

ARYA GROUP SPA

Evaluation Report

SCOPE OF WORKs

Durability and Reliability Testing – Solar thermal system – AR150L, AR150L-II, AR200L, AR200L-II

REPORT NUMBER

241015016GZU-001

ISSUE DATE

2024-11-20

[REVISED DATE]

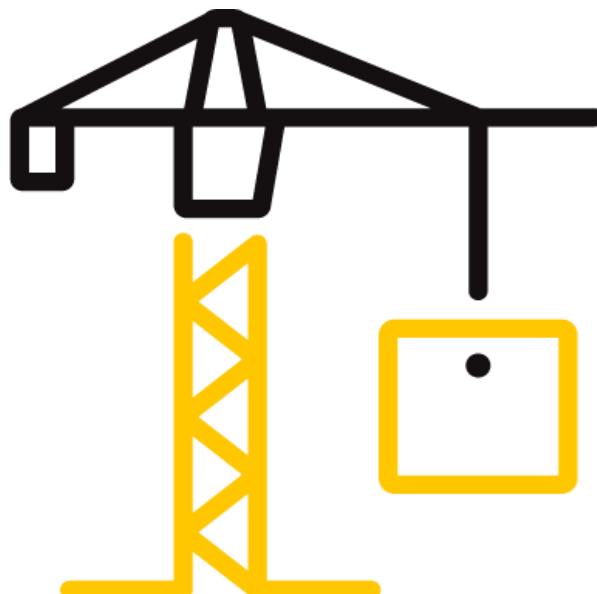
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Report Date: 2024-11-20

Manufacturer Name:	ARYA GROUP SPA
Manufacturer Address:	VIA TROPEA 40, 00178 ROMA, ITALY

Sample information	
Production site Name:	Zhejiang Shentai Solar Energy Co., Ltd
Production site Address:	No. 199, Lianhong Road, Yuanhua Industry Park, Haining, Zhejiang, China
Sample ID:	/
Date of receipt of test item:	/
Situation of receipt samples:	/
Date (s) of performance of tests:	/

Testing Information	
Standard:	EN 12976-1:2017 Thermal solar systems and components-factory made systems-part1:General requirments EN 12976-2:2019 thermal solar systems and components-factory made systems - part 2: Test methods
Other Test Specification:	None
Testing Laboratory Name:	Intertek Testing Services Shenzhen Ltd. Guangzhou Branch
Testing Laboratory Address:	Room 4103 & 4203, No. 63, Punan Road, Huangpu District, Guangzhou, Guangdong Province, China.

Possible Test Case Verdicts

Test Case does not apply to the Test object: N/A (Not Application)

Test object does meet the requirement: P (Pass)

Test object does not meet the requirement: F (Fail)

Conclusion:

The submitted samples were tested and found to **COMPLY** all applicable requirements of **above test standards and/or test specification.**

Note: This report is re-issued for ARYA GROUP SPA base on 201125033GZU-001/002, 211216168GZU-001, 221130052GZU-001, 221130052GZU-002, the model AR150L, AR150L-II, AR200L, AR200L-II are same as SPM150L, SPM150L-II, SPM200L, SPM200L-II with different model number and brand name only, all test data in this report are come from original report.

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1 Description of the solar domestic hot water system

1.1 General

Name of manufacturer: ARYA GROUP SPA

Address of manufacturer: VIA TROPEA 40, 00178 ROMA, ITALY

1.2 Model

System model:	SPM150L/SPM150L-II	SPM200L/SPM200L-II
Brand Name:	/	/
Serial No:	/	/
Sample no. (Intertek sample no.)	/	/

1.3 System classification

☒ thermosiphon	☐ forced	☒ closed
☒ direct	☐ indirect	☒ draindown
☐ open	☐ vented	
☐ filled	☐ drainback	
☐ Circulating	☒ Series-connected	
☐ remote storage	☐ close-coupled collector storage	
☐ integral collector storage		
☐ other(specify):		

1.4 Heat transfer fluid

Type:

☐ water/glycol mixture, concentration of glycol

☐ oil

☐ chlorofluorocarbon

☐ air

other(specify):

	Water	Water
Specifications:	--	--
Total fluid content:	140L	175L
Alternative acceptable fluid:	--	--

1.5 Antifreeze

Antifreeze protection ☒ Yes ☐ No

Minimum allowed temperature of the system: -10°C

Other: --

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1 Description of the solar domestic hot water system

1.6 Collector

Type:

☐ Flat plate

☐ Evacuated tube

System model	SPM150L/S PM150L-II	SPM200L/S PM200L-II					
Collector Model	NA	N/A					
Number of tubes	5	7					
Aperture Area (m ²)	1.63	2.23					
Absorber area (m ²)	1.29	1.84					
Gross area (m ²)	1.9	2.63					
Gross glass tube length (mm)	N/A						
Glass tube diameter (mm)	N/A						
Distance between tubes (mm)	148						
Cover material	Glass						
Cover thickness(mm)	3.2						
Absorber material(s)	Stainless steel						
Absorber tube diameter (mm)	φ135						
Absorber tube thickness (mm)	0.53						
Absorber constructiontype	The tubular container surface coated as absorber						
Asorber surface reatment	Selective coating						

1.7 Pump

Name of manufacturer:

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Model:

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Rating:

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Speed:

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1.8 Controller

Name of manufacturer:

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Model:

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1.9 Storage Tank

System model	SPM150L/S PM150L-II	SPM200L/S PM200L-II					
Tank Model	--	--					
Manufacturer	Zhejiang Shentai Solar Energy Co., Ltd						
Volume (L)	140	175					
Outside tank diameter(mm)	135	130					
Inside tank diameter(mm)	135	130					
Outside tank length (mm)	1990	1929					
Insulation thickness (mm)	40 / 55	10					
Insulation material(s)	EPP	EPP					

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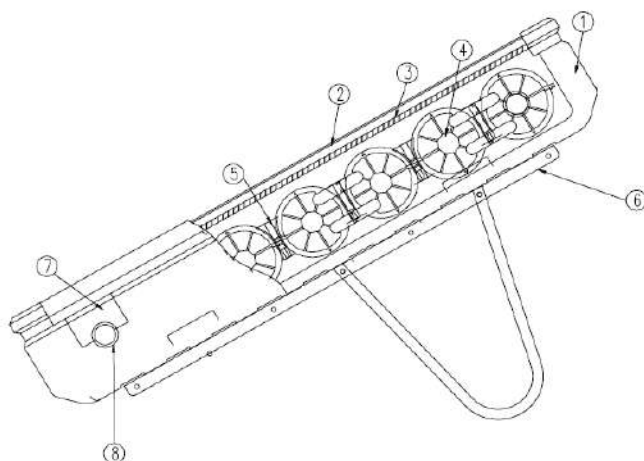
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1 Description of the solar domestic hot water system

1.10 Insulation

Thickness (Back) [mm]:	--	--
Thickness (Side) [mm]:	--	--
Thermal conductivity [W/m ² K]:	0.035-0.045 (MS)	0.035-0.045 (MS)

1.11 Schematic diagram of the system



1.12 Connecting piping between the collector(s) and the tank

Diameter:	--
Total length of collector circuit (m):	--
Connection tube material:	--
Insulation material:	--
Insulation thickness (mm):	--

1.13 System data

Collector orientation:	--
Collector tilt angle:	--
Flowrate in collector loop:	--
Controller setting:	--
Location of system:	--

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1.14 Sample random selection and description

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1.15 Photograph of the system



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2 Documentation (EN 12976-1:2020 claus 4.6)

2.1 General

With each Factory Made solar heating system, the manufacturer or official supplier shall deliver documents for assembly and installation (for the installer) and documents for operation (for the user).

These documents shall be written in the official language(s) of the country of sale. These documents shall include all instructions necessary for assembly and operation, including maintenance, and draw attention to further requirements and technical rules that are concerned.

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2.2 Documents for the installer

The assembly instructions shall be appropriate to the system and include information concerning:

a) technical data, at least with respect to:

- 1) layout of the system, including combinations and configurations;
- 2) location and nominal diameters of all external connections;
- 3) an overview with all components to be delivered (such as solar collector, storage tank, support structure, flashings, fixing, collector loop pipework that penetrate into the building, hydraulic circuit, back-up provisions, control system and accessories), with information on each component: type, electrical power, dimensions, weight, marks and mounting;
- 4) maximum operating pressure of all fluid circuits in the system, such as the collector circuit, the domestic hot water line and the auxiliary heating circuit;
- 5) working limits: admissible temperatures, pressures, etc., throughout the system;
- 6) type of corrosion protection;
- 7) type of heat transfer fluid;

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b) packing and transport of the whole system and/or components and way of storage (outdoors, indoors, packed, not packed);

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c) installation guidelines with recommendations concerning:

- 1) pre installation survey,
- 2) risk assessment survey,
- 3) declaration of roof types suitable for use with solar collector and installation method/s,
- 4) mounting surfaces,
- 5) location of collector:
 - i) distances from walls, roof edges, ridge, eaves, projections or abutments (such as chimneys
 - ii) reasonable and safe access for maintenance, cleaning, repair or replacement,
- 6) procedure for insulation of collector loop pipework (indoors and outdoors):
 - i) thickness, labelling, securing, temperature resistance, UV and weather resistance, et
 - ii) distances to walls and safety with regard to frost,
- 7) the way the entrance of piping into the building shall be finished (resistance against rain and moisture),
- 8) seal for a pipe penetration in a roof underlay in connection with collector loop pipewor
- 9) performance specification and durability of collector and mounting system (in-roof or on-roof) and compatibility with fixing substrate,
- 10) assessment and suitability of fixing substrate to accommodate collector and mounting,

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- 11) the roof integration of the collector (for each roof type) – which should cover as a minimum, roof type suitability declaration, assembly instructions, design details, flashings, fixings (type, number, position, spacing, resistance to design loads, etc.), brackets, penetrations and weather proofing as a minimum (where applicable) for drain-back or drain-down systems, the minimal pipe slope and any other instructions necessary to ensure proper draining of the collector circuit,
- 12) offset distance of collector above roof (on-roof),
- 13) weather tightness, detailing and description:
- i) integrated collectors and flashings (in-roof),
 - ii) fixings, brackets, etc. through essential building element (on-roof),
 - iii) collector loop pipework penetration (system circuit),
- 14) bi metallic corrosion prevention (collector, mounting system, collector loop and solar system
- 15) verification of requirements of EN 806-1 and EN 806-2,
- 16) recommendations about lightning protection;
- d) If a support frame that is normally mounted outdoors is part of the system, the maximum values of s_k (snow load) and q_p (peak velocity pressure) according to EN 1991-1-3, EN 1991-1-4 and a statement that the system may only be installed in locations with lower values of s_k and q_p , should be provided. Both the permissible and the maximum positive and negative pressure (wind and snow load) for both the collector and supporting frame should be declared.
- Recommendations for the calculation of design loads:
- 1) The calculation should be done by a Structural Engineer or a specialist with equivalent skill;
 - 2) The calculation should be done in accordance with the relevant Eurocodes and National
 - 3) Self-weight shall be calculated in accordance with EN 1991-1-1 / NA
 - 4) Minimum imposed roof loads shall be calculated in accordance with the snow load map
 - 5) Wind loads shall be calculated in accordance with EN 1991-1-4 / NA;
- e) Method for pipework connections:
- 1) design and Sizing of Solar Thermal System (collectors, pumps, store tanks, etc.)
 - 2) internal space and access requirements (cylinder, pumps, controls, store, safety vessels, etc.);
- f) Types and sizes of the safety and security devices and their draining: the assembly instruction shall demand that any pressure relief valves from which steam can escape during normal or stagnation conditions shall be mounted, in such a way that no injuries, harm or damage can be caused by the escape of steam. When the system has a provision to drain an amount of drinking water as a protection against overheating, the hot water drain shall be constructed in such a way that no damage is done to the system or any other materials in the building by the drained hot water;
- g) The necessary control and safety devices including the wiring diagram, including the need for:
- 1) assembly instructions for each system design and configuration;
 - 2) solar pipework layout (shortest distances, fall, supports, fixing intervals, penetrations,

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2 Documentation (EN 12976-1:2020 claus 4.6)

contact, protection from high temperature, etc.);	P
3) if required. a thermostatic mixing valve which limits the draw-off temperature to 60 °C, according to 4.1.5.2 and is in accordance with EN 15092;	P
4) adequate means for preventing backflow from all circuits to drinking main supplies;	P
h) Reviewing, filling and starting up of the system;	P
i) Commissioning of the system:	
1) operational/functioning details of solar thermal system;	P
2) design details of collector, mounting system and exposed components (integrated or on the roof);	P
3) system signage following installation (installer and commissioning details, maintenance, potential risks, etc.); signage, refers to the design or use of signs and symbols that may be classified according to their functions such as information, identification and safety and	P
4) installer qualifications and training;	P
5) primary transmission level indicator (where applicable);	P
6) flow rates for optimum heat transfer of solar energy;	P
7) wiring;	P
8) regulations that prevail in the country where sold;	P
9) works only by suitably qualified and trained persons;	P
j) a checklist for the installer to check proper functioning of the system;	P
k) the lowest temperature at which the system can withstand freezing;	P
l) if the installation of the system is limited to special climatic zones, it shall be mentioned in the documentation.	P

2.3 Documents for the user

The operating instructions shall include information concerning:

a) existing safety and security components and their thermostat adjustment where applicable	P
b) implementation of the system drawing particular attention to the facts that:	
1) prior to putting the system in operation it shall be checked that all valves are properly working and the system is filled with water and/or antifreeze fluid completely or according to the manufacturer's instructions;	P
2) in the event of any failure condition a specialist shall be called in;	P
3) verification of requirements of EN 806-1;	P
c) regular operation of safety valves;	P
d) precautions with regard to the risk of freezing damage and/or overheating;	P
e) the manner of avoiding failure when starting the system under frost or possible frost conditions;	P
f) decommissioning of the system;	P
g) maintenance of the system by a specialist, including frequency of inspections and maintenance and a list of parts that need to be replaced during normal maintenance;	P
h) performance data for the system (see also 4.8):	
1) the recommended load range for the system (in l/day) at specified temperature;	P
2) the thermal performance and solar fraction of the system according to EN 12976-2:2017, 5.9, for loads in the specified recommended load range;	P
3) the annual electricity consumption for pumps, control systems and electrical valves of	

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2 Documentation (EN 12976-1:2020 claus 4.6)

the system for the same conditions as specified for the thermal performance, assuming a yearly pump operating time of the collector pump of 2 000 h;	P
4) if the system contains devices for freeze protection that cause electrical consumption, the electrical power of these devices (in W) and their characteristics (e.g. switch-on temperatures);	P
5) for a "solar-plus-supplementary system", the maximum daily hot water load which can be met by the system without any contribution from solar energy, according to EN 12976-2:2017, 5.10;	P
i) if the installation of the system is limited to special climatic zones, it shall be mentioned in the documentation;	P
j) when the overheating protection of the system is dependent on electricity and/or cold water supply and/or the system being filled with drinking water, the requirement to never switch off the electricity supply and/or the mains water supply, or that the system is not drained when there is high solar irradiation;	P
k) the fact that drinking water may be drained from the system during high irradiation situations, if this method is used to prevent overheating;	P
l) the lowest temperature at which the system can withstand freezing;	P
m) type of heat transfer fluid;	P
n) in case of solar heating systems with emergency auxiliary heaters, instructions shall be issued that this emergency heater shall only be used for emergency heating purposes;	P
o) recommendations on measures to reduce risk of Legionella proliferation;	P
p) primary transmission level indicator (where applicable).	P

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3 Energy Labelling (EN 12976-1:2020 claus 4.7)

Evaluation

European standardisation mandate M/324 related to Council Directive 92/75/EEC defining the basis for a compulsory system of energy labelling according to the "EU tapping cycles" is used to determine the energy label necessary for labelling of water heater systems. Every system shall have the following information durably marked on a plate or label to be visible at installation, i.e.:

- the label is included in the documentation supplied with the system and in the documentation it is stated that the label (or corresponding page of the documentation with the label) shall be placed at the systems or the site where the system is installed and
- an appropriate way for providing a durable fixing and display of the label is provided.
- a) Name of manufacturer or responsible supplier of the system;
- b) system type indication;
- c) manufacturing number or serial number;
- d) year of manufacture - this may be included in the production or serial number in coded or clear form;
- e) gross and aperture area of the collector in m²;
- f) nominal capacity of the storage vessel in l;
- g) maximum operating pressure of the drinking water line;
- h) collector heat transfer medium to be used;
- i) maximum operating pressure of the collector heat transfer medium or, in case the system has an open or vented collector circuit, a statement to this effect;
- j) when the overheating protection of the system is dependent on electricity or cold water supply and/or the system being filled with drinking water, a warning to this effect shall be marked on the system; in case of dependency on the electricity supply, the mains plug of the system shall also be clearly marked to this effect;
- k) electrical power of all electric components.

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Revision Summary

Revision No.	Date	Changes	Author	Reviewer
		Initial publish		

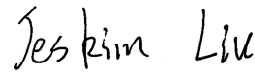
Note: if the report had revised, this report will be replaced previous report

Approved by:



Name: Steve Zhu
Title: Reviewer

Prepared by:



Name: Jeskim Liu
Title: Project Engineer

The End of Report