





Summary of	<b>EN12976-2</b>	<b>SOLAR SYSTEM test results</b>	Licence Number	<b>011-7S2657 A</b>						
Annex to Solar KEYMARK Certificate			Issued	<b>2018-06-21</b>						
Company	IMMERGAS S.p.A.		Country	Italy						
Brand (optional)	--		Website	www.immergas.com						
Street	Via Cisa Ligure 95		E-mail	sales-export@immergas.com						
Postal Code	IT-42041	Brescello	Tel. / Fax	+39	522 689 450/178					
<b>System classification</b>										
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)	None									
If other auxiliary/internal back-up heating, please specify:	Optional internal back-up heating (not tested)									
Solar+supplementary OR Solar-only / Solar pre-heat	Solar only / Solar preheat									
<b>Collector(s)</b>			<b>Heat store(s)</b>							
Company	SAMMLER B.Michalopoulos		Company	SAMMLER B.Michalopoulos						
Keymark lic.no. if available	011-7S494 F		Keymark lic.no. if available	--						
Collector name	<b>Per module</b>			Store name	Total nominal volume	Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power
	Gross Area (Ag)	Gross length	Gross width							
ARIS2004	2.11	2037	1036	SV160	160	1055	580	580	--	--
				SV200	200	1324	580	580	--	--
				SV300	300	1764	580	580	--	--
<b>Solar loop controller</b>			<b>Solar loop fluid</b>							
Keymark lic.no. if available	--		Recommended/required	Recommended						
Company	--		Company	--						
Name	--		Name	Water/Glycole						
Solar loop pump - power range	-- W	to	-- W	Freezing point	-- °C					
<b>System family overview</b>										
Collector name	<b>Number of collectors in each configuration for each store</b>									
	SV160			SV200			SV300			
ARIS2004	1			1			2			
Testing Laboratory	Institut für Solartechnik SPF, CH-8640 Rapperswil									
Website	www.spf.ch									
Test report id. number	S248QPEN; S249EN									
Date of test report	2018-06-20									
Comments of test lab	--									
 INSTITUT FÜR SOLARTECHNIK 										



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System family overview

Collector name	For each storage and collector size, give number of collectors												
	SV160			SV200			SV300						
ARIS2004	1			1			2						

Name of system configuration	NATURAL SOL 150 V2														
Collector name	ARIS2004			No. Collectors			1			Storage name			SV160		

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 140 l				Daily drawoff 170 l				Daily drawoff 200 l			
		Qd,hw		QL		Qd,hw		QL		Qd,hw		QL	
		MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y
Stockholm SE	--	7821	3386	--	43	9492	3664	--	39	11164	3829	--	34
WürzburgDE	--	7506	3543	--	47	9114	3892	--	43	10691	4084	--	38
Davos CH	--	8483	4954	--	58	10281	5315	--	52	12110	5534	--	46
Athens GR	--	5834	4451	--	76	7064	5015	--	71	8326	5487	--	66

Perf. indicators for the table above

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

Ref. conditions		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).

Max. operating press. - collector side	300	kPa	Max. operating press. - tank side	1'000	kPa
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Testing Laboratory	Institut für Solartechnik SPF, CH-8640 Rapperswil
Website	www.spf.ch
Test report id. number	S248QPEN; S249EN
Date of test report	2018-06-20
Test method	ISO 9459-5 (DST)

Comments of test lab

The SPF test number for the system subtype NATURAL SOL 150 V2 is S249 ST1. The annual performance for the system subtype was calculated according to the Specific CEN Keymark Scheme Rules for system families.



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Postal Code	IT-42041	Brescello	Tel. / Fax	+39 522 689 450/178

System family overview

Collector name	For each storage and collector size, give number of collectors												
	SV160			SV200			SV300						
ARIS2004	1			1			2						

Name of system configuration	NATURAL SOL 200 V2				
Collector name	ARIS2004	No. Collectors	1	Storage name	SV200

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 170 l					Daily drawoff 200 l					Daily drawoff 250 l				
		Qd,hw		QL		Qpar	Qd,hw		QL		Qpar	Qd,hw		QL		Qpar
		MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y
Stockholm SE	--	9492	3626	--	38	11164	3851	--	35	13939	4056	--	29			
WürzburgDE	--	9114	3855	--	42	10691	4105	--	38	13371	4359	--	33			
Davos CH	--	10281	5223	--	51	12110	5522	--	46	15137	5813	--	38			
Athens GR	--	7064	4980	--	71	8326	5503	--	66	10407	6088	--	59			

Perf. indicators for the table above

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

Ref. conditions		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).

Max. operating press. - collector side	300	kPa	Max. operating press. - tank side	1'000	kPa
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Testing Laboratory	Institut für Solartechnik SPF, CH-8640 Rapperswil
Website	www.spf.ch
Test report id. number	S248QPEN; S249EN
Date of test report	2018-06-20
Test method	ISO 9459-5 (DST)

Comments of test lab

The SPF test number for the system subtype NATURAL SOL 200 V2 is S249 ST3. The annual performance for the system subtype was calculated according to the Specific CEN Keymark Scheme Rules for system families.



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System family overview

Collector name	For each storage and collector size, give number of collectors														
	SV160			SV200			SV300								
ARIS2004	1			1			2								

Name of system configuration	NATURAL SOL 280 V2				
Collector name	ARIS2004	No. Collectors	2	Storage name	SV300

Calculated annual results for "solar-only / preheat system"

Location	Qd,sh MJ/y	Daily drawoff 250 l					Daily drawoff 300 l					Daily drawoff 400 l				
		Qd,hw		QL		Qpar	Qd,hw		QL		Qpar	Qd,hw		QL		Qpar
		MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y	MJ/y
Stockholm SE	--	13939	6760	--	49	16746	7335	--	44	22327	7882	--	35			
WürzburgDE	--	13371	6940	--	52	16052	7641	--	48	21413	8330	--	39			
Davos CH	--	15137	9915	--	66	18165	10645	--	59	24220	11238	--	46			
Athens GR	--	10407	8481	--	82	12488	9529	--	76	16651	12073	--	73			

Perf. indicators for the table above



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

Ref. conditions		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).

Max. operating press. - collector side	300	kPa	Max. operating press. - tank side	1'000	kPa
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Testing Laboratory	Institut für Solartechnik SPF, CH-8640 Rapperswil
Website	www.spf.ch
Test report id. number	S248QPEN; S249EN
Date of test report	2018-06-20
Test method	ISO 9459-5 (DST)

Comments of test lab	 INSTITUT FÜR SOLARTECHNIK 
NATURAL SOL 280 V2 was tested as the "medium" subtype under SPF Test Number S249.	