

**Powerzon Solar Systems (Pty)Ltd**  
ATT: Mr. Mike Breckenridge  
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 Page : 1 of 12  
 Date : 2012-08-29

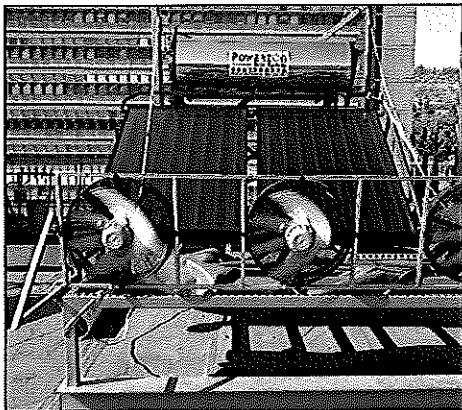
**TESTING TO SANS 1307:2009****SUMMARY**

A full specification test was performed on the Powerz-On systems (see samples description below) submitted. The Powerz-On system complied with the requirements of SANS 1307. 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 Powerz-On systems (see samples description below) were submitted by Mr. J. Bisogno on behalf of the company Powerzon (Pty) Ltd.

<u>Sample No.</u>	<u>Quantity</u>	<u>Sample Description</u>
12S121	1	Indirect freeze resistant HP Powerzon with 300 liter Kwikot storage tank and 2 x (2.04m <sup>2</sup> ) blue selective coated flat plate collector close/split thermosiphon system.
12S121	1	Direct non-freeze resistant HP Powerzon with 150 liter WE storage tank and a (2.04m <sup>2</sup> ) blue selective coated flat plate collector close/split thermosiphon system.

**2 REPORT CONDITIONS**

*The contents of this test report refers to the sample/s 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 ESKOM Rebate Scheme or the JASWIC Acceptance Scheme, the validity of the test reports shall not exceed a period of one (1) year.*

**3 SAMPLE SUBMITTED**

The Powerz-On systems were received in good condition and were suitable for testing.

Date sample received : 2012-09-27  
Test start date : 2012-09-27  
Test completion date : 2012-10-05

**4 TEST REQUESTED**

To test the Powerz-On systems 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 6210-2011.

**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. Powerz-on Solar Systems.**
- b) the working pressure (see 4.10);  
**Result: Complied. 400kPa.**
- c) a model number;  
**Result: Complied. ST-2.2 for 300lt and ST-2.2 for 150lt**
- d) the aperture area;  
**Result: Complied. 2 x 2.04m<sup>2</sup> for 300lt and 2.04m<sup>2</sup> for 150lt**
- e) whether fitted with hail cover or not;  
**Result: Complied; Hail resistant.**
- f) whether resistant to freezing or not;  
**Result: Complied. 300lt system is freeze resistant , 150lt system is not freeze resistant.**
- 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 (SOC) Ltd.

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- i) the type, mixing ratio and grade of transfer fluid (for indirect systems);  
**Result: Complied. Redsol H.T.F Pre-mixed Food grade glycol (300 litre system).**
- j) the total and useful energy rating, in kilo Watt hours per square metre per day; and  
**Result: Complied. 4.5 kWh/m<sup>2</sup>/day**
- k) date of manufacture and or serial number.  
**Result: Complied. G000102 for 300lt system and 005010 for 150lt.**

**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. Nameplates 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. 4.5 kWh/m<sup>2</sup>/day .**
- 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. Information was covered in installation booklets.**
- c) clear and unambiguous advice regarding resistance to freezing and hail (see 6.1(f));  
**Result: Complied. Information was covered in the booklets.**
- d) safety precautions; and  
**Result: Complied. Information was covered in the installation booklets.**
- e) precautions regarding corrosion prevention and warning details are given in annex B.  
**Result: Complied. Information was covered in the instruction booklets.**

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

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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; refer to the table below.**

Table 1 — SWH system options

1	2	3	4	5	6	7	8	9
<b>Collector/Storage Combinations</b>								
integral	close-coupled X2				split X2			
<b>Heat transfer method</b>								
direct	Direct X	Indirect X			direct	indirect		
<b>Circulation method</b>								
Thermo-siphon	Thermo-siphon X2	pumped	Thermo-siphon	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; Direct and Indirect with supplementary energy.**

4.3 Operating system

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

- a) 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.**
- b) a close-coupled system, in which hot water is stored in a separate but close-coupled water storage tank (see 4.4);  
**Result: Complied.**
- c) 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: Complied.**
- d) 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.**

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#### 4.4 Hot water storage tank

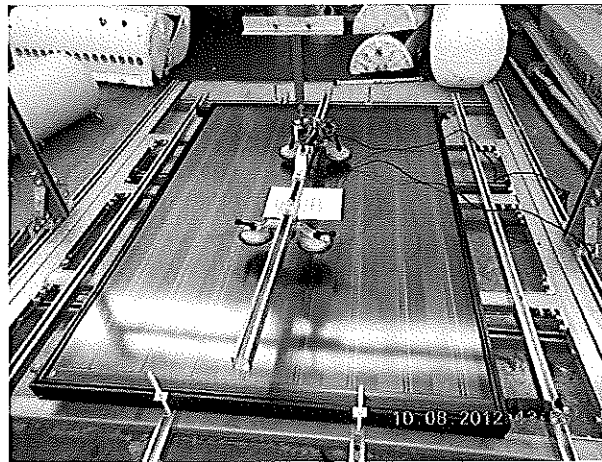
A hot water storage tank (with or without supplementary heating) shall comply fully with the relevant mechanical and design requirements of SANS 151 and with all the additional requirements for solar storage water heaters given in SANS 151 and with the additional requirements given in 4.11.1.2.

**Result: Complied. Kwikot geyser and WE geyser (SABS 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: Complied: The collector cover to resist an upward force of not less than 200 N.**



#### 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: Complied. No deformation or compression was detected.**
- b) when in contact with a metal, it does not cause corrosion of the metal,  
**Result: Complied. No corrosion of the metal was detected.**
- c) it does not react in the presence of heat in a manner that will produce corrosive salts or vapours, and  
**Result: Complied. No produce corrosive salts or vapours were detected.**
- 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: Complied. The insulation used dimensionally stable at maximum expected temperatures.**

#### 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 jointing and the use of inhibitors, in order to reduce the possibility of galvanic action under wet and dry conditions.

**Result: Complied. Acceptable precautions were taken in order to reduce the possibility of galvanic action.**

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#### 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: Complied. Components were sturdy, acceptable and had neat workman-like appearance.**

##### 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: Complied. The joints were of an acceptable design and quality.**

#### 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. No deformation of any part of the collector was detected.**

b) vapour deposition on the underside of the collector cover,

**Result: Complied. No vapour in the collector was detected.**

c) degrading of paint, sealants, seals or insulation, and

**Result: Complied. No degrading on any part of the system was detected.**

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. No cracking, flaking, blistering or loss of cohesion of the absorber paint film was detected.**

#### 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

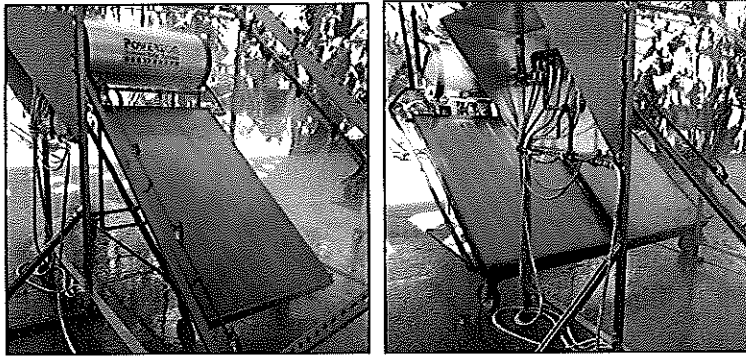
###### 4.11.1.1 Collector

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. The interior of the collector remain free from any water.**

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#### 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. Kwikot and WE geyser (SABS 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. No damages that could impair its normal operation on panel after test.**



#### 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. The 300lt indirect system uses glycol and Rigifoam as freeze resistant method. The 150lt direct system was not freeze resistant, it was for coastal installations only.**

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#### 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. WE geyser and Kwikot geyser (SABS mark holder).**

#### 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: Complied. The systems were in an acceptable condition after handling, transport and installation.**

#### 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 geyser and Kwikot geyser (SABS 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: Complied. All other materials used performed their respective functions in a durable manner.**

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

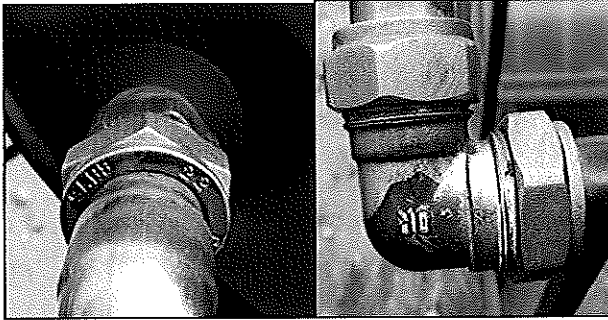
An aluminum alloy that complies with the relevant SANS standard.  
**Result: Complied. Refer to Ferro Industrial Products (Pty)Ltd Brakpan Permit to Apply Certification Mark No.: 5142/7504.**

#### 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. Maksal copper pipes (SABS mark holder) also refer to the Maskal Tubes Certification Mark permit number: 2684/5315 provided by the client.**

**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. SABS approved Cobra brass fittings were used.**





#### 4.12.4 Stainless steel

- a) for general mechanical construction shall be one of the types given in ASTM A 167 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. On panel but geyser Complied.**

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: Complied. W.E geyser (SABS mark holder).**
- 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: Complied. W.E geyser (SABS mark holder).**
- d) has not deteriorated during compounding and production.  
**Result: Complied. W.E geyser (SABS mark holder).**

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.  
**Result: Complied. W.E geyser (SABS mark holder).**

**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: Complied; All sealant used were still intact at the end of the test.**

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: Result: Complied. Kwikot geyser and W.E geyser (SABS mark holder).**

**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: Complied.W.E geyser (SABS mark holder).**

**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: Complied. Food glycol, red in colour.**

**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/m<sup>2</sup>/d.

**Result: Complied. Refer to test report 012S121 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 012S121 b of the thermal performance tests.**

**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: Complied. Refer to test report 012S121 b of the thermal performance tests.**

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**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: Complied. Kwikot and WE geyser are SABS mark holder products and SANS 460 copper tubing was used.**

**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: Complied. Copper pipes used and brass components were tested products.**

**4.14.3 Electroplated coatings**

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

**Result: Complied. Refer to Ferro Industrial Products (Pty)Ltd Brakpan Permit to Apply Certification Mark No.: 5142/7504.**

**4.14.4 Thermal-sprayed metal coatings**

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

**Result: Refer to Alanod Solar mirotherm absorber fact Booklet.**

**4.14.5 Anodizing**

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

**Result: Complied. Refer to Ferro Industrial Products (Pty)Ltd Brakpan Permit to Apply Certification Mark No.: 5142/7504.**

10 **METHODS OF TEST (Clause 5 of SANS 1307:2009)**

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**

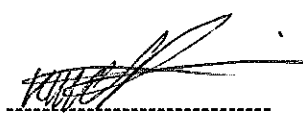
Carry out the test given in SANS 6211-1 or SANS 6211-2 and check for compliance with 4.13.

**11 SUMMARY OF RESULTS**

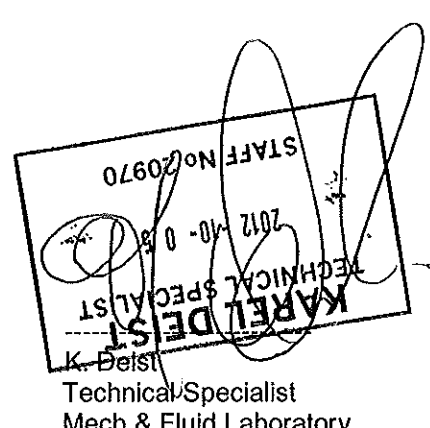
The Powerz-on systems (See clause 1 for samples description on page 1) **complied** with the requirements of SANS 1307:2009.

**12 GENERAL**

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



KMC Pitsi  
Test Officer  
Mech & Fluid Laboratory



Technical Specialist  
Mech & Fluid Laboratory