



Test Report

DATE ISSUED: 31 October 2008

DEVICE TESTED: Heating Cable:
Livella Heating Model Number
UF1000

CLIENT'S NAME: Livella Group Pty Ltd
PO Box 3929
Robina Town Centre
Queensland 4320
Australia

CLIENT'S REFERENCE: Email 8 September 2008

TEST SPECIFICATION: Client specified Clauses of:
IEC 20/938/CDV 2008-04-04
(Project number IEC 60800 Ed. 3.0)
Heating cables with a rated voltage of
300/500 V for comfort heating and prevention
of ice formation.
IEC 60800 Second Edition 1992-04
Heating cables with a rated voltage of
300/500 V for comfort heating and prevention
of ice formation; and
IEC 61423-1 First Edition 1995-06,
Heating cables for industrial applications Part 1.

DATE OF TEST COMPLETION: 30 October 2008

SUMMARY OF RESULTS: Refer to this Report for results.



Tests marked with * reported herein have
been performed in accordance with the
Laboratory's terms of registration
Laboratory Registration Number: 42

Checked By: K Manson

IANZ Signatory: G I Dix



Sample Details

Client specified ratings for IEC 60800:

Test to IEC 60800 as cable with a type reference 800 IEC 15/HDPE80/HDPE80. The mechanical strength classification is B and the minimum bending radius is 25 mm. The operating surface temperature is 80 °C.

Client specified ratings for IEC 61423-1:

Test to IEC 61423 as cable with the specified construction. The mechanical strength classification is M and the minimum bending radius is 25 mm. The operating surface temperature is 80 °C.

The cable has to be supplied with (can be on a label):

Supplier or manufacturer identification

Cable type "S" (means series)

Resistance at 20 °C in Ω/m

Maximum operating voltage (250 V)

Mechanical strength category (M)

Minimum bending radius (25 mm)

Minimum installation temperature (5 °C)

Nominal thermal output (14 W/m at 230 V)

Maximum withstand temperature (80 °C continuous)

Sample description:

The sample tested consists of a metal conductor (heating element) enclosed in white insulation having a thickness of 0.71 mm. This insulation is enclosed in a braided metal strand screen. These components are enclosed in a red sheath. The overall cable diameter is 3.1 mm.

Sizes with in range covered by this test report

Model number	Resistance in Ohms per length
UF3000	17.6
UF2500	21.2
UF2000	26.5
UF1800	29.4
UF1500	35.3
UF1250	42.3
UF1000	52.9
UF0800	66.1
UF0650	81.4
UF0500	105.8
UF0400	132.3
UF0300	176.3
UF0200	264.5

This Report covers the above conductor sizes, the model UF1000 was assessed as it is the worst case.

Test Schedule

The sample was tested to the following clauses of IEC 20/938/CDV

Clause 7.4*	Electrically conducting screen
Clause 8.2.1*	Electrical resistance of heating conductors and screen
Clause 8.2.5*	Penetration test for electrical conductive screen

The sample was tested to the following clauses of IEC 60800

Table 1 test 2	Non-contamination test
Clause 3.4.2*	Electrical resistance of conductors
Clause 3.4.3*	High voltage test 2000 V for 5 minutes
Clause 3.4.4*	High voltage test at high temperature 1500 V for 15 minutes
Clause 3.4.5*	Insulation resistance test at high temperature measured at 500 V d.c. applied for 1 minute (0.03 M Ω .km minimum)
Clause 3.5.1*	Deformation test 600 N
Clause 3.5.3	Tensile test (120 N minimum)
Clause 3.5.4*	Reverse winding test

The sample was tested to the following clauses of IEC 61423-1

Clause 5.2.1.1*	Inrush current, cold start temperature – 20 °C
Clause 5.2.1.2*	Insulation resistance test measured at 500 V d.c. applied for 1 minute on 3 m length of cable
Clause 5.2.2*	Thermal endurance, 150 °C for 12 days
Clause 5.2.3.3*	Impact test (drop height 400 mm)
Clause 5.2.3.4*	Cold bend test – 20 °C

Test Report to part of IEC 20/938/CDV

Clause		Result
Clause 7.4	Electrically conducting screen	Complies

A braided metallic screen is provided. Refer to Clauses 8.2.1 and 8.2.5 for compliance.

Clause 8.2.1	Electrical resistance of heating conductors and screen	Complies
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Resistance of screen at 20 °C:	35.0 Ω/km
Allowed maximum (0.5mm ² plain copper conductor):	36.0 Ω/km
Less than the heating conductor:	638 Ω/km

Resistance of screen at 100 °C: Temperature coefficient is positive

Clause 8.2.5	Penetration test for electrical conductive screen	Complies
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A 1 mm diameter steel pin was pushed through the screen when the cable was straight. This test was carried out on 3 samples of the cable. The 30mA RCD was activated during each test.

A 1 mm diameter steel pin was pushed through the screen when the cable was wound on a 15.5 mm mandrel. This test was carried out on 3 samples of the cable. The 30mA RCD was activated during each test.

Test Report to part of IEC 60800

Clause		Result
Table 1 test 2	Non-contamination test	
<p>The maximum measured variation between tensile strength and elongation at break of aged and non aged samples was –18%, which is less than the allowed maximum of $\pm 25\%$.</p>		
Clause 3.4.2	Electrical resistance of conductors	
Resistance at 20 °C:	0.638 Ω /m	
Manufacturer's rated value:	between 0.584 to 0.644 Ω /m	
Temperature coefficient:	positive	
		Complies
Clause 3.4.3	High voltage test	
<p>The sample withstood 2000V for 5 minutes.</p>		
		Complies
Clause 3.4.4	High voltage test at high temperature	
<p>The sample withstood 1500V for 15 minutes at 100°C.</p>		
		Complies
Clause 3.4.5	Insulation resistance test at high temperature	
<p>The samples measured insulation resistance at 100°C was 270 MΩ.km</p>		
<p>Minimum permitted: 0.03 MΩ.km</p>		
		Complies
Clause 3.5.1	Deformation test 600 N	
<p>The sample withstood 1500V for 30 seconds with an applied force of 600 N. There were no noticeable cracks in the insulation.</p>		
		Complies
Clause 3.5.3	Tensile test	
<p>The sample did not exhibit any loss of continuity until a load of 180 N which is greater than the minimum permitted, 120 N.</p>		
		Complies
Clause 3.5.4	Reverse winding test	
<p>No cracks were observed following the reverse winding test. The sample withstood 2000V for 5 minutes.</p>		
		Complies

Test Report to part of IEC 61423-1

Clause
Result

Clause 5.2.1.1 Cold inrush current
Complies

The mean cold inrush current after 10 seconds was 4.8 A which is within the allowed deviation of $\pm 10\%$ from the rated 5.0 A.

Clause 5.2.1.2 Insulation resistance at 500 V d.c. for 1 minute

The insulation resistance of a 3m length of cable was 210 G Ω .
Minimum permitted: 500M Ω

Complies

Clause 5.2.2 Thermal endurance

No cracks were observed during the bend test following heating at 150 °C for 12 days
The sample withstood 1500V for 1 minute after the bend test.

Complies

Clause 5.2.3.3 Impact test

No cracks were observed following the impact test of 400 mm drop and the sample withstood 1500V for 1 minute, after conditioning at the manufacturer's specified minimum installation temperature of 5 °C.

Complies

Clause 5.2.3.4 Cold bend test

No cracks were observed during the bend test following cooling at -20 °C for 4 hours.
The sample withstood 1500V for 1 minute after the cold bend test.

Complies