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Summary of	EN12976-2	SOLAR SYSTEM test results		Licence Number	011-7S1749 A					
Annex to Solar KEYMARK Certificate				Issued	2016-01-15					
Company	Wagner Solar GmbH			Country	Germany					
Brand (optional)	-			Website	www.wagner-solar.com					
Street	Sonnenallee 2			E-mail	info@wagner-solar.com					
Postal Code	35274	Kirchhain		Tel. / Fax	+49	6421 8007 0				
System classification										
Application(s)	Hot water									
Solar loop, circulation principle	Thermosyphon									
Direct solar loop / heat exchanger	Heat exchanger									
Open, vented or closed solar loop	Closed									
Drain back/down	Always filled (no drain)									
Store location	Outdoor									
Store orientation (of main axis)	Horizontal									
Type of auxiliary heating (internal back-up heat)	Electric									
If other auxiliary/internal back-up heating, please specify:	-									
Solar+supplementary OR Solar-only / Solar pre-heat	Solar only / Solar preheat									
Collector(s)			Heat store(s)							
Company	Wagner Solar GmbH			Company	Wagner Solar GmbH					
Keymark lic.no. if available	011-7S1734F			Keymark lic.no. if available	-					
Collector name	Per module			Store name	Total nominal volume	Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power
	Gross Area (A _G)	Gross length	Gross width							
EURO L42 TS	2.01	1933	1163	T-S 160	160	1250	500	500	-	1.5
				T-S 200	200	1250	580	580	-	1.5
				T-S 300	300	1870	580	580		1.5
Solar loop controller			Solar loop fluid							
Keymark lic.no. if available	-			Recommended/required	Recommended					
Company	-			Company	Wagner Solar GmbH					
Name	n.a. (Thermosyphon)			Name	DC20					
Solar loop pump - power range	- W to - W			Freezing point	-10 °C					
System family overview										
Collector name	Number of collectors in each configuration for each store									
	Store name									
	T-S 160		T-S 200		T-S 300					
EURO L42 TS	1		1		2					
Testing Laboratory	IZES gGmbH, TZSB									
Website	www.izes.de/tzsb/									
Test report id. number	SYS11_03 + A1, A2, A3 & SYS12_01 + A1, A2									
Date of test report	21.10.2011 & 03.08.2012									
Comments of test lab							data sheet issued by:			
Der im Speicherteil integrierte Heizstab dient lediglich zur Notversorgung mit Warmwasser. Vor Frostperioden sind die mit Trinwasser gefüllten Teile der Anlage (Speicher, Anschlüsse) zu entleeren.							 Institut für Solarenergieforschung GmbH Am Ohreberg 1 D-31860 Emmertal Tel: 0 51 51 / 999-100 Fax: 0 51 51 / 999-500			
The integrated electrical backup heater is only for an emergency supply with hot water. The parts of the system filled with potable water (storage tank, pipes,...) have to be drained before freeze periods										

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Summary of	EN12976-2	test results	Certification No.	011-7S1749 A										
Annex to Solar KEYMARK Certificate			Issued	2016-01-15										
Company	Wagner Solar GmbH		Country	Germany										
Brand (optional)	-		Website	www.wagner-solar.com										
Street	Sonnenallee 2		E-mail	info@wagner-solar.com										
Postal Code	35274	Kirchhain	Tel. / Fax	+49	6421 8007 0									
System family overview														
For each storage and collector size, give number of collectors														
Collector name	T-S 160	T-S 200	T-S 300											
EURO L42 TS	1	1	2											
Name of system configuration														
SECUterm 160 P														
Collector name	EURO L42 TS	No. Collectors	1	Storage name	T-S 160									
Calculated annual results for "solar-only / preheat system"														
Location	Q _{d,sh} MJ/y	Daily drawoff 80 l				Daily drawoff 110 l				Daily drawoff 140 l				
		Q _{d,hw} MJ/y	Q _L MJ/y	Q _{par} MJ/y	f _{sol} %	Q _{d,hw} MJ/y	Q _L MJ/y	Q _{par} MJ/y	f _{sol} %	Q _{d,hw} MJ/y	Q _L MJ/y	Q _{par} MJ/y	f _{sol} %	
Stockholm SE	-	4478	2596	0	58.0	6150	3143	0	51.1	7821	3470	0	44.4	
WürzburgDE	-	4289	2646	0	61.7	5897	3247	0	55.1	7506	3690	0	49.2	
Davos CH	-	4857	3942	0	81.2	6654	4730	0	71.1	8483	5234	0	61.7	
Athens GR	-	3343	3035	0	90.8	4573	3881	0	84.9	5834	4540	0	77.8	
Rom, I	-	4037	3751	0	92.9	5550	4856	0	87.5	7064	5738	0	81.2	
Madrid, ES		3910	3499	0	89.5	5393	4414	0	81.8	6843	5173	0	75.6	
Dubai, VAE*1		2081	2081	0	100.0	2862	2862	0	100.0	3625	3625	0	100.0	
Perf. indicators for the table above														
Q _{d,sh}	MJ/y	Not relevant for solar domestic hot water system												
Q _d	MJ/y	Annual heat demand for domestic hot water												
Q _L	MJ/y	Annual heat energy delivered by the solar system												
Q _{par}	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)												
f _{sol} =Q _L /Q _d	-	Solar fraction												
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR	Rom, I	Madrid, ES	Dubai, VAE*1						
	G	1 157	1 230	1 684	1 736	1 805	1 822	2164*1						
	T _{a,ave}	7.5	9.0	3.2	18.5	17.2	14.3	28.0						
	T _{c,ave}	8.5	10.0	5.4	17.8	12.0	13.0	28*2						
	± ΔT _c	6.4	3.0	0.8	7.4	3.0	5.9	_*2						
G	kWh/m ²	Annual irradiation South, 45°												
T _{a,ave}	°C	Annual average outdoor air temperature												
T _{c,ave}	°C	Annual average mains cold water temp.												
ΔT _c	K	Seasonal variation of T _c												
Th	45 °C	Desired hot water temperature (mixing valve temperature).												
Max. operating press. - collector side		250	kPa	Max. operating press. - tank side		800	kPa							
Testing Laboratory		IZES gGmbH, TZSB												
Website		www.izes.de/tzsb/												
Test report id. number		SYS11_03 + A1, A2, A3 & SYS12_01 + A1, A2												
Date of test report		21.10.2011 & 03.08.2012												
Test method		ISO 9459-5 (DST)												
Comments of test lab						data sheet issued by:								
*1 Location Dubai: south orientation of the system with 25° inclination of the collector						 Institut für Solarenergieforschung GmbH Am Ohnberg 1 D-81660 Emmenthal Tel.: 0 51 51 / 999-100 Fax: 0 51 51 / 999-500								
*2 definition by manufacturer														

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

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Summary of	EN12976-2	test results	Certification No.	011-7S1749 A										
Annex to Solar KEYMARK Certificate			Issued	2016-01-15										
Company	Wagner Solar GmbH		Country	Germany										
Brand (optional)	-		Website	www.wagner-solar.com										
Street	Sonnenallee 2		E-mail	info@wagner-solar.com										
Postal Code	35274	Kirchhain	Tel. / Fax	+49 6421 8007 0										
System family overview														
For each storage and collector size, give number of collectors														
Collector name	T-S 160	T-S 200	T-S 300											
EURO L42 TS	1	1	2											
Name of system configuration														
			SECUterm 200 P											
Collector name	EURO L42 TS	No. Collectors	1	Storage name	T-S 200									
Calculated annual results for "solar-only / preheat system"														
Location	Q _{d,sh} MJ/y	Daily drawoff 80 l				Daily drawoff 110 l				Daily drawoff 140 l				
		Q _{d,hw} MJ/y	Q _L MJ/y	Q _{par} MJ/y	f _{sol} %	Q _{d,hw} MJ/y	Q _L MJ/y	Q _{par} MJ/y	f _{sol} %	Q _{d,hw} MJ/y	Q _L MJ/y	Q _{par} MJ/y	f _{sol} %	
Stockholm SE	-	4478	2665	0	59.5	6150	3154	0	51.3	7821	3532	0	45.2	
WürzburgDE	-	4289	2706	0	63.1	5897	3248	0	55.1	7506	3721	0	49.6	
Davos CH	-	4857	4037	0	83.1	6654	4730	0	71.1	8483	5267	0	62.1	
Athens GR	-	3343	3084	0	92.3	4573	3879	0	84.8	5834	4573	0	78.4	
Rom, I	-	4037	3816	0	94.5	5550	4857	0	87.5	7064	5740	0	81.3	
Madrid, ES		3910	3564	0	91.2	5393	4447	0	82.5	6843	5203	0	76.0	
Dubai, VAE*1		2081	2081	0	100.0	2862	2862	0	100.0	3625	3625	0	100.0	
Perf. indicators for the table above														
Q _{d,sh}	MJ/y	Not relevant for solar domestic hot water system												
Q _d	MJ/y	Annual heat demand for domestic hot water												
Q _L	MJ/y	Annual heat energy delivered by the solar system												
Q _{par}	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)												
f _{sol} =Q _L /Q _d	-	Solar fraction												
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR	Rom, I	Madrid, ES	Dubai, VAE*1						
	G	1 157	1 230	1 684	1 736	1 805	1 822	2164*1						
	T _{a,ave}	7.5	9.0	3.2	18.5	17.2	14.3	28.0						
	T _{c,ave}	8.5	10.0	5.4	17.8	12.0	13.0	28*2						
	± ΔT _c	6.4	3.0	0.8	7.4	3.0	5.9	_*2						
G	kWh/m ²	Annual irradiation South, 45°												
T _{a,ave}	°C	Annual average outdoor air temperature												
T _{c,ave}	°C	Annual average mains cold water temp.												
ΔT _c	K	Seasonal variation of T _c												
Th	45 °C	Desired hot water temperature (mixing valve temperature).												
Max. operating press. - collector side		250	kPa	Max. operating press. - tank side		800	kPa							
Testing Laboratory		IZES gGmbH, TZSB												
Website		www.izes.de/tzsb/												
Test report id. number		SYS11_03 + A1, A2, A3 & SYS12_01 + A1, A2												
Date of test report		21.10.2011 & 03.08.2012												
Test method		ISO 9459-5 (DST)												
Comments of test lab						data sheet issued by:								
*1 Location Dubai: south orientation of the system with 25° inclination of the collector						 <small>Institut für Solarenergieforschung GmbH Am Ohreberg 1 D43180 Emmertal Tel.: 0 51 51 / 999-100 Fax: 0 51 51 / 999-500</small>								
*2 definition by manufacturer														


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Brand (optional)	-		Website	www.wagner-solar.com										
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Postal Code	35274	Kirchhain	Tel. / Fax	+49 6421 8007 0										
System family overview														
For each storage and collector size, give number of collectors														
Collector name	T-S 160		T-S 200											
EURO L42 TS	1		1	2										
Calculated annual results for "solar-only / preheat system"														
Location	Q_{d,sh}	Daily drawoff 170 l				Daily drawoff 200 l				Daily drawoff 250 l				
		Q_{d,hw}	Q_L	Q_{par}	f_{sol}	Q_{d,hw}	Q_L	Q_{par}	f_{sol}	Q_{d,hw}	Q_L	Q_{par}	f_{sol}	
	MJ/y	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	MJ/y	MJ/y	MJ/y	%	
Stockholm SE	-	9492	5393	0	56.8	11164	5929	0	53.1	13939	6623	0	47.5	
WürzburgDE	-	9114	5487	0	60.2	10691	6118	0	57.2	13371	6969	0	52.1	
Davos CH	-	10281	8136	0	79.1	12110	8956	0	74.0	15137	10028	0	66.2	
Athens GR	-	7064	6370	0	90.2	8326	7222	0	86.7	10407	8452	0	81.2	
Rom, I	-	8578	7916	0	92.3	10092	9019	0	89.4	12614	10628	0	84.3	
Madrid, ES	-	8326	7285	0	87.5	9776	8231	0	84.2	12236	9587	0	78.4	
Dubai, VAE*1	-	4415	4415	0	100.0	5203	5203	0	100.0	6496	6496	0	100.0	
Perf. indicators for the table above														
Q _{d,sh}	MJ/y	Not relevant for solar domestic hot water system												
Q _d	MJ/y	Annual heat demand for domestic hot water												
Q _L	MJ/y	Annual heat energy delivered by the solar system												
Q _{par}	MJ/y	Annual parasitic energy: (electricity for pumps/controllers)												
f _{sol} =Q _L /Q _d	-	Solar fraction												
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR	Rom, I	Madrid, ES	Dubai, VAE*1						
	G	1 157	1 230	1 684	1 736	1 805	1 822	2164*1						
	T _{a,ave}	7.5	9.0	3.2	18.5	17.2	14.3	28.0						
	T _{c,ave}	8.5	10.0	5.4	17.8	12.0	13.0	28*2						
	± ΔT _c	6.4	3.0	0.8	7.4	3.0	5.9	_*2						
G	kWh/m ²	Annual irradiation South, 45°												
T _{a,ave}	°C	Annual average outdoor air temperature												
T _{c,ave}	°C	Annual average mains cold water temp.												
ΔT _c	K	Seasonal variation of T_c												
Th	45 °C	Desired hot water temperature (mixing valve temperature).												
Max. operating press. - collector side		250	kPa	Max. operating press. - tank side		800	kPa							
Testing Laboratory		IZES gGmbH, TZSB												
Website		www.izes.de/tzsb/												
Test report id. number		SYS11_03 + A1, A2, A3 & SYS12_01 + A1, A2												
Date of test report		21.10.2011 & 03.08.2012												
Test method		ISO 9459-5 (DST)												
Comments of test lab										data sheet issued by:				
*1 Location Dubai: south orientation of the system with 25° inclination of the collector										 <small>Institut für Solarenergieforschung GmbH Am Obenberg 1 D-31960 Emmerthal Tel.: 0 51 51 / 999-100 Fax: 0 51 51 / 999-500</small>				
*2 definition by manufacturer														

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