

Hugh Hoagland Consulting, Inc.

ArcWear.com

Electric Arc Exposure Tests

For Antex

Material System

1582FR

Style: Double Pique 202426FR

Color: Navy

Actual Areal Density (AAD): 7.8 oz/yd², 264 g/m²

Report Number: 0804P1582FR, Revision: 00

April, 2008

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

Electric Arc Exposure Report

ASTM F 1959/F 1959M-06 a^{ε1} Standard Test Method for Determining the Arc Rating of Materials for Clothing

General

At the request of Alan Gitomer electric arc exposure tests were conducted on textile systems for Antex. Alan Gitomer arranged with ArcWear.com to facilitate testing by the High Current Laboratory of Kinectrics in Toronto and to review test data.

The tests documented in this report were conducted in accordance with ASTM International Standard F 1959/F 1959M-06 a^{ε1} Standard Test Method for Determining the Arc Rating of Materials for Clothing.

Test samples

The test material was received on April 1, 2008. The test material was washed 3 times and dried by ArcWear.com in accordance with requirements of the above standard. This is specified in the standard to allow for minimal shrinkage while removing contaminants from the material manufacturing process. Following the washing procedure, material was cut into panel test specimens.

Test results

The test program includes minimum of twenty individual panel arc trials. The following test data was recorded for each trial:

- 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 is available for download from ArcWearOnline.com arc testing website. Test data is accessible only to and protected with Antex unique password.

Essential test data and test results are presented in the table below and on the attached data pages as follows:

- arc rating ATPV or EBT or both and plots of the burn injury probability (ATPV) or breakopen probability (EBT) or both versus E_i
- test specimen description and order of layer
- distance from an arc center line to the panel surface
- subjective evaluation
- heat attenuation factor (HAF) and plot of HAF on E_i
- ignition probability value (if determined during testing)

Rating

Material system specified in the table below received Arc Rating as

(ATPV) =12 cal/cm²

Customer	Antex
Material design	1582FR
Style	Double Pique 202426FR
Color	Navy
Actual Areal Density (AAD) as tested	7.8 oz/yd ² , 264 g/m ²

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

Requested by: Alan Gitomer



Approved by Hugh Hoagland
Arcwear.com

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Report # K-41810-0804PAnt1582FR		Test Report Kinectrics Inc., 800 Kipling Avenue, Unit 2 Toronto, Ontario, Canada Tel: 416-207-6000, www.kinectrics.com	 KINECTRICS ISO 9001-2008
Samples Received: April 2008	Samples Tested: April 22, 2008		

<u>Tested for</u> Hugh Hoagland ArcWear.com 502-314-7158 hugh@arcwear.com	<u>Contact information for item tested:</u> Alan Gitomer Antex 323-232-2061 agito@aol.com
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Test item description
ANTEX, Style 1582FR, Double Pique 202426 FR Cotton, Navy, AAD 7.8 oz/yd², 264 g/m²

Reference Standard
ASTM F1959/F1959M-06ae1
Standard Test Method for Determining Arc Thermal Performance of Textile Materials for Clothing by Electric Arc Exposure Method

<u>Test Parameters:</u>	Test current: 8kA	Number of samples analysed: 24
	Distance to Fabric: 12 inches	
	Arc Gap: 12 inches	Incident Energy Range: 9 to 13 cal/cm ²

Arc Rating, ATPV = 12 Cal/cm²
Heat Attenuation Factor, HAF = 81%

Summary
The Arc Rating of this material is intended for use as part of a flame resistant garment for workers exposed to electric arcs. The material was tested by Kinectrics as received. The test result is applicable only to the Test Item, other material or color may have different protection level. Actual performance of the complete garment may vary depending on the final design and assembly of the garment. The Arc Rating was calculated based on the data obtained and analysed in accordance with the latest version of the applicable standards. The individual test sheets, graphs, photographs of the samples and video of every test are provided in digital format to the Client for review.

As of August 1, 2010, the arc testing performed to the above mentioned Standard is accredited by the Standards Council of Canada to conform to the requirements of CAN-P-4E (ISO/IEC 17025:2005) by QMI, a division of SAI Global and North America's leading QMS registrar. Adherence to this standard provides one of the strongest assurances of service quality available. As a minimum, since July 1998 all work at Kinectrics is performed to meet the requirements of ISO 9001.

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Note
- The test performed does not apply to electrical contact or electrical shock hazard.
- An unsigned copy of this report is an unofficial reporting of information. Report must be signed to validate test data and conform to quality standards.

Performed by:	Approved by:
Joe Ogrodowczyk Station Operator High Current Laboratory Ph: 416-207-6000	Claude Maurice, Lab Manager Kinectrics, Inc. Toronto, ON Canada Ph: 416-207-6305 hcl@kinectrics.com

Date:
April 22, 2008

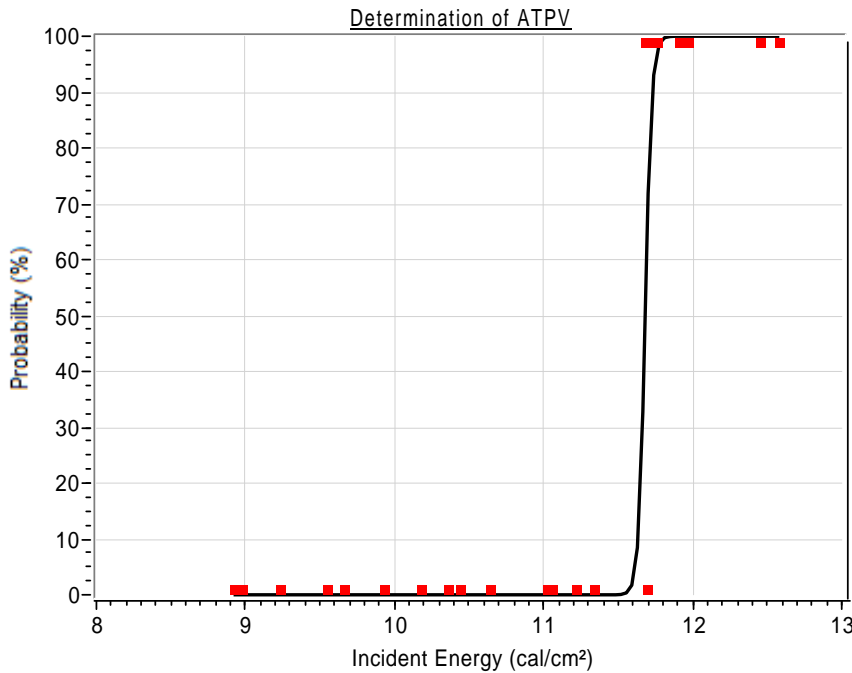
Determination of ATPV by performing logistic regression on panel burn response as indicated in Summary Table



Report #
K-41810-0804PAnt1582FR

Test Performed in accordance with : ASTM F1959/F1959M-06ae1

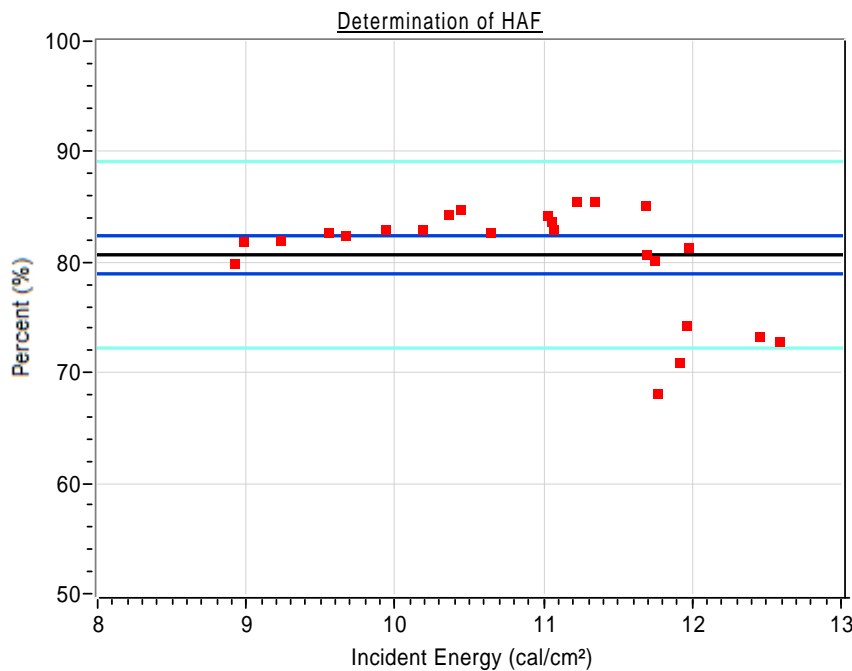
Fabric Description: ANTEX, Style 1582FR, Double Pique 202426 FR Cotton, Navy, AAD 7.8 oz/yd², 264 g/m²



ATPV = 12 cal/cm²

Probability	Ei
5%	11.6
10%	11.6
20%	11.6
30%	11.7
40%	11.7
50%	11.7
60%	11.7
70%	11.7
80%	11.7
90%	11.7

Pts = 24
 # Pts above Stoll = 8
 # Pts Break-Open = 3
 # Pts always >STOLL = 7
 # Pts always <STOLL = 15
 # Pts within 20% = 21
 # Pts in mix zone = 2



HAF = 81 %

Confidence Intervals
 95% CI = 79.3 , 82.7

Data pts

Best Fit

95% CI

95% CI pts

Date:
April 22, 2008

Report #
K-41810-

Summary Table

Test Performed in accordance with : ASTM F1959/F1959M-06ae1



Fabric Description: ANTEX, Style 1582FR, Double Pique 202426 FR Cotton, Navy, AAD 7.8 oz/yd², 264 g/m²

Summary of measured energy and observations

Test #	Panel	Test Current A	Cycles of 60Hz	Ei Cal/cm ²	SCD Cal/cm ²	HAF %	Burn Y/N	Break Open Y/N	Ablation Y/N	After Flame sec.	Omit Y/N	Comment
1	08-1761	A	8kA	11.1	9.55	-0.58	82.7	No	-	-	No	
2	08-1761	B	8kA	11.1	8.92	-0.39	79.9	No	-	-	No	
3	08-1761	C	8kA	11.1	8.98	-0.51	81.9	No	-	-	No	
4	08-1762	A	8kA	13.1	11.76	1.76	68.2	Yes	-	-	No	
5	08-1762	B	8kA	13.1	11.22	-0.56	85.5	No	-	-	No	
6	08-1762	C	8kA	13.1	11.97	0.05	81.4	Yes	-	-	No	
7	08-1763	A	8kA	14.1	12.45	1.39	73.3	Yes	-	-	No	
8	08-1763	B	8kA	14.1	9.93	-0.51	83.0	No	-	-	No	
9	08-1763	C	8kA	14.1	12.58	1.52	72.9	Yes	-	-	No	
10	08-1764	A	8kA	12.1	10.36	-0.52	84.4	No	-	-	No	
11	08-1764	B	8kA	12.1	9.66	-0.41	82.5	No	-	-	No	
12	08-1764	C	8kA	12.1	11.74	0.20	80.2	Yes	-	-	No	
13	08-1765	A	8kA	12.1	10.44	-0.57	84.8	No	-	-	No	
14	08-1765	B	8kA	12.1	10.64	-0.34	82.7	No	-	-	No	
15	08-1765	C	8kA	12.1	10.18	-0.31	83.0	No	Y	-	No	
16	08-1766	A	8kA	13.1	11.06	-0.36	83.0	No	-	-	No	
17	08-1766	B	8kA	13.1	9.23	-0.55	82.0	No	-	-	No	
18	08-1766	C	8kA	13.1	11.05	-0.40	83.7	No	-	-	No	
19	08-1767	A	8kA	13.6	11.34	-0.67	85.5	No	-	-	No	
20	08-1767	B	8kA	13.6	11.02	-0.37	84.3	No	-	-	No	
21	08-1767	C	8kA	13.6	11.96	1.23	74.3	Yes	Y	-	No	
22	08-1768	A	8kA	13.6	11.69	0.09	80.7	No	-	-	No	
23	08-1768	B	8kA	13.6	11.68	-0.49	85.2	Yes	-	-	No	
24	08-1768	C	8kA	13.6	11.91	1.51	71.0	Yes	Y	-	No	
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