



aitex  
textile research institute



**ENAC**  
E N S A Y O S  
N° 12 / LE025  
N° 12 / LE427

Tests marked with \* are not included  
within the scope of the ENAC accreditation

POLISON CORPORATION  
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REPORT ISSUED BY THE RESEARCH ASSOCIATION OF THE TEXTILE  
INDUSTRY, AITEX

**N° 2020EP2550**

The test was carried out at Polígono Industrial Fuente del Jarro. C/ Ciudad de Gibraltar, 5; 46988 – Paterna (Valencia); which property is shared at 50% between research institutes AITEX and ITE.

**Rev.1** This revision cancels and replaces the previous  
*Description error*

## APPLICANT

POLISON CORPORATION

**Date of reception** 28/10/2020

**Date Test** Starting: 28/01/2021  
Ending: 29/01/2021

## IDENTIFICATION AND DESCRIPTION OF SAMPLES

REFERENCES
AR1-45

## TESTS CARRIED OUT

- ELECTRIC ARC EXPOSURE TEST: DETERMINATION OF THE ARC RATING FOR EYE OR FACE PROTECTIVE PRODUCTS.

## RESULTS/RESULTADOS

### ELECTRIC ARC EXPOSURE TEST: DETERMINATION OF THE ARC RATING FOR EYE OR FACE PROTECTIVE PRODUCTS

#### 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 sensors for each panel in each trial, plot of average responses from two monitor sensors.

Pictures after arc exposure.

Video.

#### Essential test data and test results are presented in the following pages as follows:

Arc rating: ATPV or  $E_{BT50}$  or both and plots of the burn injury probability (ATPV) or break open probability ( $E_{BT50}$ ) or both versus  $E_i$ .

Test specimen description and order of layer.

Distance from an arc centerline to the panel surface.

Subjective evaluation.

Pictures after arc exposure.

Ignition probability value (if determined during testing).

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**Standard**

ASTM F2178 – 20 – Procedure A

Test conditions	
Date test	28/01/2021
Arc current	(8 ± 1) kA
Stainless steel electrodes, gap of the electrodes	(300 ± 5) mm
Distance between the electrodes and sample	(300 ± 5) mm
Fuse wire	0.5 mm
Number of samples tested	20

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**Reference** AR1-45

**Lens / Window description**

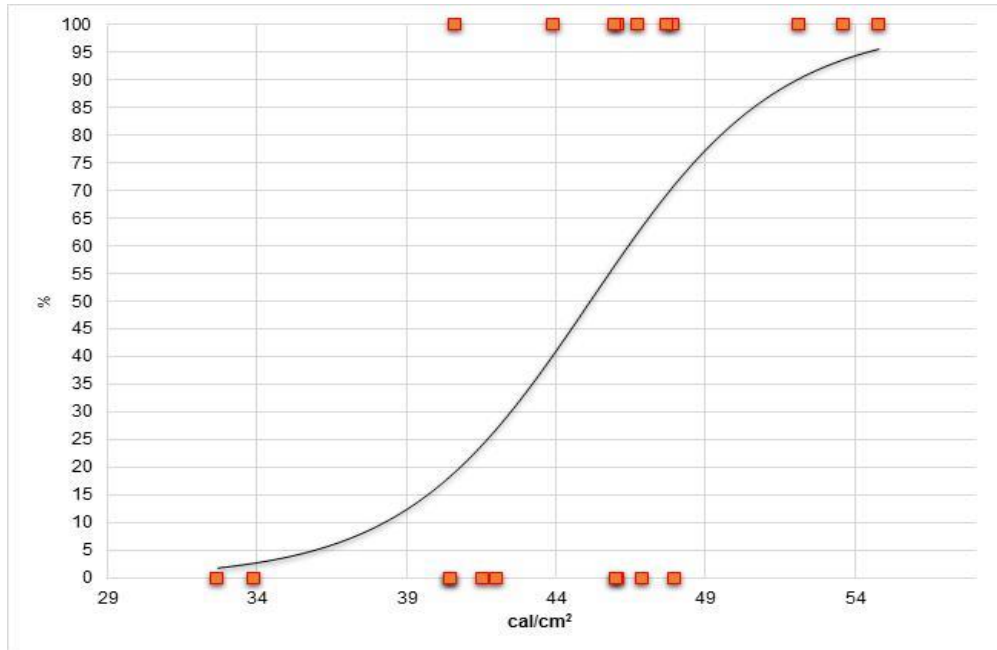
**Manufacturer** Polison Corporation.

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**Determination of ATPV, 50% of Probability of 2nd degree burn**

ATPV 45,1 cal/cm<sup>2</sup>



<b>Probability%</b>	5,0	10,0	20,0	30,0	40,0	50,0	60,0	70,0	80,0	95,0
<b>E<sub>i</sub> cal/cm<sup>2</sup></b>	35,8	38,2	40,7	42,4	43,8	45,1	46,4	47,8	49,5	54,4

ATPV points above	3
ATPV points 20%	17
ATPV points below	4
ATPV points mix zone	13

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**Summary of measured energy and subjective evaluation:**

Test	Time (ms)	Cycles 50Hz	Ei cal/cm <sup>2</sup>	SCD cal/cm <sup>2</sup>	HAF %	Burn	Break Open
1-A	1013,4	50,67	52,1	2,06	92,7	Y	N
1-C	1013,4	50,67	48,0	0	95,5	N	N
2-A	913,4	45,67	40,4	-0,63	97,0	N	N
2-C	913,4	45,67	41,6	-0,05	95,1	N	N
3-A	933	46,65	46,0	0,36	95,0	Y	N
3-C	933	46,65	46,0	-0,69	97,0	N	N
4-A	1163,4	58,17	54,8	1,89	92,9	Y	N
4-C	1163,4	58,17	53,6	1,04	93,0	Y	N
5-A	693,4	34,67	32,6	-0,76	97,5	N	N
5-C	693,4	34,67	33,9	-0,91	97,8	N	N
6-A	893,4	44,67	42,0	-0,03	95,3	N	N
6-C	893,4	44,67	40,4	-0,7	96,8	N	N
7-A	893,2	44,66	45,9	1,02	93,8	Y	N
7-C	893,2	44,66	46,9	-0,06	95,7	N	N
8-A	923,4	46,17	40,6	0,32	94,5	Y	N
8-C	923,4	46,17	43,9	0,09	95,0	Y	N
9-A	992	49,6	47,9	2,15	91,2	Y	N
9-C	992	49,6	46,7	0,16	95,1	Y	N
10-A	973	48,65	47,7	1,57	93,1	Y	N
10-C	973	48,65	46,0	-0,57	97,2	N	N

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**Summary of measured energy and subjective evaluation:**

Test	After flame	Ablation	Melting	Dripping	Charring	Embrittlement	Deformation
1-A	25	Y	N	N	Y	Y	N
1-C	9,5	Y	N	N	Y	Y	N
2-A	23	Y	N	N	Y	Y	N
2-C	6,5	Y	N	N	Y	Y	N
3-A	7,2	Y	N	N	Y	Y	N
3-C	6	Y	N	N	Y	Y	N
4-A	37	Y	N	N	Y	Y	N
4-C	11	Y	N	N	Y	Y	N
5-A	9,4	Y	N	N	Y	Y	N
5-C	4,2	Y	N	N	Y	Y	N
6-A	5	Y	N	N	Y	Y	N
6-C	10,1	Y	N	N	Y	Y	N
7-A	28	Y	N	N	Y	Y	N
7-C	9,1	Y	N	N	Y	Y	N
8-A	11,9	Y	N	N	Y	Y	N
8-C	8,8	Y	N	N	Y	Y	N
9-A	5,4	Y	N	N	Y	Y	N
9-C	7,4	Y	N	N	Y	Y	N
10-A	38	Y	N	N	Y	Y	N
10-C	5,3	Y	N	N	Y	Y	N

Y Yes N No

Average afterflame time within 20% of the arc rating (ATPV) = 45 cal/cm<sup>2</sup> is 13 seconds.

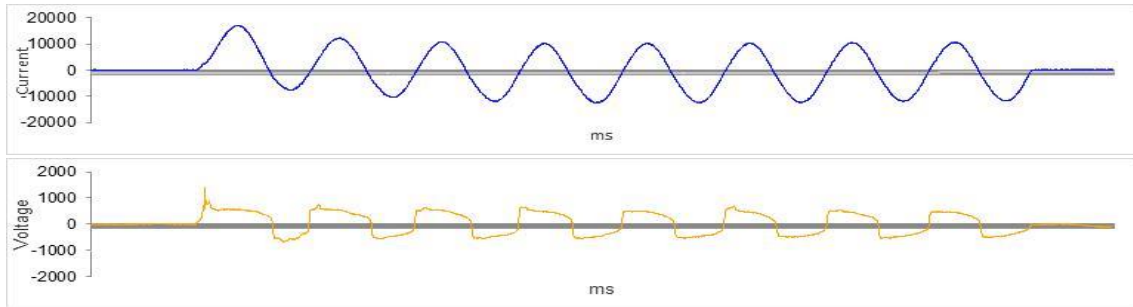
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**Electrical current and response sensor response:**

**Calibration shot**

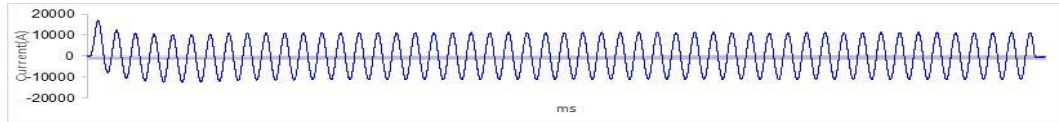
**INITIAL CALIBRATION**



<b>Ei Panel A</b>	6,8 cal/cm <sup>2</sup>	<b>Ei Panel B</b>	6,0 cal/cm <sup>2</sup>	<b>Ei Panel C</b>	cal/cm <sup>2</sup>
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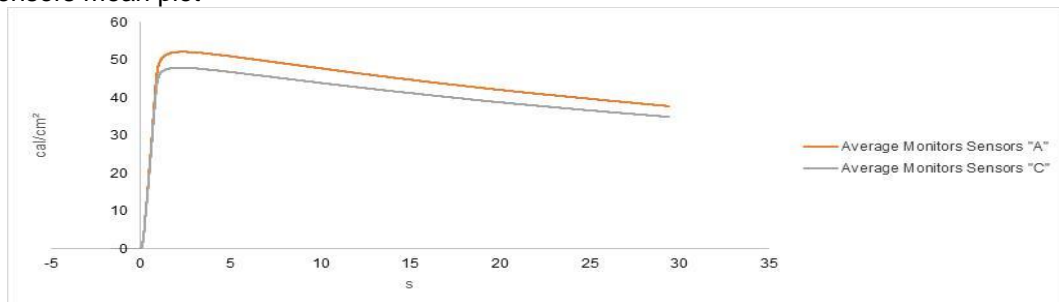
Shot 1  
Current plot



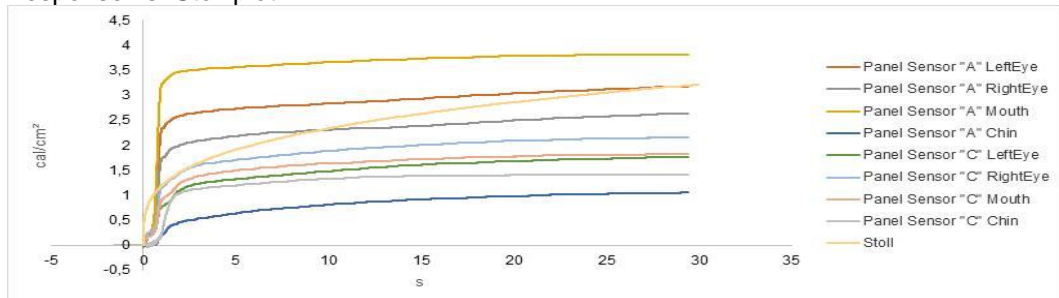
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

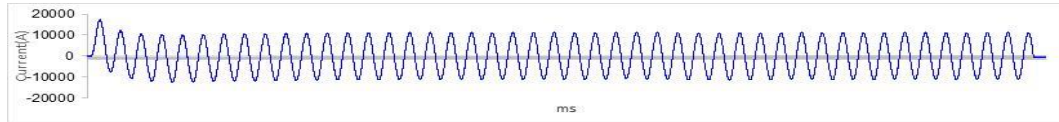


<b>Current Total RMS (kA)</b>	7,9	<b>Current Peak (kA)</b>	17,0	<b>Arc Voltage (V)</b>	1398,0
<b>Duration (cycles n°)</b>	50,7	<b>Duration (ms)</b>	1013,4	<b>Arc Energy (kJ)</b>	3096,5
<b>Arc Voltage (kJ)</b>	415,9				

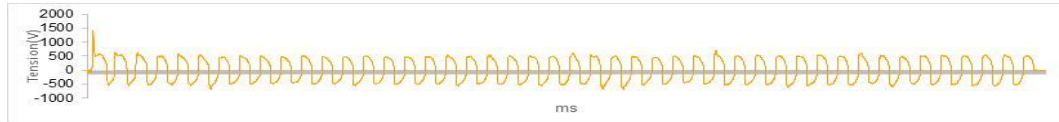
sensor response	PANEL A	PANEL C
<b>Ei</b>	52,13 cal/cm <sup>2</sup>	47,97 cal/cm <sup>2</sup>
<b>SCD</b>	2,06 cal/cm <sup>2</sup>	0,00 cal/cm <sup>2</sup>

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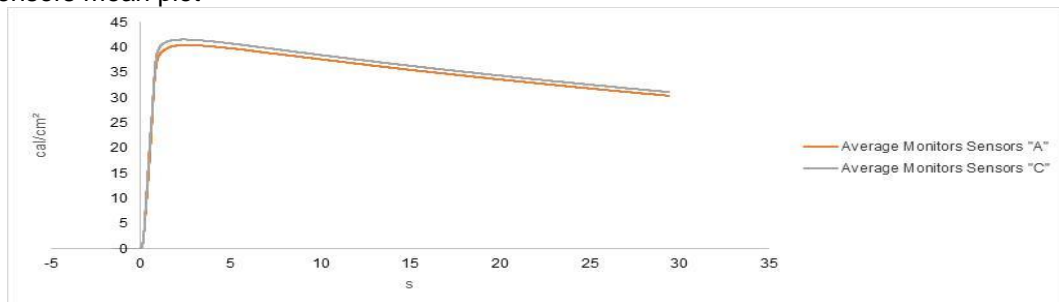
Shot 2  
Current plot



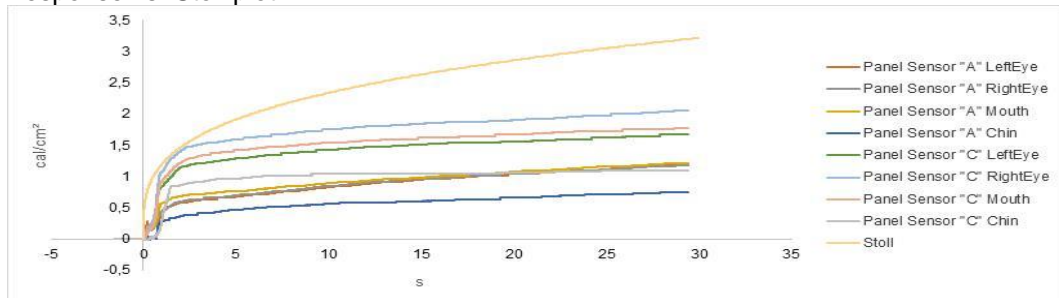
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

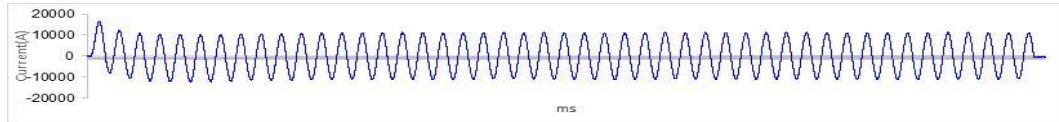


<b>Current Total RMS (kA)</b>	7,9	<b>Current Peak (kA)</b>	17,4	<b>Arc Voltage (V)</b>	1425,0
<b>Duration (cycles nº)</b>	45,7	<b>Duration (ms)</b>	913,5	<b>Arc Energy (kJ)</b>	2853,6
<b>Arc Voltage (kJ)</b>	424,9				

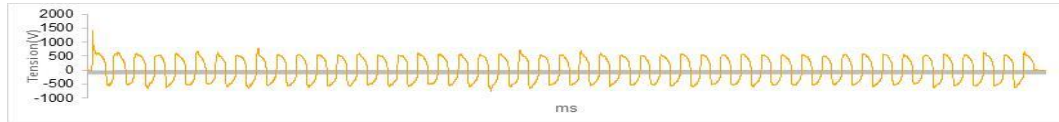
sensor response	PANEL A	PANEL C
<b>Ei</b>	40,45 cal/cm <sup>2</sup>	41,55 cal/cm <sup>2</sup>
<b>SCD</b>	-0,63 cal/cm <sup>2</sup>	-0,05 cal/cm <sup>2</sup>

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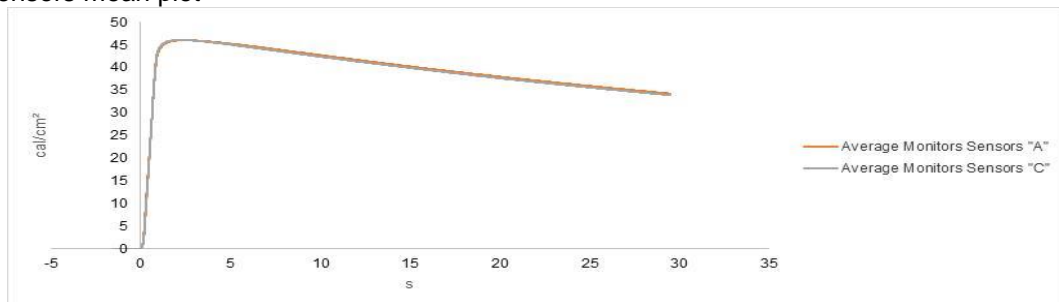
Shot 3  
Current plot



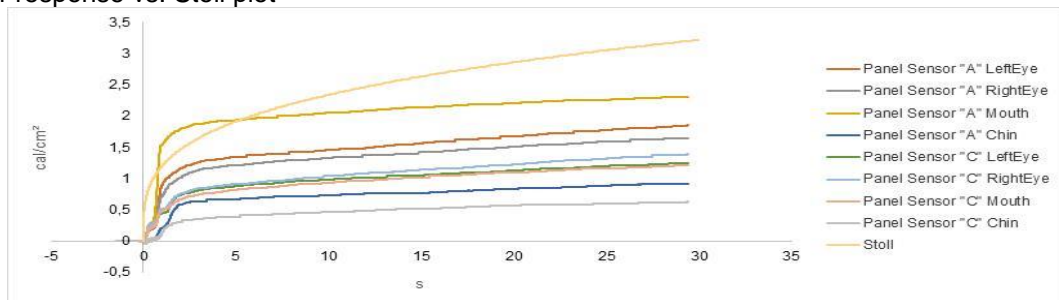
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

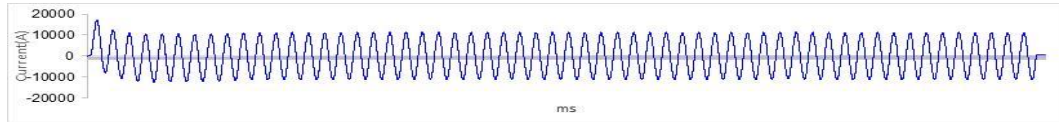


<b>Current Total RMS (kA)</b>	7,8	<b>Current Peak (kA)</b>	16,6	<b>Arc Voltage (V)</b>	1434,0
<b>Duration (cycles nº)</b>	46,6	<b>Duration (ms)</b>	933,0	<b>Arc Energy (kJ)</b>	3069,0
<b>Arc Voltage (kJ)</b>	453,0				

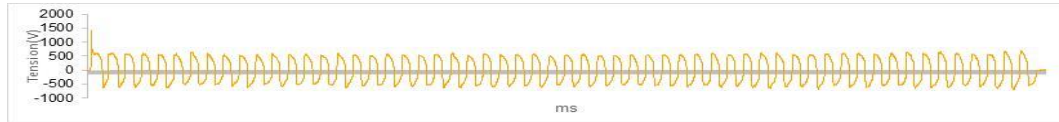
sensor response	PANEL A	PANEL C
<b>Ei</b>	46,03 cal/cm <sup>2</sup>	46,05 cal/cm <sup>2</sup>
<b>SCD</b>	0,36 cal/cm <sup>2</sup>	-0,69 cal/cm <sup>2</sup>

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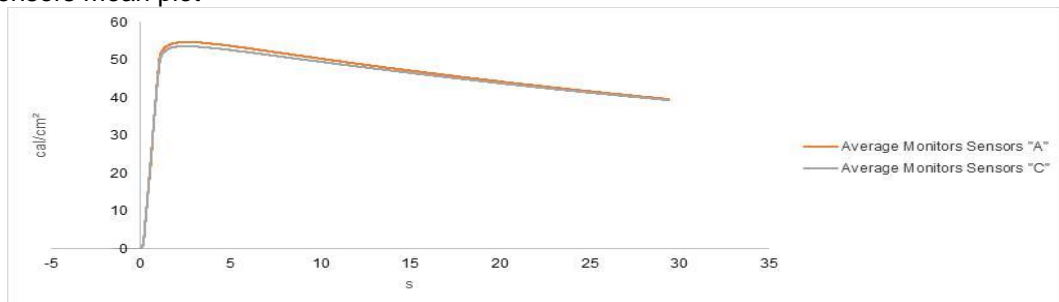
Shot 4  
Current plot



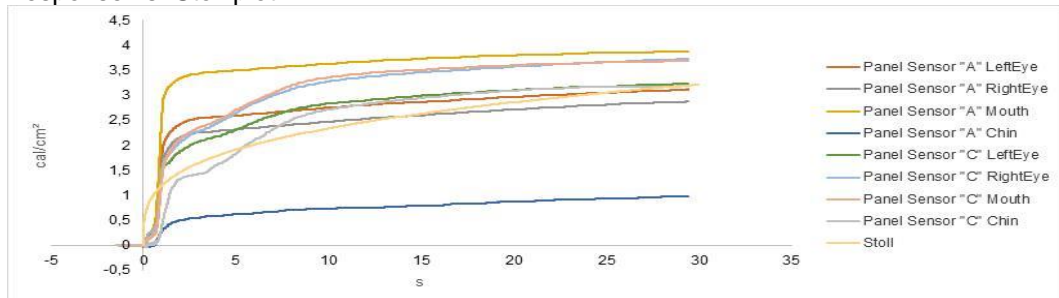
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

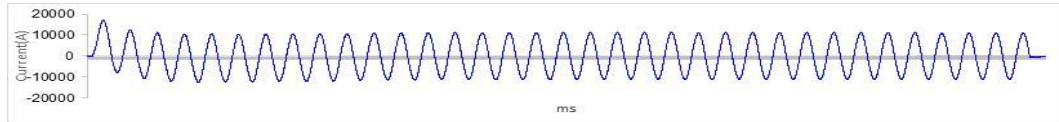


<b>Current Total RMS (kA)</b>	7,9	<b>Current Peak (kA)</b>	17,1	<b>Arc Voltage (V)</b>	1416,0
<b>Duration (cycles n°)</b>	58,2	<b>Duration (ms)</b>	1163,5	<b>Arc Energy (kJ)</b>	3926,0
<b>Arc Voltage (kJ)</b>	461,6				

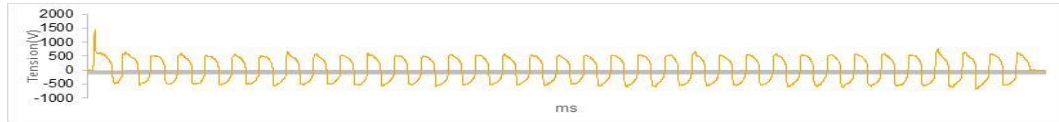
sensor response	PANEL A	PANEL C
<b>Ei</b>	54,76 cal/cm <sup>2</sup>	53,61 cal/cm <sup>2</sup>
<b>SCD</b>	1,89 cal/cm <sup>2</sup>	1,04 cal/cm <sup>2</sup>

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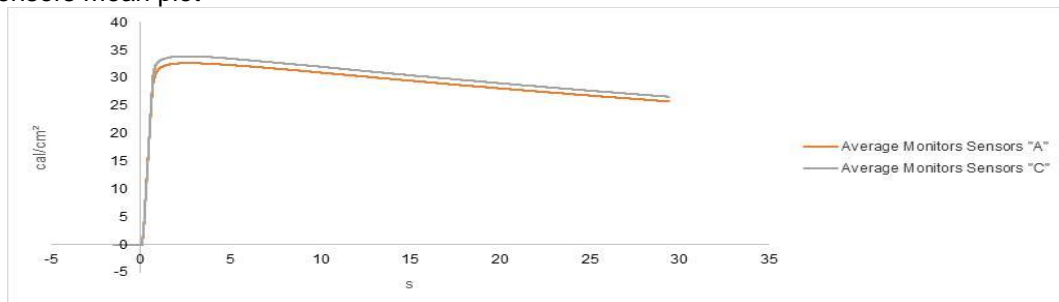
Shot 5  
Current plot



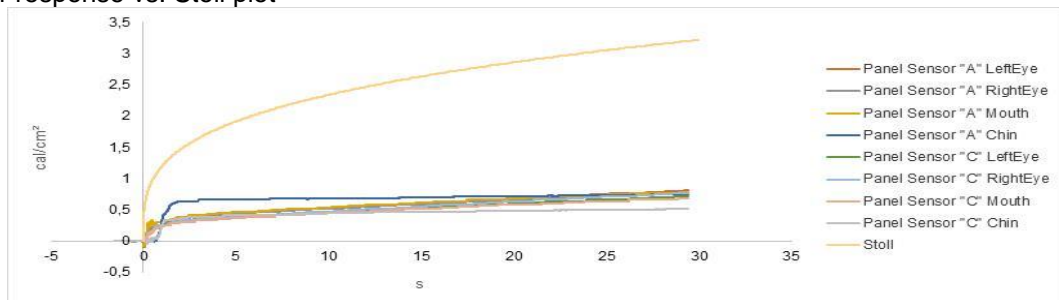
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

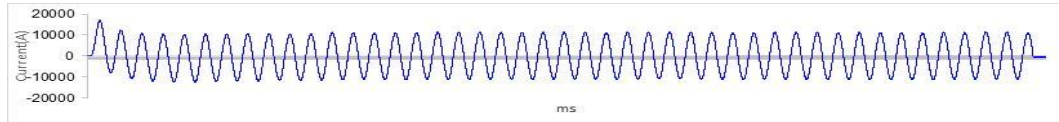


<b>Current Total RMS (kA)</b>	7,9	<b>Current Peak (kA)</b>	17,1	<b>Arc Voltage (V)</b>	1476,0
<b>Duration (cycles nº)</b>	34,7	<b>Duration (ms)</b>	693,4	<b>Arc Energy (kJ)</b>	2264,9
<b>Arc Voltage (kJ)</b>	445,7				

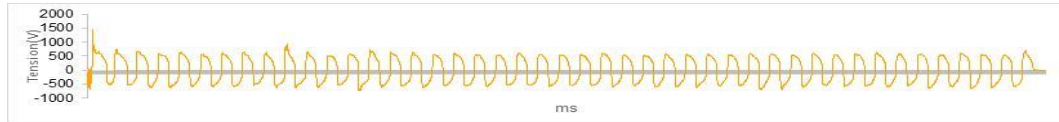
sensor response	PANEL A	PANEL C
<b>Ei</b>	32,65 cal/cm <sup>2</sup>	33,88 cal/cm <sup>2</sup>
<b>SCD</b>	-0,76 cal/cm <sup>2</sup>	-0,91 cal/cm <sup>2</sup>

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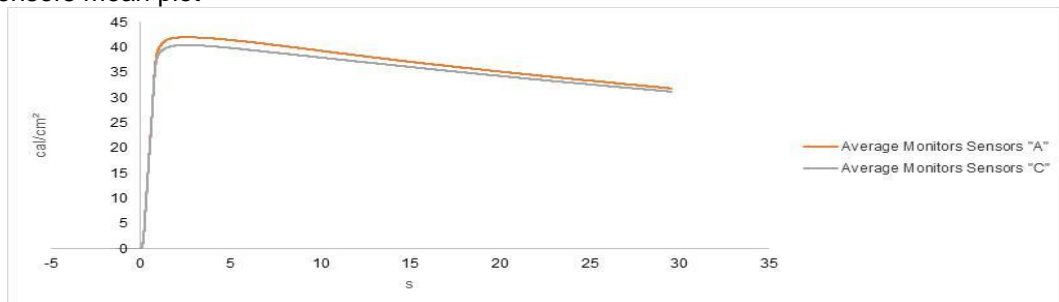
Shot 6  
Current plot



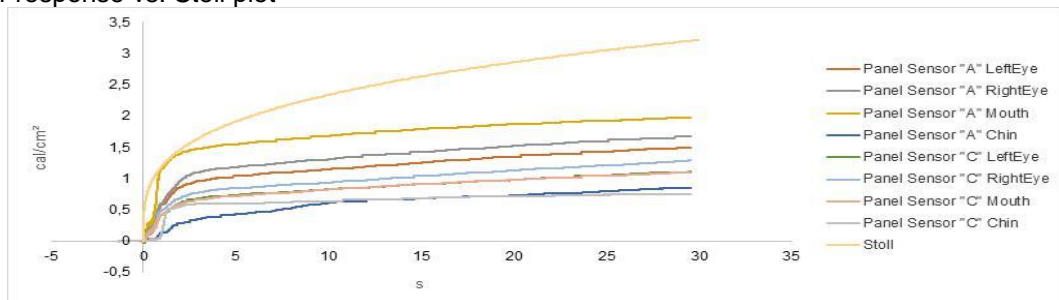
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

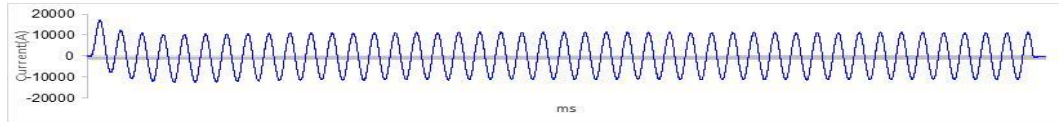


<b>Current Total RMS (kA)</b>	7,9	<b>Current Peak (kA)</b>	17,0	<b>Arc Voltage (V)</b>	1446,0
<b>Duration (cycles nº)</b>	44,7	<b>Duration (ms)</b>	893,5	<b>Arc Energy (kJ)</b>	3058,4
<b>Arc Voltage (kJ)</b>	469,1				

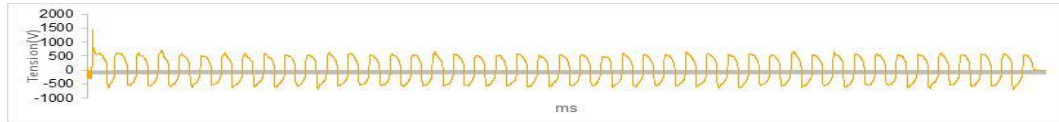
sensor response	PANEL A	PANEL C
<b>Ei</b>	42,00 cal/cm <sup>2</sup>	40,45 cal/cm <sup>2</sup>
<b>SCD</b>	-0,03 cal/cm <sup>2</sup>	-0,70 cal/cm <sup>2</sup>

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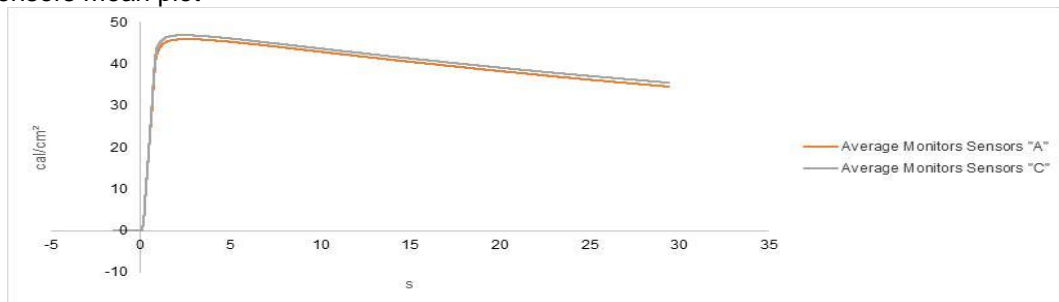
Shot 7  
Current plot



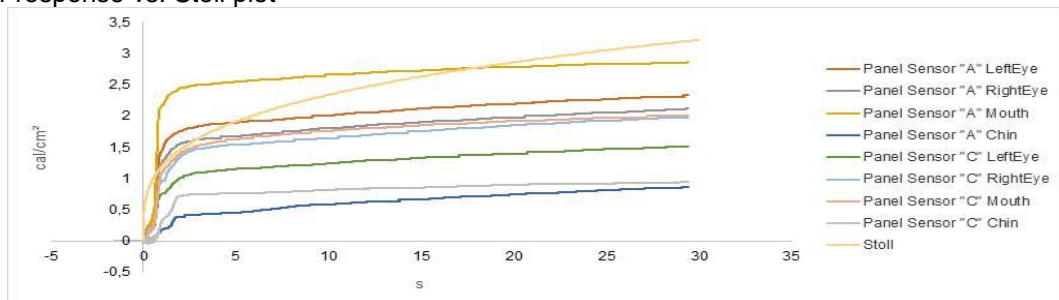
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



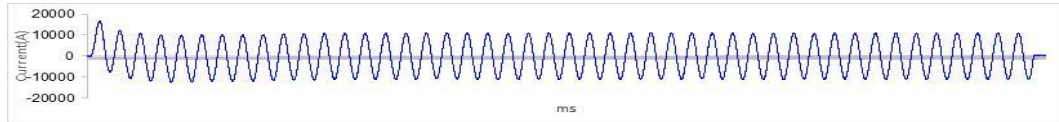
<b>Current Total RMS (kA)</b>	7,9	<b>Current Peak (kA)</b>	17,2	<b>Arc Voltage (V)</b>	1449,0
<b>Duration (cycles nº)</b>	44,7	<b>Duration (ms)</b>	893,2	<b>Arc Energy (kJ)</b>	3028,3
<b>Arc Voltage (kJ)</b>	460,4				

sensor response	PANEL A	PANEL C
<b>Ei</b>	45,93 cal/cm <sup>2</sup>	46,88 cal/cm <sup>2</sup>
<b>SCD</b>	1,02 cal/cm <sup>2</sup>	-0,06 cal/cm <sup>2</sup>

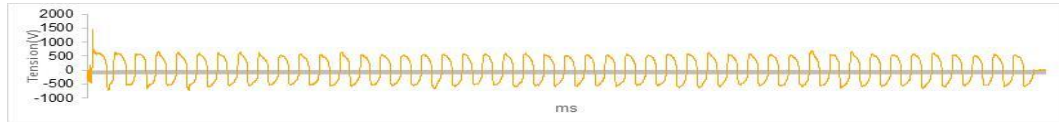
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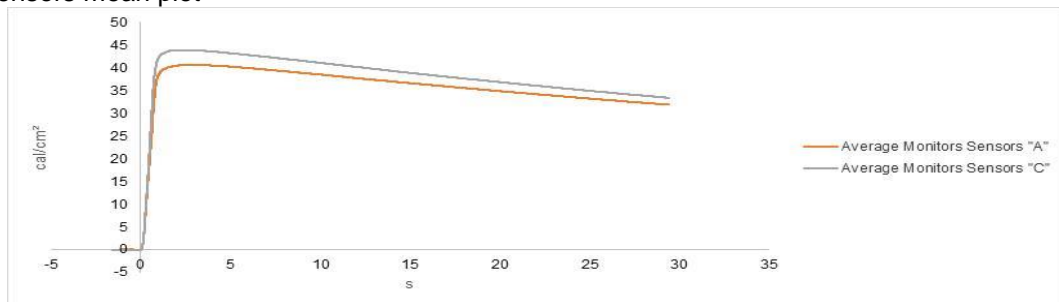
Shot 8  
Current plot



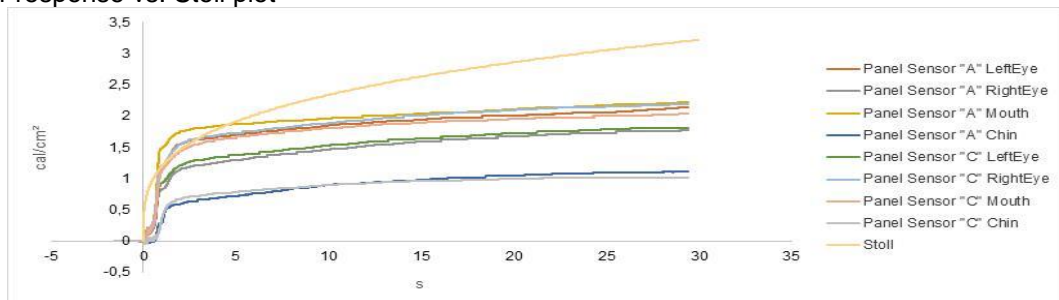
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

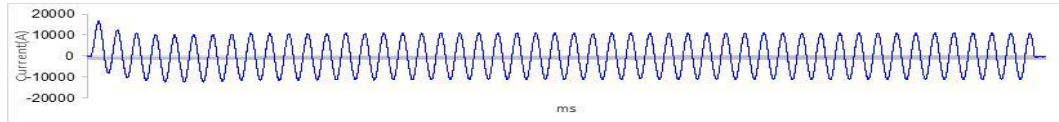


<b>Current Total RMS (kA)</b>	7,8	<b>Current Peak (kA)</b>	16,8	<b>Arc Voltage (V)</b>	1461,0
<b>Duration (cycles nº)</b>	46,2	<b>Duration (ms)</b>	923,4	<b>Arc Energy (kJ)</b>	3097,5
<b>Arc Voltage (kJ)</b>	462,4				

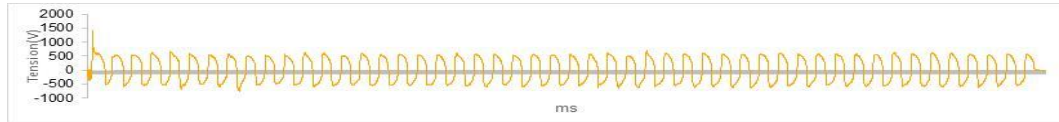
sensor response	PANEL A	PANEL C
<b>Ei</b>	40,62 cal/cm <sup>2</sup>	43,89 cal/cm <sup>2</sup>
<b>SCD</b>	0,32 cal/cm <sup>2</sup>	0,09 cal/cm <sup>2</sup>

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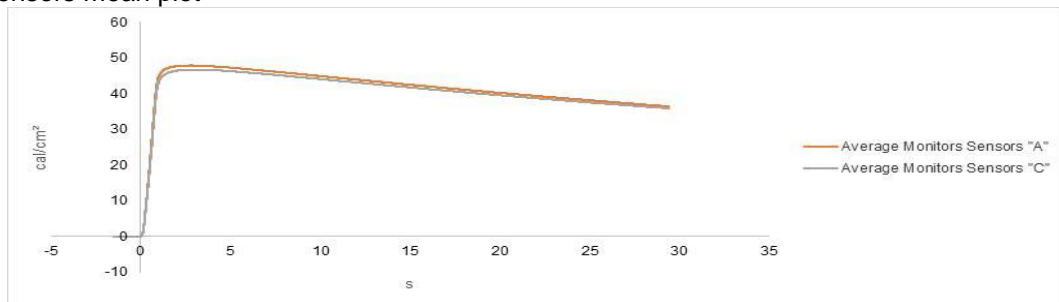
Shot 9  
Current plot



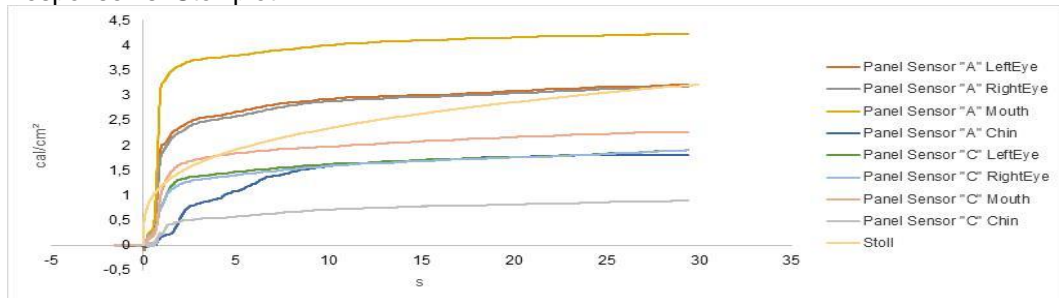
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

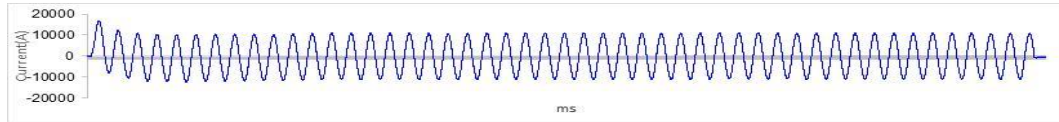


<b>Current Total RMS (kA)</b>	7,8	<b>Current Peak (kA)</b>	16,6	<b>Arc Voltage (V)</b>	1422,0
<b>Duration (cycles nº)</b>	49,6	<b>Duration (ms)</b>	992,0	<b>Arc Energy (kJ)</b>	3294,3
<b>Arc Voltage (kJ)</b>	458,3				

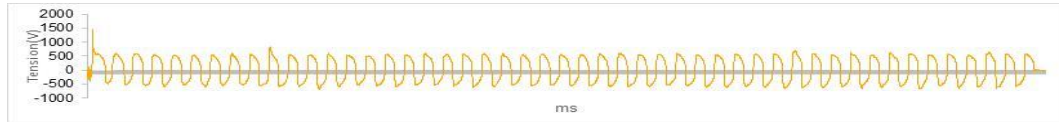
sensor response	PANEL A	PANEL C
<b>Ei</b>	47,90 cal/cm <sup>2</sup>	46,72 cal/cm <sup>2</sup>
<b>SCD</b>	2,15 cal/cm <sup>2</sup>	0,16 cal/cm <sup>2</sup>

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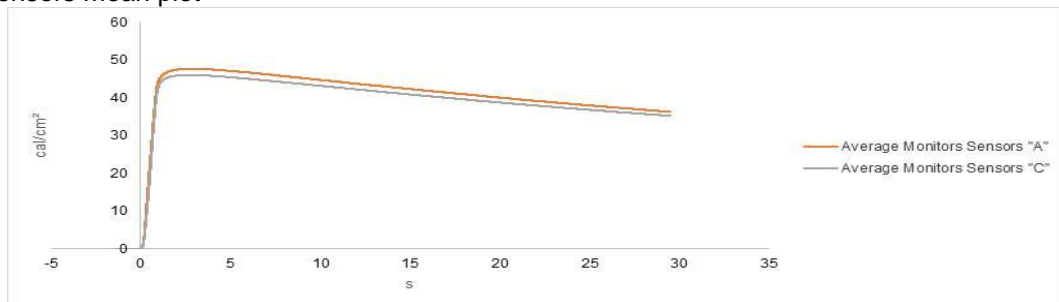
Shot 10  
Current plot



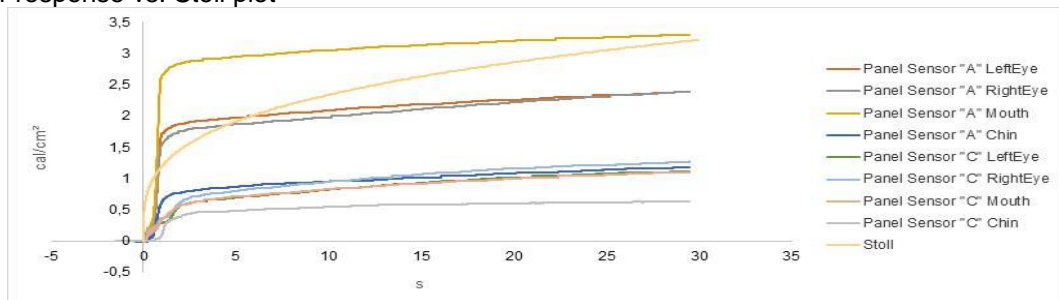
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot

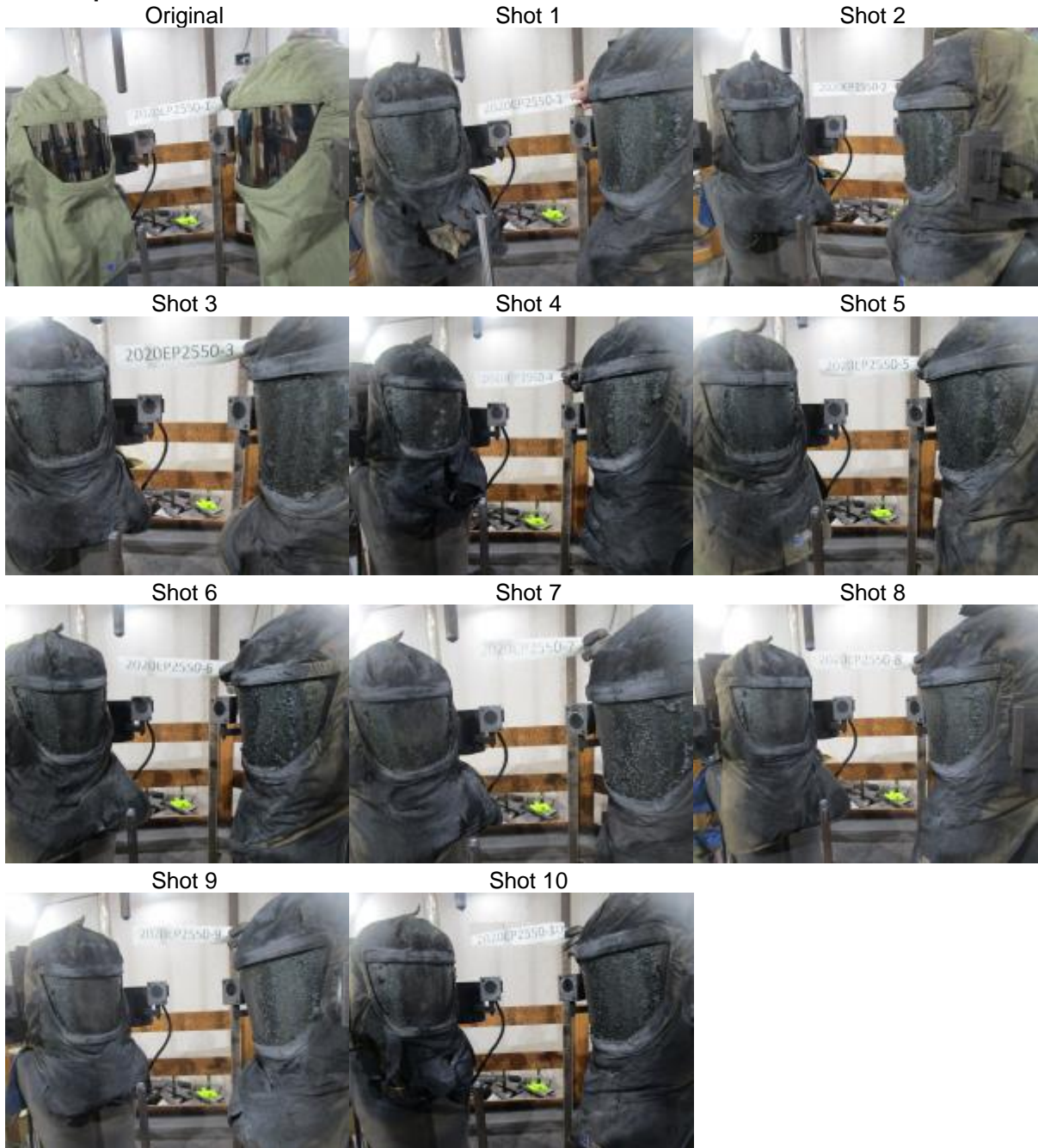


<b>Current Total RMS (kA)</b>	7,8	<b>Current Peak (kA)</b>	16,9	<b>Arc Voltage (V)</b>	1452,0
<b>Duration (cycles nº)</b>	48,6	<b>Duration (ms)</b>	973,0	<b>Arc Energy (kJ)</b>	3259,3
<b>Arc Voltage (kJ)</b>	462,4				

sensor response	PANEL A	PANEL C
<b>Ei</b>	47,68 cal/cm <sup>2</sup>	46,02 cal/cm <sup>2</sup>
<b>SCD</b>	1,57 cal/cm <sup>2</sup>	-0,57 cal/cm <sup>2</sup>

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**Tested material pictures:**



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**Summary of results:**

The arc rating of the textile component has been previously tested according to the standard ASTM F1959-14e1 on the test report n° K-352124-05-A-R00 with an arc rating ATPV of 46 cal/cm<sup>2</sup>.

The arc rating of the assembled system has been tested according to the standard ASTM F2178-20 - Procedure A with an arc rating ATPV of 45 cal/cm<sup>2</sup>.

Based on ASTM F2178 - 2020, final arc rating eye or face protective products with fabric component is limited to arc rating of textile component if it is lower than arc rating of assembled system.

ACCORDING TO THE STANDARD ASTM F2178 - 20 - PROCEDURE A

**ARC RATING OF THE EYE OR FACE  
PROTECTIVE PRODUCTS (ATPV)                      45 cal/cm<sup>2</sup>**

Arc Flash PPE category according to standard NFPA70E Edition 2018 Table 130.7 (C) (16) - Personal Protective Equipment (PPE)

<b>PPE Category</b>	<b>Minimum Arc Rating (cal/cm<sup>2</sup>)</b>
1	4
2	8
3	25
4	40

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**Lucia Martinez**  
**Head of PPE and Ballistics department**



Digitally signed by MIGUEL ANGEL  
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