
Hugh Hoagland Consulting, Inc.

ArcWear.com

Electric Arc Exposure Tests

For Bug X FREE

Repellent

Insect Repellent Spray Lotion, Geranoil 20%, Soybean Oil 5%,
Rosemary 0.8%, Peppermint Oil 0.45%, Rosemary Oil 0.4%, Geranium
Oil 0.05%, (Water, Lecithins, Xanthan Gum) 74.1%

October 2018

Tests Conducted at Kinectrics High Current Laboratory
Toronto, Ontario, Canada

Bug X FREE

Evaluation of Textile Materials

ASTM F1959-2004

R&D Arc Tests at Kinectrics High Current Laboratory

At the request of CoreTex Products, electric arc exposure tests were conducted on several R&D samples of the Insect Repellent for Bug X FREE. CoreTex Products arranged with Hugh Hoagland Consulting, Inc. to conduct tests at the High Current Laboratory of Kinectrics in Toronto and review test data.

Test Samples

Sample preparation was completed by CoreTex Products, Inc.

The samples as tested are described in the Table below:

Manufacturer	BugXFREE
Layer 1	
Test object	Insect Repellent Spray Lotion
Design	Geranoil 20%, Soybean Oil 5%, Peppermint Oil 0.45%, Rosemary Oil 0.4%, Geranium Oil 0.05%, (Water, Lecithins, Xanthan Gum) 74.1%.

Test Method

Test apparatus

The ASTM F1959-2004 Standard Test Method for Determining the Arc Rating of Materials for Clothing requires testing conducted in a high current laboratory with a controlled arc source. Test apparatus is required to be equipped with instrumented sensor panels and instrumented monitor sensors as shown on Figure 1.

The Kinectrics High Current Laboratory uses a 100 MVA supply (100 million volt-amperes). This supply feeds the arc current to the arc electrodes through co-axial circuit.

Arc electrodes are enclosed within a modified Faraday "cage" to minimize the effects of magnetic fields on the directionality of the arc. The test apparatus is placed in a test cell to minimize or eliminate the effect of rain, wind and ambient temperature.

A series of trials completes one test. Each trial results in three data point.

Following parameters are set, checked and recorded for each trial:

- arc current
- arc duration
- arc electrodes spacing
- distance between test specimen(s) and arc electrode

The peak current is controlled by closing phase angle of the 60 Hz supply source with accuracy of 0.01 cycles.

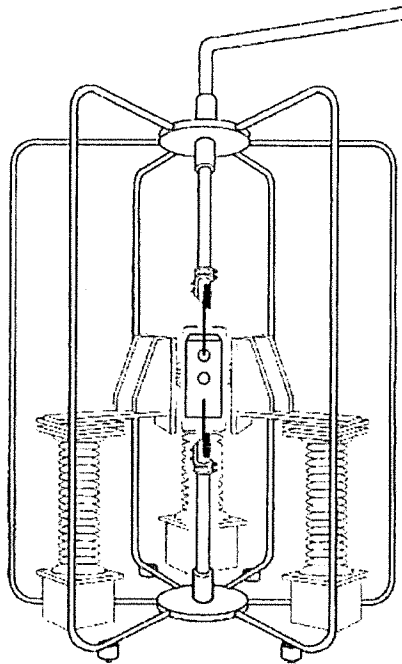


Figure 1. Test Set Up With Cage

Instrumented Panel and Monitor Sensors

Each panel equipped with two copper calorimeters mounted as shown in Figure 2. Two monitor sensors attached with mounting hardware on both sides of each panel. Each monitor sensor is equipped with one copper calorimeter.

Monitor sensors measure the incident energy (E_i) for the panel. Panel sensors measure the pass through energy that is compared with to the Stoll second-degree burn criteria.

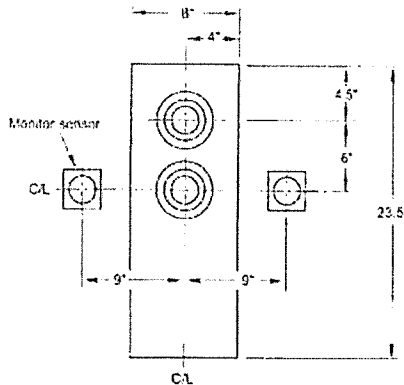


Figure 2. Instrumented Panel and Monitor Sensors

Arc Thermal Energy Measurement

The arc is not a straight vertical column. It may move horizontally or vertically or both. The co-axial supply and the arc "cage" (Fig. 1) reduce this arc movement caused by the magnetic field by the high currents in the test circuit.

The monitor sensors on each side of the panels measure the heat across materials. The temperature rises of the sensors are evaluated to determine the results of each test.

However, in addition to recorded data each trial must be evaluated using visual observations.

Test Results

The test program included two arc trials.

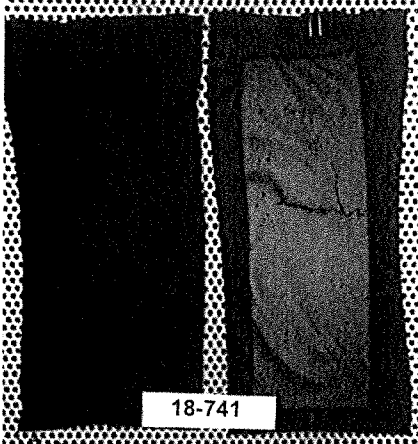
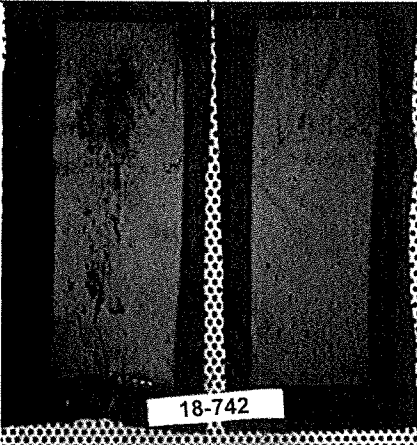
Detailed test data and graphs are shown on attached pages.

Test photographs and observations are shown in the Table below.

The arc voltage record, arc current record, arc duration, arc energy and the temperature rise record for each sensor are included on CD.

Each test was video taped. Video is included on CD.

CD is a part of this report.

Trial # 18-741			
Panel	Panel A	Panel B	
Repellent applied	Yes	No	
Incident energy E_i , cal/cm ²	6.14	7.05	
Afterflame, s	0	0	
Break open	No	No	
			
Trial # 18-742			
Panel	Panel A	Panel B	
Repellent applied	Yes	No	
Incident energy E_i , cal/cm ²	13.23	10.72	
Afterflame, s	0	0	
Break open	No	No	
			

The arc voltage record, arc current record, arc duration, arc energy and the temperature rise record for each sensor are included on CD.

Each test was video taped. Video is included on CD.

No ignition or extended afterflame up to energy level of 13 cal/cm². Oil will ignite and continue to burn but with the limited amount recommended for use and the high water content it did not have any afterflame.

Oct 17, 2018

Test # 18-741

WO#: 14117

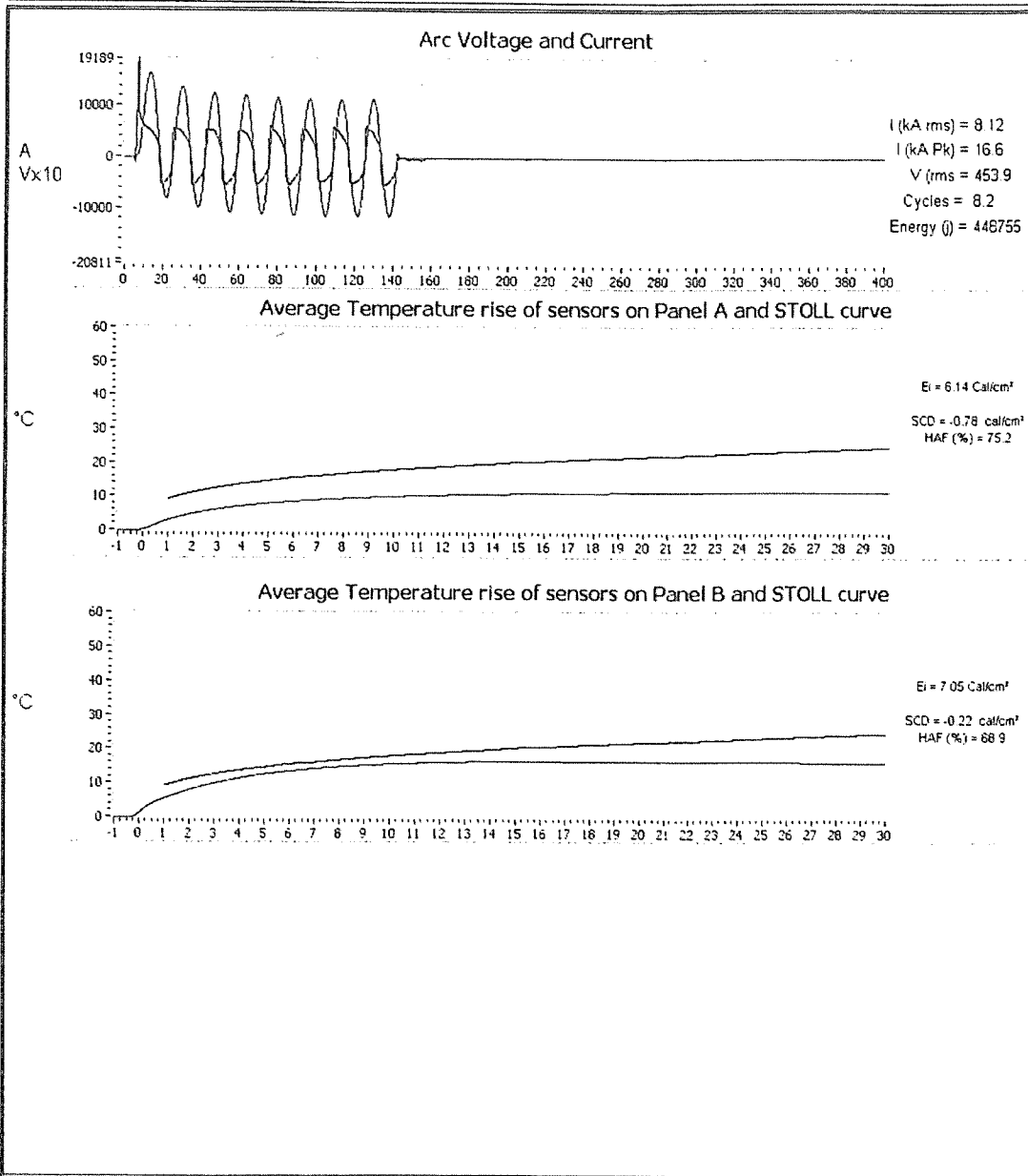
High Current Test Laboratory
Kinectrics Inc.
Test Sheet



Client:
Arcwear.com

Description:

Electrical arc exposure of FR fabrics to determine arc rating in accordance
With ASTM F 1959M-04
Panel A: fabric sprayed with Bug X FREE insect repellent

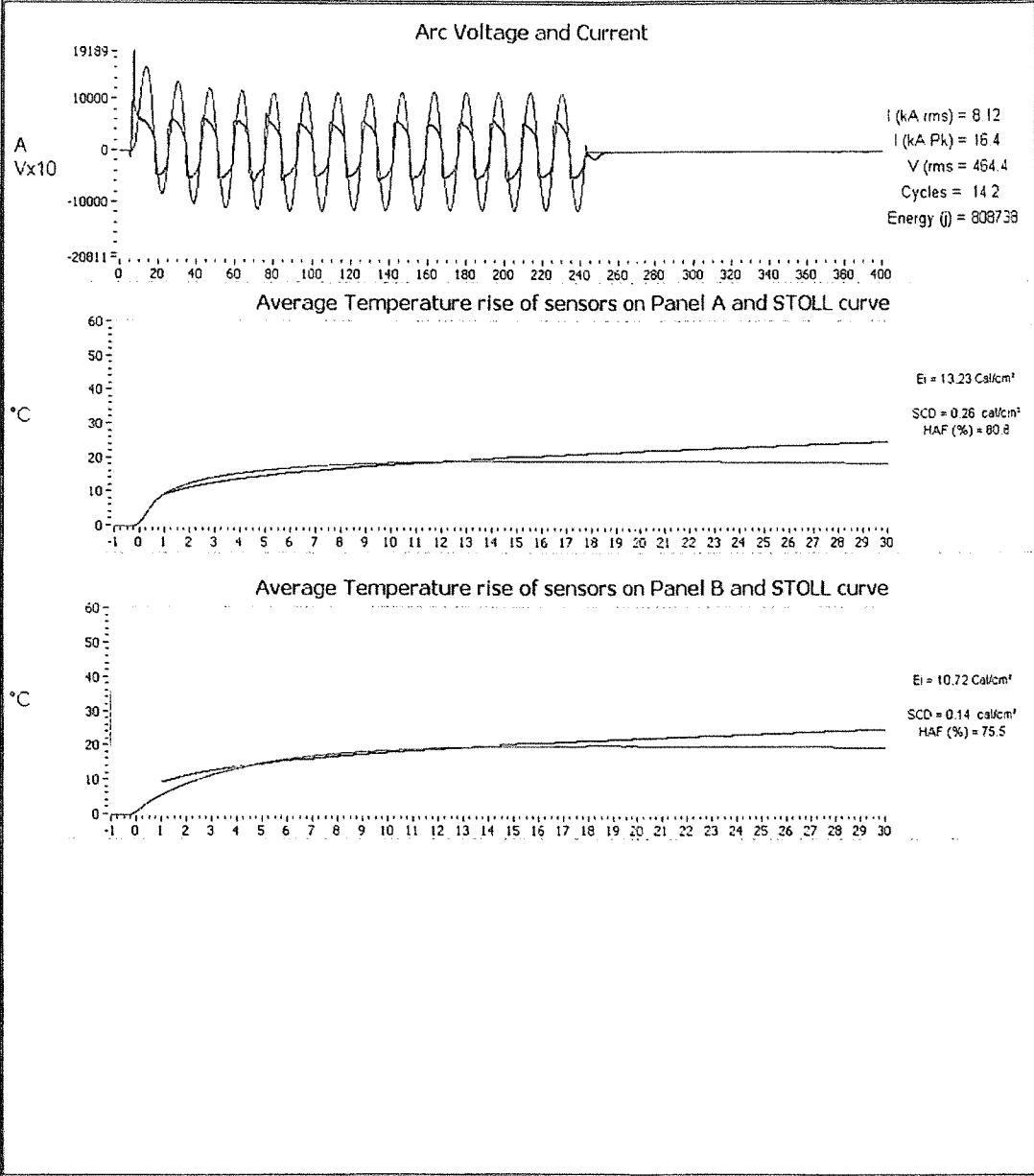


PRIVATE INFORMATION, This test data shall not be disclosed or distributed without permission of the client.

Oct 17, 2018	High Current Test Laboratory Kinectrics Inc. Test Sheet
Test # 18-742	
WO#: 14117	



Client: Arcwear.com	Description: Electrical arc exposure of FR fabrics to determine arc rating in accordance With ASTM F 1959M-04 Panel A: fabric sprayed with Bug X FREE insect repellent
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PRIVATE INFORMATION, This test data shall not be disclosed or distributed without permission of the client.