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REPORT ISSUED BY THE RESEARCH ASSOCIATION OF THE TEXTILE
INDUSTRY, AITEX
Nº 2019CN0512

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

1/31

The test was carried out at High Current Laboratory located 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.

Applicant

Shanghai XM Group LTD

Date of reception

23/07/2019

Data tested

Starting: 26/07/2019

Ending: 30/08/2019

Identification of samples

- "FABRIC Poseidon-245"

According to information supplied by the customer:

Fabric reference: POSEIDON-245

Composition & percentage: 80% Cotton, 19% Polyester, 1% Antistatic

Weight: 245 g

Color: Dark Navy

Others: FR-Twill 2/2

Test Carried out

- PRE-TREATMENT FOR DOMESTIC WASHING AND DRYING PROCEDURES FOR TEXTILE TESTING
- MASS PER UNIT AREA
- DETERMINATION OF THE ARC RATING (ELIM, ATPV AND/OR EBT) OF CLOTHING MATERIALS AND OF PROTECTIVE CLOTHING USING AN OPEN ARC

RESULTS

PRE-TREATMENT FOR DOMESTIC WASHING AND DRYING PROCEDURES FOR TEXTILE TESTING

Standard

ISO 6330:2012

Standard deviation

Reference

Sample1 FABRIC Poseidon-245

Units

1

2

Equipment

Wascator 13471E05 Wascator 13370E12

Dryer machine

JAMES HEAL

ELECTROLUX

13473E05

13428E12

Washing procedure 6N **Washing cycles** 5

Drying procedure

F (tumble dryer)

Washing powder

ECE detergent 98 + sodium perborate + TAED

Units	Dry mass of the samples	Counterweight mass	Equipment
1	1.34 Kg	0,70 Kg of Polyester	Wascator 13471E05
2	1.34 Kg	0,70 Kg of Polyester	Wascator 13370E12

Start and finish date

26/07/2019 - 29/07/2019

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RESULTS

MASS PER UNIT AREA

Standard

UNE-EN 12127:1998; pto. 8.3

Conditioning date

29/07/2019

Test date

31/07/2019

Atmosphere for conditioning and testing

Temperature

(20±2) °C

Relative Humidity

(65±4) %

Pre-treatment

5 cycles of washing at 60°C and drying process F, according to the standard EN ISO 6330:2012

Reference	Mass per unit area (g/m ²)	CV (%)
FABRIC POSEIDON-245	262	1,02

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RESULTS

DETERMINATION OF THE ARC RATING (ELIM, ATPV AND/OR EBT) OF CLOTHING MATERIALS AND OF PROTECTIVE CLOTHING USING AN OPEN ARC

Standard

IEC 61482-1-1: 2019 Material test (Procedure A)

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 ELIM 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 center line to the panel surface.

Subjective evaluation.

Pictures after arc exposure.

Ignition probability value (if determined during testing).

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RESULTS

Test conditions	
Date test	29/08/2019
Arc current	(8 ± 0,5) kA
Stainless steel electrodes, gap of the electrodes	(300 ± 5) mm
Distance between the electrodes and sample	(300 ± 5) mm
Distance between the electrodes and monitor sensors	(340 ± 5) mm
Fuse wire	0.5 mm
Number of samples tested	21
Starting and ending pre-treatment date	26/07/2019 - 29/07/2019
Starting and ending conditioning date	26/08/2019 - 29/08/2019
Conditioning	24 h; 21 ± 1°C, 65 ± 2 % Hr.

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RESULTS

Reference FABRIC Poseidon-245

Sample description according to the information supplied by the customer

Dark Navy Woven fabric style Poseidon-245, s 80% Cotton, 19% Polyester, 1% Antistatic, 245 g/m², manufacturer XM Textiles.

Pre-treatment

5 washing cycles at 60°C, according to standard UNE-EN ISO 6330:2012, method 6N and type F drying

Washed sample weight before test

262 g/m²

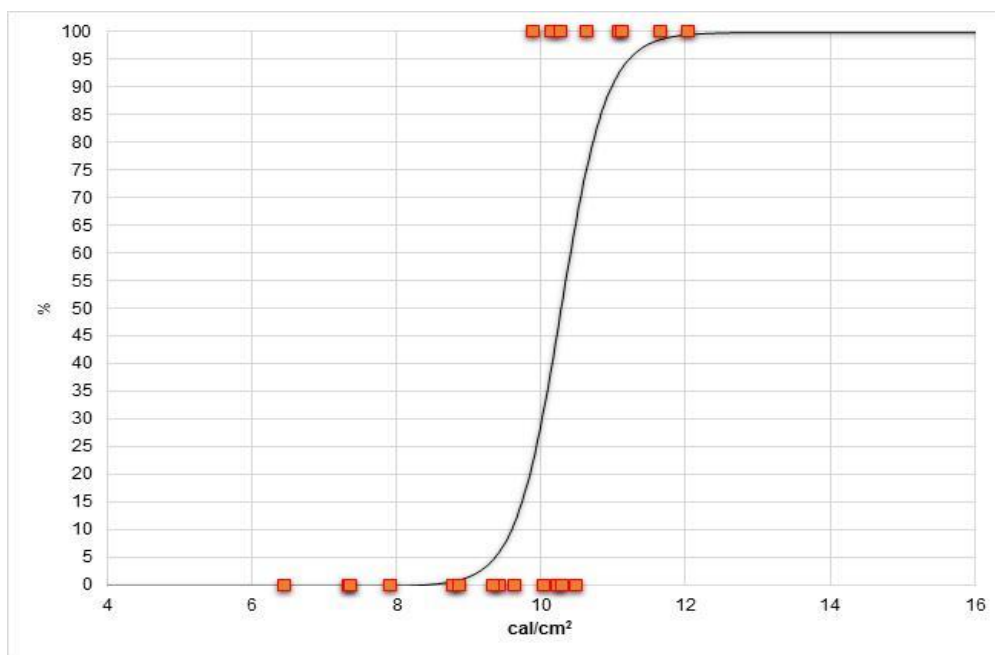
Deviation from the standard

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RESULTS

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

ATPV	10,26 cal/cm ²
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Probability %	5	10	20	30	40	50	60	70	80	95
E _i cal/cm ²	9,3	9,6	9,8	10,0	10,1	10,3	10,4	10,5	10,7	11,2

ATPV points above	5
ATPV points 20%	17
ATPV points below	9
ATPV points mix zone	7

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RESULTS

Summary of measured energy and subjective evaluation:

Test	Time (ms)	Cycles 50Hz	Ei cal/cm ²	SCD cal/cm ²	Burn	Break Open
1-A	213,2	10,66	12,0	1,36	Y	N
1-B	213,2	10,66	11,6	1,08	Y	N
1-C	213,2	10,66	11,1	1,64	Y	N
2-A	133	6,65	7,9	-0,62	N	N
2-B	133	6,65	7,3	-0,33	N	N
2-C	133	6,65	6,4	-0,39	N	N
3-A	173,4	8,67	9,9	0,08	Y	N
3-B	173,4	8,67	9,6	-0,3	N	N
3-C	173,4	8,67	10,0	-0,11	N	N
4-A	183,6	9,18	10,1	1,03	Y	N
4-B	183,6	9,18	10,5	-0,05	N	N
4-C	183,6	9,18	11,1	1,5	Y	N
5-A	183,6	9,18	8,8	-0,32	N	N
5-B	183,6	9,18	8,9	-0,27	N	N
5-C	183,6	9,18	10,2	-0,28	N	N
6-A	193	9,65	9,4	-0,36	N	N
6-B	193	9,65	10,3	0,22	Y	N
6-C	193	9,65	10,6	0,81	Y	N
7-A	171,8	8,59	10,3	-0,17	N	N
7-B	171,8	8,59	9,3	-0,46	N	N
7-C	171,8	8,59	7,4	-0,47	N	N

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RESULTS

Summary of measured energy and subjective evaluation:

Test	After flame (s)	Ablation	Melting	Dripping	Charring	Embrittlement
1-A	0	N	N	N	Y	Y
1-B	0	N	N	N	Y	Y
1-C	0	N	N	N	Y	Y
2-A	0	N	N	N	Y	Y
2-B	0	N	N	N	Y	Y
2-C	0	N	N	N	Y	Y
3-A	0	N	N	N	Y	Y
3-B	0	N	N	N	Y	Y
3-C	0	N	N	N	Y	Y
4-A	0	N	N	N	Y	Y
4-B	0	N	N	N	Y	Y
4-C	0	N	N	N	Y	Y
5-A	0	N	N	N	Y	Y
5-B	0	N	N	N	Y	Y
5-C	0	N	N	N	Y	Y
6-A	0	N	N	N	Y	Y
6-B	0	N	N	N	Y	Y
6-C	0	N	N	N	Y	Y
7-A	0	N	N	N	Y	Y
7-B	0	N	N	N	Y	Y
7-C	0	N	N	N	Y	Y

Y Yes N No

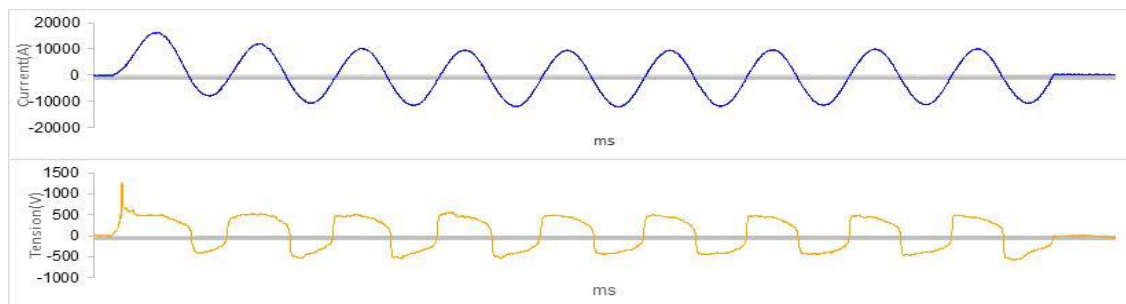
>>>

RESULTS

Electrical current and response sensor response:

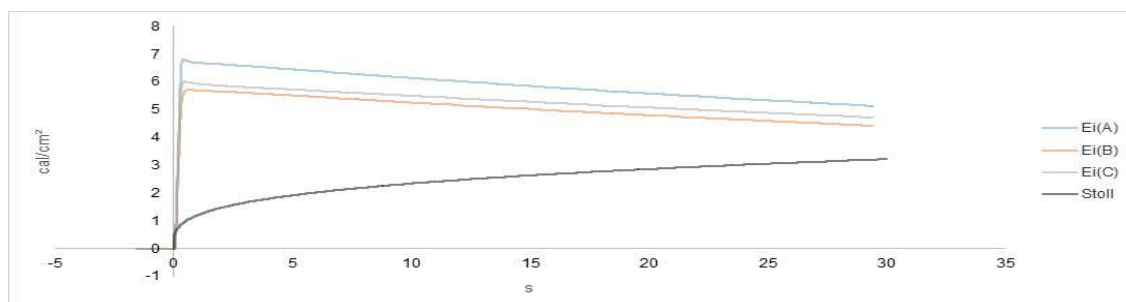
Calibration shot

INITIAL CALIBRATION

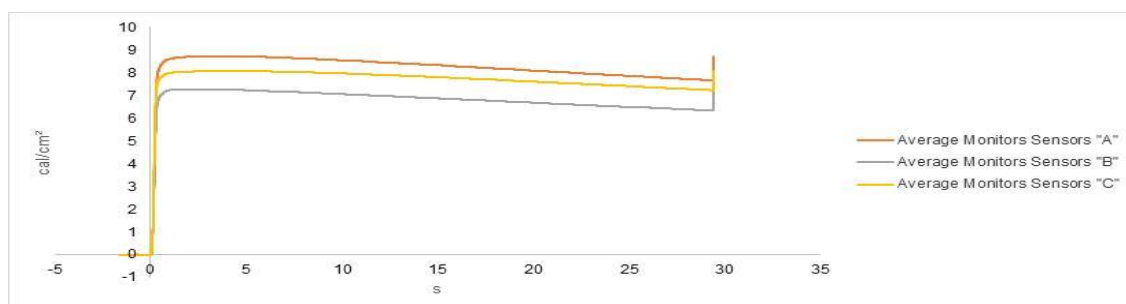


Ei Panel A	8,7 cal/cm²	Ei Panel B	7,3 cal/cm²	Ei Panel C	8,1 cal/cm²
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Average panel sensors response Vs. Stoll plot



Average monitor sensors plot

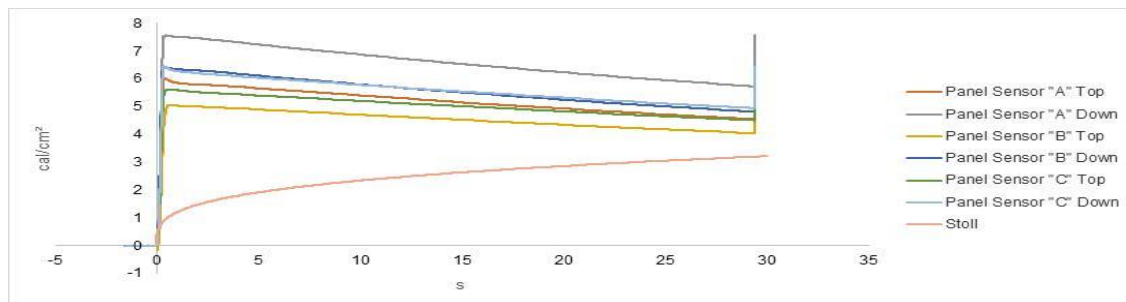


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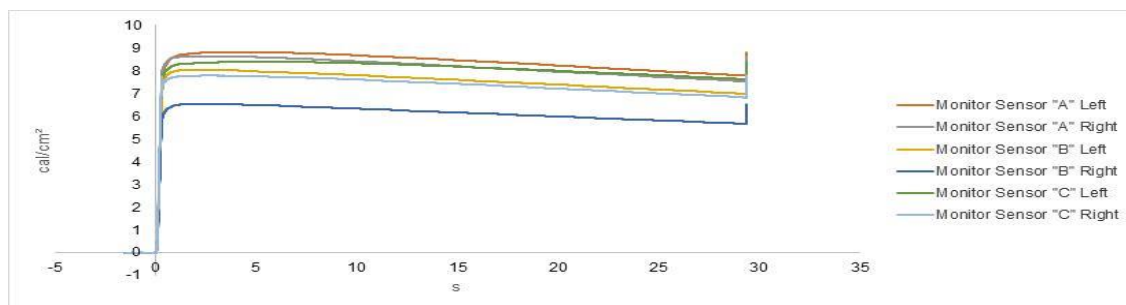
RESULTS

Electrical current and response sensor response:

Panel sensors Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	7,8	Current Peak (kA)	16,3	Arc Voltage (V)	1263,0
Duration (cycles n°)	9,2	Duration (ms)	183,2	Arc Energy (kJ)	525,4
Arc Voltage (kJ)	405,2				

Average incident energy at same level: 7,6

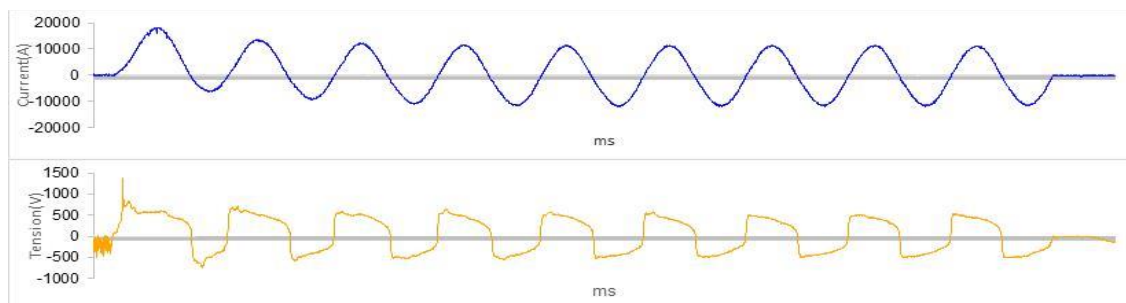
Highest incident energy: 8,8

Lowest incident energy: 6,4

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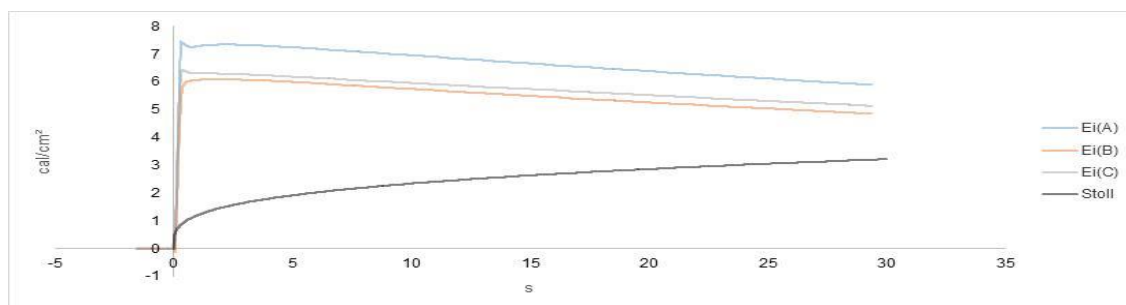
RESULTS

FINAL CALIBRATION

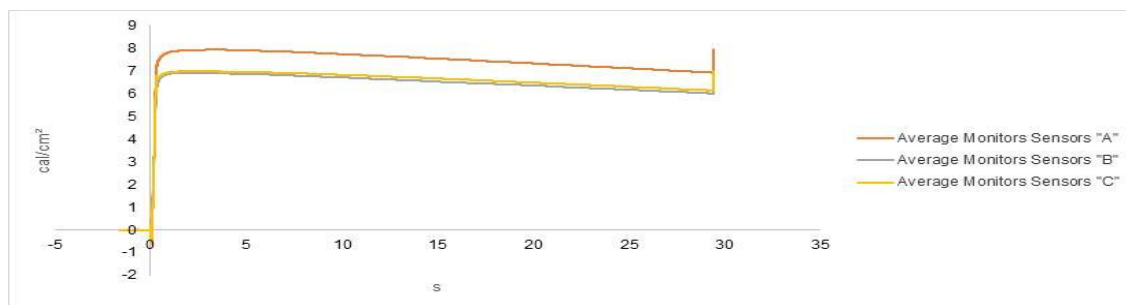


Ei Panel A	7,9 cal/cm²	Ei Panel B	6,9 cal/cm²	Ei Panel C	7,0 cal/cm²
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Average panel sensors response Vs. Stoll plot



Average monitor sensors plot

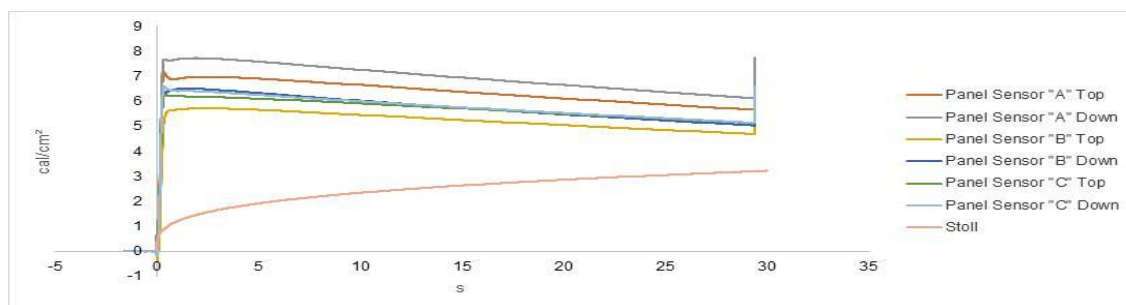


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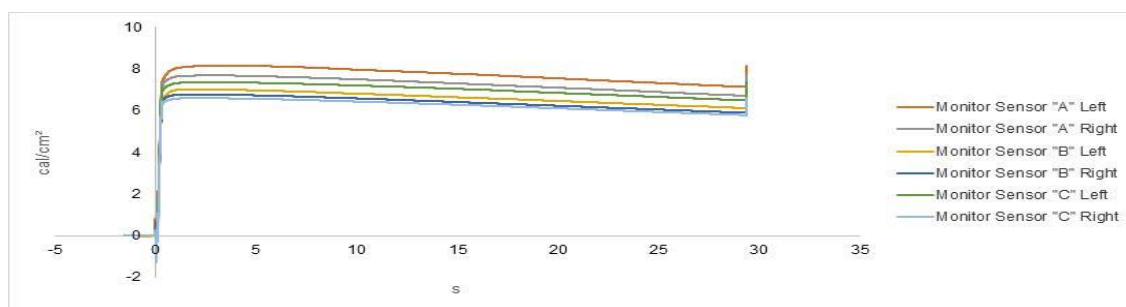
RESULTS

Electrical current and response sensor response:

Panel sensors Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	8,2	Current Peak (kA)	18,2	Arc Voltage (V)	1365,0
Duration (cycles n°)	9,2	Duration (ms)	183,9	Arc Energy (kJ)	591,4
Arc Voltage (kJ)	436,2				

Average incident energy at same level: 7,2

Highest incident energy: 8,1

Lowest incident energy: 6,5

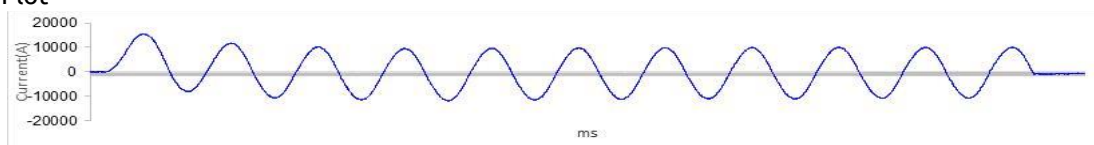
>>>

RESULTS

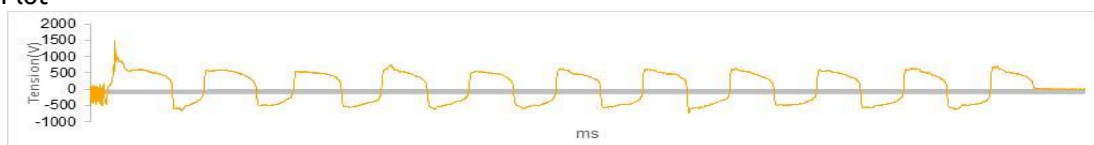
Electrical current and response sensor response:

Shot 1

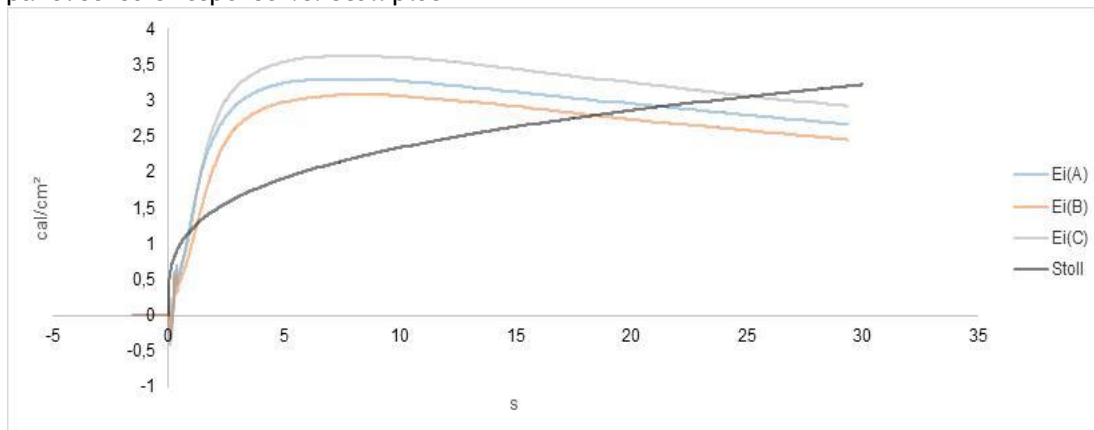
Current Plot



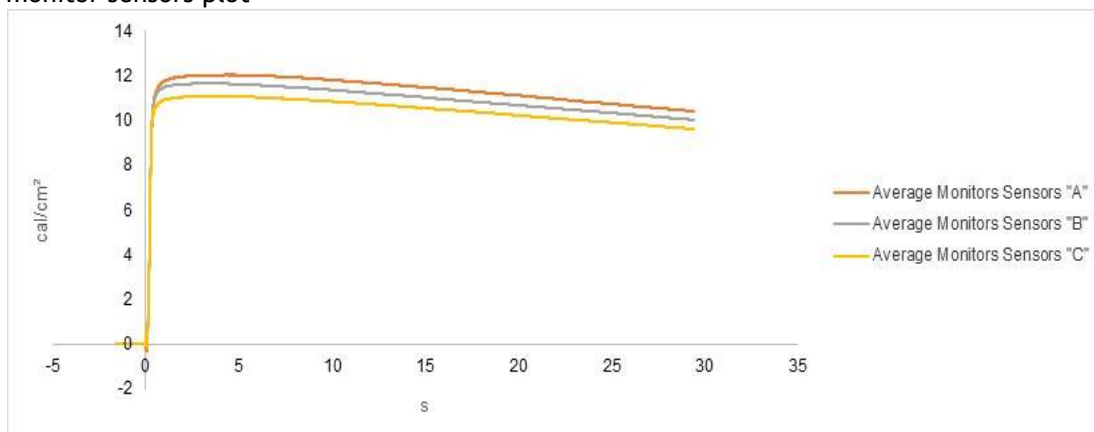
Voltage Plot



Average panel sensors response Vs. Stoll plot



Average monitor sensors plot



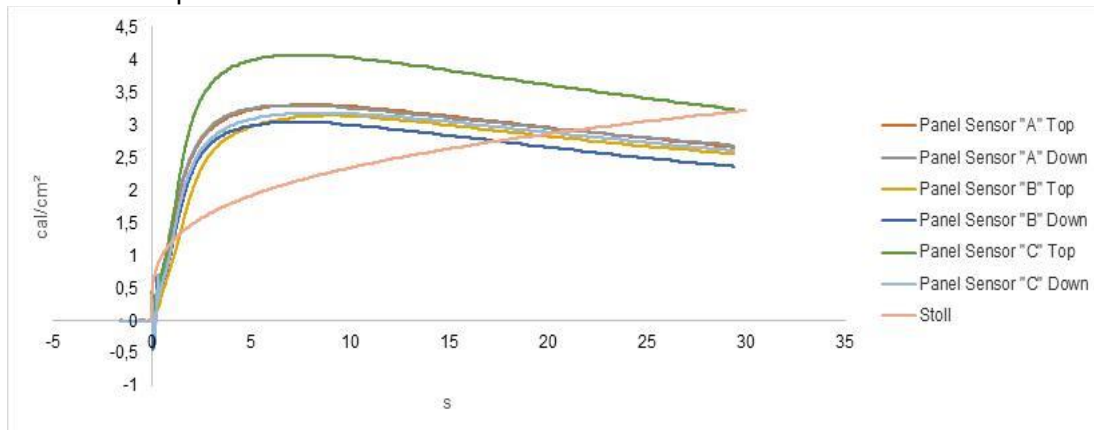
>>>

RESULTS

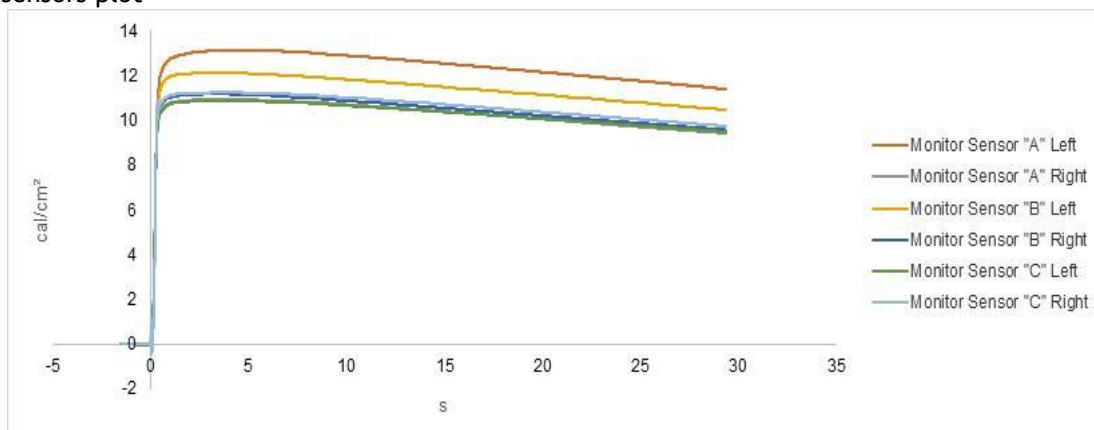
Electrical current and response sensor response:

Shot 1

Panel sensors Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	7,6	Current Peak (kA)	15,6	Arc Voltage (V)	1488,0
Duration (cycles n°)	10,7	Duration (ms)	213,2	Arc Energy (kJ)	702,1
Arc Voltage (kJ)	479,8				

sensor response	PANEL A	PANEL B	PANEL C
Ei	12,03 cal/cm ²	11,64 cal/cm ²	11,07 cal/cm ²
SCD	1,36 cal/cm ²	1,08 cal/cm ²	1,64 cal/cm ²

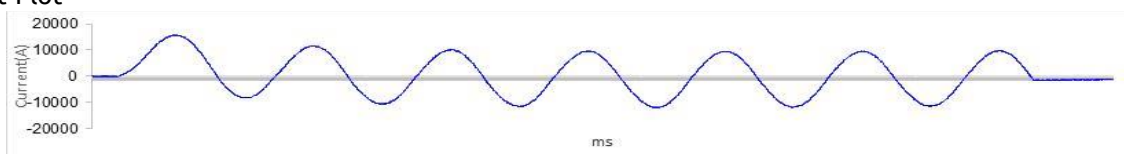
>>>

RESULTS

Electrical current and response sensor response:

Shot 2

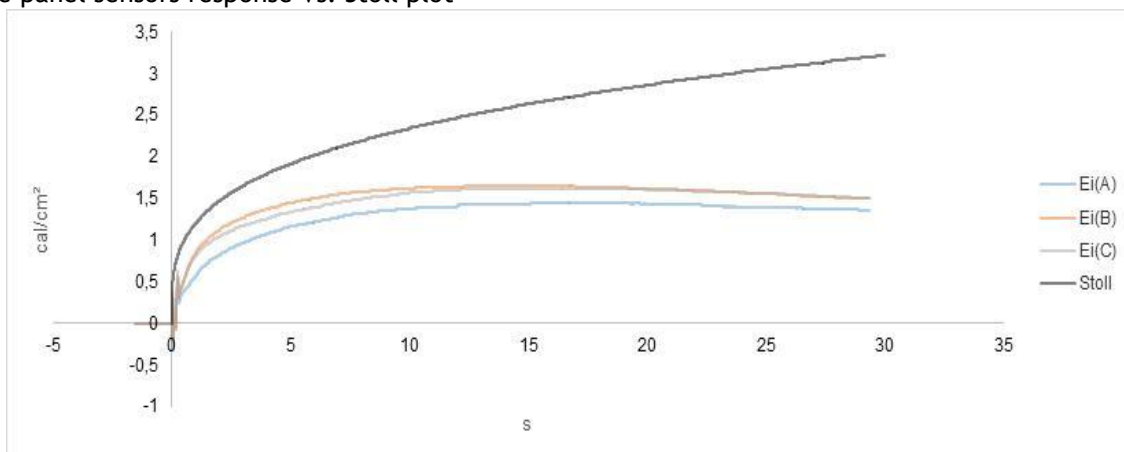
Current Plot



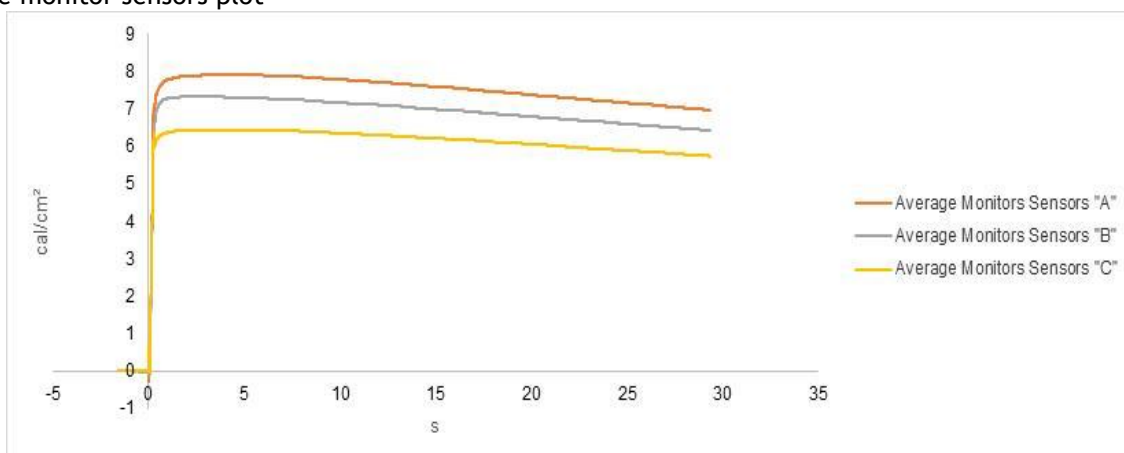
Voltage Plot



Average panel sensors response Vs. Stoll plot



Average monitor sensors plot



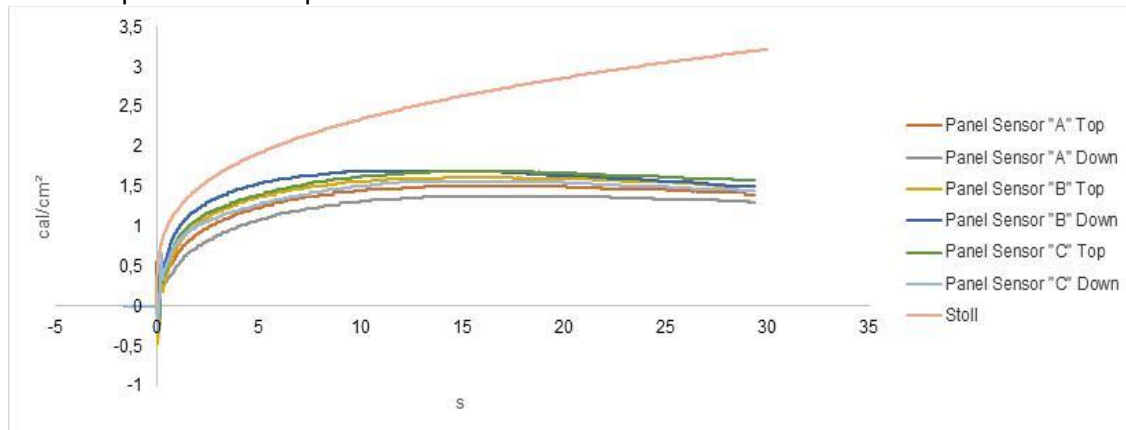
>>>

RESULTS

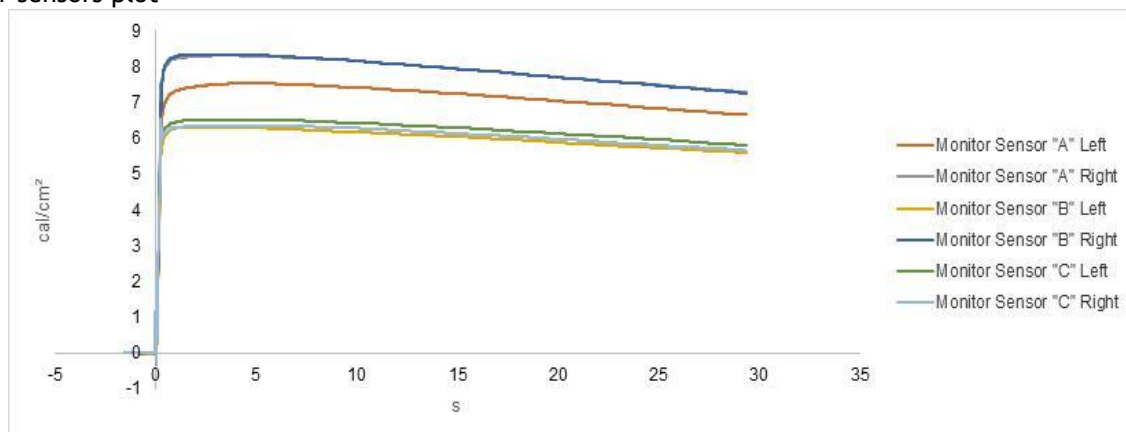
Electrical current and response sensor response:

Shot 2

Panel sensors response Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	7,8	Current Peak (kA)	15,7	Arc Voltage (V)	1506,0
Duration (cycles n°)	6,6	Duration (ms)	133,0	Arc Energy (kJ)	441,7
Arc Voltage (kJ)	478,1				

sensor response	PANEL A	PANEL B	PANEL C
Ei	7,91 cal/cm ²	7,33 cal/cm ²	6,44 cal/cm ²
SCD	-0,62 cal/cm ²	-0,33 cal/cm ²	-0,39 cal/cm ²

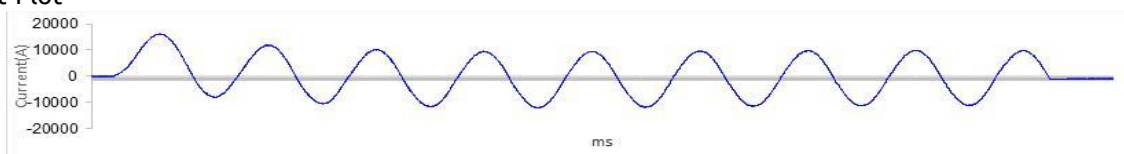
>>>

RESULTS

Electrical current and response sensor response:

Shot 3

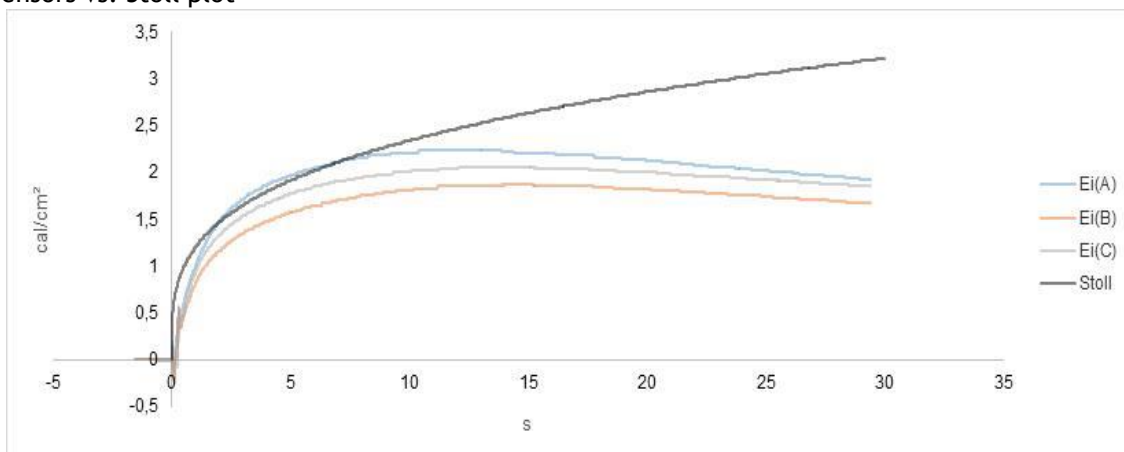
Current Plot



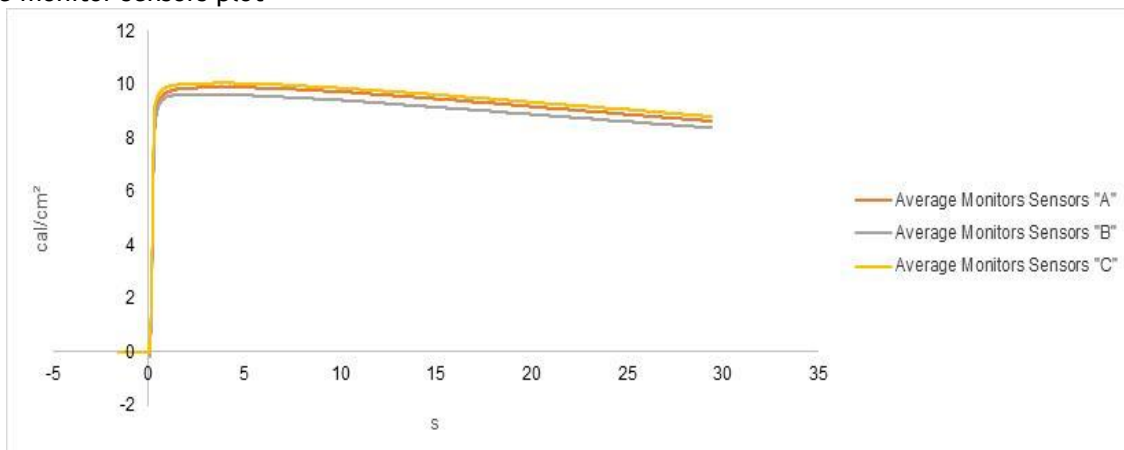
Voltage Plot



Panel sensors vs. Stoll plot



Average monitor sensors plot



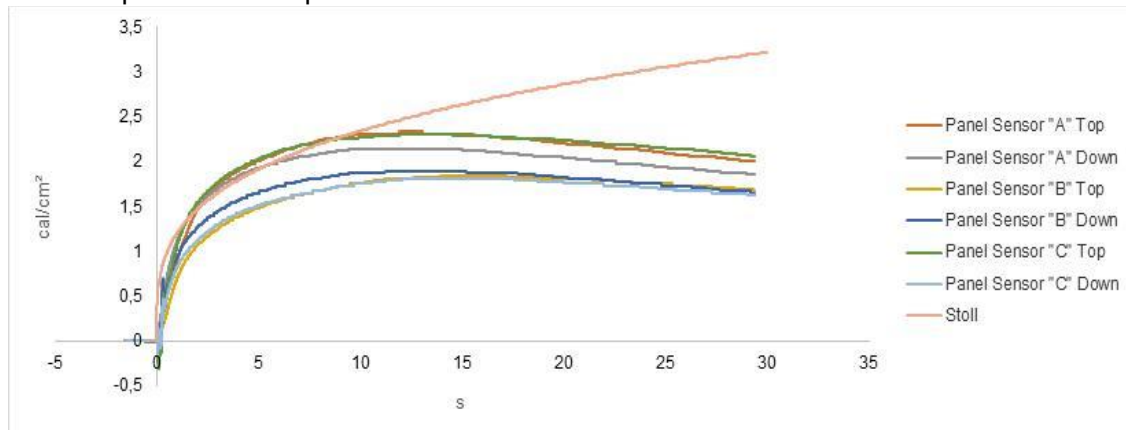
>>>

RESULTS

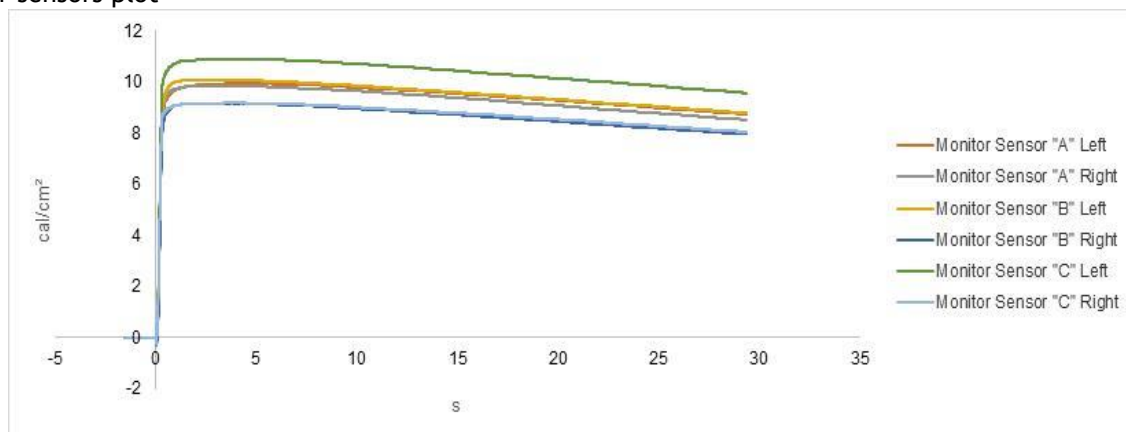
Electrical current and response sensor response:

Shot 3

Panel sensors response Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	7,8	Current Peak (kA)	16,2	Arc Voltage (V)	1476,0
Duration (cycles n°)	8,7	Duration (ms)	173,5	Arc Energy (kJ)	575,1
Arc Voltage (kJ)	482,5				

sensor response	PANEL A	PANEL B	PANEL C
Ei	9,89 cal/cm ²	9,63 cal/cm ²	10,04 cal/cm ²
SCD	0,08 cal/cm ²	-0,30 cal/cm ²	-0,11 cal/cm ²

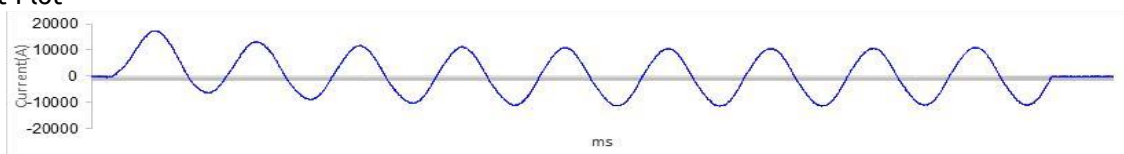
>>>

RESULTS

Electrical current and response sensor response:

Shot 4

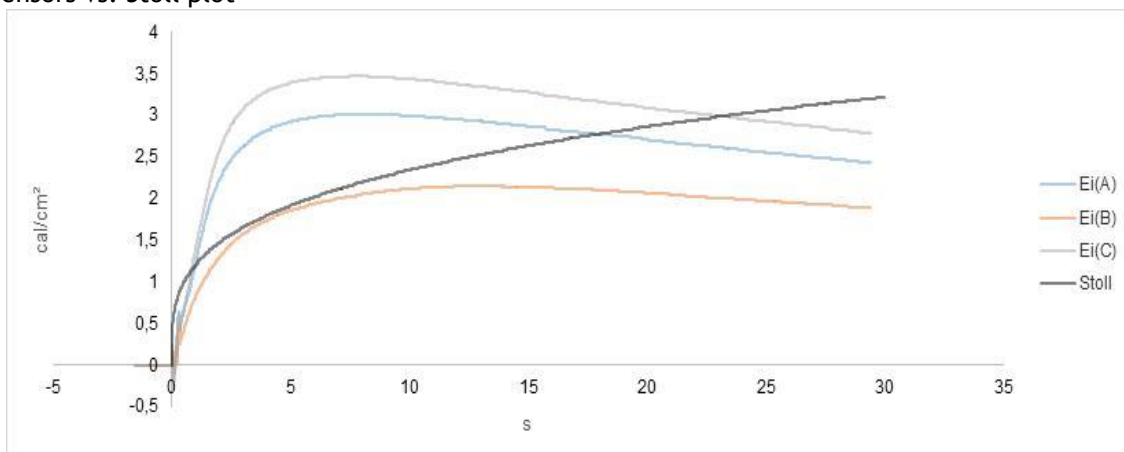
Current Plot



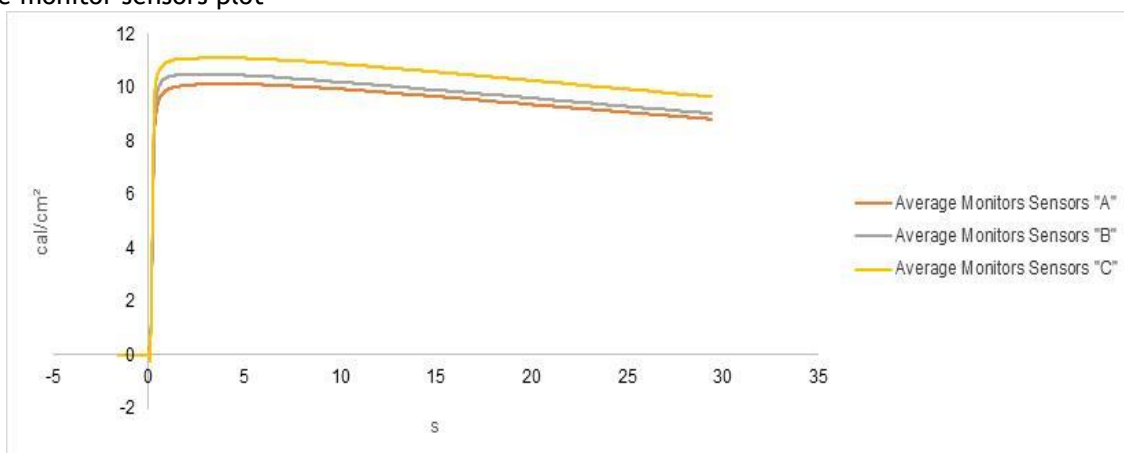
Voltage Plot



Panel sensors vs. Stoll plot



Average monitor sensors plot



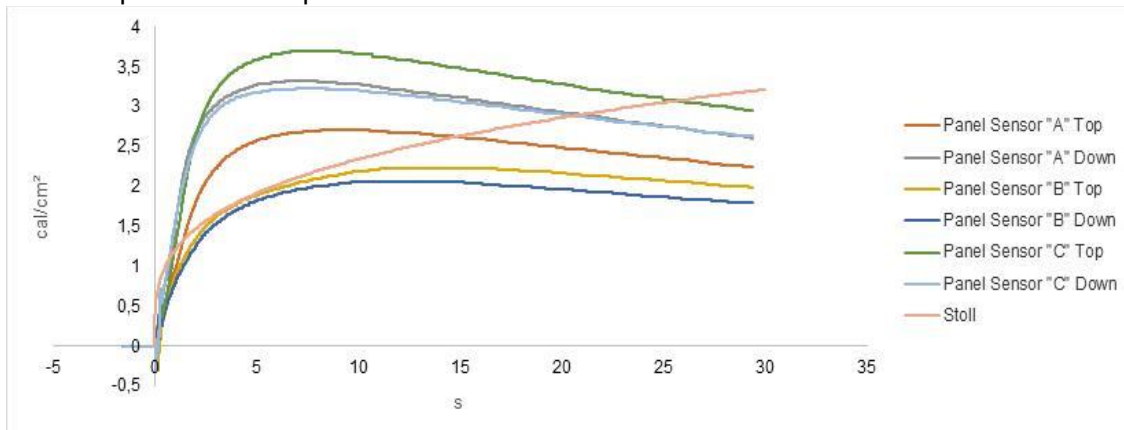
>>>

RESULTS

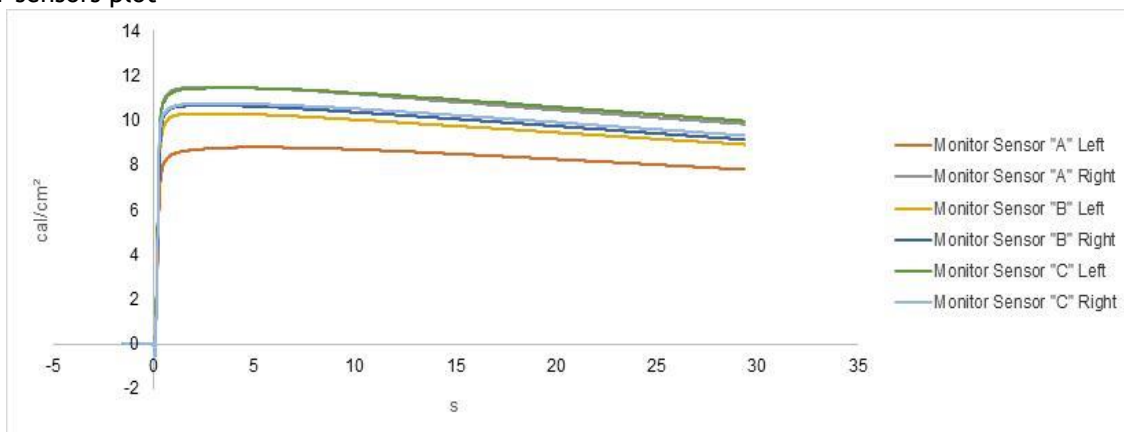
Electrical current and response sensor response:

Shot 4

Panel sensors response Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	7,9	Current Peak (kA)	17,4	Arc Voltage (V)	1524,0
Duration (cycles n°)	9,2	Duration (ms)	183,6	Arc Energy (kJ)	624,2
Arc Voltage (kJ)	474,4				

sensor response	PANEL A	PANEL B	PANEL C
Ei	10,13 cal/cm ²	10,48 cal/cm ²	11,11 cal/cm ²
SCD	1,03 cal/cm ²	-0,05 cal/cm ²	1,50 cal/cm ²

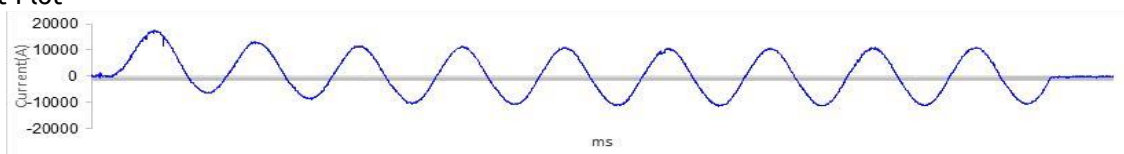
>>>

RESULTS

Electrical current and response sensor response:

Shot 5

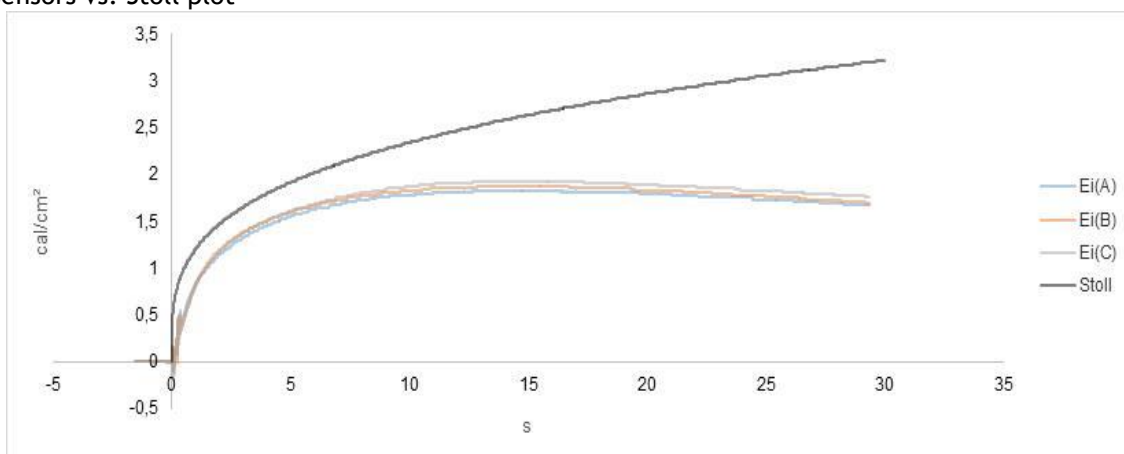
Current Plot



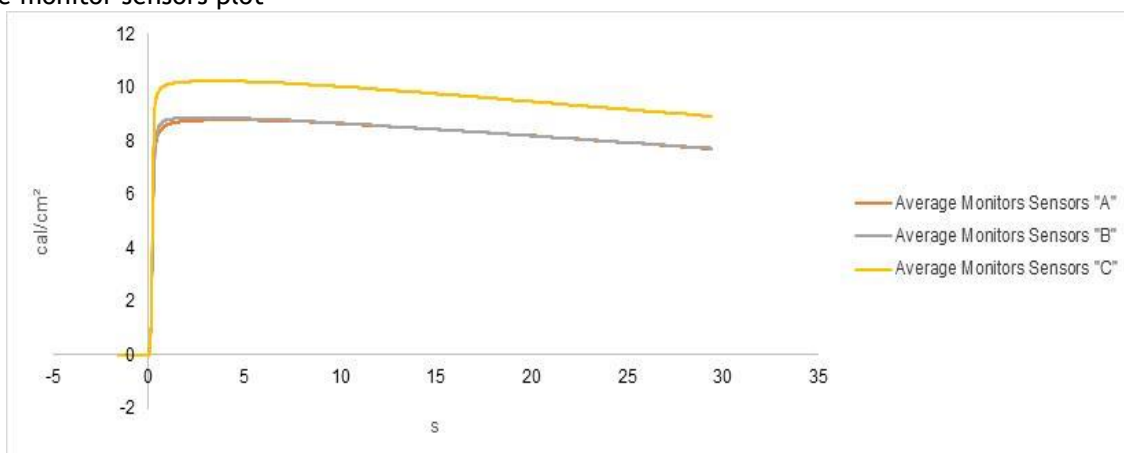
Voltage Plot



Panel sensors vs. Stoll plot



Average monitor sensors plot



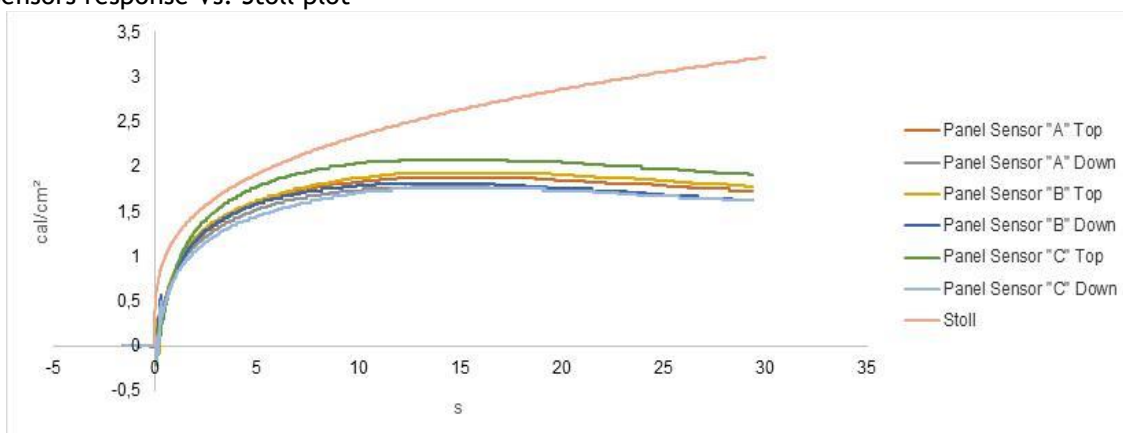
>>>

RESULTS

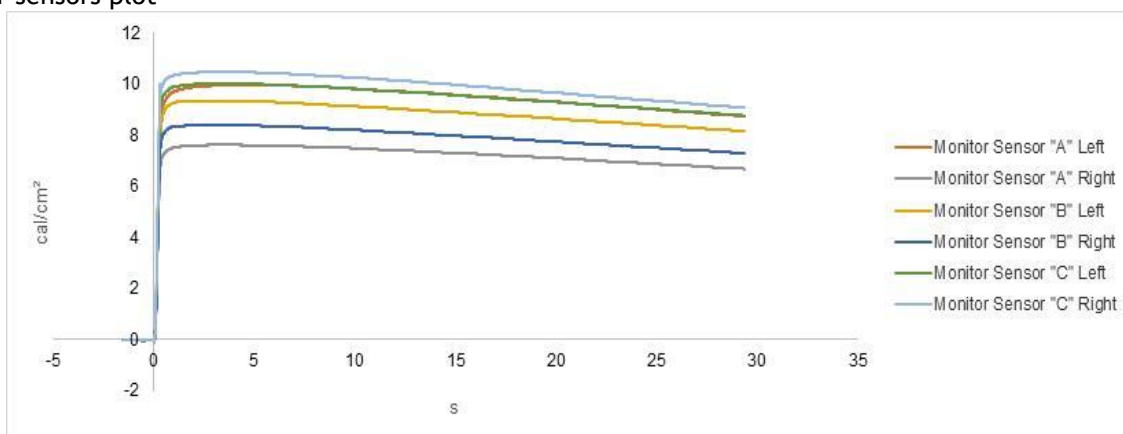
Electrical current and response sensor response:

Shot 5

Panel sensors response Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	7,8	Current Peak (kA)	17,4	Arc Voltage (V)	1482,0
Duration (cycles n°)	9,2	Duration (ms)	183,5	Arc Energy (kJ)	599,5
Arc Voltage (kJ)	464,4				

sensor response	PANEL A	PANEL B	PANEL C
Ei	8,79 cal/cm ²	8,87 cal/cm ²	10,23 cal/cm ²
SCD	-0,32 cal/cm ²	-0,27 cal/cm ²	-0,28 cal/cm ²

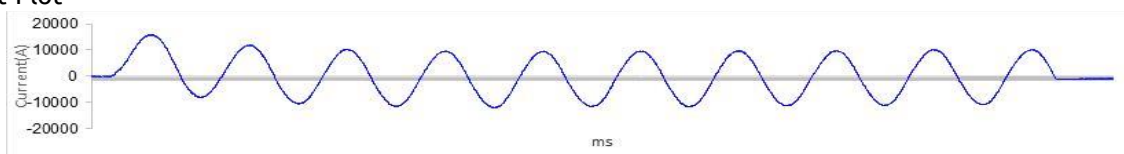
>>>

RESULTS

Electrical current and response sensor response:

Shot 6

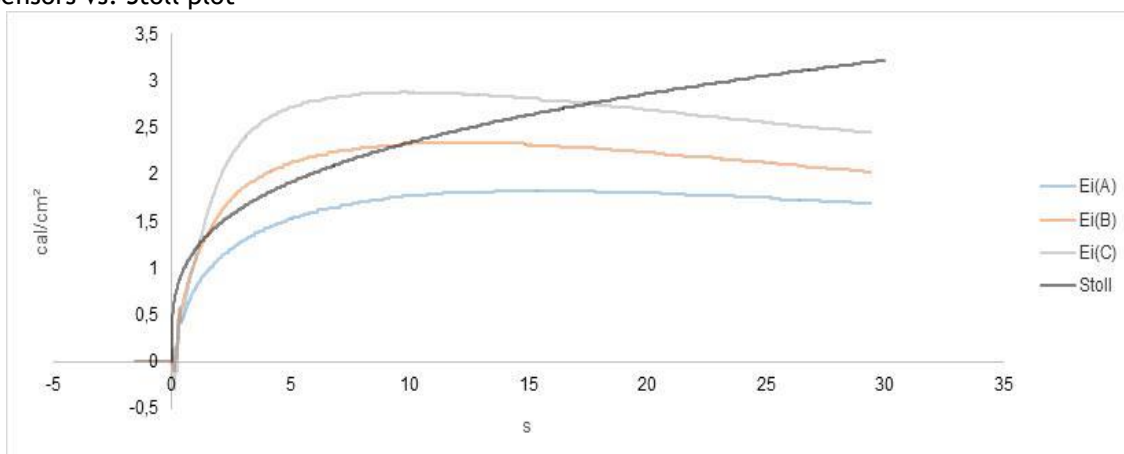
Current Plot



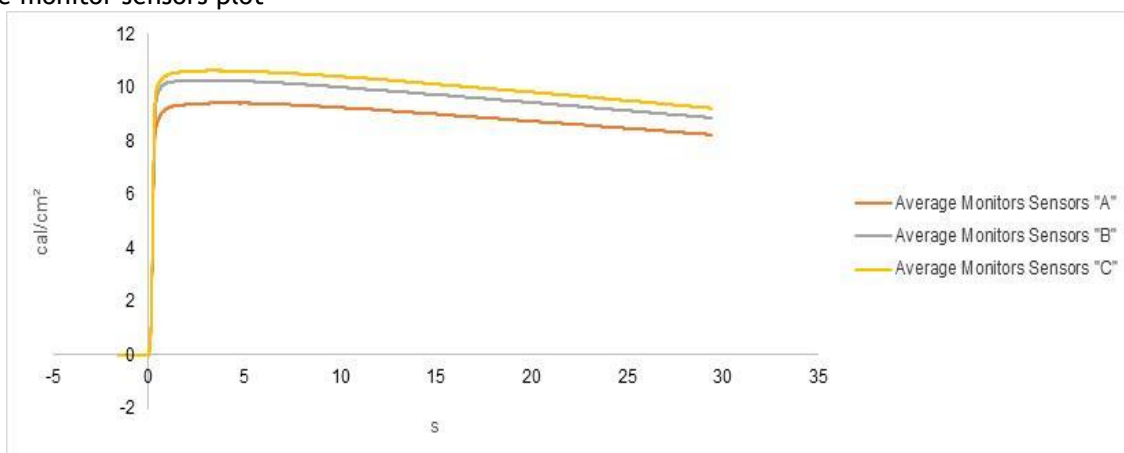
Voltage Plot



Panel sensors vs. Stoll plot



Average monitor sensors plot



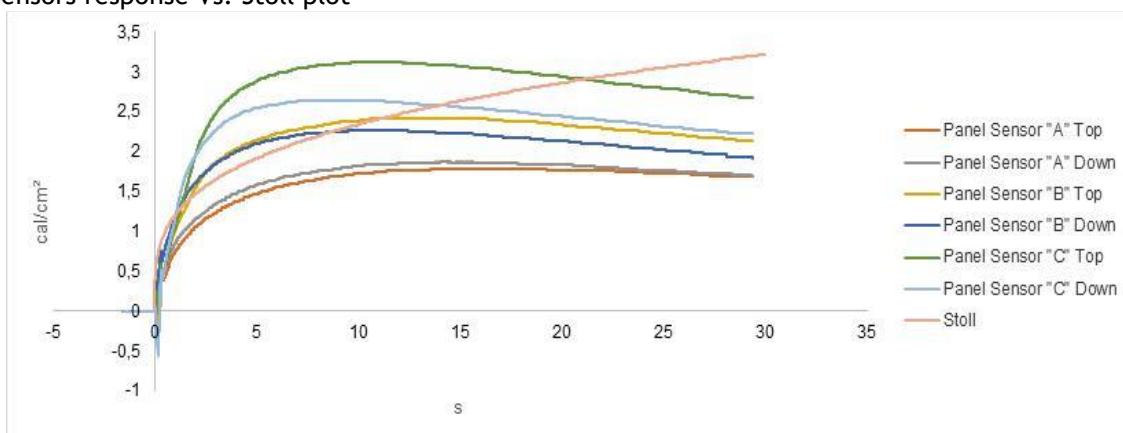
>>>

RESULTS

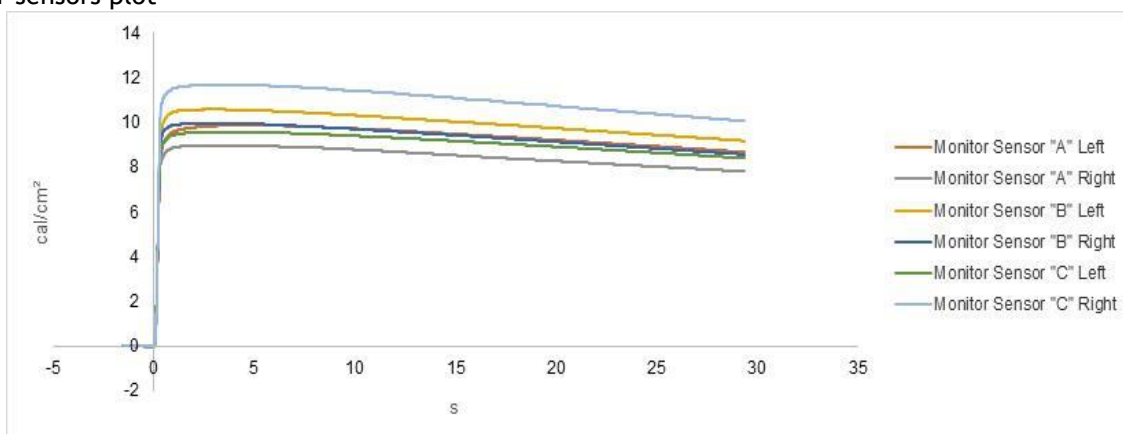
Electrical current and response sensor response:

Shot 6

Panel sensors response Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	7,7	Current Peak (kA)	15,8	Arc Voltage (V)	1524,0
Duration (cycles n°)	9,6	Duration (ms)	192,9	Arc Energy (kJ)	588,7
Arc Voltage (kJ)	440,6				

Sensor response	PANEL A	PANEL B	PANEL C
Ei	9,41 cal/cm²	10,27 cal/cm²	10,63 cal/cm²
SCD	-0,36 cal/cm²	0,22 cal/cm²	0,81 cal/cm²

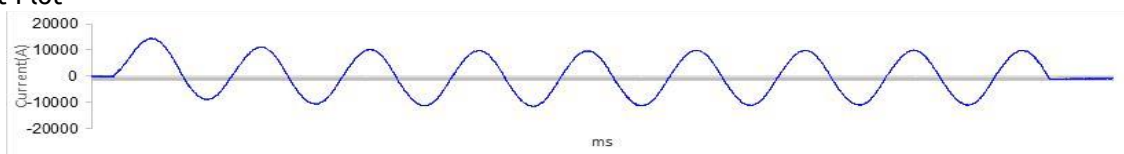
>>>

RESULTS

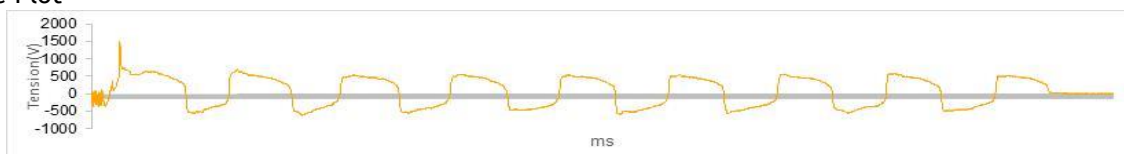
Electrical current and response sensor response:

Shot 7

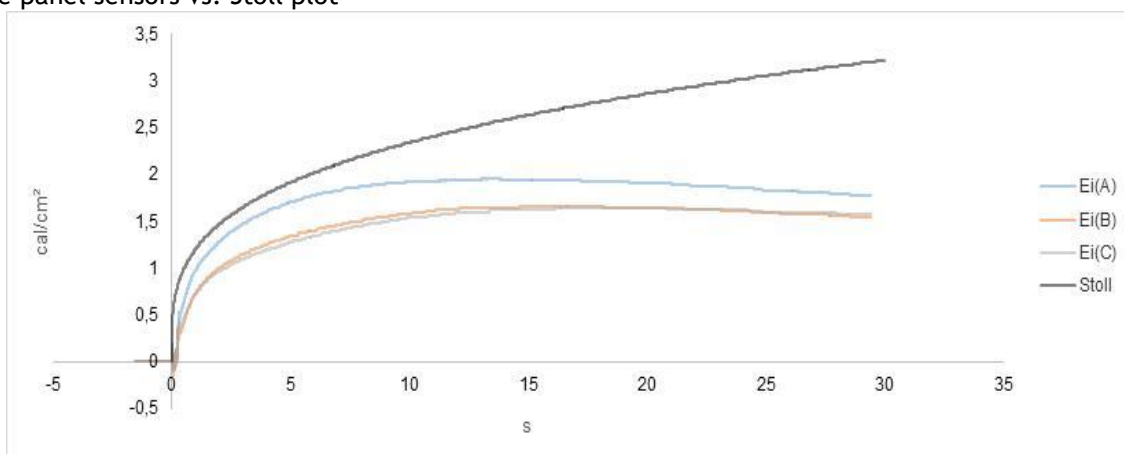
Current Plot



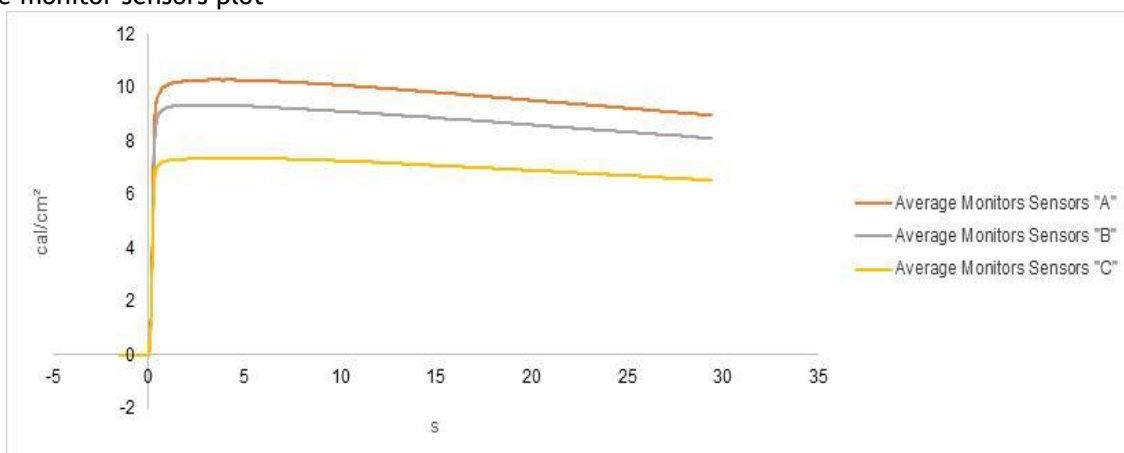
Voltage Plot



Average panel sensors vs. Stoll plot



Average monitor sensors plot



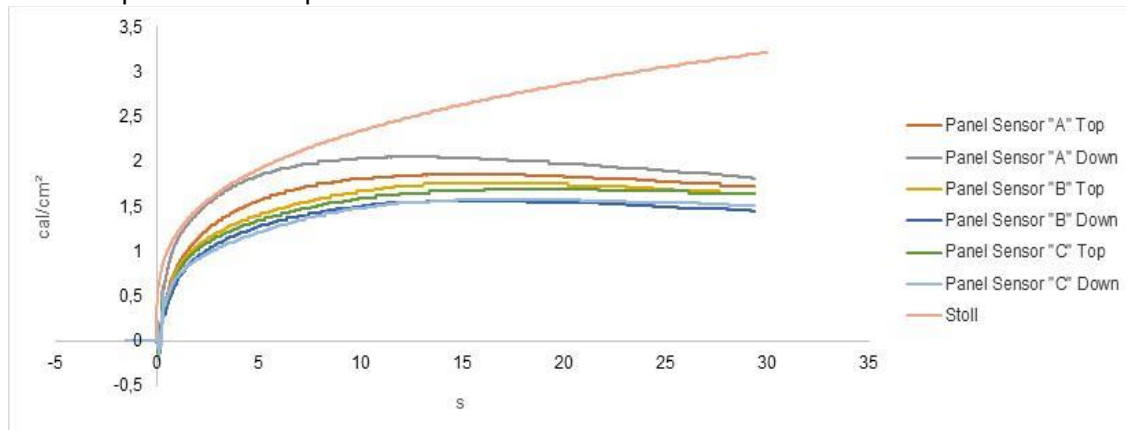
>>>

RESULTS

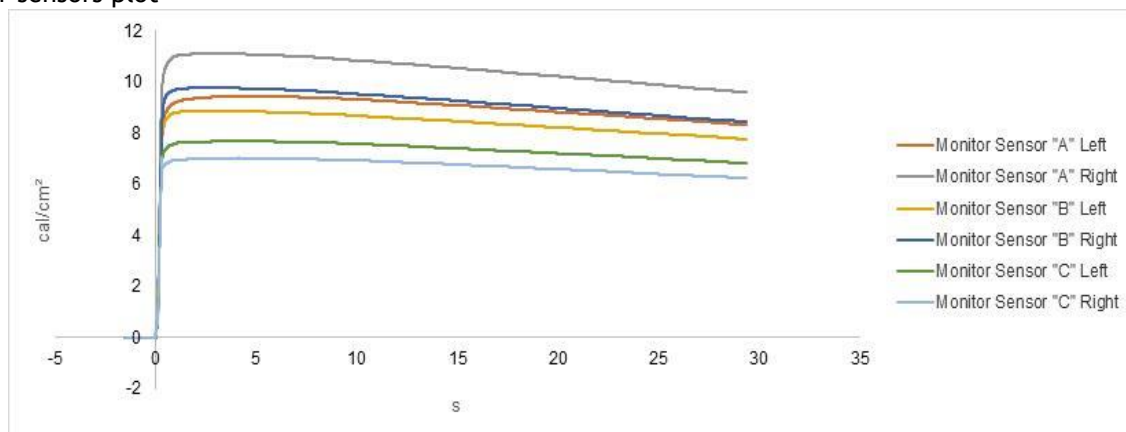
Electrical current and response sensor response:

Shot 7

Panel sensors response Vs. Stoll plot



Monitor sensors plot



Current Total RMS (kA)	7,6	Current Peak (kA)	14,6	Arc Voltage (V)	1479,0
Duration (cycles n°)	8,6	Duration (ms)	171,8	Arc Energy (kJ)	522,8
Arc Voltage (kJ)	441,4				

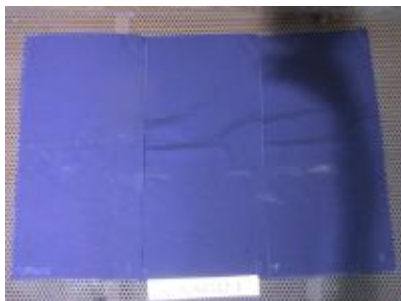
sensor response	PANEL A	PANEL B	PANEL C
Ei	10,28 cal/cm ²	9,33 cal/cm ²	7,36 cal/cm ²
SCD	-0,17 cal/cm ²	-0,46 cal/cm ²	-0,47 cal/cm ²

>>>

RESULTS

Tested material pictures:

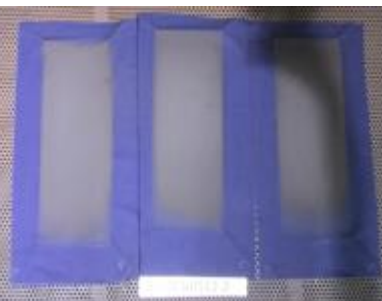
Original



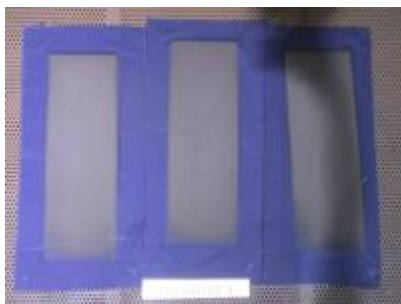
Shot 1



Shot 2



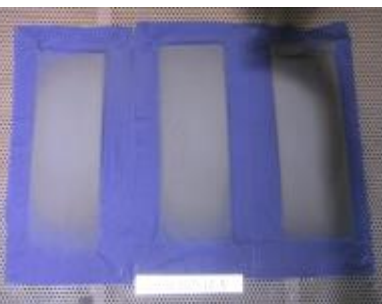
Shot 3



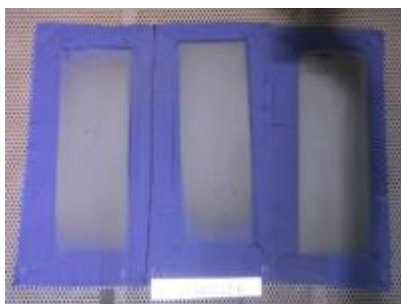
Shot 4



Shot 5



Shot 6



Shot 7



>>>

RESULTS

Summary of results:

ATPV	10,2 cal/cm ²
ELIM	9,4 cal/cm ²

FABRIC TESTED ACCORDING TO THE STANDARD IEC 61482-1-1: 2019 Material test (Procedure A)
ARC RATING (ATPV)
10 cal/cm ²

Note 1

The values of ATPV, EBT and/or ELIM, reported in clause 13.2 or 13.3 as resulting from testing according to either Procedure A or B, when given in units of cal/cm², shall be rounded down to the first digit after the decimal point, in case of the value being less than 10 cal/cm² and shall be rounded down to the last digit before the decimal point, in case of the value being greater than 10 cal/cm².

Note 2

1 kJ/m² = 1 kW.s/m² = 0,1 J/cm² = 0,023 9006 cal/cm²

1 cal/cm² = 41,840 kJ/m² = 41,840 kW.s/m²

///

Lucia Martinez
Head of PPE and Ballistics department

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- 12.- This report may only be sent or delivered by hand to the applicant or to a person duly authorised by the same.
- 13.- The results of the tests and the statement of compliance with the specification in this report refer only to the test sample as it has been analyzed / tested and not the sample / item which has taken the test sample.
- 14.- The client must attend at all times, to the dates of the realization of the tests.
- 15.- According to Resolution EA (33) 31, the test reports must include the unique identification of the sample, and any brand or label of the manufacturer may be added. It is not allowed to re-issue test reports of untested sample names (references), they can only be re-issued for error correction or inclusion of omitted data that were already available at the time of the test. The laboratory can not assume responsibility for declaring that the product with the new trade name / trademark is strictly identical to the one originally tested; This responsibility belongs to the client.

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