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Test Report

to

AS 1334.9-1982 *Determination of Electrical Resistance of Conveyor Belting*

Acceptance Criteria Specified by PR Polymers Pty Ltd

Report No:	**NE11/0018**
Date of Issue:	02 September 2011
Job Number:	11/0080
Applicant/Customer Name:	PR Polymers Pty Ltd 3 Bronze Street SUMNER PARK QLD 4074
Equipment Details:	**Underwater Charge Bag**

Checked: _____ G Ross Approved Signatory: _____ J Ellis

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1.0 Description of Material

The Underwater Charge Bag as supplied by PR Polymers Pty Ltd and tested by Simtars measures approximately 2000 mm long and 300 mm wide and is constructed of two material types. The outer cover material is a white woven plastic material and is stitched together to form the basic shape of the Underwater Charge Bag. The inner liner material is a clear linear plastic film and completely lines the Underwater Charge Bag. The Underwater Charge Bag has metal eyelets inserted in the top and bottom of the bag as well as a draw string in the top of the bag.

2.0 Test Specification

The PR Polymers Underwater Charge Bag was tested in accordance with AS1334.9-1982.

PR Polymers Pty Ltd has specified the acceptance criteria of a surface resistivity of greater than 1 GΩ/square and less than 1 TΩ/square. This acceptance criteria is in alignment with the values for an antistatic material as specified in DOD-HDBK-263 (1980).

Three samples of each material type, outer cover and inner liner, were cut from a different section of the same Underwater Charge Bag supplied by PR Polymers Pty Ltd.

The external outer cover and internal liner were tested separately.

The following formula was used to determine the surface resistivity:

Surface Resistivity = $\{2\pi/[\ln(r1/r2)]\}R = 3.915 \times R$

The relevant diameters of the brass conductors are as follows:

Radius Outer Conductor (r1) = 62.43 mm
Radius Inner Conductor (r2) = 12.54 mm

The samples were conditioned for in excess of 24 hours at 22°C and a relative humidity of 65 %.

Testing was conducted at 22°C and a relative humidity of 49 % immediately after removal from the environment chamber.

The following clauses of AS 1334.9-1982 were applied: 1, 2, 3, 4, 5 and 6.

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3.0 Test Results

The measured resistance values and calculated resistivity values are recorded in Tables 1 to 6.

Table 1: Sample 1 Outer Cover - Resistance Measured

Voltage Applied	Time (seconds)	Resistance	Surface Resistivity	Resistance with Graphite Solution	Surface Resistivity with Graphite Solution
92 Vdc	0 to 90	147 GΩ	575.5 GΩ/sq	91.5 GΩ	358.2 GΩ/sq
511 Vdc	90 to150	142 GΩ	555.9 GΩ/sq	79.9 GΩ	312.8 GΩ/sq
1023 Vdc	150 to 240	144 GΩ	563.8 GΩ/sq	68.1 GΩ	266.6 GΩ/sq

Table 2: Sample 1 Inner Liner - Resistance Measured

Voltage Applied	Time (seconds)	Resistance	Surface Resistivity
93 Vdc	0 to 90	16.3 GΩ	63.8 GΩ/sq
512 Vdc	90 to150	16.1 GΩ	63.0 GΩ/sq
1024 Vdc	150 to 240	16.5 GΩ	64.6 GΩ/sq

Table 3: Sample 2 Outer Cover - Resistance Measured

Voltage Applied	Time (seconds)	Resistance	Surface Resistivity	Resistance with Graphite Solution	Surface Resistivity with Graphite Solution
92 Vdc	0 to 90	78.5 GΩ	307.3 GΩ/sq	37.0 GΩ	144.9 GΩ/sq
511 Vdc	90 to150	73.9 GΩ	289.3 GΩ/sq	33.1 GΩ	129.6 GΩ/sq
1023 Vdc	150 to 240	72.8 GΩ	285.0 GΩ/sq	31.8 GΩ	124.5 GΩ/sq

Table 4: Sample 2 Inner Liner - Resistance Measured

Voltage Applied	Time (seconds)	Resistance	Surface Resistivity
92 Vdc	0 to 90	19.0 GΩ	74.4 GΩ/sq
511 Vdc	90 to150	17.8 GΩ	69.7 GΩ/sq
1023 Vdc	150 to 240	17.5 GΩ	68.5 GΩ/sq

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Table 5: Sample 3 Outer Cover - Resistance Measured

Voltage Applied	Time (seconds)	Resistance	Surface Resistivity	Resistance with Graphite Solution	Surface Resistivity with Graphite Solution
92 Vdc	0 to 90	45.9 GΩ	179.7 GΩ/sq	21.7 GΩ	85.0 GΩ/sq
511 Vdc	90 to150	42.6 GΩ	166.8 GΩ/sq	20.4 GΩ	79.9 GΩ/sq
1023 Vdc	150 to 240	42.0 GΩ	164.4 GΩ/sq	19.7 GΩ	77.1 GΩ/sq

Table 6: Sample 3 Inner Liner - Resistance Measured

Voltage Applied	Time (seconds)	Resistance	Surface Resistivity
92 Vdc	0 to 90	19.4 GΩ	76.0 GΩ/sq
510 Vdc	90 to150	17.8 GΩ	69.7 GΩ/sq
1022 Vdc	150 to 240	17.5 GΩ	68.5 GΩ/sq

Table 7: Calculated Average Surface Resistivity

	Outer Cover		Inner Liner
	Surface Resistivity	Surface Resistivity with Graphite Solution	Surface Resistivity
Sample 1	565.1 GΩ/sq	312.5 GΩ/sq	63.8 GΩ/sq
Sample 2	293.9 GΩ/sq	133.0 GΩ/sq	70.9 GΩ/sq
Sample 3	170.2 GΩ/sq	80.7 GΩ/sq	71.4 GΩ/sq
Average	343.1 GΩ/sq	175.4 GΩ/sq	68.7 GΩ/sq

4.0 Assessment of Test Results

Average surface resistivity for the outer cover material of the supplied samples tested without graphite solution is 343.1 GΩ/square which complies with the acceptance criteria specified by PR Polymers Pty Ltd.

Average surface resistivity for the outer cover material of the supplied samples tested with graphite solution is 175.4 GΩ/square which complies with the acceptance criteria specified by PR Polymers Pty Ltd. The effect of the graphite solution is to provide a better contact between the electrodes and the material under test.

Average surface resistivity for the inner liner material of the supplied samples tested is 68.7 GΩ/square which complies with the acceptance criteria specified by PR Polymers Pty Ltd.

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