

Your ref.: O/No. SR12027

Our ref.: ML/106796

Enquiries: M Sikhweni

Date: 2013-03-26

Interpower Corporation
Attention: Maureen Awtry
100 Interpower Ave.
OSKALOOSA
IA 52577
United States

Dear Sir

TESTING OF DEDICATED (RED) NON-REWIRABLE PLUG

--- With reference to your request, we have pleasure in enclosing our report No.ML/106796 for the tests conducted on your sample.

Yours faithfully



Ad Greyling
Specialist
Short-Circuit Laboratory: **SABS Commercial SOC Ltd**
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TEST REPORT

Client : Interpower Corporation, 100 Interpower Ave, **Oskaloosa**, IA 52577, United States
Manufacturer : Interpower Corporation
Apparatus : Dedicated (Red) non-rewirable plug
Designation : 075

Ratings assigned by the Manufacturer:

Rated Voltage : 250 V~
Rated Current : 16 A

Test have been carried out strictly in accordance with

- **Compulsory specification VC 8008 Plugs, socket-outlets and socket-outlet adapters published by Government notice No. R 1075 of 10 November 2010.**

SANS 164-4:2007 Plug and Socket-outlets systems for household and similar purposes for use in South Africa-Part 4: Dedicated system, 16 A 250 V a.c.

Date of Tests: 18 March 2013 to 26 March 2013

Conclusion


The sample has complied with the relevant requirements

This report consists of:

Report form(s) : Pages 1-18
Photograph(s) : Page 19



F Nkosi
Specialist (Technical signatory)
Materials/Installations Laboratory: **SABS Commercial SOC Ltd**



AJ Greyling
Specialist
Short-Circuit Laboratory: **SABS Commercial SOC Ltd**

Olifantsfontein, 26 March 2013

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The test work relating to this report was performed by SABS Commercial SOC Ltd. This report and its test results relate only to the specific sample(s) identified herein. They do not imply SABS approval of the quality and/or performance of the item(s) in question and the test results do not apply to any similar item that has not been tested. This report may not be reproduced except in full. The authenticity of this report and its contents can be confirmed by contacting the person who signed it.

1 Description of Sample

The sample consisted of nine (09) non-rewirable plugs with markings as indicated on page 19 of this report comprising of:

0.95 m flexible cord is marked as follows:

HELUKABEL <VDE> <HAR> HO5VV-F 3G 1.5 mm² CE

2 Test Method

Compulsory specification VC 8008 *Plugs, socket-outlets and socket-outlet adapters* published by Government notice No. R 1075 of 10 November 2010.

SANS 164-4:2007 Plug and Socket-outlets systems for household and similar purposes for use in South Africa-Part 4: Dedicated system, 16 A 250 V a.c.

3 Sampling Procedure

The sample was new when submitted for testing by Interpower Corporation on the 12 March 2013 and allocated NETFA samples No. ML/106796(A-I).

4 Test Conditions

The tests were conducted at the National Electrical Test Facility, NETFA, at an altitude of 1 540 m.

5 Measuring Equipment

Refer to appendix A for a list of measuring equipment and tolerances.

6 Results

For detailed results see pages 3 to 17 of this report.

SANS 60884-1: 2006			
Clause	Requirements-Test	Results-Remark	Verdict
6	Ratings		
6.1	Preferred: - Voltage rating and - Current rating	250 V 16 A	Complied
6.2	In a cord extension set, the rated current of the portable socket-outlet shall not be higher and rated voltage shall not be less than that of the plug		N/A
6.3	Accessories should preferably have a degree of protection IP20, IP40, IP44 or IP55		Complied
7	Classification		
7.1	Accessories classification: - Protection against harmful ingress of foreign objects - Protection against harmful ingress of water - Provision for earthing - Method of connection - Type of terminals	IP2X IPX0 With earthing contact Non-rewirable accessories Screwless	Complied
7.2	Socket-outlets classification		N/A
7.3	Plug classification	I	Complied

Clause	Requirements-Test	Results-Remark	Verdict
8	Marking		
8.1	Accessories shall be marked as follows: <ul style="list-style-type: none"> Rated current Rated voltage Symbol of nature of supply Manufacturers name Type reference 	16 A 250 V ~ Interpower Corporation 075	Complied
8.2	When symbols are used, they shall be as follows: <ul style="list-style-type: none"> - Amperes.....A - Volts.....V - Alternating current.....~ - Neutral.....N - Protective earth..... (earth symbol with a circle around it) 		Complied
8.3	Fixed socket-outlets		N/A
8.4	Marking shall be easily discernible when the accessory is wired and assembled.		Complied
8.5	Terminals: <ul style="list-style-type: none"> - intended exclusively for the neutral conductor shall be indicated by the letter N, and - for the connection of the protective conductor shall be indicated by the earth symbol with circle around it. 		Complied
8.6	Surface-type mounting boxes: IP code shall be marked on the outside of its associated enclosure.		N/A
8.7	Degree of protection shall be indicated either by marking or in a manufacturer's catalogue or instruction sheet.		N/A
8.8	Marking shall be durable and easily legible.		Complied
9	Checking of dimensions		
	Gauges	SANS 164-4	Complied
	Measurements		Complied

1ST SAMPLE		
Plug- Standard sheet 4-2-2 of SANS 164-4:2007		
Tests	Results	Requirements
Diameter of pins, mm		
- Earth	7,59	7,6 ± 0,04
- Live	7,04	7,05 ± 0,04
- Neutral	7,04	7,05 ± 0,04
Height of pins, mm		
- Earth	29,3	29,0 ± 0,6
- Live	21,1	21,1 ± 0,6
- Neutral	21,1	21,1 ± 0,6
Distance between pins, mm		
- Live - Earth	28,0	28,6 nom
- Live - Neutral	25,5	25,4 nom
Height of Insulation sleeves, mm		
- Earth	6,7	6,8 max
- Live	9,3	10,0 max
- Neutral	9,5	10,0 max

2ND SAMPLE		
Plug- Standard sheet 4-2-2 of SANS 164-4:2007		
Tests	Results	Requirements
Diameter of pins, mm		
- Earth	7,6	7,6 ± 0,04
- Live	7,05	7,05 ± 0,04
- Neutral	7,05	7,05 ± 0,04
Height of pins, mm		
- Earth	29,4	29,0 ± 0,6
- Live	21,1	21,1 ± 0,6
- Neutral	21,1	21,1 ± 0,6
Distance between pins, mm		
- Live - Earth	28,1	28,6 nom
- Live - Neutral	25,4	25,4 nom
Height of Insulation sleeves, mm		
- Earth	6,5	6,8 max
- Live	9,6	10,0 max
- Neutral	9,5	10,0 max

3rd SAMPLE		
Plug- Standard sheet 4-2-2 of SANS 164-4:2007		
Tests	Results	Requirements
Diameter of pins, mm		
- Earth	7,59	$7,6 \pm 0,04$
- Live	7,04	$7,05 \pm 0,04$
- Neutral	7,05	$7,05 \pm 0,04$
Height of pins, mm		
- Earth	29,4	$29,0 \pm 0,6$
- Live	21,1	$21,1 \pm 0,6$
- Neutral	20,9	$21,1 \pm 0,6$
Distance between pins, mm		
- Live - Earth	28,1	28,6 nom
- Live - Neutral	25,5	25,4 nom
Height of Insulation sleeves, mm		
- Earth	6,5	6,8 max
- Live	9,5	10,0 max
- Neutral	9,4	10,0 max

Clause	Requirements-Test	Results-Remark	Verdict
10	Protection against electric shock		
10.1	Socket-outlets: - Live parts are not accessible, even after removal of parts which can be removed without the use of a tool.		N/A
	Plugs: - Live parts shall not be accessible when the plug is in partial or complete engagement with a socket-outlet.		Complied
	Compression test for each specimen of plug or portable socket-outlet, - Force = 150 N - Time = 5 min		Complied
10.2	Parts which are accessible shall be made of insulating material		Complied
10.3	Shall not be possible to make contact between a pin of a plug and a live socket-contact of a socket-outlet while any other pin is accessible. - Test temperature = $(35 \pm 2) ^\circ\text{C}$ - Force = 75 N		N/A
10.4	External parts of plugs shall be of insulating material and the overall dimensions of rings, if any, shall not exceed 8 mm.	Insulating material	Complied
10.5	Shuttered socket-outlets shall be so constructed that live parts are not accessible.		N/A
10.6	Earthing contacts, if any shall be so designed that they cannot be deformed by the insertion of a plug		N/A
10.7	Socket-outlets with increased protection shall be so constructed that, when mounted and wired as in normal use, live parts shall not be accessible.		N/A

Clause	Requirements-Test	Results-Remark	Verdict
11	Provision for earthing		
11.1	Earth connection made before the current-carrying contacts become live		Complied
	Current-carrying pins shall separate before the earth connection.		Complied
11.2	Earthing terminals of rewirable accessories shall comply with clause 12		N/A
11.3	Accessible metal parts of fixed socket-outlets shall be permanently and reliably connected to the earthing terminal		N/A
11.4	Socket-outlets, having an IP code higher than IPX0 shall be provided with an internal fixed earthing terminal		N/A
11.5	Connection between earthing terminal and accessible metal parts shall be of low resistance		N/A
11.6	Fixed socket-outlets according to item b) of 7.2.5: shall have the earthing socket contact and its terminal electrically separated from any metal mounting means		N/A
12	Terminals and terminations		
12.1	General: - Rewirable plugs and rewirable portable socket-outlets shall be provided with terminals with screw clamping, - Non-rewirable accessories shall be provide with soldered, welded, crimped or equally effective permanent connections (termination)	- Non-rewirable accessories - Crimped	Complied
	12.2	Terminals with screw clamping for external copper conductors	N/A
12.3	Screwless terminals for external copper conductors		Complied
13	Construction of fixed socket-outlets		N/A

Clause	Requirements-Test	Results-Remark	Verdict
14	Construction of plugs and portable socket-outlet		
14.1	Non-rewirable portable accessories shall be such that: - the flexible cable cannot be separated from the accessory without making it permanently useless, and - the accessory cannot be opened by hand or by using a general purpose tool.		Complied
14.2	Pins of portable accessories - Shall have adequate mechanical strength		Complied
14.3	Pins of plugs shall be: - locked against rotation, - not removable without dismantling the plug, - adequately fixed in the body of the plug...		Complied
14.4	Earthing contacts and neutral contacts of portable socket-outlets shall be locked against rotation and removable only with the aid of a tool, after dismantling the socket-outlet.		N/A
14.5	Socket-contact assemblies shall have sufficient resilience to ensure adequate contact on plug pins..		N/A
14.6	Pins and socket-contacts shall be resistant to corrosion and abrasion.		Complied
14.7	The enclosures of rewirable portable accessories shall completely enclose the terminals and the ends of flexible cable.		N/A
14.8	Rewirable portable accessories shall be designed in such a way that terminal screws or nuts cannot become loose and fall out...		N/A
14.9	Rewirable portable accessories with earthing contact shall be designed with ample space for slack in the earthing conductor...		N/A
14.10	Terminals of rewirable portable accessories and terminations of non-rewirable accessories shall be located or shielded in such a way that loose wires from a conductor in the accessory will not present a risk of electric shock.		Complied
14.11	For rewirable portable accessories		N/A
14.12	For rewirable portable socket-outlets accessories and non-rewirable non-moulded on portable accessories. It shall not be possible to remove covers, cover-plates or parts of them intended to ensure protection against electric shock without the use of a tool.		N/A
14.13	If covers of portable socket-outlets...		N/A
14.14	Screws intended to allow access to the interior of the accessory shall be captive		N/A

Clause	Requirements-Test	Results-Remark	Verdict
14.15	The engagement face of plugs shall have no projections other than the pins, when the plug is wired and assembled as for normal use.		Complied
14.16	Portable socket-outlets		N/A
14.17	Portable accessories of IP code higher than IP20		N/A
14.18	Portable socket-outlets having means for suspension		N/A
14.19	Combinations of portable accessories and switches, circuit-breakers or other devices		N/A
14.20	Portable accessories shall not be an integral part of lampholders		Complied
14.21	Plugs classified exclusively as plugs for equipment of class II may be rewirable or non-rewirable shall comply with SANS 60884-1:2006		N/A
14.22	Components, such as switches and fuses, incorporated in accessories		N/A
14.23	If a plug is an integral part of plug-in equipment		N/A
14.24	Plugs shall be shaped in such a way and/or made of such material that they can easily be withdrawn by hand from the relevant socket-outlet		Complied
14.25	Membranes in inlet openings of portable accessories shall meet the requirements of 13.22 and 13.23.		N/A
15	Interlocked socket-outlet		N/A

Clause	Requirements-Test	Results-Remark	Verdict
16	Resistance to ageing, protection provided by enclosure and resistance to humidity		
16.1	Resistance to ageing: Accessories shall be resistance to ageing. - Temperature at $(70\pm 2)^\circ\text{C}$ for seven days(168 h), - Relative humidity of between 45 % and 55 % for four days (96 h), After the test, the specimens shall show no damage.		Complied
16.2	Protection provided by enclosures - Enclosure shall provide protection against access to hazardous parts, harmful effects due to ingress of solid foreign objects and harmful effects...		Complied
16.3	Resistance to humidity: Accessories shall be proof against humidity which may occur in normal use. - Relative humidity of between 91 % and 95 % for two days (48 h)		Complied
17	Insulation resistance (I.R) and electric strength (H.V)		
	The insulation resistance and electric strength shall be adequate		Complied
17.1	The insulation resistance test, - Rated current (16 A) - Test voltage (500 V), - Duration (1 min). The insulation resistance shall be not less than 5 M Ω , except for items g) and h) of clause 17.1.1, where the resistance shall not be less than 2 M Ω .		Complied
17.2	The electric strength test, - Rated voltage (250 V), - Test voltage (2 000 V). - Duration (1 min) No flashover or breakdown shall occur during the test		Complied
18	Operating of earthing contacts		
	Earthing contacts shall provide adequate contact pressure and shall not deteriorate in normal use.		Complied

Clause	Requirements-Test	Results-Remark	Verdict
19	Temperature rise		
	Accessories shall be so constructed that the temperature rise shall not exceed 45 K <ul style="list-style-type: none"> - Rated current (16 A) - Test current (16 A) - Duration (1 h) - Nominal cross-sectional area of conductors (1.5 mm²) 	22,4 K	Complied
20	Breaking capacity		
	Accessories shall have adequate breaking capacity. <ul style="list-style-type: none"> - Test voltage (1,1Vn) - Test current (1,25In) - Power factor(0,6) and - Number of strokes(100) During the test, no sustained arcing shall occur and After the test, the specimens shall show no damage impairing their further use.		Complied
21	Normal Operation		
	Accessories shall withstand without excessive wear or other harmful effect, the mechanical, electrical and thermal stresses occurring in normal use. <ul style="list-style-type: none"> - Test voltage(rated) - Test current(rated) - Power factor(0,8) and - Number of strokes(10000) During the test, no sustained arcing shall occur and		Complied
22	Force necessary to withdraw the plug		N/A

Clause	Requirements-Test	Results-Remark	Verdict
23	Flexible cable and their connection		
23.1	<ul style="list-style-type: none"> - Rewirable plugs and rewirable portable socket-outlets shall be provided with a cord anchorage. - Non rewirable plugs and non rewirable portable socket-outlets shall be designed in such a way that the cable is maintained in position and the terminations are relieved from strain and twisting. 		Complied
23.2	<p>The effectiveness of the retention of the cable by the cord anchorage after the tests,</p> <ul style="list-style-type: none"> - Number of the pull (100 times) - Rated current (16 A) - Force of 60 N <p>After the test flexible cable shall not been displaced by more than 2 mm</p>		Complied
23.3	Non-rewirable plugs and non-rewirable portable socket-outlets shall be provided with a flexible cable complying with IEC 60227 or IEC 60245		Complied
23.4	Non-rewirable plugs and non-rewirable portable socket-outlets shall be designed in such a way that the flexible cable is protected against excessive bending where it enters the accessory.		Complied

Clause	Requirements-Test	Results-Remark	Verdict
24	Mechanical strength		
24.1	Impact test After the test, the specimen shall show no damage within the meaning of this standard.		N/A
24.2	Free fall test Non-rewirable accessories are tested as delivered - Free length (100 mm) - Number of falls (1000) for mass not exceeding 100 g,		Complied
24.3	Surface type socket-outlets...		N/A
24.4	Impact test - After the test, the specimen shall show no damage within the meaning of this standard.		Complied
24.5	Compression test - Shall show no damage within the meaning of this standard.		Complied
24.6	Screwed glands - After the test, the glands and the enclosures of the specimen shall show no damage within the meaning of this standard.		N/A
24.7	Plug pins provided with insulating sleeves - After the test, the pins shall show no damage which may affect safety or impair the further use of the plug.		Complied
24.8	Shuttered socket-outlets - After the test, the specimen shall show no damage within the meaning of this standard.		N/A
24.9	Rewirable multiple portable socket-outlets - After the test, the specimen shall show no damage within the meaning of this standard.		N/A
24.10	The plug is placed on a rigid steel plate		Complied
24.11	Barriers -The rod shall not pierce the barrier		N/A
24.12	Portable socket-outlet - Shall not break in a way which allows live parts to become accessible to the standard test finger.		N/A
24.13	Portable socket-outlets - Shall not break in a way which allows live parts to become accessible		N/A
24.14	Verification of retention of covers or cover-plates		N/A
24.15	Cover or cover plates		N/A

Clause	Requirements-Test	Results-Remark	Verdict
24.16	Cover or cover plates		N/A
24.17	Cover or cover plates		N/A
24.18	Force of 1 N shall not enter more than 1,0 mm from the upper part of any groove, hole or reverse taper		N/A
24.19	The shrouds of portable socket-outlets are subjected to a compression test at an ambient temperature of (25+5) °C in an apparatus similar to that shown in figure 38 of SANS 60884-1		N/A

25	Resistance to heat		
25.1	The specimens are kept for 1 h in a heating cabinet at a temperature of (100±2) °C		Complied
25.2	Parts of insulating materials of fixed socket-outlets necessary to retain current-carrying parts and parts of the earthing circuit in position, as well as parts of the front surface zone of 2 mm wide surrounding the phase and neutral pin entry holes: Ball pressure test at (125±2) °C for 1 h - after the test: diameter of impression < 2 mm...		Complied
25.3	For parts not necessary to retain current-carrying parts and parts of the earthing circuit in position, even though in contact with them: ball-pressure test (1 h) - after the test: diameter of impression , 2 mm		Complied
25.4	Portable accessories: compression test (20 N) at (80±2) °C for 1 h by means of the apparatus shown in figure 38 - after the test: no damage		Complied

Clause	Requirements-Test	Results-Remark	Verdict
26	Screws, current-carrying parts and connections		
26.1	Connection, electrical or mechanical, shall withstand the mechanical stresses occurring in normal use.		Complied
26.2	Screws engaged in insulating material, operated when mounting the accessory during installation		N/A
26.3	Contact pressure shall not be transmitted through insulating material		Complied
26.4	Screws and rivets for electrical as well as mechanical connection shall be locked against loosening or turning		N/A
26.5	Current-carrying parts shall be of metal having, mechanical strength, electrical conductivity and resistance to corrosion adequate for their intended use.		Complied
26.6	Contacts subjected to a sliding action in normal use shall be of metal resistance to corrosion.		Complied
26.7	Thread-forming and thread-cutting screw shall not be used for the connection of current-carrying parts and may be used to provide earthing continuity if at least two screws are used for each connection		N/A

27	Creepage distances, clearances and distances through sealing compound		
27.1	Creepage distance, clearances and distances through sealing compound shall comply with table 23 of SANS 60884-1		Complied
27.2	Measurements made with and without plug fitted with and without conductors of largest c.s.a per table 3 fitted		Complied
27.3	Surface-type socket-outlets shall not have bare current-carrying strips at the back		N/A

Clause	Requirements-Test	Results-Remark	Verdict
28	Resistance of insulating material to abnormal heat, to fire and to tracking		
28.1	Resistance to abnormal heat and to fire		Complied
28.1.1	Glow-wire test: - Test temperature= 750 °C - Time = 30 seconds The specimen regarded as having passed the glow-wire test if - there is no visible flame and no sustained glowing, or if - flames and glowing at the specimen extinguish within 30 s after removal of the glow-wire. - There shall be no ignition of the tissue paper or scorching of the board.	The sample ignited and it extinguished itself in 12 seconds. The tissue did not ignite	Complied
	Heating test (pins with insulating sleeves)		Complied
28.2	Resistance to tracking: - No flashover or breakdown between electrodes shall occur before a total of 50 drops has fallen	No flashover occurred	Complied
29	Resistance to rusting		
	Ferrous parts shall be adequately protected against rusting - The surface shall show no signs of rust.	No rust	Complied
30	Additional tests on pins provided with insulation sleeves		
30.1	Pressure test at high temperature: - Force applied through the blade (2,5 N), - Temperature of heating cabinet (200±5) °C, - Duration (2 hours) Insulation remaining after the test shall not have been reduced by more than 50 % of its original value.		Complied
30.2	Static damp heat test		Complied
30.3	Test at low temperature: - Temperature(-15±2) °C, - Duration (24 h)		Complied
30.4	Impact test at low temperature: - Mass of the falling weight (100±5) g - Temperature of a freezer (-15±2) °C		Complied
N/A=Not applicable			

APPENDIX A**Measuring Equipment**

The following equipment was used for the measurements:

Type of equipment	Make and model	SABS No.	Accuracy
Scale	Sartorius BP8100	PP&E0004332	± 0,05 %
Vernier	Digital caliper	LIN 7580575	± 0,02 mm
Omega stop watch	Omega UUT	13299	± 0,01 %
Impact hammer	MES 379	16828	± 3,0 %
Clamp meter	Top tronic	05338134	± 0,2 %
Megger 500V d.c.	Megger 2083832	14487	± 3,0 %
Oven	Gallenkamp	PP&E0004243	± 5,0 %
Oven	Gallenkamp	7396	± 5,0 %
Temperature recorder	Yokogawa	PP&E0005413	± 2,0 %
High voltage test set	Foster	17920	± 0,2 %
Digital thermometer	Fluke 2175A	20940	± 5,0 °C

Calibration of this equipment is traceable to national standards.



Photograph No. 1
Top view of the sample



Photograph No. 2
Bottom view of the sample