Summary of	EN12976-2	SOLAR SYSTEM test results	Licence Number	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-08-10

Company	HELIOAKMI S.A.	Country	Greece
Brand (optional)	HELIOAKMI, MEGASUN, ASSOS BOILERS, NOVASUN, VORMANN, SOLARTOP, ATLASOL, SOLARNET, SOL	Website	www.helioakmi.com
Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

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)	None
If other auxiliary/internal back-up heating, please specifiy:	
Solar+supplementary OR Solar-only / Solar pre-heat	Solar only / Solar preheat

Collector(s)				Heat store(s)						
Company	HELIOAKMI S.A.			Company	HELIOAKMI S.A.					
Keymark lic.no. if available	*SKM 9926/3*			*Keymark lic.no. if available*						
Collector name	Per module: Gross Area (Ag)	Gross length	Gross width	Store name	Total nominal volume	Gross height	Gross width	Gross depth	Auxiliary heated volume	Electrical aux. heating power
	m²	mm	mm		litres	mm	mm	mm	litres	kW
ST–ALSEL 2000	2.07	2.05	1.01	SP 120 KK	108	1050	530	-	-	1 - 4
ST–ALSEL 2500	2.62	2.05	1.28	SP 160 KK	155	1300	530	-	-	1 - 4
				SP 200 KK	187	1300	570	-	-	1 - 4
				SP 300 KK	290	2050	570	-	-	1 - 4
				SP 350 KK	324	2050	570	-	-	1 - 4

Solar loop controller		Solar loop fluid		
Keymark lic.no. if available	*ControllerLicenceNumber*	Recommended/required	Required	
Company	ControllerCompany	Company		
Name	ControllerName	Name		
Solar loop pump - power range	99 W to 999 W	Freezing point	-5 to -36	°C

System family overview

Collector name	Number of collectors in each configuration for each store — Store name: SP 120 KK						SP 160 KK						SP 200 KK						SP 300 KK						SP 350 KK					
ST–ALSEL 2000	1						1						1	2					2	3					2					
ST–ALSEL 2500							1						1						1						1					

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6064DE1, 6065DE1, 6083DE1, 6064F4, 8068-1
Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018

Comments of test lab

Comments ...

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-06-20

Company	HELIOAKMI S.A.	Country	Greece
Brand (optional)	HELIOAKMI, MEGASUN, ASSOS BOILERS, NOVASUN, VORMANN, SOLARTOP, ATLASOL, SOLARNET, SOL	Website	www.helioakmi.com
Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 120 KK x 2.10m²	
Collector name	ST–ALSEL 2000	No. Collectors	1	Storage name	SP 120 KK

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

Location	Qd,sh	Daily drawoff 80 l				Daily drawoff 110 l				Daily d 140 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	-	4478	2318	-	52	6150	2728	-	44	7821	2920	-	37
WürzburgDE	-	4289	2346	-	55	5897	2822	-	48	7506	3050	-	41
Davos CH	-	4857	3437	-	71	6654	4005	-	60	8483	4226	-	50
Athens GR	-	3343	2835	-	85	4573	3532	-	77	5834	4005	-	69

Perf. indicators for the table above		
Qd,sh	MJ/y	0
	MJ/y	Not relevant for solar domestic hot water system
	MJ/y	Annual heat demand for domestic hot water
	MJ/y	Annual heat energy delivered by the solar system
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	Annual irradiation South, 45°
Ta,ave	°C	Annual average outdoor air temperature
Tc,ave	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
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Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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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

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-06-20

Company	HELIOAKMI S.A.	Country	Greece
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Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 160 KK x 2.10m²	
Collector name	ST–ALSEL 2000	No. Collectors	1	Storage name	SP 160 KK

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

Location	Qd,sh	Daily drawoff 140 l				Daily drawoff 170 l				Daily d 200 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	-	7821	3021	-	39	9492	3185	-	34	11164	3280	-	29
WürzburgDE	-	7506	3185	-	42	9114	3406	-	37	10691	3469	-	32
Davos CH	-	8483	4384	-	52	10281	4604	-	45	12110	4699	-	39
Athens GR	-	5834	4131	-	71	7064	4604	-	65	8326	4857	-	58

Perf. indicators for the table above		
Qd,sh	MJ/y	0
	MJ/y	Not relevant for solar domestic hot water system
	MJ/y	Annual heat demand for domestic hot water
	MJ/y	Annual heat energy delivered by the solar system
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	Annual irradiation South, 45°
Ta,ave	°C	Annual average outdoor air temperature
Tc,ave	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
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Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-06-20

Company	HELIOAKMI S.A.	Country	Greece
Brand (optional)	HELIOAKMI, MEGASUN, ASSOS BOILERS, NOVASUN, VORMANN, SOLARTOP, ATLASOL, SOLARNET, SOL	Website	www.helioakmi.com
Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 160 KK x 2.62m²	
Collector name	ST–ALSEL 2500	No. Collectors	1	Storage name	SP 160 KK

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

Location	Qd,sh	Daily drawoff 140 l				Daily drawoff 170 l				Daily d 200 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	-	7821	3500	-	45	9492	3753	-	40	11164	3879	-	35
WürzburgDE	-	7506	3627	-	48	9114	3974	-	44	10691	4100	-	38
Davos CH	-	8483	5172	-	61	10281	5519	-	54	12110	5645	-	47
Athens GR	-	5834	4541	-	78	7064	5109	-	72	8326	5519	-	66

Perf. indicators for the table above		
Qd,sh	MJ/y	0
	MJ/y	Not relevant for solar domestic hot water system
	MJ/y	Annual heat demand for domestic hot water
	MJ/y	Annual heat energy delivered by the solar system
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	Annual irradiation South, 45°
Ta,ave	°C	Annual average outdoor air temperature
Tc,ave	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6064DE1, 6065DE1, 6083DE1, 6064F4, 8068-1
Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
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Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 200 KK x 2.10m²	
Collector name	ST–ALSEL 2000	No. Collectors	1	Storage name	SP 200 KK

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

Location	Qd,sh	Daily drawoff 170 l				Daily drawoff 200 l				Daily d 250 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	-	9492	3217	-	34	11164	3343	-	30	13939	3500	-	25
WürzburgDE	-	9114	3437	-	38	10691	3595	-	34	13371	3721	-	28
Davos CH	-	10281	4636	-	45	12110	4825	-	40	15137	4951	-	33
Athens GR	-	7064	4636	-	66	8326	4983	-	60	10407	5267	-	51

Perf. indicators for the table above		
Qd,sh	MJ/y	0
	MJ/y	Not relevant for solar domestic hot water system
	MJ/y	Annual heat demand for domestic hot water
	MJ/y	Annual heat energy delivered by the solar system
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	Annual irradiation South, 45°
Ta,ave	°C	Annual average outdoor air temperature
Tc,ave	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
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Test report id. number	6064DE1, 6065DE1, 6083DE1, 6064F4, 8068-1
Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-06-20

Company	HELIOAKMI S.A.	Country	Greece
Brand (optional)	HELIOAKMI, MEGASUN, ASSOS BOILERS, NOVASUN, VORMANN, SOLARTOP, ATLASOL, SOLARNET, SOL	Website	www.helioakmi.com
Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 200 KK x 2.62m²	
Collector name	ST–ALSEL 2500	No. Collectors	1	Storage name	SP 200 KK

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

Location	Qd,sh	Daily drawoff 170 l				Daily drawoff 200 l				Daily d 250 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	-	9492	3816	-	40	11164	3974	-	36	13939	4194	-	30
WürzburgDE	-	9114	4037	-	44	10691	4289	-	40	13371	4447	-	33
Davos CH	-	10281	5582	-	54	12110	5834	-	48	15137	6023	-	40
Athens GR	-	7064	5172	-	73	8326	5645	-	68	10407	6181	-	59

Perf. indicators for the table above

Qd,sh	MJ/y	0
	MJ/y	**Not relevant for solar domestic hot water system**
	MJ/y	**Annual heat demand for domestic hot water**
	MJ/y	**Annual heat energy delivered by the solar system**
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
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Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-06-20

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Brand (optional)	HELIOAKMI, MEGASUN, ASSOS BOILERS, NOVASUN, VORMANN, SOLARTOP, ATLASOL, SOLARNET, SOL	Website	www.helioakmi.com
Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 **2**	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 200E KK x 4.20m²	
Collector name	ST–ALSEL 2000	No. Collectors	2	Storage name	SP 200 KK

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

Location	Qd,sh	Daily drawoff 170 l				Daily drawoff 200 l				Daily d 250 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	-	9492	4762	-	50	11164	5109	-	46	13939	5519	-	40
WürzburgDE	-	9114	4888	-	54	10691	5361	-	50	13371	5803	-	43
Davos CH	-	10281	7159	-	70	12110	7695	-	64	15137	8105	-	54
Athens GR	-	7064	5897	-	83	8326	6623	-	80	10407	7506	-	72

Perf. indicators for the table above		
Qd,sh	MJ/y	0
	MJ/y	Not relevant for solar domestic hot water system
	MJ/y	Annual heat demand for domestic hot water
	MJ/y	Annual heat energy delivered by the solar system
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	Annual irradiation South, 45°
Ta,ave	°C	Annual average outdoor air temperature
Tc,ave	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
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No comments

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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

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-06-20

Company	HELIOAKMI S.A.	Country	Greece
Brand (optional)	HELIOAKMI, MEGASUN, ASSOS BOILERS, NOVASUN, VORMANN, SOLARTOP, ATLASOL, SOLARNET, SOL	Website	www.helioakmi.com
Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	

Name of system configuration				SP 300 KK x 2.62m^2	
Collector name	ST–ALSEL 2500	No. Collectors	1	Storage name	SP 300 KK

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

Location	Qd,sh	Daily drawoff 250 l				Daily drawoff 300 l				Daily d 400 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	-	13939	4320	-	31	16746	4541	-	27	22327	4793	-	21
WürzburgDE	-	13371	4636	-	35	16052	4857	-	30	21413	5046	-	24
Davos CH	-	15137	6244	-	41	18165	6496	-	36	24220	6717	-	28
Athens GR	-	10407	6402	-	62	12488	6875	-	55	16651	7253	-	44

Perf. indicators for the table above

Qd,sh	MJ/y	0
	MJ/y	**Not relevant for solar domestic hot water system**
	MJ/y	**Annual heat demand for domestic hot water**
	MJ/y	**Annual heat energy delivered by the solar system**
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6064DE1, 6065DE1, 6083DE1, 6064F4, 8068-1
Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-06-20

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System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 300 KK x 4.20m²	
Collector name	ST–ALSEL 2000	No. Collectors	2	Storage name	SP 300 KK

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

Location	Qd,sh	Daily drawoff 250 l				Daily drawoff 300 l				Daily d 400 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	-	13939	5866	-	42	16746	6118	-	37	22327	6339	-	28
WürzburgDE	-	13371	6181	-	46	16052	6528	-	41	21413	6717	-	31
Davos CH	-	15137	8578	-	57	18165	8830	-	49	24220	9019	-	37
Athens GR	-	10407	7726	-	74	12488	8515	-	68	16651	9366	-	56

Perf. indicators for the table above

Qd,sh	MJ/y	0
	MJ/y	**Not relevant for solar domestic hot water system**
	MJ/y	**Annual heat demand for domestic hot water**
	MJ/y	**Annual heat energy delivered by the solar system**
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6064DE1, 6065DE1, 6083DE1, 6064F4, 8068-1
Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
Annex to Solar KEYMARK Certificate			Issued	2018-06-20

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System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 300 KK x 6.30m²	
Collector name	ST–ALSEL 2000	No. Collectors	3	Storage name	SP 300 KK

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

Location	Qd,sh	Daily drawoff 250 l				Daily drawoff 300 l				Daily d 400 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	-	13939	6906	-	50	16746	7537	-	45	22327	8294	-	37
WürzburgDE	-	13371	7159	-	54	16052	7916	-	49	21413	8704	-	41
Davos CH	-	15137	10470	-	69	18165	11384	-	63	24220	12110	-	50
Athens GR	-	10407	8672	-	83	12488	9839	-	79	16651	11479	-	69

Perf. indicators for the table above		
Qd,sh	MJ/y	0
	MJ/y	Not relevant for solar domestic hot water system
	MJ/y	Annual heat demand for domestic hot water
	MJ/y	Annual heat energy delivered by the solar system
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	Annual irradiation South, 45°
Ta,ave	°C	Annual average outdoor air temperature
Tc,ave	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
Website	www.solar.demokritos.gr
Test report id. number	6064DE1, 6065DE1, 6083DE1, 6064F4, 8068-1
Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Version 4.5, 2017-10-24

Summary of	EN12976-2	test results	Certification No.	SKM 9926/1
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Company	HELIOAKMI S.A.	Country	Greece
Brand (optional)	HELIOAKMI, MEGASUN, ASSOS BOILERS, NOVASUN, VORMANN, SOLARTOP, ATLASOL, SOLARNET, SOL	Website	www.helioakmi.com
Street	Thesi Nea Zoi	E-mail	megasun@helioakmi.com
Postal Code	19300 Aspropyrgos, Attiki	Tel. / Fax	+30 210 5595625 / 5595723

System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 350 KK x 2.62m²	
Collector name	ST–ALSEL 2500	No. Collectors	1	Storage name	SP 350 KK

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

Location	Qd,sh	Daily drawoff 250 l				Daily drawoff 300 l				Daily d 400 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	-	13939	4352	-	31	16746	4541	-	27	22327	4857	-	22
WürzburgDE	-	13371	4636	-	35	16052	4888	-	30	21413	5140	-	24
Davos CH	-	15137	6213	-	41	18165	6528	-	36	24220	6843	-	28
Athens GR	-	10407	6402	-	62	12488	6938	-	56	16651	7348	-	44

Perf. indicators for the table above

Qd,sh	MJ/y	0
	MJ/y	**Not relevant for solar domestic hot water system**
	MJ/y	**Annual heat demand for domestic hot water**
	MJ/y	**Annual heat energy delivered by the solar system**
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	**Annual irradiation South, 45°**
Ta,ave	°C	**Annual average outdoor air temperature**
Tc,ave	°C	**Annual average mains cold water temp.**
ΔTc	K	**Seasonal variation of Tc**
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
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Test report id. number	6064DE1, 6065DE1, 6083DE1, 6064F4, 8068-1
Date of test report	27/3/14, 27/3/14, 8/12/16, 31/3/17, 23/7/2018
Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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Version 4.5, 2017-10-24

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System family overview

For each storage and collector size, give number of collectors

Collector name	SP 120 KK	SP 160 KK	SP 200 KK	SP 300 KK	SP 350 KK
ST–ALSEL 2000	1	1	1 2	2 3	2
ST–ALSEL 2500		1	1	1	1

Name of system configuration				SP 350 KK x 4.20m²	
Collector name	ST–ALSEL 2000	No. Collectors	2	Storage name	SP 350 KK

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

Location	Qd,sh	Daily drawoff 250 l				Daily drawoff 300 l				Daily d 400 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	-	13939	5929	-	43	16746	6307	-	38	22327	6812	-	31
WürzburgDE	-	13371	6213	-	46	16052	6717	-	42	21413	7222	-	34
Davos CH	-	15137	8672	-	57	18165	9209	-	51	24220	9776	-	40
Athens GR	-	10407	7821	-	75	12488	8735	-	70	16651	9965	-	60

Perf. indicators for the table above		
Qd,sh	MJ/y	0
	MJ/y	Not relevant for solar domestic hot water system
	MJ/y	Annual heat demand for domestic hot water
	MJ/y	Annual heat energy delivered by the solar system
	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	Perf. indicators for the table above	Qd,sh
	G	1,157	1,230	1,684	1,736		
	Ta,ave	7.5	9.0	3.2	18.5		
	Tc,ave	8.5	10.0	5.4	17.8		
	± ΔTc	6.4	3.0	0.8	7.4		

G	kWh/m²	Annual irradiation South, 45°
Ta,ave	°C	Annual average outdoor air temperature
Tc,ave	°C	Annual average mains cold water temp.
ΔTc	K	Seasonal variation of Tc
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

Testing Laboratory	NCSR "DEMOKRITOS"- SOLAR & ENERGY SYSTEMS LAB
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Test method	ISO 9459-5 (DST)

Comments of test lab

No comments

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