



Summary of annex to Solar KEYMARK Certificate	EN12976-2	SOLAR SYSTEM test results	Licence Number	011-753266 A						
Annex to Solar KEYMARK Certificate			Issued	2024-11-20						
Company	ARYA GROUP SPA		Country	ITALY						
Brand (optional)	--		Website	www.aryagroupspa.com						
Street	VIA TROPEA 40		E-mail	info@aryagroupspa.com						
Postal Code	178	ROMA	Tel. / Fax	+39 67183958						
System classification										
Application(s)	Hot water									
Solar loop, circulation principle	Thermosyphon									
Direct solar loop / heat exchanger	Direct									
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:	NA									
Solar+supplementary OR Solar-only / Solar pre-heat	Solar only / Solar preheat									
Collector(s)			Heat store(s)							
Company	Zhejiang Shentai Solar Energy Co., Ltd		Company	Zhejiang Shentai Solar Energy Co., Ltd						
Keymark lic.no. if available	NA		Keymark lic.no. if available	NA						
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							
	m ²	mm	mm							
150L	1.90	2140	890	150L	140	135	1990	135	NA	NA
200L	2.23	2010	1111	200L	200	130	1929	130	NA	NA
Solar loop controller			Solar loop fluid							
Keymark lic.no. if available	NA		Recommended/required	Required						
Company	-		Company	NA						
Name	-		Name	Water						
Solar loop pump - power range	- W to - W		Freezing point	0 °C						
System family overview										
Collector name	Number of collectors in each configuration for each store									
	Store name									
	150L		200L							
150L	1									
200L			1							
Testing Laboratory			Intertek Testing Services Shenzhen Ltd. Guangzhou Branch							
Website			http://www.intertek.com							
Test report id. number			201125033GZU-001/002, 211216168GZU-001, 221130052GZU-001, 221130052GZU-002, 241015016GZU-001							
Date of test report			2021/3/25, 2021/12/29, 2023/05/06, 2024/07/25, 2024-11-20							
Comments of test lab			 Stamp & signature u.							
Note 1: there are 5 same stainless steel tube as storage tank in models AR150L and AR150L-II, and 7 same stainless steel tube as storage tank in models AR200L and AR200L-II.										



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Postal Code	178	ROMA	Tel. / Fax	+39 67183958									
System family overview													
Collector name	For each storage and collector size, give number of collectors												
	150L	200L											
150L	1												
200L		1											
Name of system configuration													
			AR150L										
Collector name	150L	No. Collectors	1	Storage name									
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff				Daily drawoff				Daily drawoff			
		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	0	6126	2578	-	42.1	7796	2952	-	37.9	9457	3047	-	32.2
Würzburg DE	0	5874	2431	-	41.4	7476	2853	-	38.2	9068	2957	-	32.6
Davos CH	0	6646	3801	-	57.2	8459	4231	-	50.0	10256	4310	-	42.0
Athens GR	0	4565	3226	-	70.7	5810	3942	-	67.8	7042	4361	-	61.9
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 _{a,ave}	7.5	9.0	3.2	18.5								
	T _{c,ave}	8.5	10.0	5.4	17.8								
	± ΔT _c	6.4	3.0	0.8	7.4								
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											
T _h	45 °C	Desired hot water temperature (mixing valve temperature).											
Max. operating press. - collector side		NA	kPa	Max. operating press. - tank side		500	kPa						
Testing Laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch											
Website		http://www.intertek.com											
Test report id. number		201125033GZU-001/002, 211216168GZU-001, 221130052GZU-001, 221130052GZU-002, 241015016GZU-001											
Date of test report		2021/3/25, 2021/12/29, 2023/05/06, 2024/07/25, 2024-11-20											
Test method		ISO 9459-2 (CSTG)											
Comments of test lab		No comments											
													

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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Postal Code		178		ROMA		Tel. / Fax		+39 67183958					
System family overview													
Collector name		For each storage and collector size, give number of collectors											
		150L		200L									
150L		1											
200L				1									
Name of system configuration						AR150L-II							
Collector name		150L		No. Collectors		1		Storage name					
								150L					
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff				Daily drawoff				Daily drawoff			
					110				140				170
		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	0	6126	2578	-	42.1	7796	2952	-	37.9	9457	3047	-	32.2
Würzburg DE	0	5874	2431	-	41.4	7476	2853	-	38.2	9068	2957	-	32.6
Davos CH	0	6646	3801	-	57.2	8459	4231	-	50.0	10256	4310	-	42.0
Athens GR	0	4565	3226	-	70.7	5810	3942	-	67.8	7042	4361	-	61.9
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} =QL/Q _d	-	Solar fraction											
Ref. conditions		Stockholm SE	Würzburg DE	Davos CH	Athens GR								
	G	1,157	1,230	1,684	1,736								
	T _{a,ave}	7.5	9.0	3.2	18.5								
	T _{c,ave}	8.5	10.0	5.4	17.8								
	± ΔT _c	6.4	3.0	0.8	7.4								
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											
T _h	45 °C	Desired hot water temperature (mixing valve temperature).											
Max. operating press. - collector side		NA		kPa		Max. operating press. - tank side		500		kPa			
Testing Laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch											
Website		http://www.intertek.com											
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Date of test report		2021/3/25, 2021/12/29, 2023/05/06, 2024/07/25, 2024-11-20											
Test method		ISO 9459-2 (CSTG)											
Comments of test lab													
No comments													
 													

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Street		VIA TROPEA 40				E-mail		info@aryagroupspa.com					
Postal Code		178		ROMA		Tel. / Fax		+39 67183958					
System family overview													
Collector name		For each storage and collector size, give number of collectors											
		150L		200L									
150L		1											
200L				1									
Name of system configuration													
						AR200L							
Collector name		200L		No. Collectors		1		Storage name					
								200L					
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff				Daily drawoff				Daily drawoff			
		170		200		250							
		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	%
Davos CH	0	10256	3511	0	34%	12082	3568	0	30%	15098	3596	0	24%
Stockholm SE	0	9457	2627	0	28%	11138	2671	0	24%	13914	2692	0	19%
WürzburgDE	0	9072	2860	0	32%	10685	2908	0	27%	13356	2930	0	22%
Athens GR	0	7042	4065	0	58%	8298	4262	0	51%	10382	4302	0	41%
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 _{a,ave}	7.5	9.0	3.2	18.5								
	T _{c,ave}	8.5	10.0	5.4	17.8								
	± ΔT _c	6.4	3.0	0.8	7.4								
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											
T _h	45 °C	Desired hot water temperature (mixing valve temperature).											
Max. operating press. - collector side		NA		kPa		Max. operating press. - tank side		500		kPa			
Testing Laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch											
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Test method		ISO 9459-5 (DST)											
Comments of test lab													
No comments													

Shen Zhi



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System family overview													
Collector name		For each storage and collector size, give number of collectors											
		150L		200L									
150L		1											
200L				1									
Name of system configuration													
						AR200L-II							
Collector name		200L		No. Collectors		1		Storage name					
								200L					
Calculated annual results for "solar-only / preheat system"													
Location	Qd,sh	Daily drawoff				Daily drawoff				Daily drawoff			
		170		200		250							
		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	%
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ΔT _c	K	Seasonal variation of T _c											
T _h	45 °C	Desired hot water temperature (mixing valve temperature).											
Max. operating press. - collector side		NA		kPa		Max. operating press. - tank side		500		kPa			
Testing Laboratory		Intertek Testing Services Shenzhen Ltd. Guangzhou Branch											
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Test method		ISO 9459-5 (DST)											
Comments of test lab													
No comments													

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