

TEST REPORT

2020CO1009

DATE OF RECEPTION

19/05/2019

DATE TESTS

Starting: 27/05/2019

Ending: 10/02/2020

APPLICANT

ARITEKS BOYACILIK TICATET VE SANAYI AS
Hekimsuyu Cad No:36
TR-34250
ISTANBUL

Att. Ibrahim Susin

IDENTIFICATION AND DESCRIPTION OF SAMPLES

REFERENCES

ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)

According to the information supplied by the customer:

Article number: Aramid D1 210-4837

Composition: 93% M-ARAMID 5% P-ARAMID 25 CARBON

Weight: 200 - 220 g/m²

Style: 2/1S Twill fabric

Color: Navy

TESTS CARRIED OUT

- PRE-TREATMENT FOR DOMESTIC WASHING AND DRYING PROCEDURES FOR TEXTILE TESTING.
- VERTICAL RESISTANCE.
- MASS PER UNIT AREA.
- ELECTRIC ARC TEST.

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

Rev.1 This revision cancels and replaces the previous

Mistake in the description

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RESULTS

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

Standard

ISO 6330:2012

Standard deviation

Reference

Sample1 ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)

Units 1 2

Equipment Wascator 13337E12 Wascator 13151E12

Washing procedure 4N **Washing cycles** 5

Drying procedure

C (horizontal)

Washing powder

ECE detergent 98 + sodium perborate + TAED

Units	Dry mass of the samples	Counterweight mass	Equipment
1	1,800Kg	0,100 Polyester	Wascator 13337E12
2	1,700Kg	0,200 Polyester	Wascator 13151E12

Start and finish data test

28/05/2019 - 29/05/2019

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RESULTS

VERTICAL RESISTANCE

Standard

EN 1149-2:1997

Conditioned

24h in indoor ambient conditions at (20 ± 2) °C and (85 ± 5) % RH according to standard EN ISO 11611:2015

Ambient conditions test

23,0 °C and 25,0 % RH

Radius of the inner electrode

50,4 mm

Inner radius of the outer electrode

69,2 mm

Outer radius of the outer electrode

89,0 mm

Contact pressure

2,25 kPa

Potential applied

100 V

Current measurement after

15 s

Test date

13/01/2020

Tested material

Navy blue woven fabric

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RESULTS

Deviation from the standard

Pre-Treatment

5 washing cycles at 40°C, according to standard EN ISO 6330:2012, method 4N and type C drying (flat dry)

Reference

ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)

Specimen	Vertical Resistance (Ohm)
1	$2,15 \cdot 10^7$
2	$5,68 \cdot 10^7$
3	$3,55 \cdot 10^7$
4	$1,58 \cdot 10^8$
5	$1,43 \cdot 10^8$
Classification value	$2,15 \cdot 10^7$
Average (Ohm)	$6,28 \cdot 10^7$

The uncertainty of the assay of Vertical Resistance is $\pm 20\%$ of the value measured, for a coverage factor of $K=2$ (95%)

ACCORDING TO STANDARD IEC 61482-2:2018 PASS

REQUISITE

According to the Standard IEC 61482-2:2018, point 4.3.2, the volume resistance must be at least than $10^5\Omega$.

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RESULTS

MASS PER UNIT AREA

Standard

EN 12127:1997; pto. 8.3

Conditioning date

21/11/2019

Test date

25/11/2019

Atmosphere for conditioning and testing**Temperature**

(20±2) °C

Relative Humidity

(65±4) %

Reference	Mass per unit area (g/m ²)	C.V. (%)
ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)	240	0.21

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RESULTS

ELECTRIC ARC TEST

Standard	EN 61482-1-2:2014 equivalent to IEC 61482-1-2:2014
Principle of the Box test method	Determine the behaviour of materials against to thermal risk when exposed to heat energy from electric arc with specific characteristics Materials performance for this procedure is determined from the amount of the heat transmitted through the specimen and other thermal parameters
Sample type	Two layer fabric: Outer woven fabric, navy blue colour + inner woven fabric, navy blue colour with a total weight does not provided by the customer

Test conditions	
Class	Class 2
Testing atmosphere	22,00 °C 41,40 % RH
Test current I_{class} for class 2	7 kA \pm 5%
Calibration test current	6815,18 A
Average direct exposure incident energy E_{io}	401,09 kJ/m ²
Arc duration	500 ms \pm 5%
Average real arc duration	475,8 ms
Test voltage	400 V \pm 5%
Average real test voltage	390,885 V
Average real Arc Energy W_{arc}	327,405 kJ

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RESULTS

ELECTRIC ARC TEST

Test conditions	
Gap between electrodes	(30 ± 1) mm
Distance between the electrodes and sample	(300 ± 5) mm

Electrodes type

Electrodes Cu/Al

Measurement uncertainty

Temperature 17% of the measured value in °C

Equivalent energy 17% of the measured value in kJ/m²

Time ± 0,390 s

Technician performing the test

David Lázaro

Person verifying the test report

Lucía Martínez

Pre-treatment

5 washing cycles at 40°C, according to standard ISO 6330:2012, method 4N; and C drying

Pre-conditioning of the test specimens

24h. in indoor ambient conditions between (18-28)°C and between (45-75)% RH

Starting and ending pre-conditioning date

20/11/2019 - 22/11/2019

Observation or deviation of the standard

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RESULTS

ELECTRIC ARC TEST

Testing date

22/11/2019

Reference

ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)

VISUALLY OBTAINED DATA

Property	Measurement	Specimen 1	Specimen 2	Specimen 3	Specimen 4
	Class	2	2	2	2
Burning time	Video	1,38 s	2,18 s	2,54 s	1,98 s
Hole formation > 5 mm on external layer	Visual	Yes	No	Yes	No
Hole formation > 5 mm on internal layer	Visual	No	No	No	No
Melting through to the inner side	Visual	No	No	No	No
Embrittlement	Visual	Yes	Yes	Yes	Yes
Damage on the outside	Visual	No	No	No	No
Charring on the outside	Visual	Yes	Yes	Yes	Yes
Dripping	Visual	No	No	No	No
Shrinkage	Calculated	Yes	No	No	No

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RESULTS

ELECTRIC ARC TEST

Reference

ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)

COMPUTER OBTAINED DATA

Class 2				
Property	Specimen 1	Specimen 2	Specimen 3	Specimen 4
Transmitted incident energy E_{it}	104,55 kJ/m ²	105,56 kJ/m ²	97,23 kJ/m ²	105,07 kJ/m ²
Time to delta peak temperature t_{max}	29,92 s	29,96 s	29,92 s	29,92 s
Delta peak temperature ΔT_p	18,94 °C	19,12 °C	17,61 °C	19,04 °C
Differences ΔE_i of the transmitted energy values to the Stoll limit value at t_{max}	-30,01 kJ/m ²	-29,05 kJ/m ²	-37,33 kJ/m ²	-29,49 kJ/m ²
Maximum difference between the transmitted energy E_{it} to the Stoll energy E_{iSTOLL} in $t_i^{(1)}$	-29,08 kJ/m ²	-28,72 kJ/m ²	-36,57 kJ/m ²	-28,64 kJ/m ²
Excess of the Stoll curve by the heat curve of the transmitted incident energy $E_{it}(t)$	No	No	No	No

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RESULTS

ELECTRIC ARC TEST

Remark 1

t_i is the time where the difference between the transmitted incident energy E_{it} and the Stoll Energy E_{iSTOLL} is maximum.

⁽¹⁾ Interpretation: In negative value, a higher difference implies a better behavior. In positive value, a less difference implies a better behavior, considering that the material fails the test.

**IN ACCORDANCE WITH THE ACCEPTANCE CRITERIA ACCORDING TO
EN 61482-1-2:2014, FOR CLASS 2**

PASS

CATEGORY OF ARC THERMAL PROTECTION ACCORDING TO IEC 61482-2:2018 ⁽²⁾APC 2

Remark 2

⁽²⁾Arc Protection Class

The arc protection class is characterized by the test energy level of arc exposure (arc energy and incident energy)

Requirement for the standard compliance EN 61482-1-2:2014

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|---|
| a) Burning time ≤ 5 s. |
| b) No melting through to the inner side. |
| c) No hole bigger than max. 5 mm. in any direction in the innermost layer. |
| d) All four pairs of values ($E_{it} - t_{max}$) are below corresponding Stoll values, and all four heat curves $E_{it}(t)$ of transmitted energy are at any moment of time "t" of the exposure period below Stoll curve. |

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RESULTS

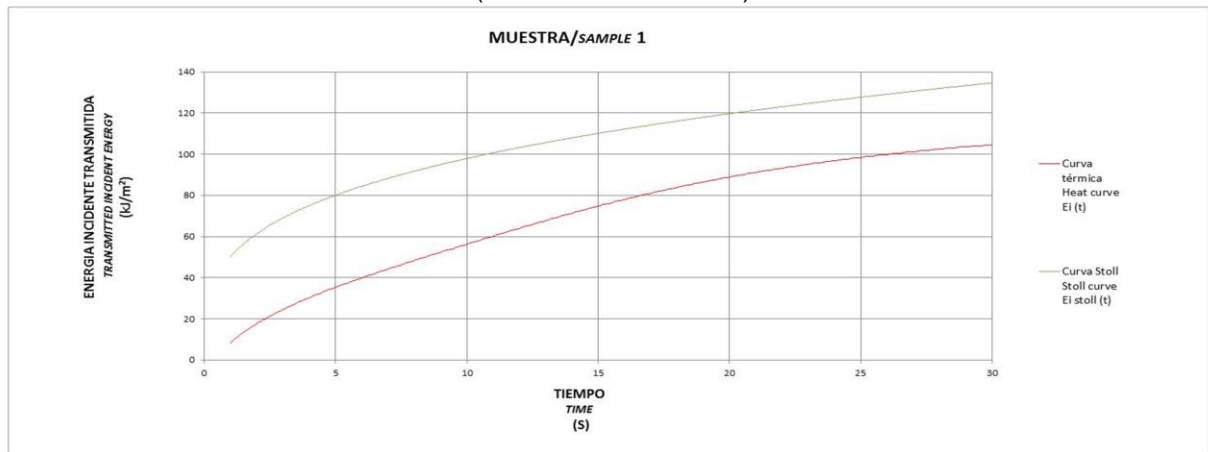
ELECTRIC ARC TEST

STOLL CURVES

Specimen 1

Reference

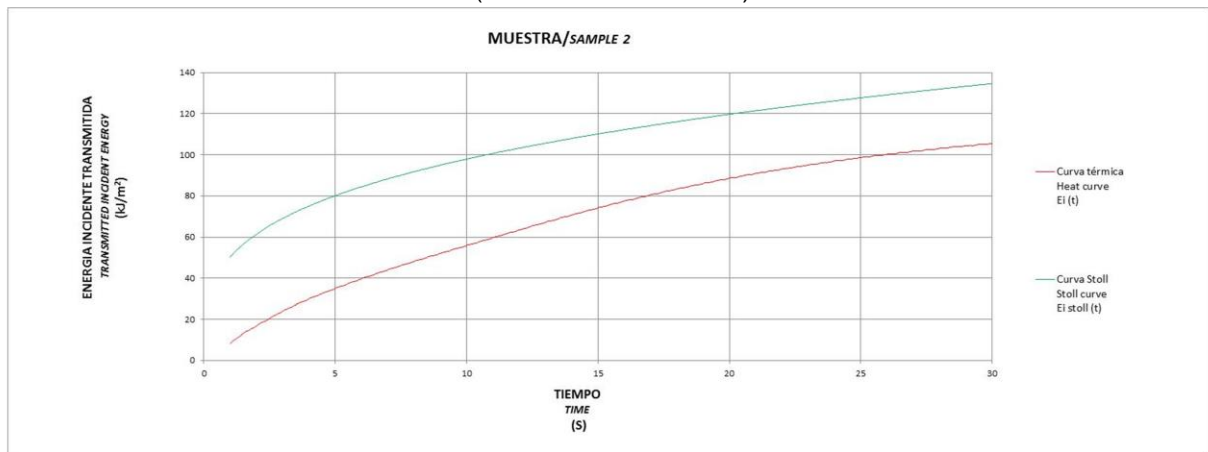
1- ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)



Specimen 2

Reference

2- ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)



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RESULTS

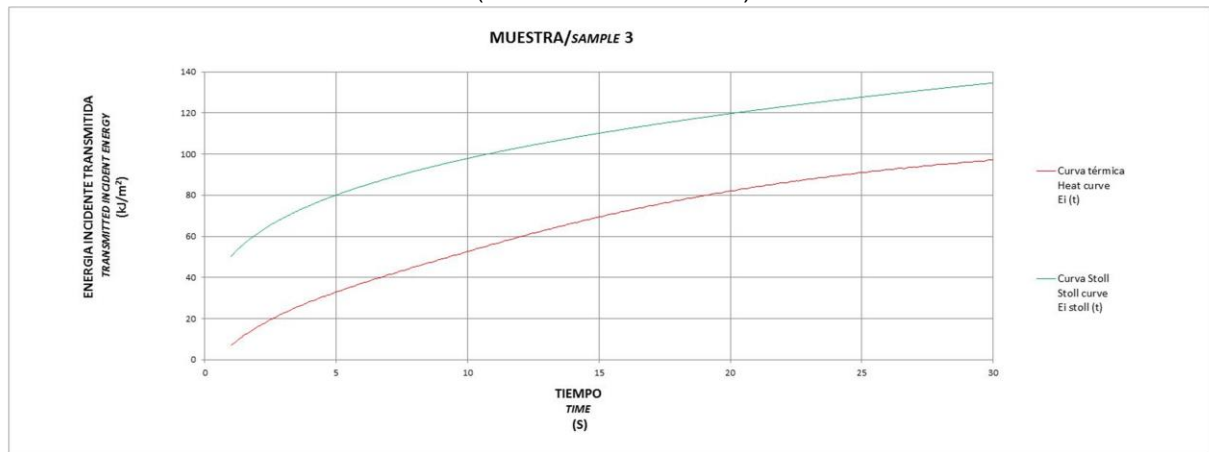
ELECTRIC ARC TEST

STOLL CURVES

Specimen 3

Reference

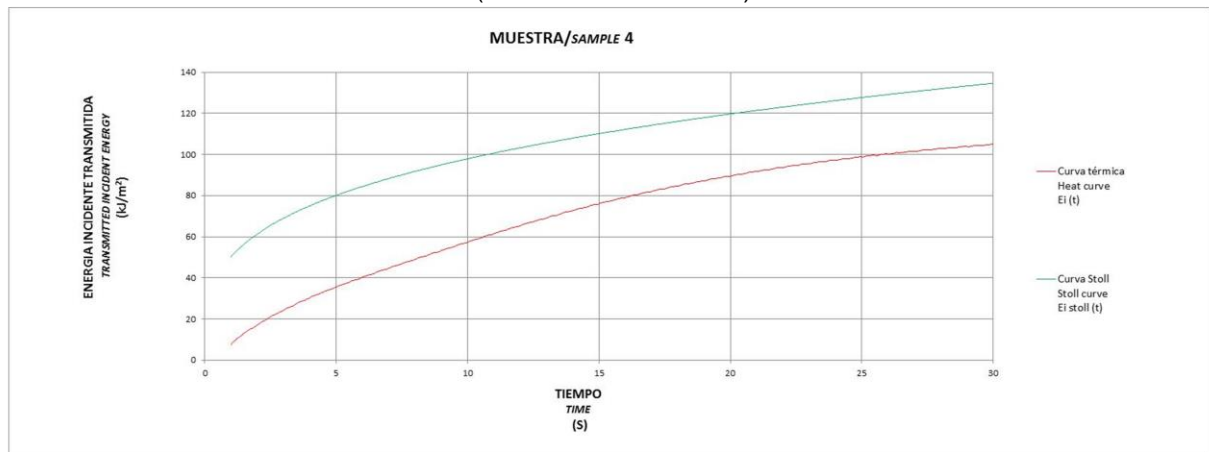
3- ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)



Specimen 4

Reference

4- ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)



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RESULTS

ELECTRIC ARC TEST

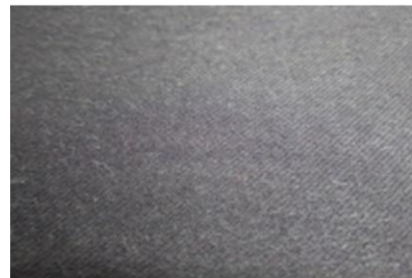
Reference

ARC PROTECTIVE JACKET SUIT (JACKET-TROUSERS)

Original material

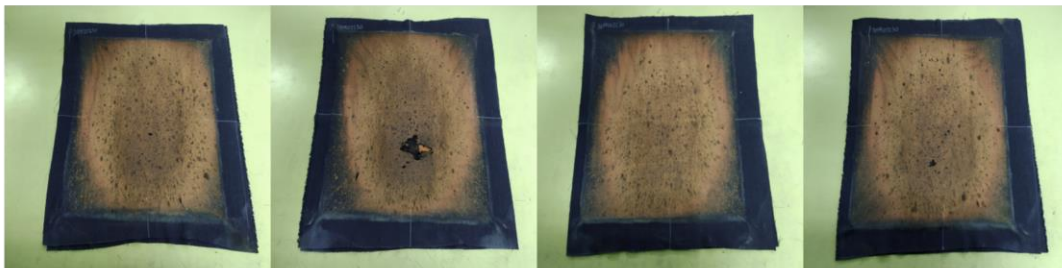


Outer fabric



Inner fabric

Tested material



Remark

The electric arc test is performed in: Cr. Villaviciosa de Odón a Móstoles (M-856) Km. 1,5 Móstoles 28935.

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Begoña Pico
Head of Public Tenders Division

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