

TEST REPORT

SABS

Powerzon
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Page : 1 of 13
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TESTING TO SANS 1397:2009

SUMMARY

A full specification test was performed on the indirect Powerzon 200 litre WE storage tank and (2m²) flat plate collector system submitted. The sample passed these tests. Refer to clause 4 for the detail of the test performed and to clause 11 for a summary of the results.

1 DESCRIPTION OF SAMPLE

The following indirect Powerzon 200 litre WE storage tank and (2m²) flat plate collector system was submitted by Mr. J. Davis on behalf of the Powerzon.

<u>Sample No.</u>	<u>Quantity</u>	<u>Sample Description</u>
115030	1	indirect Powerzon 200 litre WE storage tank with (2m ²) blue selective flat plate collector thermosiphon system.



2 REPORT CONDITIONS

The contents of this test report refers to the samples detailed above and does not infer that the above samples (or any other similar samples) are SABS approved for quality and/or performance.

In the instance where this report is used to verify compliance with the JASWIC or Eskom Acceptance Scheme, the validity of the test reports shall not exceed a period of one (1) year.

3 SAMPLE SUBMITTED

The indirect Powerzon 200 litre WE storage tank and (2m²) flat plate collector system was received in good condition and were suitable for testing.

Date sample received : 2011-04-11
Test start date : 2011-04-18
Test completion date : 2011-05-13

4 TEST REQUESTED

To test the indirect Powerzon 200 litre WE storage tank and (2m²) flat plate collector system submitted for full compliance with the requirements of SANS 1307:2009.

5 METHODS OF TESTING

Used specification SANS 1307:2009 and test methods used according to SABS method 6210-2009.

6 CONDITIONING AND TEST ENVIRONMENT

NOT APPLICABLE.

7 LABORATORIES

When applicable all tests will be performed by the Solar technology Laboratory of the SABS.

8 MARKING AND METHOD OF MARKING (Clause 6 of SANS 1307:2009)**6.1 Marking**

Each hot water storage tank shall be marked according to SANS 151:2009 and all collectors shall be legibly and indelibly marked with the following information:

- a) the manufacturer's name, trade name or trade mark;
Result: Complied. Powerzon
- b) the working pressure (see 4.10);
Result: Complied. 400kPa
- c) a model number;
Result: Complied.
- d) the aperture area;
Result: Complied. 2m².
- e) whether fitted with hail cover or not;
Result: No hail cover.
- f) whether resistant to freezing or not;
Result: Complied. Indirect system.
- g) the material of the fluid channels;
Result: Complied. Copper.
- h) the material of the collector cover;
Result: Complied. Tempered glass.

This test was performed by SABS Commercial (Pty) Ltd.

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- i) the type, mixing ratio and grade of transfer fluid (for indirect systems);
Result: Acceptable. Food grade.
- j) the total and useful energy rating, in kilo Watt hours per square metre per day; and
Result: Complied.
- k) date of manufacture and or serial number.
Result: Complied.

6.2 Method of marking

The information required in 6.1(a) to 6.1(k) (inclusive) shall be stamped or embossed on the collector or on a nameplate securely attached to the collector. In addition, the information required in 6.1(f) shall be given (in letters of height at least 30 mm) on a removable sticker fixed to the glazing of the collector. (Instead of the removable sticker consider a tag for evacuated tubes.)

Result: Complied. Nameplate securely attached to the collector.

6.3 Instruction booklet

A booklet or leaflet in English shall be attached to each solar water heater and shall set out the following:

- a) information regarding the thermal properties of the solar water heater (see SANS 6211-1 and SANS 6211-2);
Result: Complied.
- b) instructions for the safe and correct installation of the complete solar water heater, with a description of all operating components and instructions for regular maintenance, including, when relevant, the maintenance of any sacrificial anode;
Result: Complied.
- c) clear and unambiguous advice regarding resistance to freezing and hail (see 6.1(f));
Result: Complied.
- d) safety precautions; and
Result: Complied.
- e) precautions regarding corrosion prevention and warning details are given in annex B.
Result: Complied.

The information contained on the marking label shall be included in the booklet (see 6.1 and SANS 15 1:2009).

9 REQUIREMENTS (Clause 4 of SANS 1307:2009)

4.1 Types

A solar water heating system shall be one of the following, as required (see annex A).
Result: Complied. Indirect system.

Table 1 — SWH system options

1	2	3	4	5	6	7	8	9
Collector/Storage Combinations								
integral	close-coupled X			split				
Heat transfer method								
direct	direct	indirect X		direct	indirect			
Circulation method								
Thermo-siphon	Thermo-siphon	pumped	Thermo-siphon X	pumped	Thermo-siphon	pumped	Thermo-siphon	pumped
NOTE 1 Any of the above may be with or without auxiliary (back-up) power supply i.e. electric or gas. NOTE 2 Pumped (forced) circulation can be achieved with electrical mains or photovoltaic powered pumps.								

4.2 Heating system

The heating system shall be direct or indirect, and with or without supplementary energy sources as required (see annex A).

Result: Complied. Indirect, and with supplementary energy.

4.3 Operating system

The operating system shall be as required (see annex A), and shall consist of:

- an integral system, in which the hot water storage tank is incorporated integrally with the collector and is stored in the body of the collector;
Result: Not applicable.
- a close-coupled system, in which hot water is stored in a separate but close-coupled water storage tank (see 4.4);
Result: Complied.
- a separate storage system (split system), in which hot water is stored in a water storage tank (see 4.4) that is separate from the collector; or
Result: Not applicable.
- a pre-heater system, in which a solar water heater does not contain a means of supplementary heating and is installed to preheat the cold potable water supply prior to its entry into any other type of household water heater.
Result: Not applicable.

4.4 Hot water storage tank

A hot water storage tank (with or without supplementary heating) shall comply fully with the relevant mechanical and design requirements of SANS 151 and with all the additional requirements for solar storage water heaters given in SANS 151 and with the additional requirements given in 4.11.1.2.

Result: Complied. WE geyser (Mark Holder).

4.5 Collector cover

The collector shall be designed to operate with or without a collector cover, as required (See annex A). If a hail cover is used it should be non-corrosive, easily removable for cleaning and shall not impair the operation of the system. If constructed in solid sheet form it shall be secured so as to resist an upward force of not less than 200 N.

Result: No Hail Cover.

4.6 Thermal insulation

Thermal insulating material used in the construction of the collector and interconnecting pipes shall be of such quality and composition and so applied that

- a) it does not unduly compress after installation,
Result: Acceptable.
- b) when in contact with a metal, it does not cause corrosion of the metal,
Result: Acceptable.
- c) it does not react in the presence of heat in a manner that will produce corrosive salts or vapours, and
Result: Acceptable.
- d) it is dimensionally stable under dry conditions at the maximum expected temperatures likely to be reached in the collector or when exposed to the effects of UV radiation.
Result: Acceptable.

4.7 Galvanic action

Where different materials are joined together or coupled in the same system, acceptable precautions shall be taken in respect of the choice of materials, the method of joining and the use of inhibitors, in order to reduce the possibility of galvanic action under wet and dry conditions.

Result: Acceptable.

4.8 Construction**4.8.1 General**

All components of a solar water heater shall be of sturdy and acceptable design and construction. The parts and the assembled unit shall have a neat workman-like appearance.

Result: Acceptable.

4.8.2 Joints

Joints between components shall be of acceptable design and quality and shall not leak and shall comply with the relevant SANS standard. Where required, adaptors to suit South African pipe and fitting standards shall be provided.

Result: Acceptable.

4.9 Stagnation requirements for collector and connecting paperwork



The construction of a solar water heater and the quality of the different materials used shall be such that, when the solar water heater is tested in accordance with 5.2, any

a) deformation of any part of the collector,
Result: Complied.

b) vapour deposition on the underside of the collector cover,
Result: Complied.

c) degrading of paint, sealants, seals or insulation, and
Result: Complied.

d) cracking, flaking, blistering or loss of cohesion of the absorber paint film, will not be of such magnitude as to impair the operation of the solar water heater.
Result: Complied.

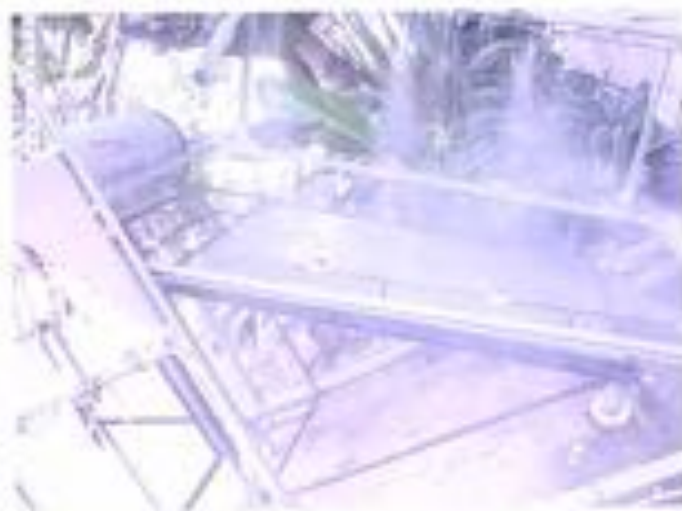
4.10 Working pressure

A solar water heater shall be designed for a working pressure of zero (open type system), 100 kPa, 200 kPa, 300 kPa, 400 kPa or 600 kPa, as required. The design and construction of any component or system shall be such that, when the component or system is tested in accordance with 5.3, there is no failure that could affect the acceptable operation of the component or system.
Result: Complied, 400kPa.

4.11 Structural protection

4.11.1 Resistance to rain penetration

4.11.1.1 Collector



When the collector of a solar heater is tested in accordance with 5.4, the interior of the collector shall remain free from any water.

Result: Complied.

4.11.1.2 Hot water storage tank

A hot water storage tank that is intended to be installed on the outside of a building shall be effectively protected, by means of a corrosion resistant outer casing, against the effects of rain, wind and other elements. Seams on the outer casing and the entry holes for pipe connections shall be effectively sealed to make a permanent watertight closure.

All exposed piping or fittings (or both) which form part of the storage tank, shall be of a non-corrosive material or protected against corrosion.

Result: Complied. WE geyser (Mark Holder).

4.11.2 Resistance to hail

The collector cover of a solar water heater shall be of such quality and strength that, when it is tested in accordance with 5.5, it does not suffer any damage that could impair its normal operation.

Result: Complied.

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4.11.3 Resistance to freezing



A solar water heating system that is marked as resistant to freezing (see 6.1(f)) shall, when tested in accordance with 5.6, show no sign of any damage that could impair its normal operation. Failure of potable water inlet and outlet pipe work connections are not considered to be a system failure.

Result: Complied. Indirect system, uses glycol as freeze resistant.

4.11.4 Resistance to fatigue and hydrostatic pressure

When a solar water heater is tested in accordance with 5.3, there shall be no leakage or any sign of damage or deformation that could impair the normal operation of any of its components.

Result: Complied.

4.11.5 Resistance to physical damage

The major components of the solar water heater shall be so designed, constructed and, when relevant, protected as to ensure that the components will remain in an acceptable condition after handling, transport and installation.

Result: Acceptable.

4.11.6 Safety requirements for hot water storage tanks

The hot water storage tanks of all solar water heaters shall comply with the safety requirements specified in SANS 60335-2-21. All solar water heater systems with provision for supplementary heating shall be tested with such supplementary energy operational.

Result: Complied. WE glyser (Mark Holder).

4.12 Materials

4.12.1 General

Except where already specified in applicable standards, the materials and, when relevant, their surface protection and its method of application, shall be such that they will perform their respective functions in a durable manner.

Result: Acceptable.

NOTE 1: ISO/TR 10217 gives a brief introduction to the corrosion risks of various material/fluid combinations.

NOTE 2: See also annex B for information on factors governing corrosion and internal scaling of solar water heating systems.

NOTE 3: For information on chloride content of water supplied to certain South African urban areas, see annex C.

4.12.2 Aluminium

An aluminium alloy that complies with the relevant SANS standard.

Result: Complied.

4.12.3 Copper

4.12.3.1 Copper tubing shall comply with the relevant requirements of SANS 460 where in contact with potable water and connected to a water supply in compliance with SANS 10252-1.

Result: Complied. Copper pipes (Mark Holder).

4.12.3.2 Brass castings shall comply with the requirements for Cu-Zn alloys of SANS 200, if the alloy is in direct contact with the main water supply, it shall, when a specimen is tested for dezincification in accordance with 5.7, show a depth of penetration not exceeding 250 µm.

Result: Complied. Functional control valves (Mark Holder).

4.12.4 Stainless steel

Stainless steel

a) for general mechanical construction shall be one of the types given in ASTM A 187 or ASTM A 240, and

Result: Not applicable.

b) for fluid channels shall be one of the types given in ASTM A 240.

Result: Not applicable.

4.12.5 Polymeric materials

4.12.5.1 Glass-reinforced polyester (GRP)

GRP shall comply with the relevant requirements for type S of SANS 141.

Result: Not applicable.

4.12.5.2 Other components (including fluid channels)

Each polymeric material shall be one that is capable of performing the required function and that

a) is based on a polymer of grade and quality recommended by the polymer manufacturer as being suitable for the function it has to perform,

Result: Not applicable.

NOTE: The polymer manufacturer should be advised if there is a possibility that the material could be used in contact with copper or could be required to operate at temperatures in excess of 100 °C.

b) for fluid channels, contains no reground material,

Result: Not applicable.

- c) for components other than fluid channels, contains no reground material in excess of 10 % by mass where any reground material present is clear reworked material derived from the manufacturer's own production, and
Result: Not applicable.
- d) has not deteriorated during compounding and production.
Result: Not applicable.

Polymeric material shall have been acceptably heat-stabilized and protected from the effects of ultraviolet light by incorporation of acceptable UV stabilizer(s) in appropriate quantities.

4.12.6 Fibre cement

The composition of fibre cement shall be as given in SANS 9933.

Result: Not applicable.

4.12.7 Glass-reinforced cement (GRC)

GRC shall consist of an acceptable mixture of cement and alkali-resistant glass fibre and shall be of a quality recommended by the supplier as suitable for the particular duty for which it is intended.

Result: Not applicable.

4.12.8 Sealants

Sealant material shall be suitable for its intended purpose.

Result: Acceptable.

Sealant shall have been applied in accordance with the relevant recommendations of SANS 10137. No sealant shall be such that it will develop, or cause the development of corrosive salts or vapours.

Result: Acceptable.

4.12.9 Water absorption of composite and polymeric material not in contact with transfer fluid

The water absorption of a composite or a polymeric material shall, when a specimen is tested in accordance with 5.8, not exceed 0, 5 %.

Result: Not applicable.

4.12.10 Heat transfer fluid

The heat transfer fluid used in an indirect heating system shall be non-toxic and non-corrosive. Heat transfer fluids should also have a colour added in order to detect a rupture between close and open circuits if it happens.

Result: Acceptable.

4.13 Thermal properties

4.13.1 Thermal performance

When the thermal performance of a solar water heater is evaluated in accordance with 5.10, the daily heat output shall not be less than 9 MJ/m²/d.

Result: Complied. Refer to test report 115030 b of the thermal performance tests.

4.13.2 Standing loss

When the standing loss of a solar water heater is determined in accordance with 5.10, the overnight heat loss shall be as described in SANS 151.

Result: Refer to test report 115030 b of the thermal performance tests.

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4.13.3 Mixing factor

When the mixing factor of a solar water heater is evaluated in accordance with 5.10, the hot water output shall be as described in SANS 151.

Result: Refer to test report 115030 b of the thermal performance tests.

4.14 Corrosion protection

4.14.1 General

All materials, including surface protection materials, that are intended to be in contact with potable water, shall be non-toxic, shall not cause the water to become toxic, and shall not impart any colour or objectionable odour to the water. The material(s) for waterways shall be intrinsically corrosion resistant.

Result: Acceptable.

4.14.2 Corrosion resistance of external surfaces of components

The material of the component or quality and method of application of surface protection coatings (except surface coatings of absorber surfaces), as relevant, shall be such that, when any metallic component of a solar water heater is tested in accordance with 5.9, there is no visible sign of corrosion of the basic material or penetration of the surface coating.

Result: Acceptable.

4.14.3 Electroplated coatings

Electroplated coatings shall comply with at least the requirements of SANS135 where applicable.

Result: Not applicable.

4.14.4 Thermal-sprayed metal coatings

Thermal-sprayed metal coatings shall comply with the requirements of SANS 2063.

Result: Acceptable.

4.14.5 Anodizing

Anodizing shall comply with at least the requirements for a coating of grade AA20 of SANS 999.

Result: Acceptable.

10 METHODS OF TEST (Clause 5 of SANS 1367:2009)

NOTE For more information on quality verification of solar water heaters, see annex D.

5.1 Sequence of tests

Carry out the tests given in 5.2 to 5.10, (inclusive) in the sequence given, one immediately after the other.

5.2 Stagnation test for collector

Carry out the test given in SANS 6210 and check for compliance with 4.9.

5.3 Mechanical strength

Carry out the test given in SANS 6210 and check for compliance with 4.10 and 4.11.4.

5.4 Resistance to rain penetration

Carry out the test given in SANS 6210 and check for compliance with 4.11.1.1.

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5.5 Resistance to hail

Carry out the test given in SANS 6210 and check for compliance with 4.11.2.

5.6 Resistance to freezing

Carry out the test given in SANS 6210 and check for compliance with 4.11.3.

5.7 Dezincification resistance

Carry out the test given in SANS 6210 and check for compliance with 4.12.5.2.

5.8 Water absorption of composite and polymeric material

Carry out the test given in SANS 6210 and check for compliance with 4.12.9.

5.9 Corrosion resistance

Carry out the test given in SANS 6210 and check for compliance with 4.14.2.

5.10 Thermal properties

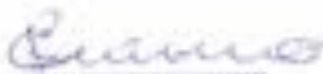
Carry out the test given in SANS 6211-1 or SANS 6211-2 and check for compliance with 4.13.

11 SUMMARY OF RESULTS

The Indirect Powerzon 200 litre WE storage tank with (2m²) blue selective flat plate collector thermosiphon system tested complied with the requirements of SANS 1307:2009.

12 GENERAL

All tested samples will be disposed of if not collected within 1 month from date of this report



C.J. Tahitho
Test Officer
Mech & Fluid Laboratory



K.C.F. Deist
Technical Specialist
Mech & Fluid Laboratory

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