

TEST REPORT

2024EP3996

DATE OF RECEPTION

Date Format: dd/MM/yyyy 23/09/2024

DATE TESTS

Starting: 23/09/2024

Ending: 17/10/2024

APPLICANT

SAGE PROTECT UG
Am Falltor 24A
D-64390 Erzhausen (Hessen)
Germany

Att. Christian Gonzalez

IDENTIFICATION AND DESCRIPTION OF SAMPLES

Reference by AITEX	Reference by customer	AITEX sample description
2024EP3996-S01	SAGE SL-16	Face shield

TESTS CARRIED OUT

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

AITEX - Carretera Bañeres, nº 10. - E-03802 ALCOY (Alicante) SPAIN Tel.: +34 96 554 22 00 www.aitex.es info@aitex.es

Tests marked with * are not covered by ENAC accreditation



DESCRIPTION OF SAMPLES



Reference by AITEX: 2024EP3996-S01

Reference by customer:

SAGE SL-16

Information supplied by the customer

Manufacturer SAGE PROTECT UG Style/Model Number SL-16

Lens Layer 1 Color Gray

Lens Layer 2 Color

Lens Layer 1 Thickness [mm] 1,8mm

Lens Layer 2 Thickness [mm]

Lens Layer 1 Material: Polycarbonate

Part Number BR-16



EXECUTIVE SUMMARY

ASTM F 2178:/F 2178M:2023a	Reference	Test/Standard	Result
	2024EP3996-S01	ELECTRIC ARC TEST (OPEN ARC) EYE OR FACE PROTECTIVE PRODUCTS ASTM F 2178/F2178M:2023a Mét.A	ATPV = 17,6



RESULTS

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

Standard

ASTM F2178:2023a – 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, 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 center line to the panel surface.

Subjective evaluation.

Pictures after arc exposure.

Ignition probability value (if determined during testing).

>>>



Test conditions	
Date test	08/10/2024 - 08/10/2024
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

>>>



Reference 2024EP3996-S01

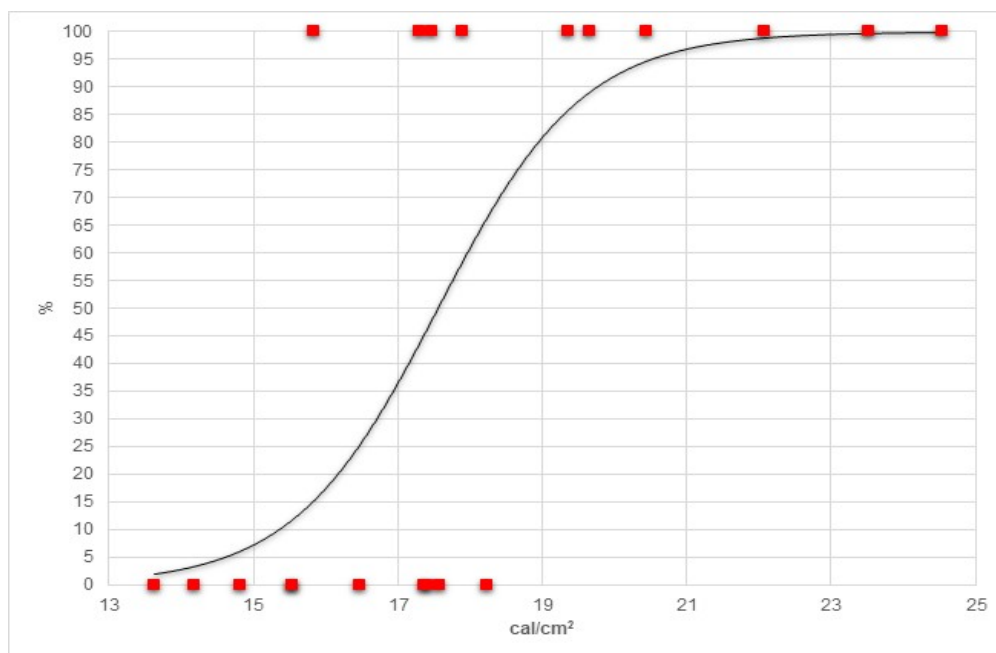
Description according to information provided by the customer

Lens / Shield description	
Manufacturer	SAGE PROTECT UG
Model	SL-16
Colour	Gray
Thickness	1,8mm
Material	Polycarbonate. Hard coating.

Hardhat Description	
Manufacturer	Not supplied by the customer
Model	Not supplied by the customer
Material	Not supplied by the customer

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

ATPV 17,6 cal/cm²



Mix zone points above	6
ATPV points 20%	16
Mix zone points below	5
Mix zone points	9

>>>

**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	444,2	22,21	19,4	0,05	Y	N
1-C	444,2	22,21	17,9	0,01	Y	N
2-A	503,6	25,18	24,6	0,28	Y	N
2-C	503,6	25,18	22,1	0,27	Y	N
3-A	304,2	15,21	14,2	-0,15	N	N
3-C	304,2	15,21	13,6	-0,21	N	N
4-A	364	18,2	15,5	-0,18	N	N
4-C	364	18,2	15,6	-0,42	N	N
5-A	424,2	21,21	23,5	0,5	Y	N
5-C	424,2	21,21	19,6	0,3	Y	N
6-A	384	19,2	20,4	0,05	Y	N
6-C	384	19,2	17,4	-0,19	N	N
7-A	384	19,2	17,6	-0,21	N	N
7-C	384	19,2	15,8	0,44	Y	N
8-A	384,2	19,21	17,4	-0,16	N	N
8-C	384,2	19,21	18,2	-0,11	N	N
9-A	404	20,2	17,5	0,62	Y	N
9-C	404	20,2	17,3	1,45	Y	N
10-A	363,6	18,18	16,5	-0,26	N	N
10-C	363,6	18,18	14,8	-0,25	N	N

>>>

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

Test	After flame	Ablation	Melting	Dripping	Charring	Embrittlement	Deformation
1-A	0	N	N	N	Y	Y	N
1-C	0	N	N	N	Y	Y	N
2-A	0	N	N	N	Y	Y	N
2-C	0	N	N	N	Y	Y	N
3-A	0	N	N	N	Y	Y	N
3-C	0	N	N	N	Y	Y	N
4-A	0	N	N	N	Y	Y	N
4-C	0	N	N	N	Y	Y	N
5-A	0	N	N	N	Y	Y	N
5-C	0	N	N	N	Y	Y	N
6-A	0	N	N	N	Y	Y	N
6-C	0	N	N	N	Y	Y	N
7-A	0	N	N	N	Y	Y	N
7-C	0	N	N	N	Y	Y	N
8-A	0	N	N	N	Y	Y	N
8-C	0	N	N	N	Y	Y	N
9-A	0	N	N	N	Y	Y	N
9-C	0	N	N	N	Y	Y	N
10-A	0	N	N	N	Y	Y	N
10-C	0	N	N	N	Y	Y	N

Y: Yes N: No

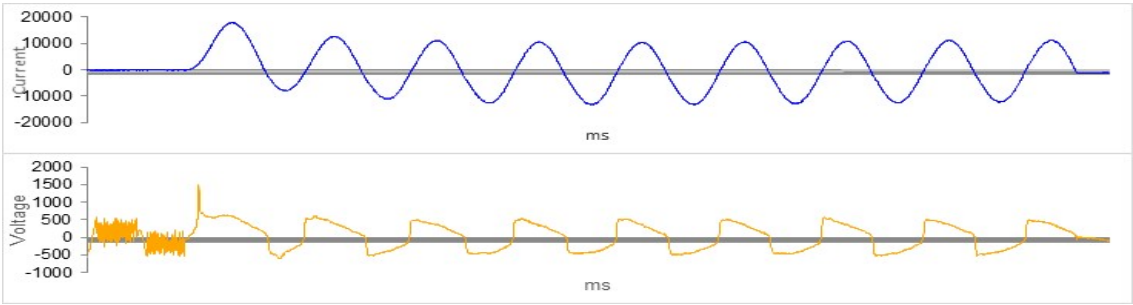
>>>



Electrical current and response sensor response:

Calibration shot

INITIAL CALIBRATION



Ei Panel A	7,7 cal/cm ²	Ei Panel C	8,0 cal/cm ²
------------	-------------------------	------------	-------------------------

>>>

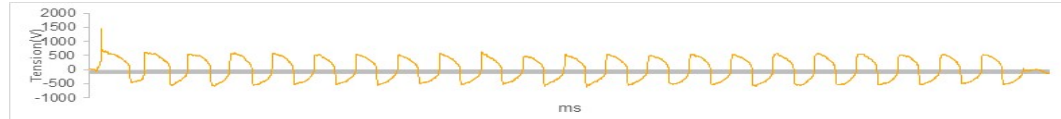


Shot 1

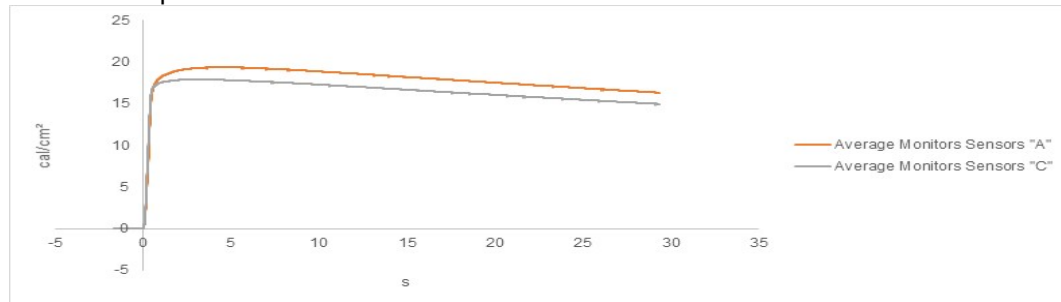
Current plot



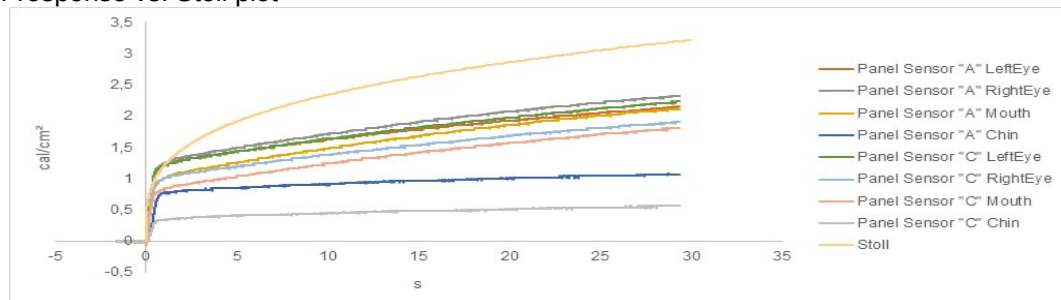
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,0	Current Peak (kA)	17,8	Arc Voltage Peak(V)	1458,0
Duration (cycles nº)	22,2	Duration (ms)	444,1	Arc Energy (kJ)	1359,2
Arc Voltage (V)	414,0				

sensor response	PANEL A	PANEL C
Ei	19,36 cal/cm ²	17,89 cal/cm ²
SCD	0,05 cal/cm ²	0,01 cal/cm ²

>>>

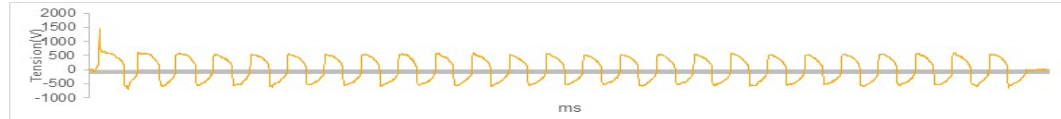


Shot 2

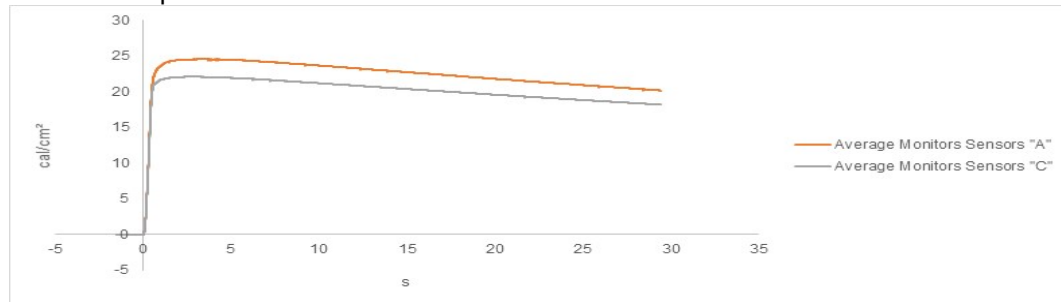
Current plot



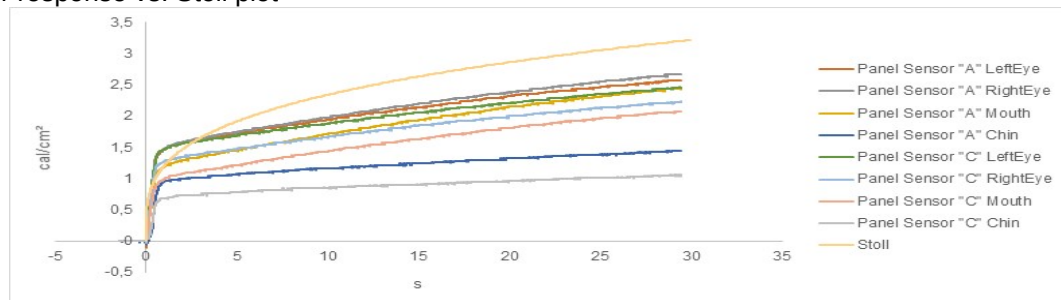
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,1	Current Peak (kA)	17,7	Arc Voltage Peak(V)	1464,0
Duration (cycles nº)	25,2	Duration (ms)	503,6	Arc Energy (kJ)	1613,9
Arc Voltage (V)	431,0				

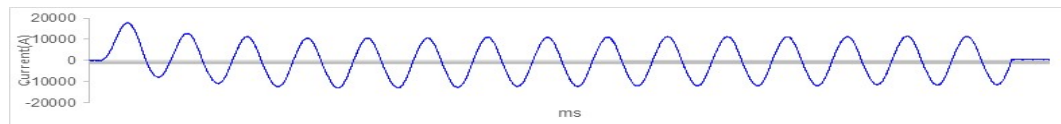
sensor response	PANEL A	PANEL C
Ei	24,55 cal/cm ²	22,08 cal/cm ²
SCD	0,28 cal/cm ²	0,27 cal/cm ²

>>>



Shot 3

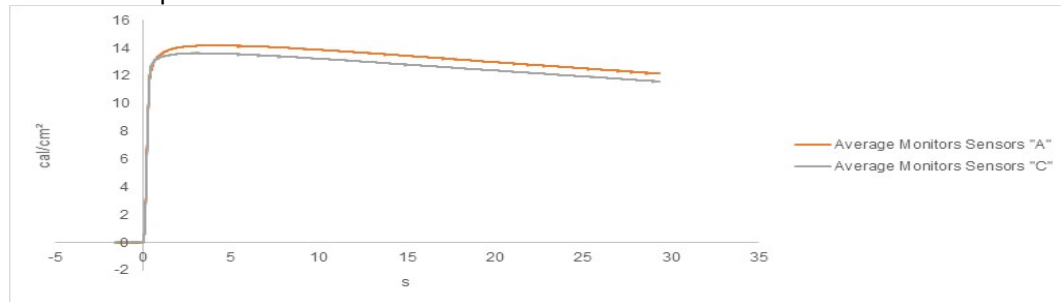
Current plot



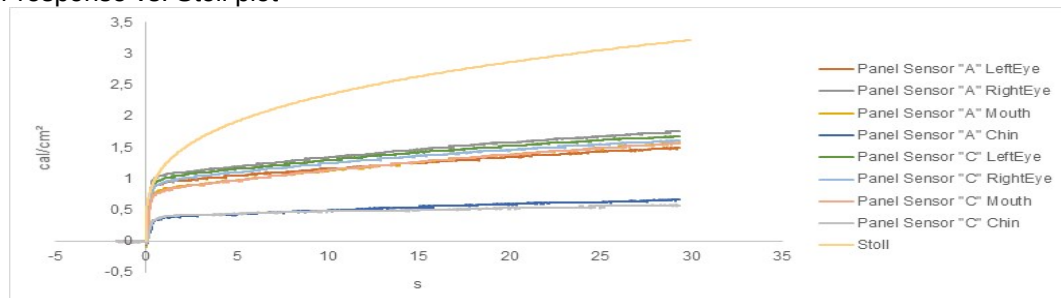
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,1	Current Peak (kA)	17,8	Arc Voltage Peak(V)	1479,0
Duration (cycles nº)	15,2	Duration (ms)	304,2	Arc Energy (kJ)	1033,7
Arc Voltage (V)	455,0				

sensor response	PANEL A	PANEL C
Ei	14,19 cal/cm ²	13,64 cal/cm ²
SCD	-0,15 cal/cm ²	-0,21 cal/cm ²

>>>

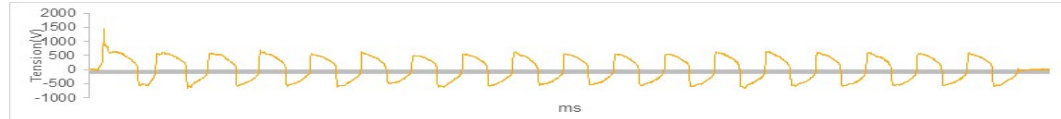


Shot 4

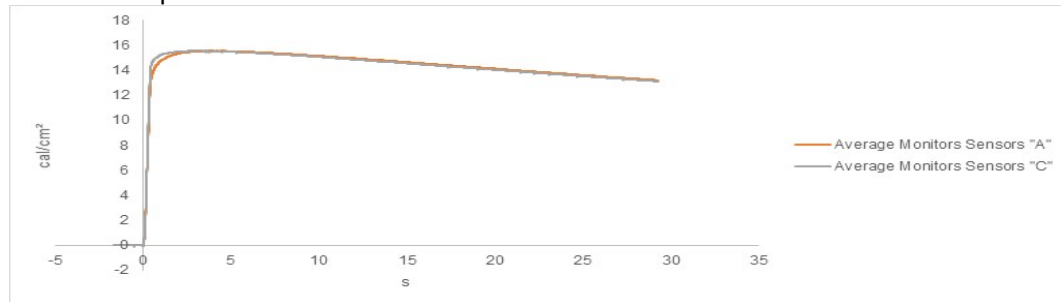
Current plot



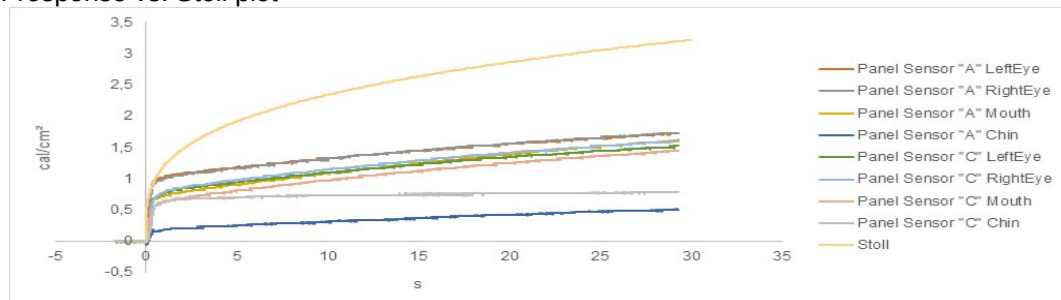
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,1	Current Peak (kA)	17,8	Arc Voltage Peak(V)	1455,0
Duration (cycles nº)	18,2	Duration (ms)	364,0	Arc Energy (kJ)	1189,9
Arc Voltage (V)	440,2				

sensor response	PANEL A	PANEL C
Ei	15,54 cal/cm²	15,55 cal/cm²
SCD	-0,18 cal/cm²	-0,42 cal/cm²

>>>

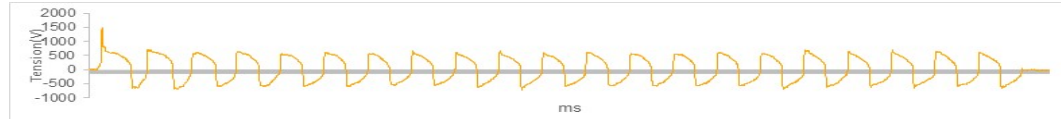


Shot 5

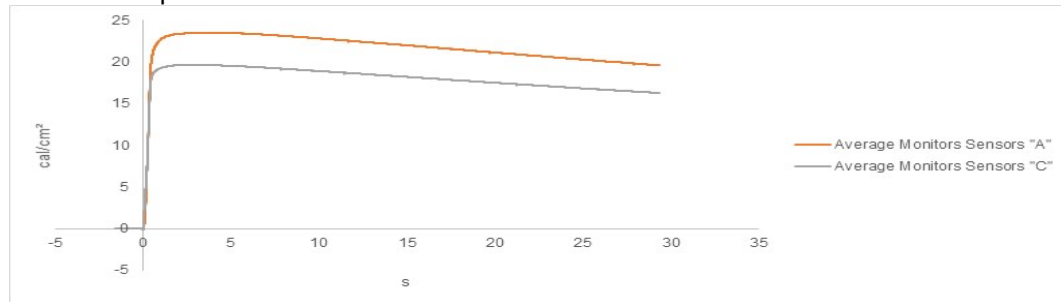
Current plot



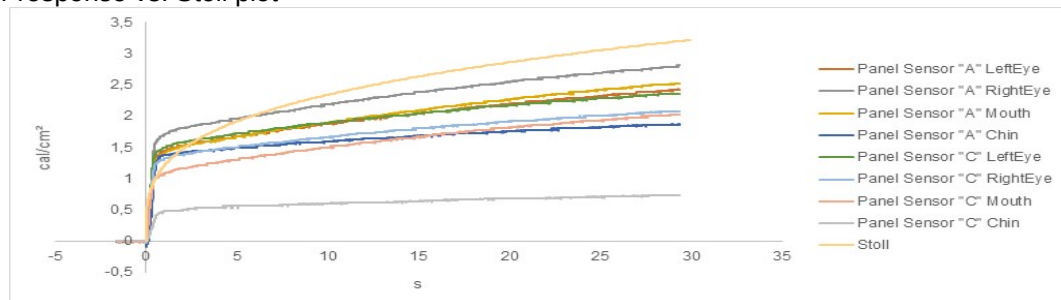
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,1	Current Peak (kA)	18,0	Arc Voltage Peak(V)	1479,0
Duration (cycles nº)	21,2	Duration (ms)	424,1	Arc Energy (kJ)	1430,9
Arc Voltage (V)	455,2				

sensor response	PANEL A	PANEL C
Ei	23,52 cal/cm ²	19,65 cal/cm ²
SCD	0,50 cal/cm ²	0,30 cal/cm ²

>>>



Shot 6

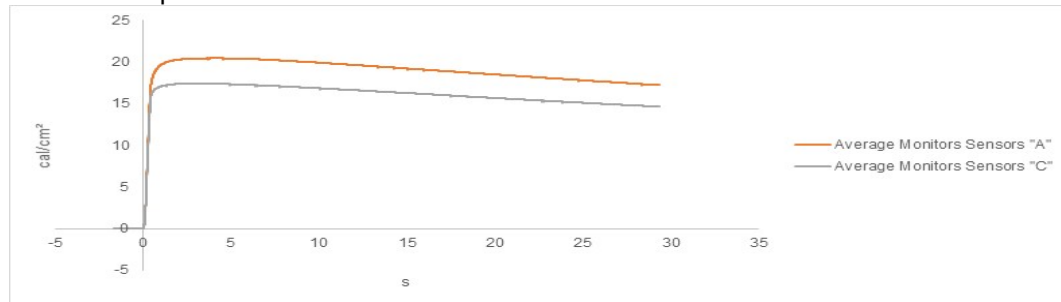
Current plot



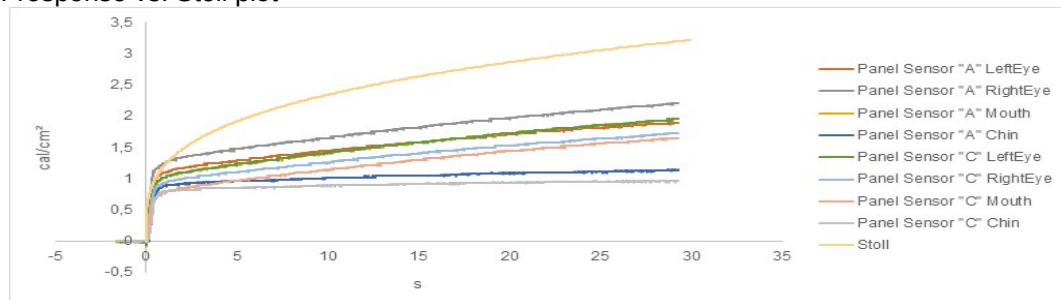
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,0	Current Peak (kA)	17,4	Arc Voltage Peak(V)	1506,0
Duration (cycles nº)	19,2	Duration (ms)	383,9	Arc Energy (kJ)	1298,3
Arc Voltage (V)	459,8				

sensor response	PANEL A	PANEL C
Ei	20,45 cal/cm²	17,41 cal/cm²
SCD	0,05 cal/cm²	-0,19 cal/cm²

>>>

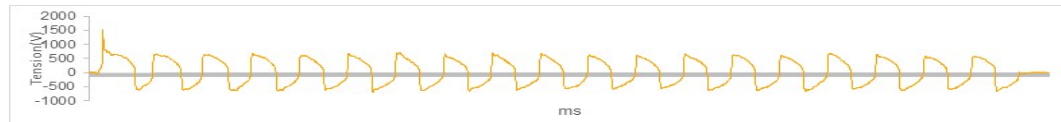


Shot 7

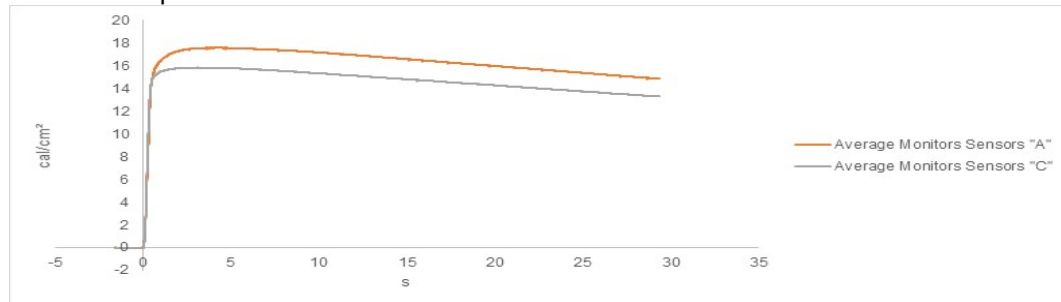
Current plot



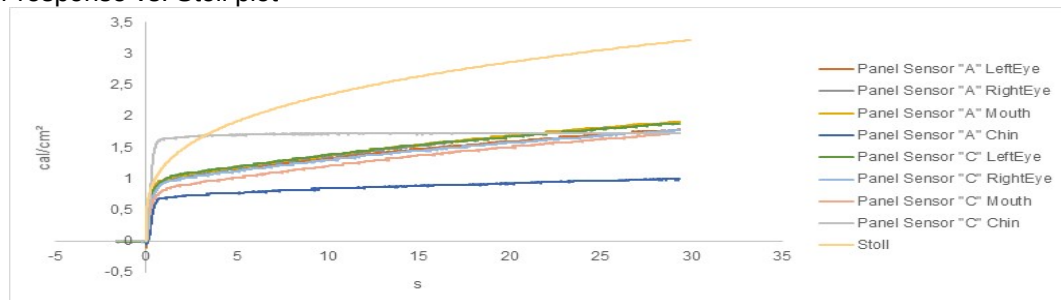
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,0	Current Peak (kA)	17,4	Arc Voltage Peak(V)	1512,0
Duration (cycles nº)	19,2	Duration (ms)	383,9	Arc Energy (kJ)	1325,1
Arc Voltage (V)	468,3				

sensor response	PANEL A	PANEL C
Ei	17,57 cal/cm ²	15,84 cal/cm ²
SCD	-0,21 cal/cm ²	0,44 cal/cm ²

>>>



Shot 8

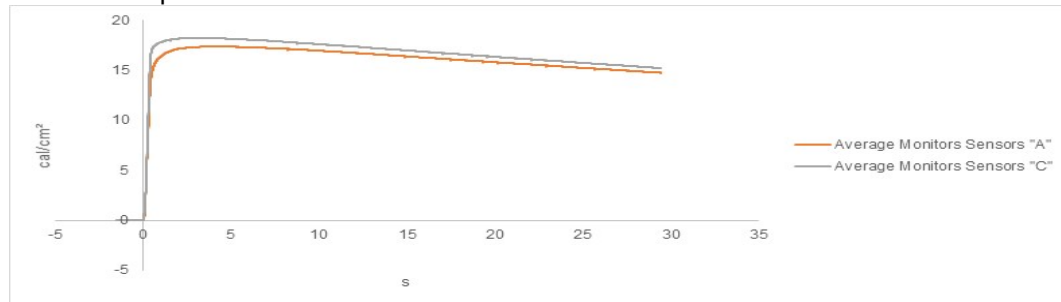
Current plot



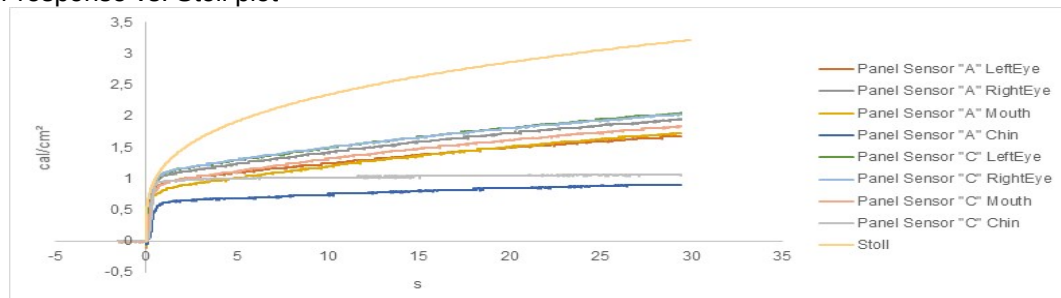
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,2	Current Peak (kA)	18,2	Arc Voltage Peak(V)	1464,0
Duration (cycles nº)	19,2	Duration (ms)	384,1	Arc Energy (kJ)	1207,0
Arc Voltage (V)	419,7				

sensor response	PANEL A	PANEL C
Ei	17,37 cal/cm ²	18,23 cal/cm ²
SCD	-0,16 cal/cm ²	-0,11 cal/cm ²

>>>

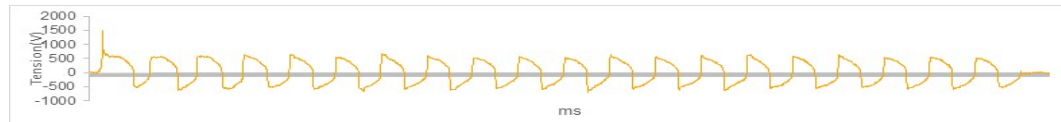


Shot 9

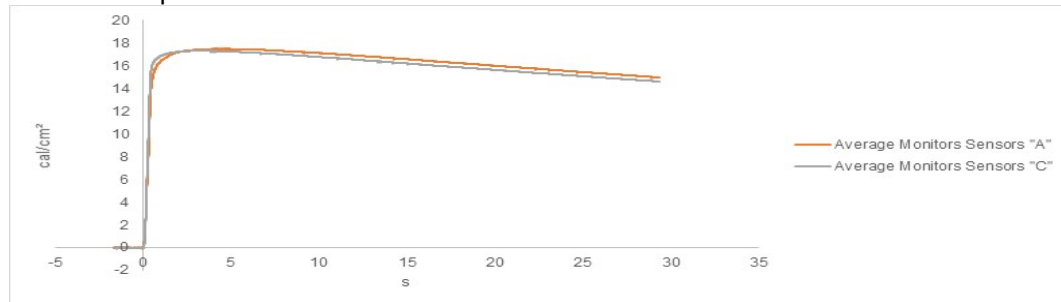
Current plot



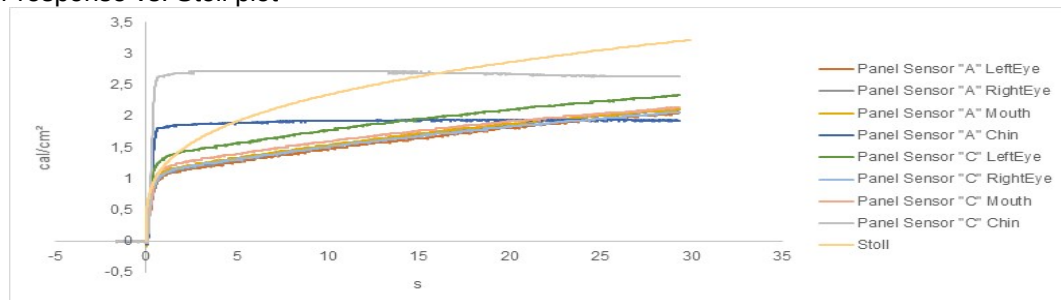
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,1	Current Peak (kA)	18,0	Arc Voltage Peak(V)	1503,0
Duration (cycles nº)	20,2	Duration (ms)	404,0	Arc Energy (kJ)	1277,2
Arc Voltage (V)	426,1				

sensor response	PANEL A	PANEL C
Ei	17,48 cal/cm ²	17,31 cal/cm ²
SCD	0,62 cal/cm ²	1,45 cal/cm ²

>>>

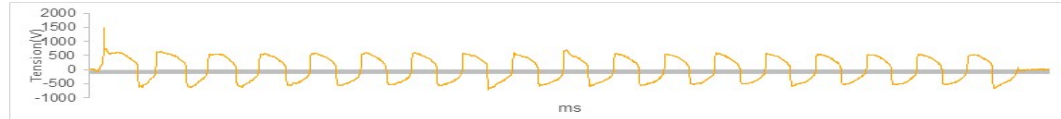


Shot 10

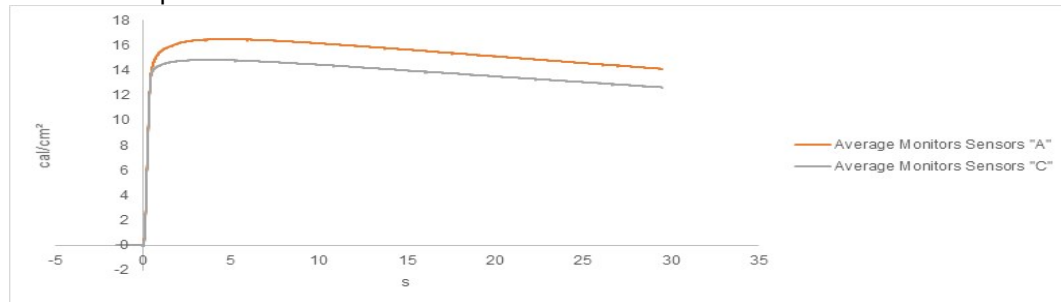
Current plot



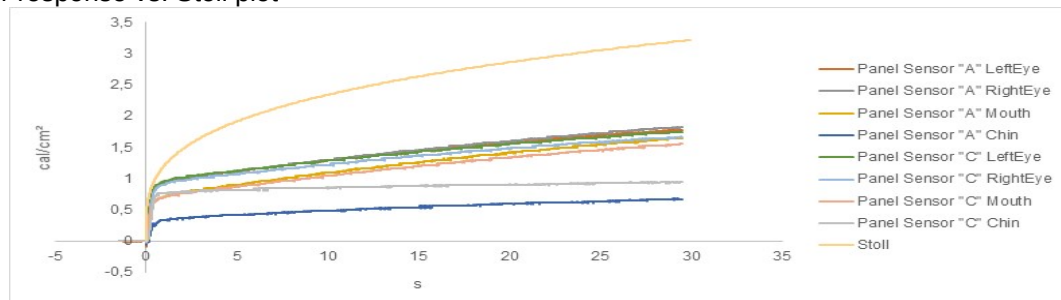
Voltage plot



Reference sensors mean plot



Panel sensor response vs. Stoll plot



Current Total RMS (kA)	8,2	Current Peak (kA)	18,1	Arc Voltage Peak(V)	1506,0
Duration (cycles nº)	18,2	Duration (ms)	363,7	Arc Energy (kJ)	1211,0
Arc Voltage (V)	440,3				

sensor response	PANEL A	PANEL C
Ei	16,48 cal/cm²	14,83 cal/cm²
SCD	-0,26 cal/cm²	-0,25 cal/cm²

>>>

**Tested material pictures:**

Original



Shot 1



Shot 2



Shot 3



Shot 4



Shot 5



Shot 6



Shot 7



Shot 8



Shot 9



Shot 10

**Summary of results:**

The arc rating of the assembled system has been tested according to the standard ASTM F2178:2023a - Procedure A with an arc rating ATPV of 18 cal/cm²

ACCORDING TO THE STANDARD ASTM F2178:2023a - PROCEDURE A

ARC RATING OF THE EYE OR FACE PROTECTIVE PRODUCTS (ATPV) 18 cal/cm²

Note

The test was carried out at: AITEX - Polígono Industrial Fuente del Jarro. C/ Ciudad de Gibraltar, 5; 46988 – Paterna (Valencia).

///



Lucia Martinez
Head of PPE and Ballistics department

Date: 18/10/2024 12:25:09

Digitally Signed by: LUCIA MARTINEZ MOLTO -

NIF: 21651425F

LIABILITY CLAUSES

- 1.- AITEX is liable only for the results of the methods of analysis used, as expressed in the report and referring exclusively to the materials or samples indicated in the same which are in its possession, the professional and legal liability of the Centre being limited to these. Unless otherwise stated, the samples were freely chosen and sent by the applicant.
- 2.- AITEX shall not be liable in any case of misuse of the test materials nor for undue interpretation or use of this document. AITEX laboratories do not carry out sampling.
- 3.- The Offer and / or Order to which the applicant gives approval through signature and seal, constitutes the Legally Executable Agreement in which AITEX is responsible for safeguarding and guaranteeing the absolute confidentiality of the management of all the information obtained or created during the performance of the contracted activities.
- 4.- In the eventuality of discrepancies between reports, a check to settle the same will be carried out in the head offices of AITEX. Also, the applicants undertake to notify AITEX of any complaint received by them as a result of the report, exempting this Centre from all liability if such is not done, the periods of conservation of the samples being taken into account.
- 5.- AITEX will provide at the request of the person concerned, the treatment of complaints procedure. In the event that you want to make it, direct it to: calidad@aitex.es.
- 6.- AITEX is not responsible for the information provided by customers, which is reflected in the Report, and may affect the validity of the results. The information provided by the client is not covered by the scope of ENAC accreditation.
- 7.- AITEX is not responsible for an inadequate state of the sample received that could compromise the validity of the results, expressing such circumstance, in the test reports.
- 8.- AITEX may include in its reports, analyses, results, etc., any other evaluation which it considers necessary, even when it has not been specifically requested.
- 9.- When a Declaration of Conformity is requested, if not indicated otherwise, the decision rule according to ILAC-G8: 2009 will be applied with a security zone of 1U and a Probability of False Acceptance <2.5%.
- 10.- The uncertainties of tests, which are made explicit in the Results Report, have been estimated for a $k = 2$ (95% probability of coverage). If not informed, they are available to the client in AITEX.
- 11.- The original materials and rests of samples, not subject to test, will be retained in AITEX during the twelve months following the issuance of the report, so that any check or claim which, in his case, wanted to make the applicant, should be exercised within the period indicated.
- 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.
- 16.- This report may not be partially reproduced without the written approval of the issuing laboratory.