Hugh Hoagland Consulting, Inc.

ArcWear.com

R&D Electric Arc Exposure Tests

For R&R Lotion

Product

R&R Lotion, Industrial Sunscreen
Tested with
Westex 7.0 oz/yd² Twill Fabric, 88% Cotton 12% Nylon

Style: Lotion - 8 oz Bottle, Number ISSC-8-30+FF Batch# 885 8-15;
Fabric – Westex 3011 2 3 4 5 6 7 8 9

Color: Lotion – White; Fabric – Orange

Actual Areal Density (AAD): Lotion (average) – 12.6 oz/yd², Fabric - 7.9 oz/yd²

Report Number: 1309Ps12, Revision: 00

November 22, 2013

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

R&D Electric Arc Exposure Report

ASTM F 1959/F 1959M-12 Standard Test Method for Determining the Arc Rating of Materials for Clothing

General

At the request of R. Fletcher Rich R&D electric arc exposure tests were conducted on textile systems for R&R Lotion. R. Fletcher Rich arranged with ArcWear.com to facilitate R&D testing by the High Current Laboratory of Kinectrics in Toronto and to review test data.

R&D tests documented in this report were conducted in accordance with ASTM International Standard F 1959/F 1959M-12 Standard Test Method for Determining the Arc Rating of Materials for Clothing.

R&D Test samples

The test material was received on August 30, 2013. The test material was washed three times by ArcWear.com.

The test material is described in the table below. Lotion was applied over 2 inch by 10 inch area that covers panel sensors.

Customer	R&R Lotion
	Layer 1
Material design	R&R Lotion, Industrial Sunscreen Tested with Westex 7.0 oz/yd² Twill Fabric, 88% Cotton 12% Nylon
Style	Lotion - 8 oz Bottle, Number ISSC-8-30+FF Batch# 885 8-15; Fabric – Westex 3011 2 3 4 5 6 7 8 9
Color	Lotion – White; Fabric – Orange
Actual Areal Density (AAD) as tested	Lotion (average) – 12.6 oz/yd², Fabric - 7.9 oz/yd²

The order of layering is numbered starting from the outer layer listed first.

R&D Test results

The following test data was recorded for each trial:

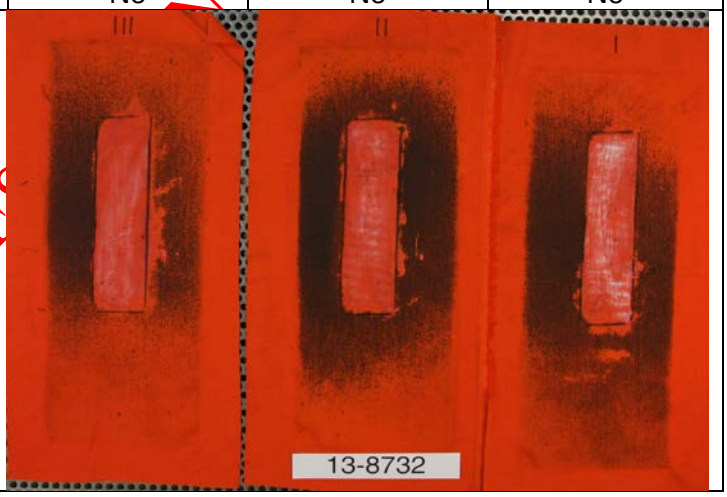
- test specimen description and order of layer
- distance from an arc center line to the panel surface
- subjective evaluation arc exposure electrical conditions: arc trial number, RMS arc current, peak arc current, arc voltage, arc duration, energy dissipated in arc, plots of arc current and arc voltage

- temperature rise response from two monitor and two panel sensors for each panel in each trial, plot of average responses from two panel and two monitor sensors, plot of Incident energy distribution *Ei* from bare shot analysis
- photographs of exposed material panels
- video

Above mentioned test data is part of report and either included in this reports or available for download from ArcWearOnline.com arc testing website. Test data is accessible only to and protected with R&R Lotion unique password.

Trial # 13-8730			
Panel	Panel A	Panel B	Panel C
Incident energy Ei, cal/cm²	7.8	5.0	4.8
Second degree burn prediction	Above Stoll – burn	Below Stoll – No burn	Above Stoll – burn
Break open	No	No	No
Afterflame, seconds	00.0	00.0	00.0
Ignition	No	No	No
Melting	No	No	No
Dripping	No	No	No
			
Trial # 13-8731			
Panel	Panel A	Panel B	Panel C
Incident energy Ei, cal/cm²	7.1	6.6	7.3
Second degree burn prediction	Above Stoll – burn	Below Stoll – No burn	Above Stoll – burn
Break open	No	No	No
Afterflame, seconds	00.0	00.0	00.0
Ignition	No	No	No
Melting	No	No	No
Dripping	No	No	No

Trial # 13-8732			
Panel	Panel A	Panel B	Panel C
Incident energy Ei, cal/cm²	5.9	6.8	5.4
Second degree burn prediction	Below Stoll – No burn	Below Stoll – No burn	Below Stoll – No burn
Break open	No	No	No
Afterflame, seconds	00.0	00.0	00.0
Ignition	No	No	No
Melting	No	No	No
Dripping	No	No	No



Conclusions

Note: This is not an official rating. Testing has been completed as scouting for RESEACH AND DEVELOPMENT purpose only.

Projected rating of the fabric with Sunscreen Lotion applied: ATPV is 6.9 cal/cm². Reduction in rating is approximately 34%. Uncontaminated rating for the same fabric is 10.6 cal/cm². No additional afterflame, no ignition, no melting and dripping was observed as result of arc exposure.

High Current Lab

Kinectrics Inc
800 Kipling Ave
Toronto, Ontario

Record #	K-418608-8730
Project #	K-418608 Client: ArcWear.com

Standard:	ASTM F1959/F1959M-12 Standard Test Method for Determining the Arc Rating of Materials for Clothing
Var. to Std:	None
Fabric	R&R Lotion, Industrial Sunscreen 8 oz Bottle
	Number ISSC-8-30+FF Batch#885 8-15, ArcWear# 1309P12
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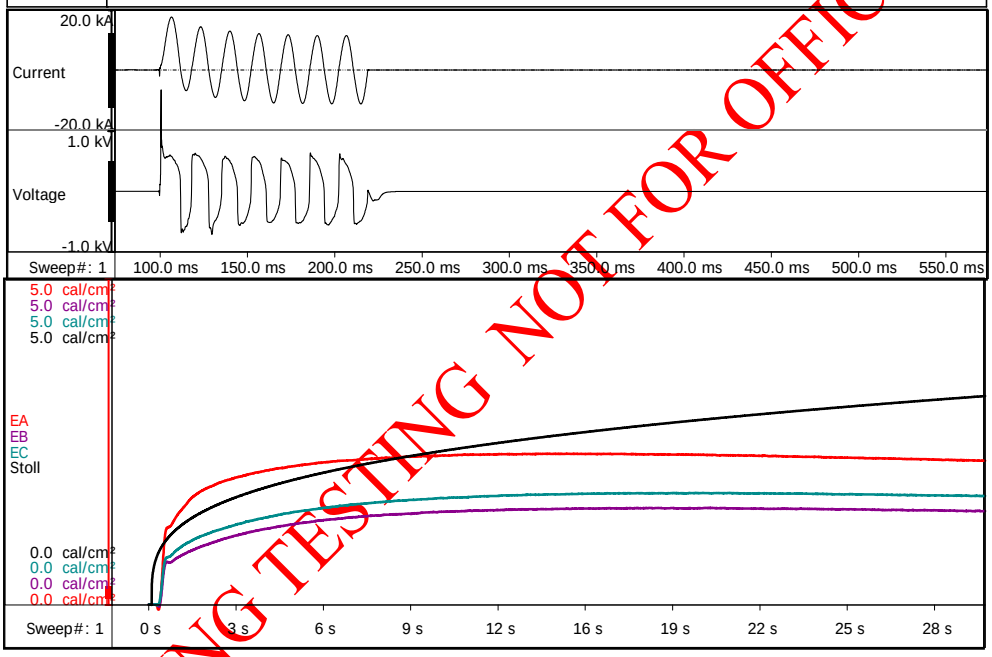

Current Total RMS	8.521 kA	Panel A:	Panel B:	Panel C:
Current Peak	17.75 kA	Ei = 7.8 cal/cm²	Ei = 4.99 cal/cm²	Ei = 4.83 cal/cm²
Arc Voltage	469.2 V	SCD = 0.33 cal/cm²	SCD = -0.46 cal/cm²	SCD = -0.328 cal/cm²
Duration (cycles)	7.211 cycles	HAF = 70.2 %	HAF = 70.2 %	HAF = 64.4 %
Duration (time)	120.1 ms			
Arc Energy	429.5 kJ	Date (mm/dd/yyyy)	11/23/2013	

High Current Lab

Kinectrics Inc
800 Kipling Ave
Toronto, Ontario

Record #	K-418608-8731
Project #	K-418608 Client: ArcWear.com
Standard:	ASTM F1959/F1959M-12 Standard Test Method for Determining the Arc Rating of Materials for Clothing
Var. to Std:	None
Fabric	R&R Lotion, Industrial Sunscreen 8 oz Bottle
	Number ISSC-8-30+FF Batch#885 8-15, ArcWear# 1309P12
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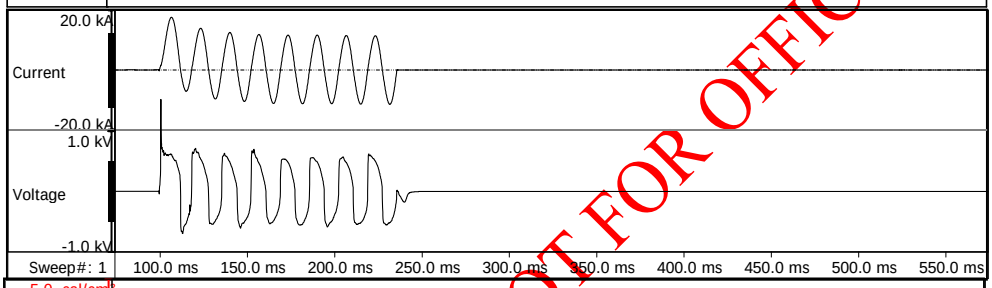

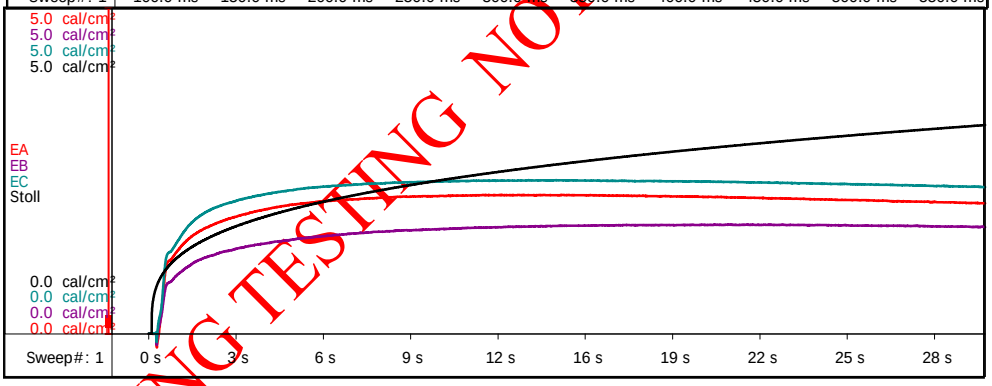

		Panel A:	Panel B:	Panel C:
Current Total RMS	8.452 kA			
Current Peak	17.66 kA	Ei = 7.06 cal/cm²	Ei = 6.5 cal/cm²	Ei = 7.35 cal/cm²
Arc Voltage	475.5 V	SCD = 0.18 cal/cm²	SCD = -0.258 cal/cm²	SCD = 0.42 cal/cm²
Duration (cycles)	8.189 cycles	HAF = 69.8 %	HAF = 74.2 %	HAF = 67.9 %
Duration (time)	136.4 ms			
Arc Energy	495.8 kJ	Date (mm/dd/yyyy)	11/23/2013	

High Current Lab

Kinectrics Inc
800 Kipling Ave
Toronto, Ontario

Record #	K-418608-8732
Project #	K-418608 Client: ArcWear.com
Standard:	ASTM F1959/F1959M-12 Standard Test Method for Determining the Arc Rating of Materials for Clothing
Var. to Std:	None
Fabric	R&R Lotion, Industrial Sunscreen 8 oz Bottle
	Number ISSC-8-30+FF Batch#885 8-15, ArcWear# 1309P12
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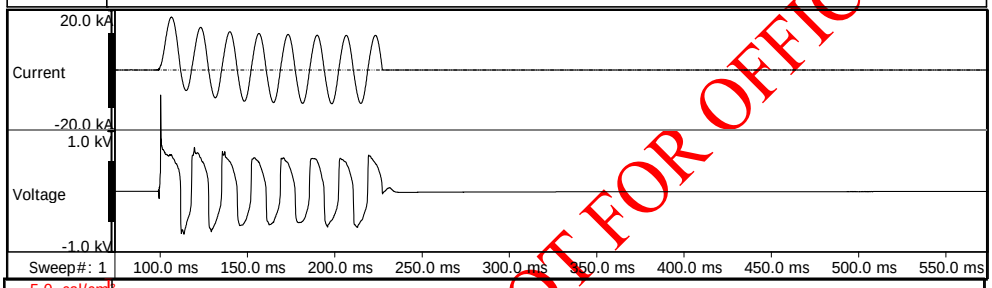

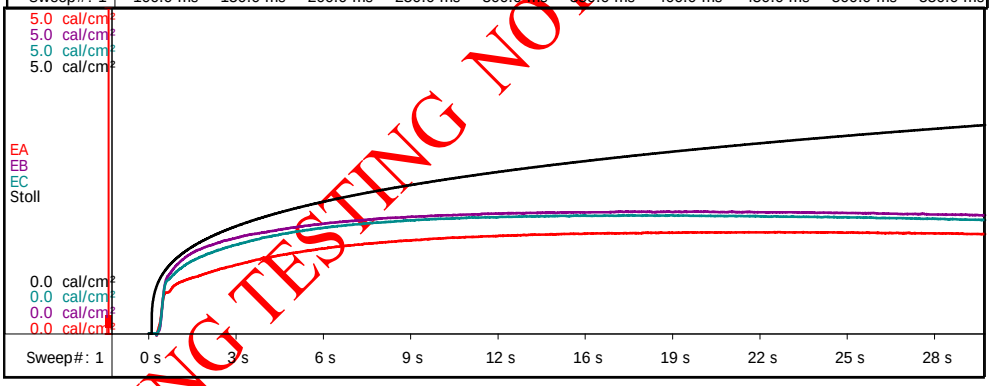

		Panel A:	Panel B:	Panel C:
Current Total RMS	8.473 kA			
Current Peak	17.73 kA	Ei = 5.87 cal/cm²	Ei = 6.78 cal/cm²	Ei = 5.42 cal/cm²
Arc Voltage	473.9 V	SCD = -0.412 cal/cm²	SCD = -0.089 cal/cm²	SCD = -0.206 cal/cm²
Duration (cycles)	7.736 cycles	HAF = 73.4 %	HAF = 72.3 %	HAF = 66.5 %
Duration (time)	128.9 ms			
Arc Energy	463.5 kJ	Date (mm/dd/yyyy)	11/23/2013	