

TEST REPORT

2020CO1010

DATE OF RECEPTION

06/06/2019

DATE TESTS

Starting: 07/06/2019

Ending: 23/09/2019

APPLICANT

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ISTANBUL

Att. Ibrahim Susin

IDENTIFICATION AND DESCRIPTION OF SAMPLES

REFERENCES

ARC PROTECTIVE T-SHIRT

According to the information supplied by the customer:

Article number: Aramid D50 Pike-5869

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

Weight: 200 - 220 g/m²

Style: Pique knit fabric

Color: Navy

TESTS CARRIED OUT

- PRE-TREATMENT FOR DOMESTIC WASHING AND DRYING PROCEDURES FOR TEXTILE TESTING.
- HEAT RESISTANCE.
- LIMITED FLAME SPREAD.
- DETERMINATION OF DIMENSIONAL CHANGE IN DOMESTIC WASHING AND DRYING.
- DETERMINING OF HEAT TRANSMISSION ON EXPOSURE TO FLAME.
- RADIANT HEAT.
- CONTACT HEAT.
- BURSTING RESISTANCE.
- DETERMINATION OF TEMPERATURE AND ENTHALPY OF MELTING.
- VERTICAL RESISTANCE.
- MASS PER UNIT AREA.
- ELECTRIC ARC TEST.
- CHARGE DECAY.

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

Rev.1 This revision cancels and replaces the previous
New Test



RESULTS

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

Standard

ISO 6330:2012

Standard deviation

Reference

Sample1 ARC PROTECTIVE T-SHIRT

Units 1**Equipment** Wascator 04123E12**Washing procedure** 4N **Washing cycles** 5**Drying procedure**

C (horizontal)

Washing powder

ECE detergent 98 + sodium perborate + TAED

Units	Dry mass of the samples	Equipment
1	2,100 Kg	Wascator 04123E12

Start and finish date

02/07/2019 - 03/07/2019

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RESULTS

HEAT RESISTANCE

Standard

ISO 17493:2016

Apparatus

Air stove

Temperature

(180 ± 5) °C

Length of the test

5 min (+0,15/-0) min

Deviation from the Standard

Test uncertainty

± 0,6 %

Pre-Treatment

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

Tested material

Navy blue knitted fabric

Reference

ARC PROTECTIVE T-SHIRT

>>>



RESULTS

Fabric			
Flame	Melting	Shrink	Elongation
No	No	Lengthwise	+ 2,3 %
		Crosswise	+ 0,2 %
No	No	Lengthwise	+ 2,7 %
		Crosswise	+ 1,6 %
No	No	Lengthwise	+ 2,6 %
		Crosswise	+ 0,5 %

PERFORMANCE LEVEL ACCORDING TO EN ISO 11612:2015

PASS

PERFORMANCE LEVEL ACCORDING TO IEC 61482-2:2018

PASS

Requirements to meet according to EN ISO 11612:2015

- | |
|----------------------------------|
| a) No layer can ignite |
| b) No layer can melt |
| c) No layer shrinks more than 5% |

Requisites to meet according to IEC 61482-2:2018, point 4.3.1

- | |
|----------------------------------|
| a) No layer can ignite |
| b) No layer can melt |
| c) No layer shrinks more than 5% |

///



RESULTS

HEAT RESISTANCE

Standard

ISO 17493:2016

Apparatus

Estufa de aire
Air stove

Temperature

(180 ± 5) °C

Length of the test

5 min (+0,15/-0) min

Deviation from the Standard

Test uncertainty

± 0,6 %

Pre-treatment

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

Tested material

Hardware: Plastic button, elastic neck (navy blue knitted fabric)

Reference

ARC PROTECTIVE T-SHIRT

>>>



RESULTS

Hardware	Flame	Melting	Separation	Hardware correctly work
Plastic button	No	No	No	Yes
Elastic neck (navy blue woven fabric)	No	No	No	Yes

PERFORMANCE LEVEL ACCORDING TO EN ISO 11612:2015

PASS

Requirements to meet according to EN ISO 11612:2015

a) No hardware/strip/seam shall ignite or melt

b) Closures opens

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RESULTS

HEAT RESISTANCE

Standard

ISO 17493:2016

Apparatus

Air stove

Temperature

(180 ± 5) °C

Length of the test

5 min (+0,15/-0) min

Deviation from the Standard

Test uncertainty

± 0,6 %

Pre-Treatment

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

Tested material

Navy blue knitted fabric

Reference

ARC PROTECTIVE T-SHIRT

>>>



RESULTS

Fabric			
Flame	Melting	Shrink	Elongation
No	No	Lengthwise	+ 2,3 %
		Crosswise	+ 0,2 %
No	No	Lengthwise	+ 2,7 %
		Crosswise	+ 1,6 %
No	No	Lengthwise	+ 2,6 %
		Crosswise	+ 0,5 %

PERFORMANCE LEVEL ACCORDING TO EN ISO 11612:2015

PASS

PERFORMANCE LEVEL ACCORDING TO IEC 61482-2:2018

PASS

Requirements to meet according to EN ISO 11612:2015

a) No layer can ignite
b) No layer can melt
c) No layer shrinks more than 5%

Requisites to meet according to IEC 61482-2:2018, point 4.3.1

a) No layer can ignite
b) No layer can melt
c) No layer shrinks more than 5%

///



RESULTS

LIMITED FLAME SPREAD

Standard

EN ISO 15025:2002 (Method A)

Apparatus

Equipment for determination of limited flame spread 13008IE12

After pre-treatment test date

17/07/2019

Test date**Conditioned**

24h in indoor ambient conditions at (20 ± 2) °C and (65 ± 5) % RH

Ambient conditions test

24, 2°C and 45, 5% RH

Gas used

Propane gas

Deviation from the standard

Face exposed to the flame

Surfaces: Outer

Tested material

Navy blue knitted fabric

Test uncertainty

$\pm 0,29$ s

Reference

ARC PROTECTIVE T-SHIRT

>>>



RESULTS

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

Specimen	1	2	3
Flaming to top or either side edge	No	No	No
Post- After flame (s)	0	0	0
Afterglow time (s)	0	0	0
Melting	No	No	No
Loose waste	No	No	No
Inflammation of the filter paper detached from waste	No	No	No
Hole formation	No	No	No
Seams separation	No	No	No

PERFORMANCE LEVEL ACCORDING TO EN ISO 11612:2015 A1

Requirements to be met according to standard EN ISO 11612:2015

a) No specimen must ignite toward the top or toward the edges
b) No specimen shall give hole formation of 5 mm or greater in any direction
c) No specimen shall give flaming or molten debris
d) The after flame time shall be ≤ 2 s
e) The after flame time shall be ≤ 2 s
f) Seams do not separate

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RESULTS

LIMITED FLAME SPREAD

Standard

EN ISO 15025:2002 (Method A)

Apparatus

Equipment for determination of limited flame spread 13008IE12

After pre-treatment test date

25/07/2019

Conditioned

24h in indoor ambient conditions at (20 ± 2) °C and (65 ± 5) % RH

Ambient conditions test

23, 9°C and 43, 3% RH

Gas used

Propane gas

Deviation from the standard

Face exposed to the flame

Surface: Outer

Tested material

Hardware: Plastic button, elastic neck (navy blue knitted fabric).

Test uncertainty

$\pm 0, 29$ s

Reference

ARC PROTECTIVE T-SHIRT

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RESULTS

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

Hardware	Plastic button			Elastic neck (navy blue knitted fabric)		
Flaming to top or either side edge	No	No	No	No	No	No
Post- After flame (s)	0	0	0	0	0	0
Afterglow time (s)	0	0	0	0	0	0
Loose waste	No	No	No	No	No	No
Inflammation of the filter paper detached from waste	No	No	No	No	No	No
Hole formation	No	No	No	No	No	No
Closures can be opened	Yes	Yes	Yes	Yes	Yes	Yes

PERFORMANCE LEVEL ACCORDING TO EN ISO 11612:2015 A1

Requirements to be met according to standard EN ISO 11612:2015

a) No specimen shall give flaming to top or either side edge
b) No specimen shall give hole formation in any layer of 5 mm or greater in any direction.
c) No specimen shall give flaming or molten debris
d) The afterflame time is ≤ 2 s
e) The afterglow time is ≤ 2 s
f) Closures can be opened

///



RESULTS

DETERMINATION OF DIMENSIONAL CHANGE IN DOMESTIC WASHING AND DRYING

Standard

EN ISO 5077:2008

Standard deviation

Preparation, marking and measuring of fabric specimens according to EN ISO 3759:2011
Starting test date 02/07/2019 **Ending test date** 12/07/2019

Washing procedure

 4N ($T^a = 40 \pm 3^\circ\text{C}$; Total dry load test samples and the counterweight 2 ± 0.1 Kg) according to ISO 6330:2012

Used apparatus

Wascator type A-Horizontal drum, front loading (04123E12)

Detergent

98 ECE reference detergent without optical brightener.

Counterweight

Type III - 100% polyester

Number of washing cycles

5

Procedure C – Flat dry
Uncertainty of test (% of the measured value)
 $\pm 15 \%$
Tested material

Navy knitted fabric

Reference	Specimen	Direction	Dimensional change (%)
ARC PROTECTIVE T-SHIRT	1	Lengthwise	-4,0
		Crosswise	0,0

REMARK

Negative dimensional change indicates shrinkage

Positive dimensional change indicates lengthening

REQUISITE

 In accordance with the Standard EN ISO 13688:2013, the dimensional change of knitted fabrics shall not exceed $\pm 5\%$, both in width Crosswise and in length Lengthwise.

PASS

>>>



RESULTS

REQUISITE

In accordance with the Standard EN ISO 11612:2015, the dimensional change of knitted fabrics shall not exceed $\pm 5\%$, both in width Crosswise and in length Lengthwise.

PASS

REQUISITE

In accordance with the Standard EN ISO 11611:2015, the dimensional change of knitted fabrics shall not exceed $\pm 5\%$, both in width Crosswise and in length Lengthwise.

PASS

REQUISITE

In accordance with the Standard EN 61482-1-2:2014, the dimensional change of knitted fabrics shall not exceed $\pm 5\%$, both in width Crosswise and in length Lengthwise.

PASS

REQUISITE

In accordance with the Standard IEC 61482-2:2018, the dimensional change of knitted fabrics shall not exceed $\pm 5\%$, both in width Crosswise and in length Lengthwise.

PASS

///



RESULTS

DETERMINING OF HEAT TRANSMISSION ON EXPOSURE TO FLAME

Standard

ISO 9151:2016

Apparatus

Convective heat

Heat flux density

80,38 kW/m²

Pre-Treatment

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

Conditioned

24h in indoor ambient conditions at (20 ± 2) °C and (65 ± 5) % RH

Ambient conditions test

24,1 °C and 42 % RH

Deviation from the Standard

Test date

24/07/2019

Tested material

Navy blue woven fabric

Test uncertainty

± 0,14 s

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RESULTS

Reference	Specimen	Range HTI ^a 12 values(s)	Range HTI ^a 24 values(s)
ARC PROTECTIVE T-SHIRT	1	4,4	6,4
	2	3,6	5,5
	3	3,6	5,5
	Classification value	3,6	5,5
	Average	3,9	5,8

PERFORMANCE LEVEL ACCORDING TO EN ISO 11612:2015

B1

Results in according with standard EN ISO 11612:2015

Performance level	Range of HTI ^a 24 values (s)	
	Minimum	Maximum
B1	4,00	< 10,0
B2	10,0	< 20,0
B3	20,0	

^a: Heat transfer index, as defined in ISO 9151:1995

These results have been obtained according by a test method intended solely to rank the material and are not necessarily applicable to actual fire conditions.

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RESULTS

RADIANT HEAT

Standard

EN ISO 6942:2002, method B

Apparatus

Equipment for the determination of radiant heat

Heat flux density

19,93 kW/m²

Pre-Treatment

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

Conditioned

24h in indoor ambient conditions at (20 ± 2) °C and (65 ± 5) % RH

Ambient conditions test

23,8 °C and 46 % RH

Deviation from the Standard

Test date

19/07/2019

Tested material

Navy blue knitted fabric

Test uncertainty

± 0,34 s

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RESULTS

Reference	ARC PROTECTIVE T-SHIRT		
Specimen	Heat transfer index RHTI 12(s)	Heat transfer index RHTI 24(s)	TF(%)
1	6,2	12,2	57,25
2	6,3	12,1	57,85
3	6,3	12,1	57,89
Classification value	6,3	12,1	57,8
Average	6,3	12,1	57,7

PERFORMANCE LEVEL ACCORDANCE WITH STANDARD EN ISO 11612:2015 C1

Results in accordance with Standard EN ISO 11612:2015

Performance level	Range of RHTI ^a 24 values	
	Minimum	Maximum
C1	7,0	< 20,0
C2	20,0	< 50,0
C3	50,0	< 95,0
C4	95,0	

Heat transfer index, as defined in EN ISO 6942:2002

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RESULTS

CONTACT HEAT

Standard

EN ISO 12127-1:2015

Apparatus

ÖTI CONTACT HEAT PROTECTION TESTER

Conditioned

24h in indoor ambient conditions at (20 ± 2) °C and (65 ± 5) % HR

Ambient conditions test

23, 8 °C and 53, 2 % HR

Pre-Treatment

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

Deviation from the Standard

Test date

15/07/2019

Tested material

Navy blue knitted fabric

Test uncertainty

$\pm 0,13$ s

Reference

ARC PROTECTIVE T-SHIRT

>>>



RESULTS

Specimen	Contact temperature (°C)	Threshold time (s)
1	250	9,57
2	250	9,68
3	250	9,79
Classification value	250	9,6
Average	250	9,7

PERFORMANCE LEVEL ACCORDING TO EN ISO 11612:2015 F1

Requirements according to standard EN ISO 11612:2015

Performance levels	Threshold time (s)
	Minimum Max.
F1	5,00 < 10,0
F2	10,0 < 15,0
F3	15,0

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RESULTS

BURSTING RESISTANCE

Standard

EN ISO 13938-1:1999

Apparatus

Autoburst SDL-ATLAS M-229

Atmosphere for conditioning and testing

Temperature (20±2) °C **Relative humidity** (65±4) %

Test conditions

Dry specimen

Test surface 50 cm² **Test duration** (20±5) seg.

Nº of specimens

Tested 5 **Rejected** 0

Bursting in the proximity of the clamps

0

Observations

Breakage in a direction

Pre-treatment

5 cycles of washing at 40°C, according ISO 6330:2012, method 4N and C Drying

Reference	Bursting distension (mm)	Bursting strength (kPa)	
ARC PROTECTIVE T-SHIRT	38.3	1. 386.0	368.9
		2. 362.2	
		3. 356.2	
		4. 370.4	
		5. 369.9	

Remark

The relative expanded uncertainty of Bursting resistance according to standard EN ISO 13938-1:1999 is ±8% assay value of the measured, for a probability of coverage of 95%.

REQUISITE ACCORDING TO STANDARD EN ISO 11612:2015

The minimum bursting resistance has to be ≥100 KPa.

PASS

REQUISITE ACCORDING TO STANDARD IEC 61482-2:2009

The minimum bursting resistance has to be ≥ 100 KPa.

PASS

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RESULTS

BURSTING RESISTANCE

Standard

EN ISO 13938-1:1999

Apparatus

Autoburst SDL-ATLAS M-229

Atmosphere for conditioning and testing

Temperature (20±2) °C **Relative humidity** (65±4) %

Test conditions

Dry specimen

Test surface 50 cm² **Test duration** (20±5) seg.

N° of specimens

Tested 5 **Rejected** 0

Bursting in the proximity of the clamps

0

Observations

Breakage in a direction

Pre-treatment

5 cycles of washing at 40°C, according ISO 6330:2012, method 4N and C Drying

Reference	Bursting distension (mm)	Bursting strength (kPa)	
ARC PROTECTIVE T-SHIRT (SEAMS)	39.8	1. 349.2	359.0
		2. 374.8	
		3. 336.8	
		4. 339.8	
		5. 394.2	

Remark

The relative expanded uncertainty of Bursting resistance according to standard EN ISO 13938-1:1999 is ±8% assay value of the measured, for a probability of coverage of 95%.

REQUISITE ACCORDING TO STANDARD EN ISO 11612:2015

The minimum bursting resistance has to be ≥100 KPa.

PASS

REQUISITE ACCORDING TO STANDARD IEC 61482-2:2009

The minimum bursting resistance has to be ≥ 100 KPa.

PASS

///



RESULTS

DETERMINATION OF TEMPERATURE AND ENTHALPY OF MELTING

Standard

ISO 11357-1:2016

ISO 11357-3:2018

ApparatusDifferential scanning calorimeter DSC 3+/METTLER of heat flow rate with aluminum crucible 40 μ l**Calibration**

Calibration type Simple

Procedure

Standard reference materials: Indian de 99,99999 % putity, 4,80 mg

Zinc de 99,99998% de purity, 2,80 mg

Tin de 99,99998% de purity, 6,00 mg

Test conditionsGas: N₂ Grade: 99,99% Flow rate: 50ml/min**Previous conditioning**According standard EN 20139-1993 (20 \pm 2 $^{\circ}$ C y 65 \pm 4%HR)**Number of specimens:**

2

Temperaturas programFirst heating cycle from 20 to 300 $^{\circ}$ C at 20 $^{\circ}$ C/minIsotherm at 300 $^{\circ}$ C,5 minutesCooling cycle at 20 $^{\circ}$ C/min until 20 $^{\circ}$ CSecond heating cycle from 20 to 300 $^{\circ}$ C at 20 $^{\circ}$ C/min

>>>



RESULTS

DETERMINATION OF TEMPERATURE AND ENTHALPY OF MELTING

Start date test

11/06/2019

End date test

11/06/2019

Results

Reference	Heat of fusion
ARC PROTECTIVE T-SHIRT (sewing thread)	NO MELT

Requisite

According standard IEC 61482-2:2018 (points 4.2 and 5.2.5), sewing thread utilized in the construction of garments shall be made of an inherently flame-resistant fibre and shall not melt when tested according to ISO 3146 Method B at a temperature of $260\text{ °C} \pm 5\text{ °C}$.

PASS

///



RESULTS

VERTICAL RESISTANCE

Standard

EN 1149-2:1997

Conditioned

24h. environmental conditions to $(20 \pm 2 \text{ }^\circ\text{C})$ and $(85 \pm 5) \% \text{ RH}$

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

10 V

Current measurement after

15 s

Test date

26/07/2019

Tested material

Navy blue knitted fabric

>>>



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 T-SHIRT

Specimen	Vertical Resistance (Ohm)
1	$7,93 \cdot 10^5$
2	$7,24 \cdot 10^5$
3	$6,57 \cdot 10^5$
4	$8,06 \cdot 10^5$
5	$5,12 \cdot 10^5$
Classification value	5,12
Average (Ohm)	$6,98 \cdot 10^5$

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

Note

The vertical resistance very close to 105Ω is tested using a voltage of 10 V (at 1149-2:1997 Pto. 7.3)

ACCORDING TO STANDARD IEC 61482-2:2018 PASS

REQUIREMENT

According to the Standard IEC 61482-2:2018, point 4.3.2, the vertical resistance must be at least than 105Ω .

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RESULTS

MASS PER UNIT AREA

Standard

EN 12127:1997; pto. 8.3

Conditioning date

10/06/2019

Test date

11/06/2019

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 T-SHIRT	221	1.57

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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	Knitted fabric, navy blue colour with a weight according to the customer of 180 g/m ²

Test conditions	
Class	Class 1
Testing atmosphere	23,73 °C 39,50 % RH
Test current I_{class} for class 1	4 kA ± 5%
Calibration test current	3892,92 A
Average direct exposure incident energy E_{io}	153,57 kJ/m ²
Arc duration	500 ms ± 5%
Average real arc duration	475,85 ms
Test voltage	400 V ± 5%
Average real test voltage	394,4425 V
Average real Arc Energy W_{arc}	166,29 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

03/07/2019 - 09/07/2019

Observation or deviation of the standard

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RESULTS

ELECTRIC ARC TEST

Testing date 09/07/2019
Reference ARC PROTECTIVE T-SHIRT

VISUALLY OBTAINED DATA

Property	Measurement	Specimen 1	Specimen 2	Specimen 3	Specimen 4
	Class	1	1	1	1
Burning time	Video	0,00 s	0,00 s	0,00 s	0,00 s
Hole formation > 5 mm	Visual	No	No	No	No
Melting through to the inner side	Visual	No	No	No	No
Embrittlement	Visual	No	No	No	No
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	No	No	No	No

>>>



RESULTS

ELECTRIC ARC TEST

Reference

ARC PROTECTIVE T-SHIRT

COMPUTER OBTAINED DATA

Class 1				
Property	Specimen 1	Specimen 2	Specimen 3	Specimen 4
Transmitted incident energy E_{it}	76,48 kJ/m ²	83,26 kJ/m ²	73,32 kJ/m ²	83,29 kJ/m ²
Time to delta peak temperature t_{max}	29,79 s	29,62 s	29,62 s	29,50 s
Delta peak temperature ΔT_p	13,86 °C	15,08 °C	13,28 °C	15,09 °C
Differences ΔE_i of the transmitted energy values to the Stoll limit value at t_{max}	-57,91 kJ/m ²	-50,91 kJ/m ²	-60,85 kJ/m ²	-50,72 kJ/m ²
Maximum difference between the transmitted energy E_{it} to the Stoll energy E_{iSTOLL} in $t_i^{(1)}$	-20,33 kJ/m ²	-18,59 kJ/m ²	-18,78 kJ/m ²	-18,11 kJ/m ²
Excess of the Stoll curve by the heat curve of the transmitted incident energy $E_{it}(t)$	No	No	No	No

>>>



RESULTS

ELECTRIC ARC TEST

Remark

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 1**

PASS

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

- | |
|---|
| 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. |
- >>>



RESULTS

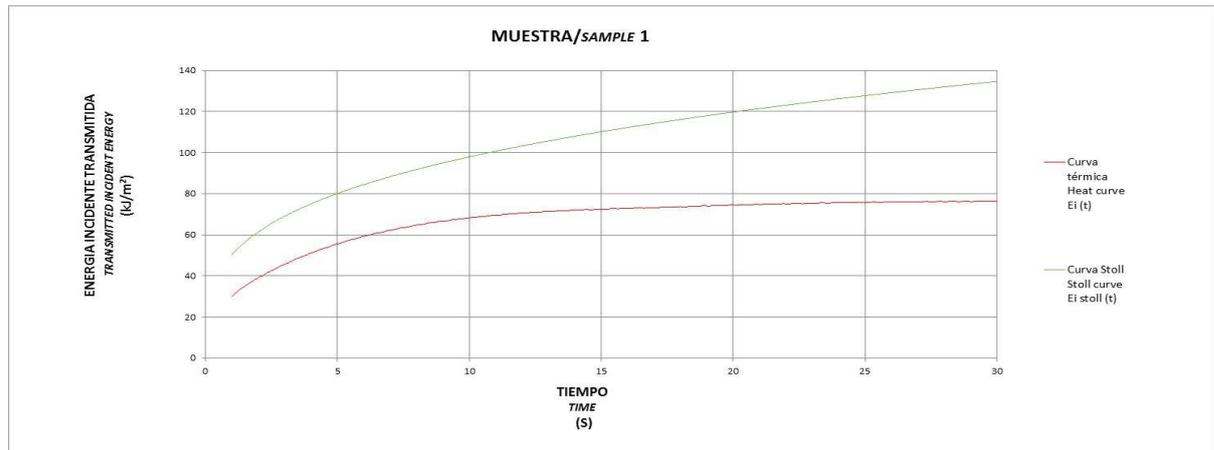
ELECTRIC ARC TEST

STOLL CURVES

Specimen 1

Reference

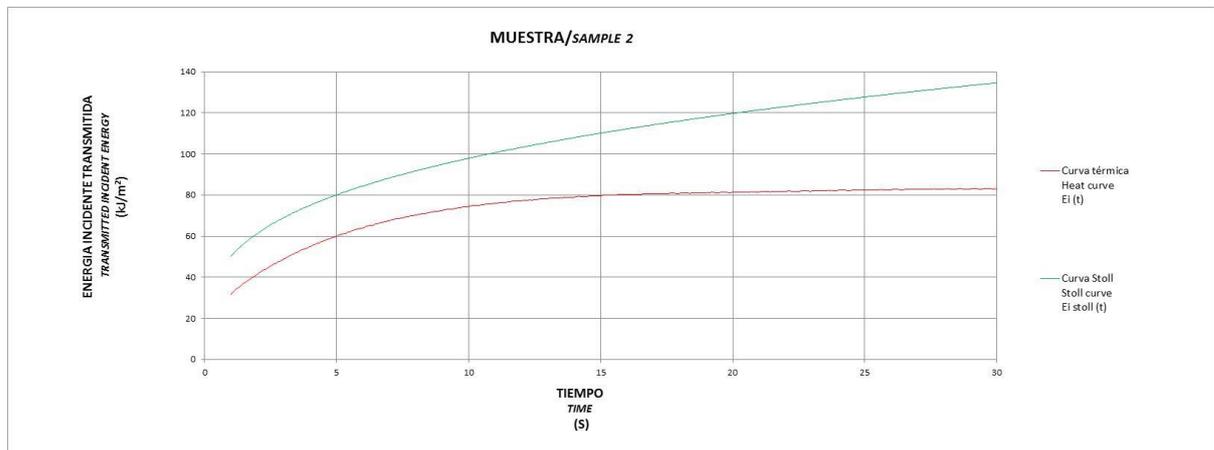
1- ARC PROTECTIVE T-SHIRT



Specimen 2

Reference

2- ARC PROTECTIVE T-SHIRT



>>>



RESULTS

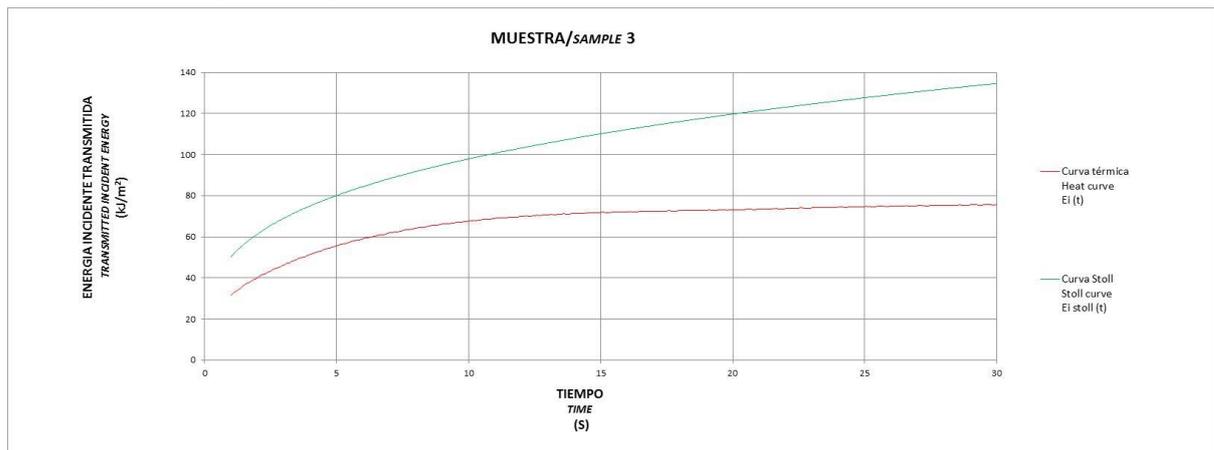
ELECTRIC ARC TEST

STOLL CURVES

Specimen 3

Reference

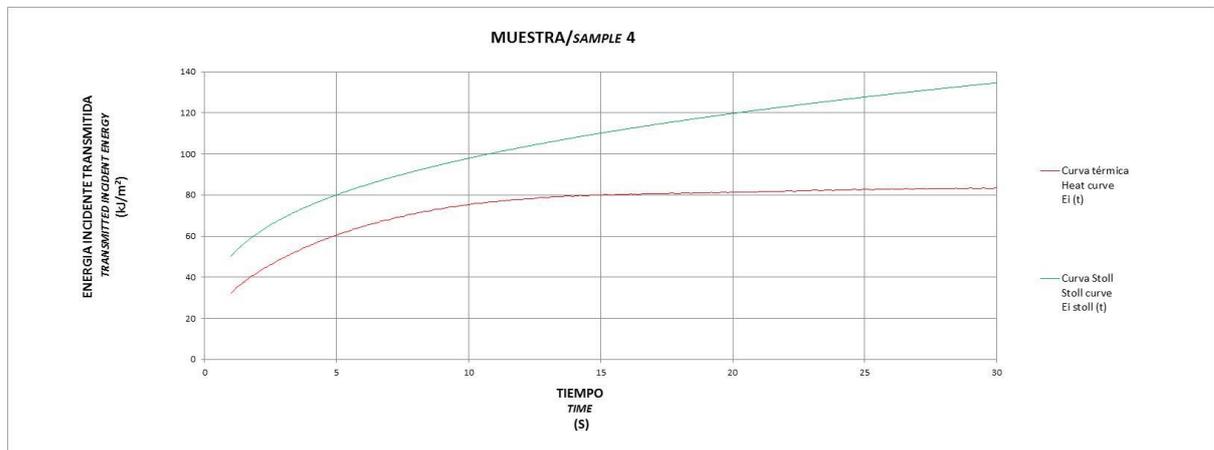
3- ARC PROTECTIVE T-SHIRT



Specimen 4

Reference

4- ARC PROTECTIVE T-SHIRT



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RESULTS

ELECTRIC ARC TEST

Reference

ARC PROTECTIVE T-SHIRT

Original material



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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RESULTS

CHARGE DECAY

Standard

EN 1149-3:2004 (Method 2, induction charging)

Conditioned

24h environmental conditions to (23 ± 1) °C and (25 ± 5) % RH

Ambient conditions test

22,8 °C and 29,8 % RH

Test method used

Induction charge (Test method 2)

Potential applied

(1200 ± 50) V in 30 μ s

Time measurement

30 s

Deviation from the Standard

Tested material

Navy blue knitted fabric

Measurement uncertainty

Shielding factor: $\pm 0,02$

t_{50} : $\pm 0,01$ s

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RESULTS

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 T-SHIRT	
Specimen	Decay half time (s) t_{50}	Shielding factor (units) S
1	< 0,01	0,53
2	< 0,01	0,51
3	0,42	0,49
Average	< 0,15	0,51

ACCORDING TO STANDARD EN 1149-5:2018

PASS

ACCEPTANCE CRITERION ACCORDING TO EN 1149-3:2004 AND EN 1149-5:2018, METHOD INDUCTION CHARGING

Requirements according to Standard EN 1149-5:2018 for the induction charge method according to the Standard EN 1149-3:2004 are:

$$t_{50} < 4s \text{ ó } S > 0,2$$

Where, t_{50} = decay half time
S = shielding factor

Start and finish test date

11/07/2019 - 15/07/2019

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Begoña Pico
Head of Public Tenders Division

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- 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.
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- 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.