

Hugh Hoagland Consulting, Inc.

# ArcWear.com

Electric Arc Exposure Tests

For Paulson Manufacturing Corporation

**Faceshield**

**Faceshield ARC-S2K1-PC-12**

**Paulson Polycarbonate Lens with CB2-HD Mounting Bracket, Part  
Number 9004860**

**Model, Part Number, Style: 2180306**

**Lens color: Green**

**Thickness: 0.060 inch, 1.5 mm**

**Report Number: 1208F09, Revision: 00**

September 19, 2012

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

# Electric Arc Exposure Report

## ASTM F2178-08 Standard Test Method for Determining the Arc Rating and Standard Specification for Eye or Face Protective Products

### **General**

At the request of Roy Paulson electric arc exposure tests were conducted on faceshields for Paulson Manufacturing Corporation. Roy Paulson 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 on September 19, 2012 in accordance with:

- ASTM F2178-08 Standard Test Method for Determining the Arc Rating and Standard Specification for Face Protective Products

### **Test Samples**

Faceshields test samples (were) received on August 14, 2012.

Samples were tested as received. No washing or any other preparation is required by the standard.

### **Test Results**

The test program includes minimum of ten two-mannequin arc trials. The test data set is evaluated using logistic regression method.

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 four face sensors for each instrumented mannequin head in each trial, plot of Incident energy distribution  $E_i$  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](http://ArcWearOnline.com) arc testing website. Test data is accessible only to and protected with Paulson Manufacturing Corporation 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 layers for fabric system and faceshield

- 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**

Faceshield system specified in the Table 1 below received final arc rating as:

**ATPV = 17 cal/cm<sup>2</sup>**

Table 1

A	Paulson Manufacturing Corporation
General Description	Faceshield ARC-S2K1-PC-12
Lens system	
Lens Manufacturer, Design	Paulson Polycarbonate Lens with CB2-HD Mounting Bracket, Part Number 9004860
Lens Model, Part Number, Style	2180306
Lens Color	Green
Lens Thickness	0.060 inch, 1.5 mm
Hard Hat	
Manufacturer, Part/Model Number	MSA, Model V-Gard

Requested by: Roy Paulson



Approved by Hugh Hoagland  
Arcwear.com

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- b) *assumes any liabilities with respect to the use of, or for damages resulting from the use of, any information, apparatus, method, or process disclosed in this report*

Report # K-418465-1208F08		<b>Test Report</b> Kinectrics Inc., 800 Kipling Avenue, Unit 2 Toronto, Ontario, Canada Tel: 416-207-6000, www.kinectrics.com	 <b>KINECTRICS</b> ISO 9001-2008
Samples Received: AUG 14, 2012	Samples Tested: SEP 19, 2012		

**Tested for**

Hugh Hoagland  
ArcWear.com  
502-333-0510  
arctesting@arcwear.com

**Contact information for item tested:**

Roy Paulson  
Paulson Manufacturing Corporation  
951-676-2451  
roypaulson@paulsonmfg.com

**Test item description**

Paulson Mfg Corp, Faceshield ARC-S2K1-PC-12, Style 2180306, Green, Polycarbonate, Thickness: .06 in, Mounting Bracket: Paulson, CB2-HD, Part Number 9004860, Hardhat: MSA, Style V-Gard, ArcWear# 1208F08

**Reference Standard**

ASTM F2178-08  
Standard Test Method for Determining the Arc Rating and Standard Specification for Eye and Face Protective Products

**Test Parameters:**

Test current: 8 kA	Number of samples analysed: 22
Distance to Fabric: 30 cm	
Arc Gap: 30 cm	Incident Energy Range: 5 to 28 cal/cm <sup>2</sup>

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**Arc Rating, ATPV = 17 Cal/cm<sup>2</sup>  
Heat Attenuation Factor, HAF = 87%**

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**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:

Daniel Ferguson  
Station Operator  
High Current Laboratory  
Ph: 416-207-6000

Approved by:

Claude Maurice,  
Lab Manager  
High Current Laboratory  
hcl@kinectrics.com

Date:  
SEP 19, 2012

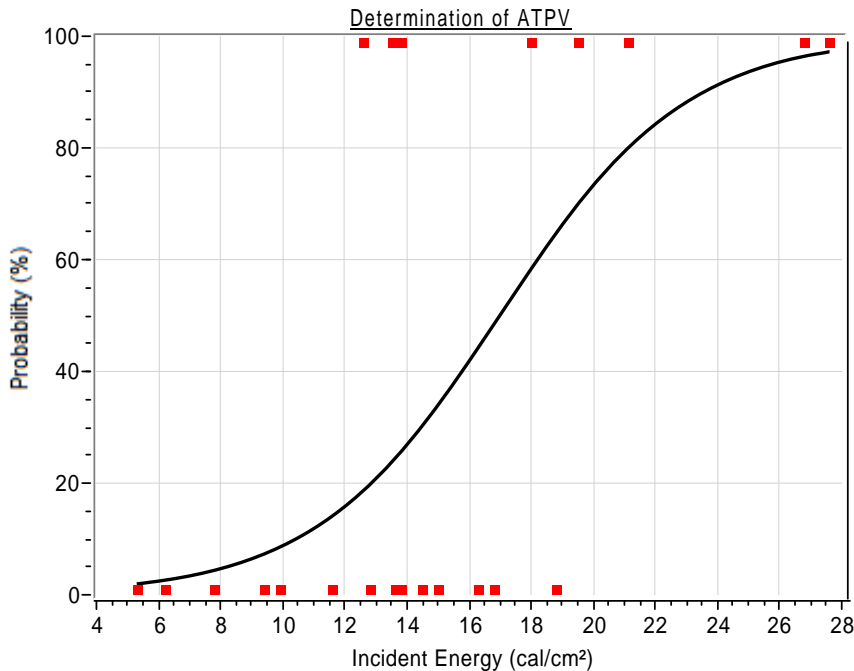
Report #  
K-418465-1208F08

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

Test Performed in accordance with : ASTM F2178-08



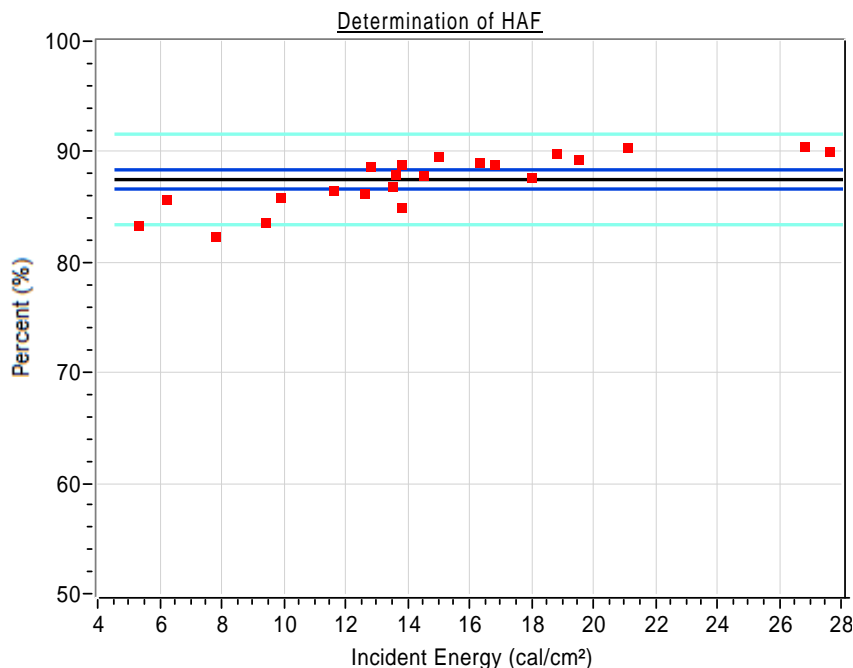
**Fabric** Paulson Mfg Corp, Faceshield ARC-S2K1-PC-12, Style 2180306, Green, Polycarbonate, Thickness: .06 in,  
**Description:** Mounting Bracket: Paulson, CB2-HD, Part Number 9004860, Hardhat: MSA, Style V-Gard, ArcWear# 1208F08



**ATPV = 17 cal/cm<sup>2</sup>**

Probability	Ei
5%	8.2
10%	10.4
20%	12.8
30%	14.5
40%	15.8
50%	17.0
60%	18.2
70%	19.5
80%	21.1
90%	23.5

# Pts = 22  
# Pts above Stoll = 8  
# Pts Break-Open = 0  
# Pts always >STOLL = 4  
# Pts always <STOLL = 6  
# Pts within 20% = 10  
# Pts in mix zone = 12



**HAF = 87 %**

Confidence Intervals  
95% CI = 86.1 , 87.9

Data pts

Best Fit

95% CI

95% CI pts

Date:  
SEP 19, 2012

Report #  
K-418465-1208F08

### Summary Table

Test Performed in accordance with : ASTM F2178-08



**Fabric Description:** Paulson Mfg Corp, Faceshield ARC-S2K1-PC-12, Style 2180306, Green, Polycarbonate, Thickness: .06 in, Mounting Bracket: Paulson, CB2-HD, Part Number 9004860, Hardhat: MSA, Style V-Gard, ArcWear# 1208F08

#### Summary of measured energy and observations

Test #	Panel	Test Current A	Cycles of 60Hz	Ei Cal/cm <sup>2</sup>	SCD Cal/cm <sup>2</sup>	HAF %	Burn Y/N	Break Open Y/N	Ablation Y/N	After Flame sec.	Omit Y/N	Comment
1	K-418465-6821	A	8027	16.2	12.6	0.00	86.3	Yes	-	-	-	No
2	K-418465-6821	B	8027	16.2	12.8	-0.3	88.7	No	-	-	-	No
3	K-418465-6822	A	8033	18.2	13.8	-0.13	88.9	No	-	-	-	No
4	K-418465-6822	B	8033	18.2	15.0	-0.2	89.6	No	-	-	-	No
5	K-418465-6823	A	8023	20.2	13.5	0.03	86.9	Yes	-	-	-	No
6	K-418465-6823	B	8023	20.2	16.3	-0.1	89.1	No	-	-	-	No
7	K-418465-6824	A	8047	24.2	13.8	0.20	85.0	Yes	-	-	-	No
8	K-418465-6824	B	8047	24.2	19.5	0.0	89.3	Yes	-	-	-	No
9	K-418465-6825	A	8187	12.2	7.8	-0.00	82.4	No	-	-	-	No
10	K-418465-6825	B	8187	12.2	9.4	-0.0	83.6	No	-	-	-	No
11	K-418465-6826	A	8308	8.2	5.3	-0.37	83.4	No	-	-	-	No
12	K-418465-6826	B	8308	8.2	6.2	-0.5	85.7	No	-	-	-	No
13	K-418465-6827	A	8051	28.2	18.0	0.28	87.7	Yes	-	-	-	No
14	K-418465-6827	B	8051	28.2	27.6	0.6	90.1	Yes	-	-	-	No
15	K-418465-6828	A	8090	17.2	9.9	-0.16	85.9	No	-	-	-	No
16	K-418465-6828	B	8090	17.2	13.6	-0.1	88.0	No	-	-	-	No
17	K-418465-6829	A	8063	19.2	11.6	-0.03	86.5	No	-	-	-	No
18	K-418465-6829	B	8063	19.2	18.8	-0.0	89.9	No	-	-	-	No
19	K-418465-6830	A	8009	30.2	21.1	0.05	90.4	Yes	-	-	-	No
20	K-418465-6830	B	8009	30.2	26.8	0.1	90.5	Yes	-	-	-	No
21	K-418465-6831	A	8059	21.2	14.5	-0.04	87.9	No	-	-	-	No
22	K-418465-6831	B	8059	21.2	16.8	-0.1	88.9	No	-	-	-	No
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