

TEST REPORT

2024EP0534

DATE OF RECEPTION

Date Format: dd/MM/yyyy 01/02/2024

DATE TESTS

Starting: 06/02/2024

Ending: 22/02/2024

APPLICANT

PORTWEST UC
WESTPORT BUSINESS AND TECHNOLOGY PARK
WESTPORT (CO MAYO)
Ireland

Att. Celia Cunney

IDENTIFICATION AND DESCRIPTION OF SAMPLES

Reference by AITEX	Reference by customer	AITEX sample description
2024EP0534-S01	AF73	Coverall

TESTS CARRIED OUT

- PRE-TREATMENT FOR DOMESTIC WASHING AND DRYING PROCEDURES FOR TEXTILE TESTING.
- PROTECTIVE CLOTHING AGAINST HEAT AND FLAME – TEST METHOD FOR COMPLETE GARMENTS – PREDICTION FOR BURN INJURY USING AN INSTRUMENTED MANIKIN.

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



**DESCRIPTION OF SAMPLES**

Reference by AITEX: 2024EP0534-S01

Reference by customer:

AF73

AITEX Subsamples	Subsample Description
2024EP0534-S01_P1	After 1 wash cycle / Coverall



RESULTS

SAMPLE DESCRIPTION

REFERENCE:

AF73

SAMPLE TYPE:

Coverall

BODY PARTS COVERED BY THE GARMENT:

Torso, neck, and the upper and lower extremities, apart from the hands and feet.

SIZE:

42

GARMENT LAYERS:

Layer 1	Navy blue woven fabric, 93% para-aramid, 5% meta-aramid, 2% antistatic, 150 g/m ² , according to the information supplied by the customer.
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PARTS OF THE GARMENT:

Collar	Double fabric layer 1.
Front	Four pieces of fabric layer 1.
Back	Three piece of fabric layer 1.
Sleeves	Long sleeves.
Closure system	Zipper with flap closed by snap buttons.
Collar closure system	No.
Cuff closure system	Self-fastening tape.
Reflective trim	One around each leg and arm and one at each shoulder.
Pockets	Patch pocket with flap and snap buttons (seat)+ French pockets + Patch pocket with flap and zipper (chest)
Belt loops	No.
Legs	Longs.
Waistband adjustment system	Elastic tape.
Bottom	No.
Others	Sewn logos.



RESULTS

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

Standard

EN ISO 6330:2021

Test date

Start date

06/02/2024

End date

06/02/2024

Washing procedure

6N

Washing temperature

60°C

Washing cycles

1

Dryer type

James Heal

Drying procedure

F (type A1 tumble drying)

Drying temperature

60°C

Washing powder

Reference detergent 3

Reference

2024EP0534-S01

Units	Dry mass of the samples(Kg)	Counterweight mass(Kg)	Counterweight type	Equipment
1	1.5	0.5	Type III	WASCATOR
2	1.5	0.5	Type III	WASCATOR

The test was carried out at laboratory located at Carretera Banyeres s/n - 03802 Alcoi, Alicante

Reference	Description
2024EP0534-S01	AF73



RESULTS

PROTECTIVE CLOTHING AGAINST HEAT AND FLAME – TEST METHOD FOR COMPLETE GARMENTS – PREDICTION FOR BURN INJURY USING AN INSTRUMENTED MANIKIN

THERMO TEX TEST

Standard

ISO 13506-1:2017

Test type

End-use garment specification

Testing date

22/02/2024 - 22/02/2024

Reference

2024EP0534-S01_P1

Underwear and accessories

Shirt underwear	Long sleeves shirt 100% cotton, 140 g/m ²
Trousers underwear	Long trousers 100% cotton, 140 g/m ²

Holes and/or cuts

Top back of the T-shirt undergarment

Apparatus

Instrumented Manikin

Test uncertainty

± 7% of the measurand's value, for a coverage value of K=2 (95%)

Conditioning

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

Pre-treatment

1 cycles of washing at 60°C, according to standard EN ISO 6330:2021, method 6N and drying process F

Pre-treatment starting date

06/02/2024

Pre-treatment ending date

06/02/2024

Observation or deviation of the standard



Exposure conditions:

Total number of burners: 12 in two tiers of six surrounding the manikin. The lower set of six burners are pointed at the legs and lower body of the manikin whilst the upper set of six burners are pointed at the upper body and head

Nominal exposure heat flux density level

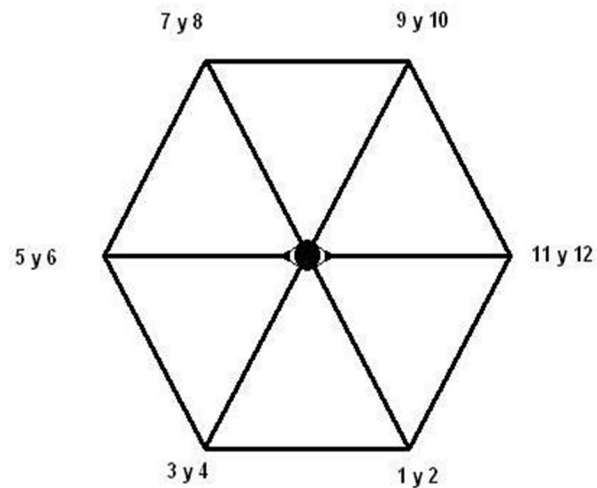
84 kW / m² ± 5%

Duration of the exposure 4 s
Duration of the data acquisition 60 s

Level of the exposure	Before the test	After the test	
Average of heat flux density	86.22 kW/m ²	83.68 kW/m ²	kW/m ²
Standard deviation of the average of heat flux density	17.29 kW/m ²	16.71 kW/m ²	-

Distribution of burners surrounding the mannequin:

Number of burners: 12





Sample n° 1 Ref.- 2024EP0534-S01_P1

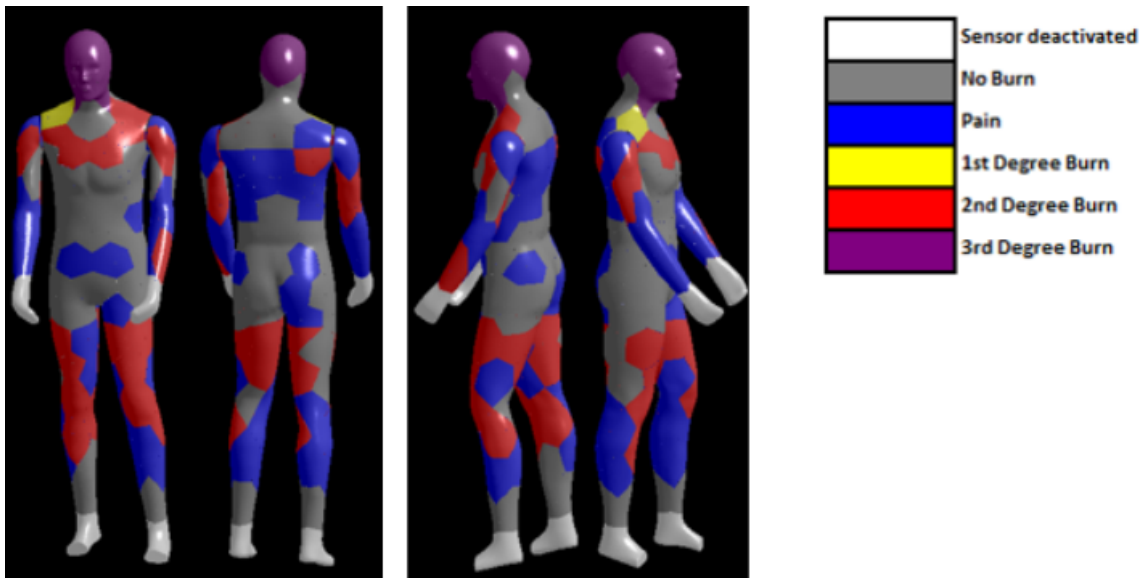
Duration of the exposure	4 s
Duration of the data acquisition	120 s
Temperature of the exposure chamber before the test	20,1 °C

Total Surface Area	1,80 m ²
Total Clothed Surface Area	1,68 m ²
Total transferred energy	202,72 kJ

Predicted total burn injury of the manikin

For this test, therefore, hands and feet are not included in the calculations.

First-degree burn injury area (%)	2nd degree burn injury area (%)	3rd-degree burn injury area (%)	Predicted total area of burn injury (2nd and 3rd degree) (%)
0,8	23,3	6,7	30,0





Sample n° 1 Ref.- 2024EP0534-S01_P1

Property	Measurement	Sample 1	Remark
Afterflame time	Video	1,2 s.	---
Hole formation	Visual	Yes	---
Melting	Visual	Yes	Labels
Embrittlement	Visual	Yes	---
Smoke	Visual	Yes	---
Dripping	Visual	No	---
Shrinkage	Visual	Yes	---
Functioning of garment accessories	Visual	Correct	---


Heat Flux, Standard Deviation, Transferred Energy and Energy Transmission Factor per Body part

Sensor/temp.	Sample 1
Left arm – Heat Flux (kW/m ²)	1,0
Left arm – Stdev (kW/m ²)	0,2
Left arm – Transferred energy (kJ)	22,3
Left arm – Energy transmission factor	0,4
Right arm – Heat Flux (kW/m ²)	1,1
Right arm – Stdev (kW/m ²)	0,2
Right arm – Transferred energy (kJ)	22,9
Right arm – Energy transmission factor	0,4
Left Leg – Heat Flux (kW/m ²)	1,0
Left Leg – Stdev (kW/m ²)	0,3
Left Leg – Transferred energy (kJ)	45,6
Left Leg – Energy transmission factor	0,4
Right Leg – Heat Flux (kW/m ²)	0,9
Right Leg – Stdev (kW/m ²)	0,4
Right Leg – Transferred energy (kJ)	44,5
Right Leg – Energy transmission factor	0,3
Chest and abdomen – Heat Flux (kW/m ²)	0,7
Chest and abdomen – Stdev (kW/m ²)	0,3
Chest and abdomen – Transferred energy (kJ)	32,2
Chest and abdomen – Energy transmission factor	0,3
Back – Heat Flux (kW/m ²)	0,8
Back – Stdev (kW/m ²)	0,2
Back – Transferred energy (kJ)	29,9
Back – Energy transmission factor	0,3
Total energy transferred (kJ)	202,7
Total energy transmission factor	0,3



Sample before test n° 1 Ref.- 2024EP0534-S01_P1

PHOTOS

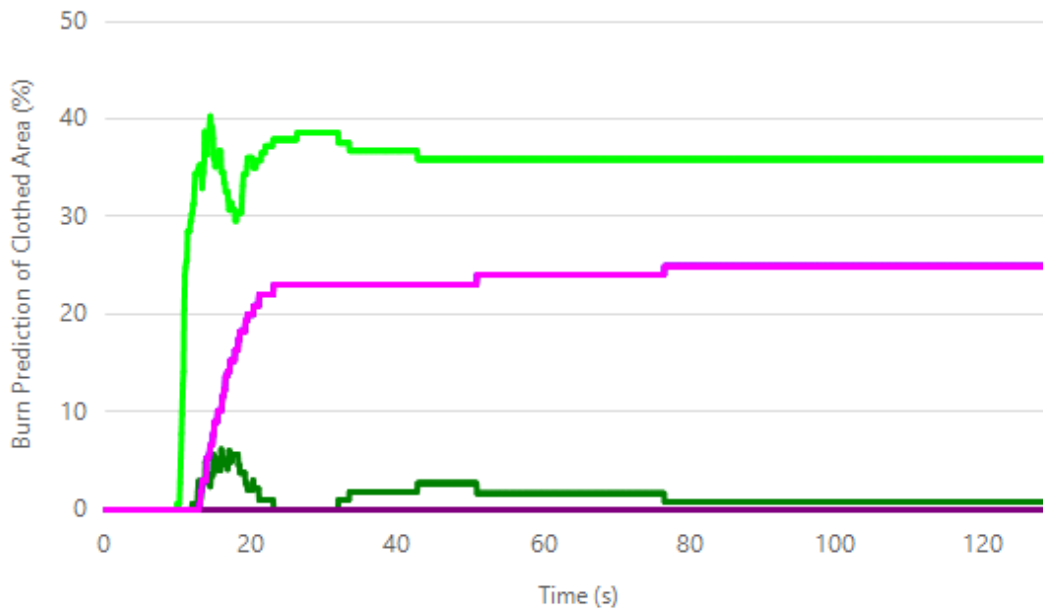




Sample n° 1 Ref.- 2024EP0534-S01_P1

Clothed Burn Injury Over Time

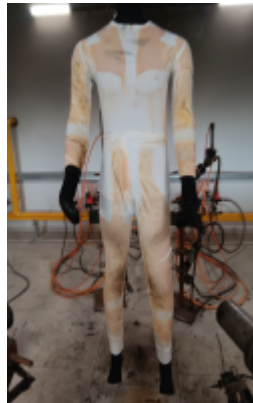
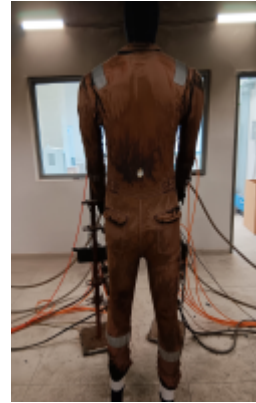
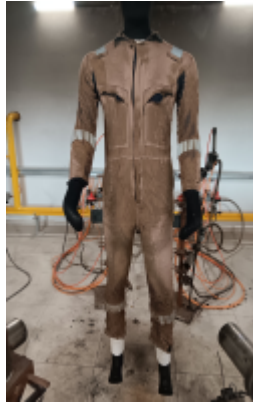
— Clothed 1st Deg Burn Area — Clothed 3rd Deg Burn Area — Total Clothed Burn Injury Area
— Clothed 2nd Deg Burn Area — Clothed Pain Area





Sample after test n° 1 Ref.- 2024EP0534-S01_P1

PHOTOS





Sample n° 2 Ref.- 2024EP0534-S01_P1

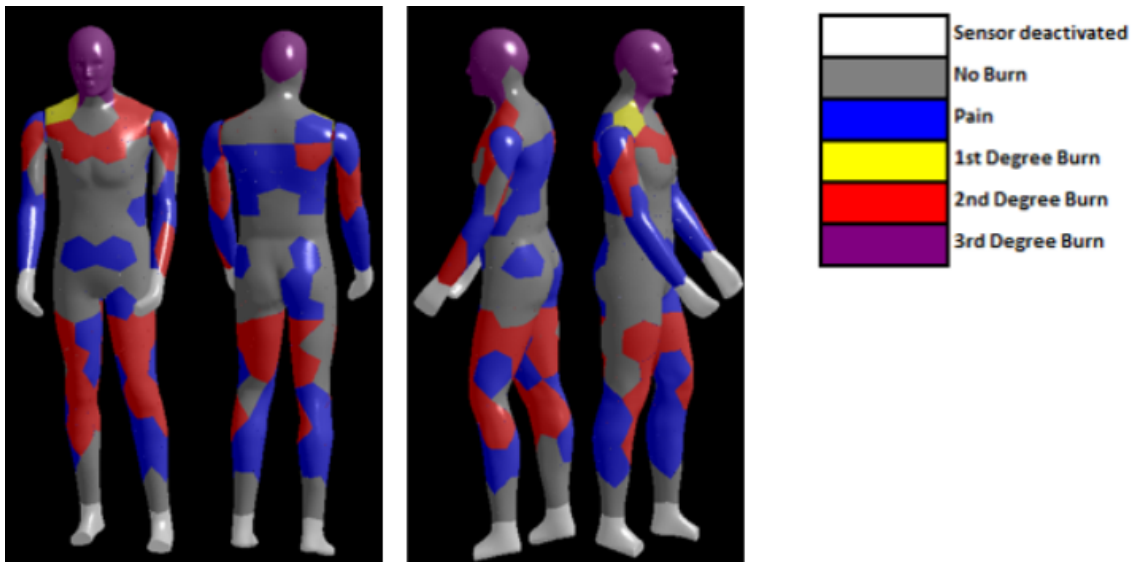
Duration of the exposure	4 s
Duration of the data acquisition	120 s
Temperature of the exposure chamber before the test	18,6 °C

Total Surface Area	1,80 m ²
Total Clothed Surface Area	1,68 m ²
Total transferred energy	202,72 kJ

Predicted total burn injury of the manikin

For this test, therefore, hands and feet are not included in the calculations.

First-degree burn injury area (%)	2nd degree burn injury area (%)	3rd-degree burn injury area (%)	Predicted total area of burn injury (2nd and 3rd degree) (%)
5,4	23,7	7,3	31,1





Sample n° 2 Ref.- 2024EP0534-S01_P1

Property	Measurement	Sample 2	Remark
Afterflame time	Video	1,1 s.	---
Hole formation	Visual	No	---
Melting	Visual	Yes	Labels
Embrittlement	Visual	Yes	---
Smoke	Visual	Yes	---
Dripping	Visual	No	---
Shrinkage	Visual	Yes	---
Functioning of garment accessories	Visual	Correct	---


Heat Flux, Standard Deviation, Transferred Energy and Energy Transmission Factor per Body part

Sensor/temp.	Sample 2
Left arm – Heat Flux (kW/m ²)	1,1
Left arm – Stdev (kW/m ²)	0,3
Left arm – Transferred energy (kJ)	23,6
Left arm – Energy transmission factor	0,4
Right arm – Heat Flux (kW/m ²)	1,1
Right arm – Stdev (kW/m ²)	0,3
Right arm – Transferred energy (kJ)	23,7
Right arm – Energy transmission factor	0,4
Left Leg – Heat Flux (kW/m ²)	1,0
Left Leg – Stdev (kW/m ²)	0,4
Left Leg – Transferred energy (kJ)	46,8
Left Leg – Energy transmission factor	0,4
Right Leg – Heat Flux (kW/m ²)	0,9
Right Leg – Stdev (kW/m ²)	0,3
Right Leg – Transferred energy (kJ)	43,2
Right Leg – Energy transmission factor	0,3
Chest and abdomen – Heat Flux (kW/m ²)	0,7
Chest and abdomen – Stdev (kW/m ²)	0,3
Chest and abdomen – Transferred energy (kJ)	32,9
Chest and abdomen – Energy transmission factor	0,3
Back – Heat Flux (kW/m ²)	0,8
Back – Stdev (kW/m ²)	0,2
Back – Transferred energy (kJ)	31,3
Back – Energy transmission factor	0,3
Total energy transferred (kJ)	206,8
Total energy transmission factor	0,3



Sample before test n° 2 Ref.- 2024EP0534-S01_P1

PHOTOS

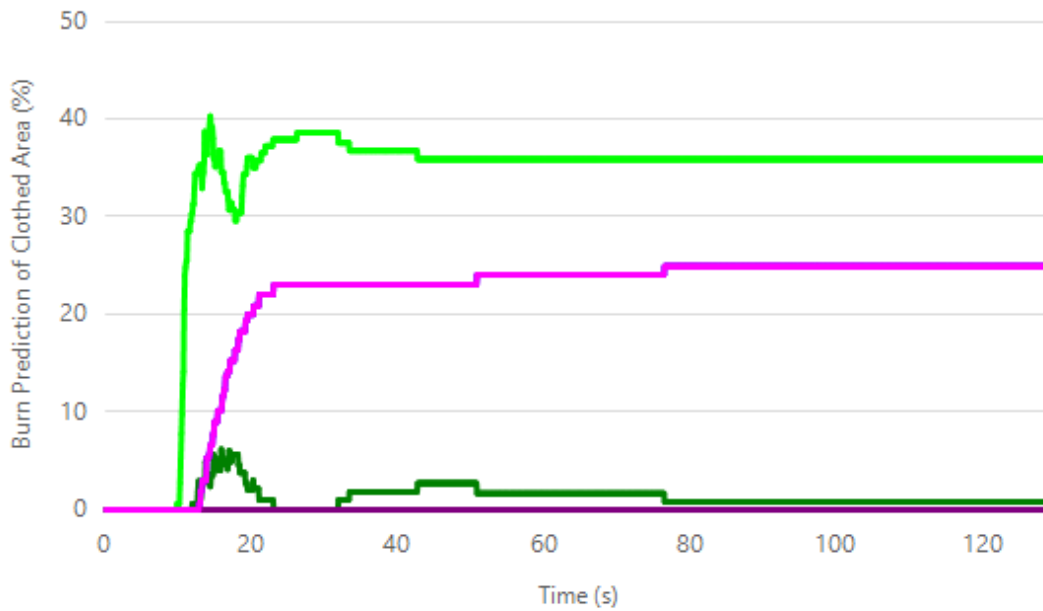




Sample n° 2 Ref.- 2024EP0534-S01_P1

Clothed Burn Injury Over Time

— Clothed 1st Deg Burn Area — Clothed 3rd Deg Burn Area — Total Clothed Burn Injury Area
— Clothed 2nd Deg Burn Area — Clothed Pain Area





Sample after test n° 2 Ref.- 2024EP0534-S01_P1

PHOTOS





Sample n° 3 Ref.- 2024EP0534-S01_P1

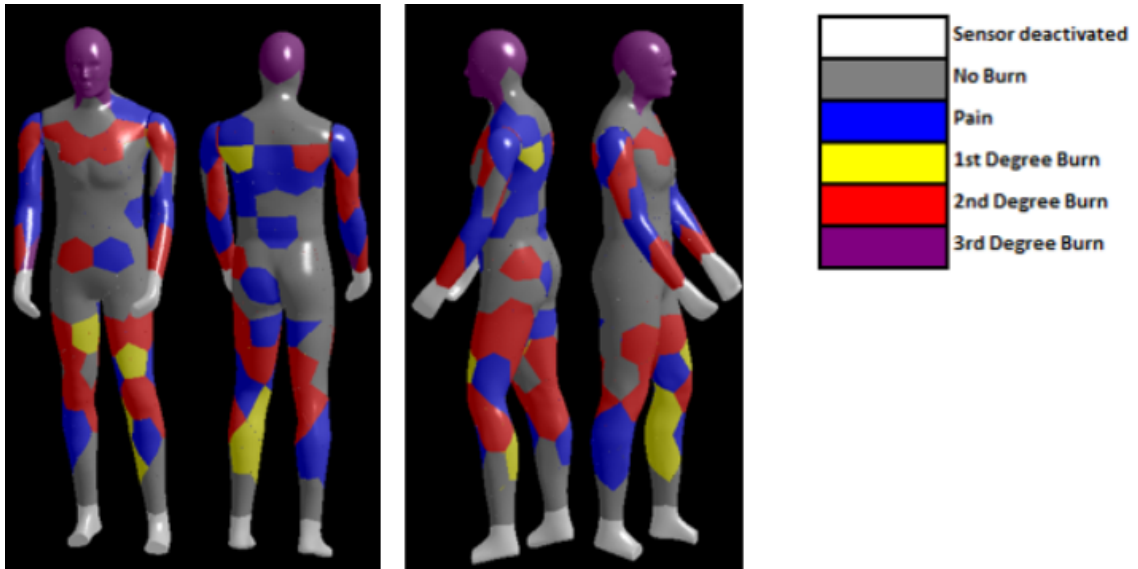
Duration of the exposure	4 s
Duration of the data acquisition	120 s
Temperature of the exposure chamber before the test	18,9 °C

Total Surface Area	1,80 m ²
Total Clothed Surface Area	1,68 m ²
Total transferred energy	201,79 kJ

Predicted total burn injury of the manikin

For this test, therefore, hands and feet are not included in the calculations.

First-degree burn injury area (%)	2nd degree burn injury area (%)	3rd-degree burn injury area (%)	Predicted total area of burn injury (2nd and 3rd degree) (%)
4,3	23,7	9,5	33,2





Sample n° 3 Ref.- 2024EP0534-S01_P1

Property	Measurement	Sample 3	Remark
Afterflame time	Video	0,9 s.	---
Hole formation	Visual	Yes	---
Melting	Visual	Yes	Labels
Embrittlement	Visual	Yes	---
Smoke	Visual	Yes	---
Dripping	Visual	No	---
Shrinkage	Visual	Yes	---
Functioning of garment accessories	Visual	Correct	---


Heat Flux, Standard Deviation, Transferred Energy and Energy Transmission Factor per Body part

Sensor/temp.	Sample 3
Left arm – Heat Flux (kW/m ²)	1,0
Left arm – Stdev (kW/m ²)	0,3
Left arm – Transferred energy (kJ)	22,3
Left arm – Energy transmission factor	0,4
Right arm – Heat Flux (kW/m ²)	1,0
Right arm – Stdev (kW/m ²)	0,3
Right arm – Transferred energy (kJ)	20,5
Right arm – Energy transmission factor	0,3
Left Leg – Heat Flux (kW/m ²)	1,0
Left Leg – Stdev (kW/m ²)	0,3
Left Leg – Transferred energy (kJ)	48,5
Left Leg – Energy transmission factor	0,4
Right Leg – Heat Flux (kW/m ²)	1,0
Right Leg – Stdev (kW/m ²)	0,3
Right Leg – Transferred energy (kJ)	44,9
Right Leg – Energy transmission factor	0,3
Chest and abdomen – Heat Flux (kW/m ²)	0,7
Chest and abdomen – Stdev (kW/m ²)	0,3
Chest and abdomen – Transferred energy (kJ)	31,2
Chest and abdomen – Energy transmission factor	0,2
Back – Heat Flux (kW/m ²)	0,8
Back – Stdev (kW/m ²)	0,3
Back – Transferred energy (kJ)	29,6
Back – Energy transmission factor	0,3
Total energy transferred (kJ)	201,8
Total energy transmission factor	0,3



Sample before test n° 3 Ref.- 2024EP0534-S01_P1

PHOTOS

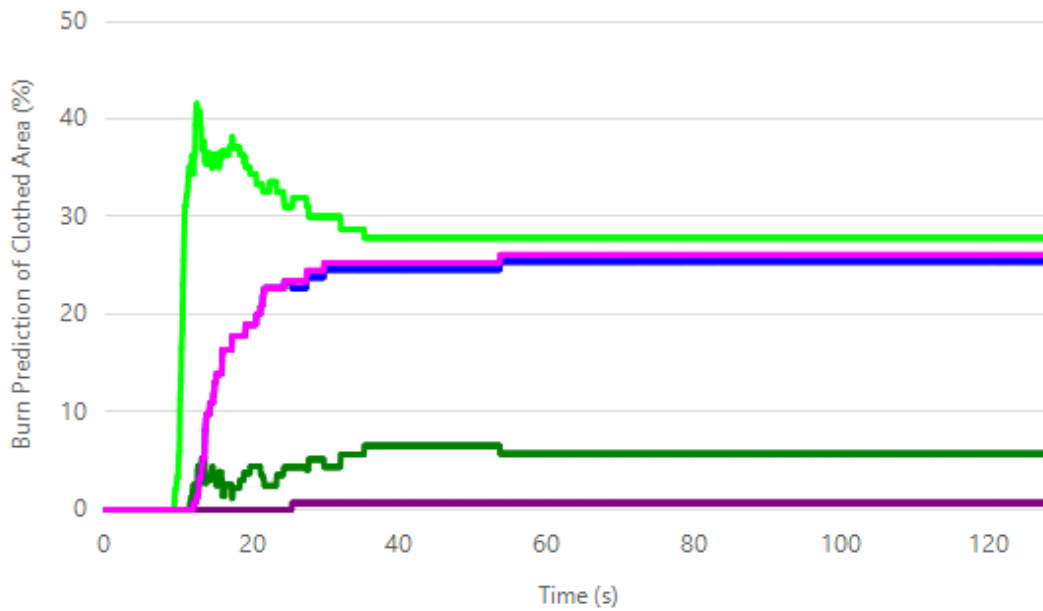




Sample n° 3 Ref.- 2024EP0534-S01_P1

Clothed Burn Injury Over Time

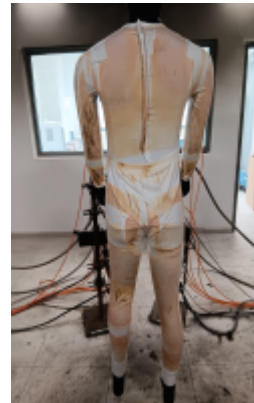
— Clothed 1st Deg Burn Area — Clothed 3rd Deg Burn Area — Total Clothed Burn Injury Area
— Clothed 2nd Deg Burn Area — Clothed Pain Area





Sample after test n° 3 Ref.- 2024EP0534-S01_P1

PHOTOS





Sample Ref.- 2024EP0534-S01_P1

Predicted burn injury on the total area of the manikin, except hands and feet.

Exposure	2nd degree burn injury area	3rd-degree burn injury area	Predicted total area of burn injury (2nd and 3rd degree)	Average	Standard deviation
1	23,3	6,7	30,0	31,4	1,6
2	23,7	7,3	31,1		
3	23,7	9,5	33,2		

Predicted burn injury on the total area of the manikin covered by the test specimen.

Exposure	2nd degree burn injury area	3rd-degree burn injury area	Predicted total area of burn injury (2nd and 3rd degree)	Average	Standard deviation
1	24,9	0,0	24,9	26,5	1,8
2	25,4	0,7	26,1		
3	25,4	3,0	28,4		

The test was carried out at laboratory located at Carretera Banyeres s/n - 03802 Alcoi, Alicante

Reference	Description
2024EP0534-S01_P1	After 1 wash cycle / Coverall



Lucia Martinez
Head of PPE and Ballistics department

Date: 22/02/2024 14:45:01

Digitally Signed by: LUCIA MARTINEZ MOLTO -

NIF: 21651425F

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