Hugh Hoagland Consulting, Inc.

ArcWear.com

Electric Arc Exposure Tests

For ITC International Textil Corporation S.A.

Material System

One Layer
7.4 oz/yd² 250 g/m² Twill
Style: HiSafe250®
Color: Navy Blue
Actual Areal Density (AAD): 7.5 oz/yd² 254 g/m²

Report Number: 1304P11 Revision: 00

April 2013

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

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 Claudio Beniaminovich, electric arc exposure tests were conducted on textile systems for ITC International Textil Corporation S.A. Claudio Beniaminovich 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-12 Standard Test Method for Determining the Arc Rating of Materials for Clothing.

Test samples

The test material was received on April 10, 2013. The test material was washed 3 times and dried by ArcWear.com in accordance with requirements of the above standard. 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 ITC International Textil Corporation S.A. 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 *Ei*
- 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 *Ei*
- ignition probability value (if determined during testing)

Rating

Material system specified in the table below received Arc Rating as

ATPV=9.3 cal/cm²

Customer	ITC International Textil Corporation S.A.
Material design	7.4 oz/yd² 250 g/m² Twill,
Style	HiSafe250®
Color	Navy Blue
Actual Areal Density (AAD) as tested	7.5 oz/yd² 254 g/m²

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

Requested by: Claudio Beniaminovich

Hugh Hoagland

Digitally signed by Hugh Hoagland
Date: 2013.04.25 09:23:35 -04'00'

Approved by Hugh Hoagland
Arcwear.com

Report # K-418499-1304P11	Test Report
Samples Received: APR 10, 2013 / Samples Tested: APR 23, 2013	Kinectrics Inc., 800 Kipling Avenue, Unit 2 Toronto, Ontario, Canada Tel: 416-207-6000, www.kinectrics.com

Tested for

Hugh Hoagland
ArcWear.com
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Contact information for item tested:

Claudio Beniaminovich
ITC International Textil Corporation S.A.
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Test item description

ITC International Textil,
Style HiSafe250®, 7.4 oz/yd² 250 g/m² Twill, Double Knit Mesh, Navy Blue, AAD 7.5 oz/yd² 254 g/m²,
ArcWear# 1304P11

Reference Standard

ASTM F1959/F1959M-12,
Standard Test Method for Determining the Arc Rating of Materials for Clothing

Test Parameters:

Test current: 8 kA
Arc Gap: 30 cm
Distance to Fabric: 30 cm

Number of samples analysed: 21

Incident Energy Range: 6 to 45 cal/cm²

Arc Rating, ATPV = 9.3 Cal/cm²
Heat Attenuation Factor, HAF = 76%

No variations to standard method noted.
Ebt not determined or not completed.

Summary

The Arc Rating of this material is intended for use as part of a flame resistant garment or system for workers exposed to electric arcs. The samples were 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.

The test result is applicable only to the test item as described; other fiber blends, weaves, finishing or dye may have different protection level. The test performed does not apply to electrical contact or electrical shock hazard. The test articles are tested as received; no test is done to validate the fiber content or composition.

The arc testing performed to the above mentioned Standard is accredited by the Standards Council of Canada (SCC) to conform to the requirements of CAN-P-4E (ISO/IEC 17025:2005). Accreditation by the Standards Council of Canada (SCC) is a mark of competence and reliability recognized throughout the world.

Performed by:

Joe Ogrodowczyk
Station Operator, HCL
Ph: 416-207-6000

Approved by:

2013.05.14
12:07:08 -04'00'

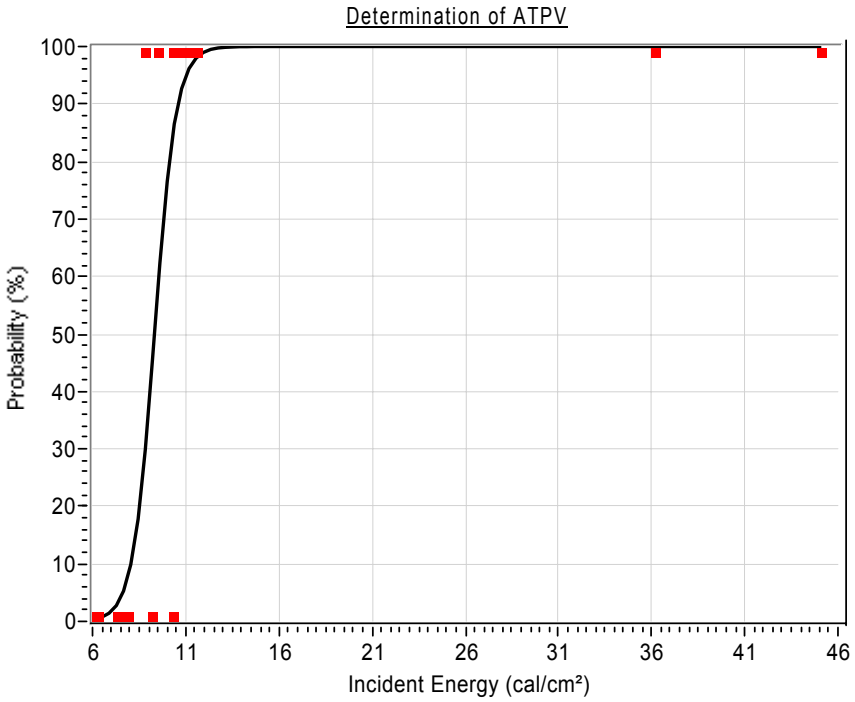
Claude Maurice,
Lab Manager, HCL
hcl@kinectrics.com

Date: APR 23, 2013	Determination of ATPV by performing logistic regression on panel response
Report # K-418499-1304P11	ASTM F1959/F1959M-12, Standard Test Method for Determining the Arc Rating of Materials for Clothing

KINECTRICS
ISO 9001-2008

Fabric Description:

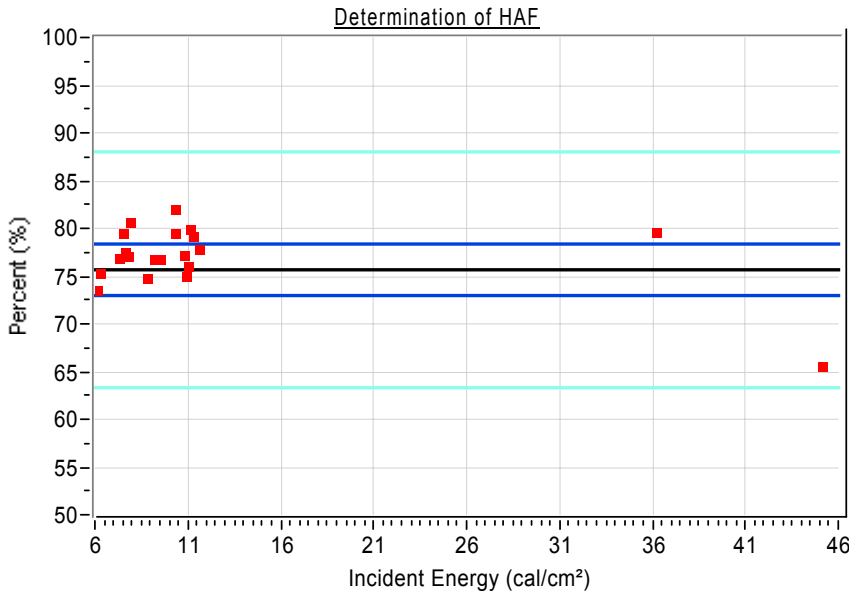
ITC International Textil,
Style HiSafe250®, 7.4 oz/yd² 250 g/m² Twill, Double Knit Mesh, Navy Blue, AAD 7.5 oz/yd² 254 g/m²,
ArcWear# 1304P11



ATPV = 9.3 cal/cm²

Probability	Ei
5%	7.6
10%	8.1
20%	8.5
30%	8.8
40%	9.1
50%	9.3
60%	9.6
70%	9.8
80%	10.1
90%	10.6

Total points analyzed = 21
Points above Stoll = 12
Points above mix zone = 10
Points below mix zone = 7
 # Pts within 20% = 13
 # Pts in mix zone = 3



HAF = 76 %

Confidence Intervals
95% CI = 73.3 , 78.7

Data pts
Best Fit
95% CI
95% CI pts

Date:
APR 23, 2013

Report #
K-418499-1304P11

Summary of Measured Energy and Observations

Test Performed in accordance with : ASTM F1959/F1959M-12,
Standard Test Method for Determining the Arc Rating of Materials for Clothing

KINECTRICS
ISO 9001-2008

Fabric Description: ITC International Textil,
Style HiSafe250®, 7.4 oz/yd² 250 g/m² Twill, Double Knit Mesh, Navy Blue, AAD 7.5 oz/yd² 254 g/m²,
ArcWear# 1304P11

	Test #	Panel	Test Current A	Cycles of 60Hz	Ei Cal/cm²	SCD Cal/cm²	HAF %	Burn Y/N	Break Open Y/N	Ablation Y/N	After Flame sec.	Omit Y/N	Comment
1	K-418499-2775	A	8493	11.2	11.6	0.5	77.8	Yes	-	-	-	No	
2	K-418499-2775	B	8493	11.2	9.2	-0.1	76.8	No	-	-	-	No	
3	K-418499-2775	C	8493	11.2	11.0	0.6	76.1	Yes	-	-	-	No	
4	K-418499-2776	A	8467	13.1	11.3	0.2	79.2	Yes	-	-	-	No	
5	K-418499-2776	B	8467	13.1	10.8	0.4	77.2	Yes	-	-	-	No	
6	K-418499-2776	C	8467	13.1	10.9	0.7	75.0	Yes	-	-	-	No	
7	K-418499-2777	A	8533	9.2	6.1	-0.4	73.5	No	-	-	-	No	
8	K-418499-2777	B	8533	9.2	7.8	-0.2	77.1	No	-	-	-	No	
9	K-418499-2777	C	8533	9.2	10.3	-0.2	82.0	No	-	-	-	No	
10	K-418499-2778	A	8248	52.2	45.1	14.2	65.6	Yes	-	-	-	No	
11	K-418499-2778	B	8248	52.2	36.2	5.9	79.6	Yes	-	-	-	No	
12	K-418499-2778	C	8248	52.2	45.1	22.1	48.1	Yes	-	-	-	No	
13	K-418499-2779	A	8504	10.2	7.5	-0.4	79.5	No	-	-	-	No	
14	K-418499-2779	B	8504	10.2	9.5	0.3	76.8	Yes	-	-	-	No	
15	K-418499-2779	C	8504	10.2	7.6	-0.2	77.5	No	-	-	-	No	
16	K-418499-2780	A	8455	12.2	11.1	0.2	79.9	Yes	-	-	-	No	
17	K-418499-2780	B	8455	12.2	8.8	0.2	74.8	Yes	-	-	-	No	
18	K-418499-2780	C	8455	12.2	10.3	0.1	79.5	Yes	-	-	-	No	
19	K-418499-2781	A	8550	8.2	6.3	-0.4	75.3	No	-	-	-	No	
20	K-418499-2781	B	8550	8.2	7.9	-0.4	80.7	No	-	-	-	No	
21	K-418499-2781	C	8550	8.2	7.3	-0.3	76.9	No	-	-	-	No	
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General Comments