>	<b>Gross depth</b>	<b>Auxiliary heated volume</b>	<b>Electrical aux. heating power</b>
	<b>Gross Area (Ag)</b>	<b>Gross length</b>	<b>Gross width</b>							
	m <sup>2</sup>	mm	mm							
Ephesus 16	2.37	1790	1330	Ephesus 16	112	420	1695	420	--	--
Ephesus 24	3.40	1790	1895	Ephesus 24	154	420	2230	420	--	--
<b>Solar loop controller</b>			<b>Solar loop fluid</b>							
<i>Keymark lic.no. if available</i>	--		<b>Recommended/required</b>	No recommend./requirements						
<b>Company</b>	--		<b>Company</b>	--						
<b>Name</b>	--		<b>Name</b>	--						
<b>Solar loop pump - power range</b>	-- W	to	-- W	<b>Freezing point</b>	-- °C					
<b>System family overview</b>										
<b>Collector name</b>	<b>Number of collectors in each configuration for each store</b>									
	<b>Store name</b>									
	Ephesus 16		Ephesus 24							
Ephesus 16	1									
Ephesus 24		1								
<b>Testing Laboratory</b>	Institut für Solartechnik SPF, CH-8640 Rapperswil									
<b>Website</b>	www.spf.ch									
<b>Test report id. number</b>	S246COLL; S246EN; S247COLL; S247EN									
<b>Date of test report</b>	2018-10-10									
<b>Comments of test lab</b>	--									
					 <b>INSTITUT FÜR SOLARTECHNIK</b> 					





<b>Summary of</b>	<b>EN12976-2</b>	<b>test results</b>	<b>Certification No.</b>	<b>011-7S2888 A</b>									
<b>Annex to Solar KEYMARK Certificate</b>			<b>Issued</b>	<b>2018-10-11</b>									
<b>Company</b>	Sistem Enerji Üretim San.ve Tic Ltd. Sti.		<b>Country</b>	Turkey									
<b>Brand (optional)</b>	Sistem Tubular		<b>Website</b>	www.sistemtubular.com									
<b>Street</b>	Organize Sanayi Bölgesi 8 Sk No 17		<b>E-mail</b>	info@sistemtubular.com									
<b>Postal Code</b>	TR-09900	Nazilli Aydın	<b>Tel. / Fax</b>	+90 0 256 316 2003/-2									
<b>System family overview</b>													
<b>For each storage and collector size, give number of collectors</b>													
<b>Collector name</b>	Ephesus 16	Ephesus 24											
Ephesus 16	1												
Ephesus 24		1											
<b>Name of system configuration</b>			Ephesus 16										
<b>Collector name</b>	Ephesus 16	<b>No. Collectors</b>	1	<b>Storage name</b>	Ephesus 16								
<b>Calculated annual results for "solar-only / preheat system"</b>													
<b>Location</b>	Qd,sh	Daily drawoff 110 l				Daily drawoff 140 l				Daily drawoff 170 l			
		Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol	Qd,hw	QL	Qpar	fsol
	MJ/y	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%
Stockholm SE	--	6150	2792	0	45	7821	2988	0	38	9492	3095	0	33
WürzburgDE	--	5897	2907	0	49	7506	3197	0	43	9114	3272	0	43
Davos CH	--	6654	4072	0	61	8483	4306	0	51	10281	4431	0	43
Athens GR	--	4573	3553	0	78	5834	4101	0	70	7064	4429	0	63
<b>Perf. indicators for the table above</b>													
Qd,sh	MJ/y	Not relevant for solar domestic hot water system											
Qd	MJ/y	Annual heat demand for domestic hot water											
QL	MJ/y	Annual heat energy delivered by the solar system											
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)											
$f_{sol}=Q_L/Q_d$	-	Solar fraction											
<b>Ref. conditions</b>		Stockholm SE	Würzburg DE	Davos CH	Athens GR								
	G	1'157	1'230	1'684	1'736								
	T <sub>a,ave</sub>	7.5	9.0	3.2	18.5								
	T <sub>c,ave</sub>	8.5	10.0	5.4	17.8								
	± ΔT <sub>c</sub>	6.4	3.0	0.8	7.4								
G	kWh/m <sup>2</sup>	Annual irradiation South, 45°											
T <sub>a,ave</sub>	°C	Annual average outdoor air temperature											
T <sub>c,ave</sub>	°C	Annual average mains cold water temp.											
ΔT <sub>c</sub>	K	Seasonal variation of T <sub>c</sub>											
Th	45 °C	Desired hot water temperature (mixing valve temperature).											
<b>Max. operating press. - collector side</b>		--	kPa	<b>Max. operating press. - tank side</b>		400	kPa						
<b>Testing Laboratory</b>	Institut für Solartechnik SPF, CH-8640 Rapperswil												
<b>Website</b>	www.spf.ch												
<b>Test report id. number</b>	S246COLL; S246EN; S247COLL; S247EN												
<b>Date of test report</b>	2018-10-10												
<b>Test method</b>	ISO 9459-5 (DST)												
<b>Comments of test lab</b>													
--													

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24



<b>Summary of</b>	<b>EN12976-2</b>	<b>test results</b>	<b>Certification No.</b>	<b>011-7S2888 A</b>									
<b>Annex to Solar KEYMARK Certificate</b>			<b>Issued</b>	<b>2018-10-11</b>									
<b>Company</b>	Sistem Enerji Üretim San.ve Tic Ltd. Sti.		<b>Country</b>	Turkey									
<b>Brand (optional)</b>	Sistem Tubular		<b>Website</b>	www.sistemtubular.com									
<b>Street</b>	Organize Sanayi Bölgesi 8 Sk No 17		<b>E-mail</b>	info@sistemtubular.com									
<b>Postal Code</b>	TR-09900	Nazilli Aydın	<b>Tel. / Fax</b>	+90 0 256 316 2003/-2									
<b>System family overview</b>													
<b>For each storage and collector size, give number of collectors</b>													
<b>Collector name</b>	Ephesus 16		Ephesus 24										
Ephesus 16	1												
Ephesus 24		1											
<b>Name of system configuration</b>													
			Ephesus 24										
<b>Collector name</b>	Ephesus 24	<b>No. Collectors</b>	1	<b>Storage name</b>	Ephesus 24								
<b>Calculated annual results for "solar-only / preheat system"</b>													
<b>Location</b>	Qd,sh MJ/y	Daily drawoff 170 l				Daily drawoff 200 l				Daily drawoff 250 l			
		Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %	Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %	Qd,hw MJ/y	QL MJ/y	Qpar MJ/y	fsol %
Stockholm SE	--	9492	4272	0	45	11164	4466	0	40	13939	4683	0	34
WürzburgDE	--	9114	4584	0	50	10691	5854	0	45	13371	5001	0	37
Davos CH	--	10281	6415	0	62	12110	6709	0	55	15137	6827	0	45
Athens GR	--	7064	5531	0	78	8326	6086	0	73	10406	6712	0	65
<b>Perf. indicators for the table above</b>													
Qd,sh	MJ/y	Not relevant for solar domestic hot water system											
Qd	MJ/y	Annual heat demand for domestic hot water											
QL	MJ/y	Annual heat energy delivered by the solar system											
Qpar	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)											
$f_{sol}=Q_L/Q_d$	-	Solar fraction											
<b>Ref. conditions</b>		Stockholm SE	Würzburg DE	Davos CH	Athens GR								
	G	1'157	1'230	1'684	1'736								
	T <sub>a,ave</sub>	7.5	9.0	3.2	18.5								
	T <sub>c,ave</sub>	8.5	10.0	5.4	17.8								
± ΔT <sub>c</sub>	6.4	3.0	0.8	7.4									
G	kWh/m <sup>2</sup>	Annual irradiation South, 45°											
T <sub>a,ave</sub>	°C	Annual average outdoor air temperature											
T <sub>c,ave</sub>	°C	Annual average mains cold water temp.											
ΔT <sub>c</sub>	K	Seasonal variation of T <sub>c</sub>											
Th	45 °C	Desired hot water temperature (mixing valve temperature).											
<b>Max. operating press. - collector side</b>		--	kPa	<b>Max. operating press. - tank side</b>		400	kPa						
<b>Testing Laboratory</b>		Institut für Solartechnik SPF, CH-8640 Rapperswil											
<b>Website</b>		www.spf.ch											
<b>Test report id. number</b>		S246COLL; S246EN; S247COLL; S247EN											
<b>Date of test report</b>		2018-10-10											
<b>Test method</b>		ISO 9459-5 (DST)											
<b>Comments of test lab</b>													
--													

All values are subject to some uncertainty; e.g. the uncertainty on system output is typically in the range of ± 5 % to ± 15 %

Version 4.5, 2017-10-24