TEST REPORT

2022EP0603

DATE OF RECEPTION
28/04/2022

DATE TESTS
Starting: 28/04/2022
Ending: 12/05/2022

APPLICANT

ZOUNDS INDUSTRIES
P.O Defence Road, Akbar Abad
Sialkot - Pakistan
PK-51310
Pakistan

Att. Yakib

IDENTIFICATION AND DESCRIPTION OF SAMPLES

REFERENCES
SUMMER IFR COVERALL (ZNDSCIFR-001)

TESTS CARRIED OUT

- SAMPLE IDENTIFICATION.
- 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.

Rev.1 This revision cancels and replaces the previous
Reference error

RESULTS

SAMPLE IDENTIFICATION

Reference
SUMMER IFR COVERALL (ZNDSCIFR-001)

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SAMPLE DESCRIPTION

REFERENCE:

SUMMER IFR COVERALL (ZNDSCIFR-001)

SAMPLE TYPE:

Coverall

BODY PARTS COVERED BY THE GARMENT:

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

SIZE:

L

GARMENT LAYERS

Layer 1	Royal blue woven fabric, FIRE RETARDANT WOVEN FABRIC 93% META-ARAMID/5% PARA- ARAMID/2% ANTISTATIC 4.5 oz/yd^2, according to the information supplied by the customer.

PARTS OF THE GARMENT

Collar	Double fabric layer 1.
Front	Four pieces of fabric layer 1.
Back	Three pieces of fabric layer 1.
Sleeves	Long sleeves.
Closure system	Zipper covered with flap
Collar closure system	No.
Cuff closure system	Metal snap button.
Reflective trim	1 both shoulders + 1 both arms + 1 both legs
Pockets	1 patch pocket at both chest + 1 patch pocket at both backs + 1 ruler pocket at the arm + 2 French pockets.
Belt loops	No.
Legs	Longs.
Waistband adjustment system	Elastic tape.
Bottom	Metal snap button.
Others	---

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RESULTS

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

Standard
NFPA 2112:2018 point 8.1.3

Standard deviation

Reference
Sample 1 SUMMER IFR COVERALL (ZNDSCIFR-001)

Equipment
Pilllerin Milnor Washing Machine 13197I12

Washing procedure
Normal

Washing cycles
1

Drying procedure
Tumble dryer

Washing powder
Tergitol 15-S-9 13157N12 + Sodium Metasilicate 13158N12 + Sodium Tripolyphosphate 13206N12 + Sodium Silicofluoride 13245N12

Dry mass of the samples	Counterweight mass	Equipment
3,350 Kg	5,400 Kg	Lavadora Pellerin Milnor 13197I12

Start and finish date test
05/05/2022 - 05/05/2022

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RESULTS

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

THERMO TEX TEST

Standard
ASTM F1930:2015 (Obsolete)

Test type
End-use garment specification

Testing date
12/05/2022

Reference
SUMMER IFR COVERALL (ZNDSCIFR-001)

Underwear and accessories

Shirt underwear	Short sleeves shirt 100% cotton, 140 g/m²
Trousers underwear	Briefs 100% cotton, 170g/m²

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 21 ± 2 ºC and 65 ± 5 %HR

Pre-treatment
1 washing cycle at 66ºC according to standard NFPA 2112:2018 parag. 8.1.3 and tumble drying at 68ºC

Pre-treatment starting date
05/05/2022

Pre-treatment ending date
05/05/2022

Observation or deviation of the standard
The garment has deviations from the design specified in point 8.2.2 of ASTM F1930: 2015 (Standard garment design).
The edition of the standard used does not correspond to the latest version released.

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RESULTS

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%**

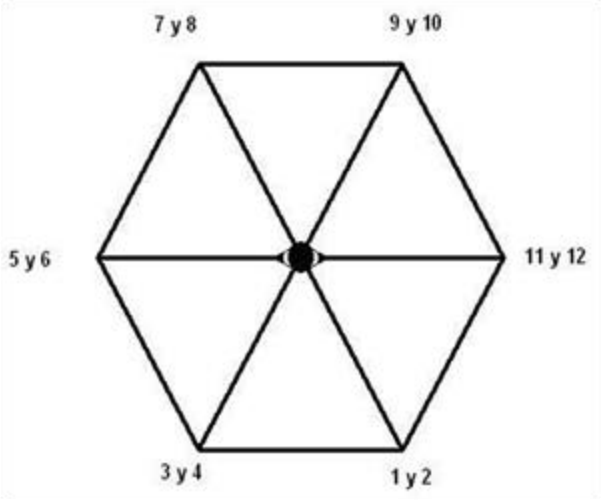
Duration of the exposure 3s

Duration of the data acquisition 60s

Level of the exposure	Before the test	After the test	
Average of heat flux density	82.56	84.16	kW/m²
Standard deviation of the average of heat flux density	14.22	15.76	-

Distribution of burners surrounding the mannequin:

Number of burners: 12



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RESULTS

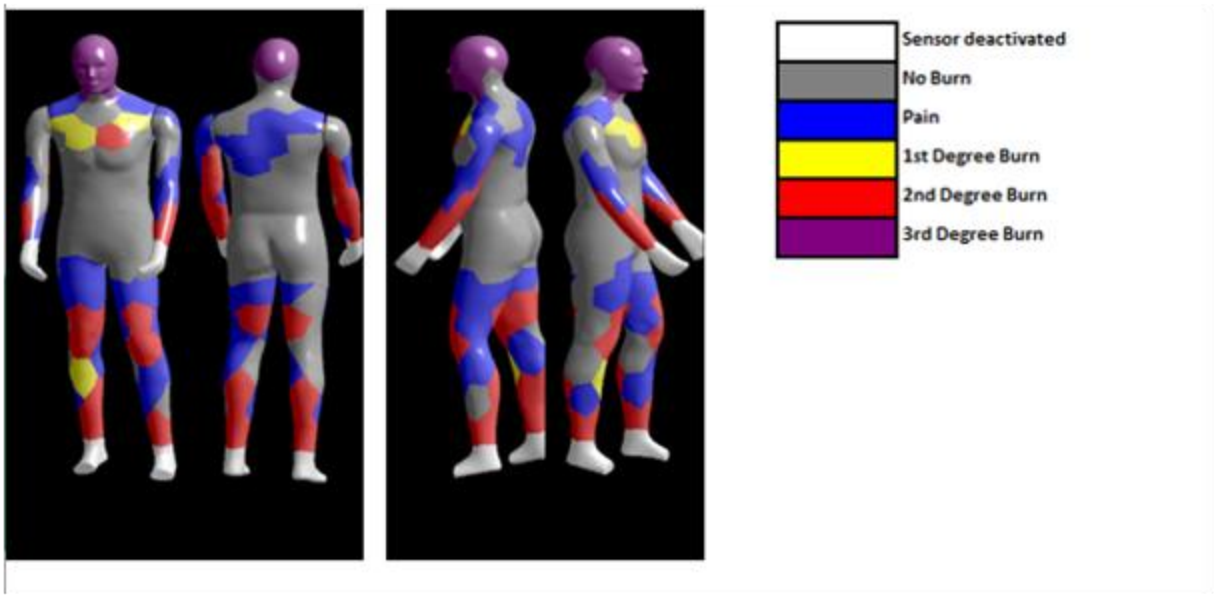
Sample nº 1 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

Duration of the exposure	3s
Duration of the data acquisition	120 s.
Temperature of the exposure chamber before the test	22.1 ºC
Total Surface Area	1,80 m²
Total Clothed Surface Area	1,68 m²
Total transferred energy	181,26 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) (%)
2,3	20,4	6,7	27,1



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RESULTS

Sample nº 1 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

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

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RESULTS

Sample nº 1 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

Burns

Sensor/temp	Clothed 1st Deg Burn Area (%)	Clothed 2nd Deg Burn Area (%)	Clothed 3rd Deg Burn Area (%)
Arms	0,0	38,9	0,0
Shanks	4,4	47,7	0,0
Thighs	0,0	20,9	0,0
Trunk	4,0	1,6	0,0
WHOLE MANIKIN	**2,5**	**21,9**	**0,0**

Remark

These percentages are for the total area of the manikin covered by the test specimen

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RESULTS

Sample before test nº 1 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

PHOTOS

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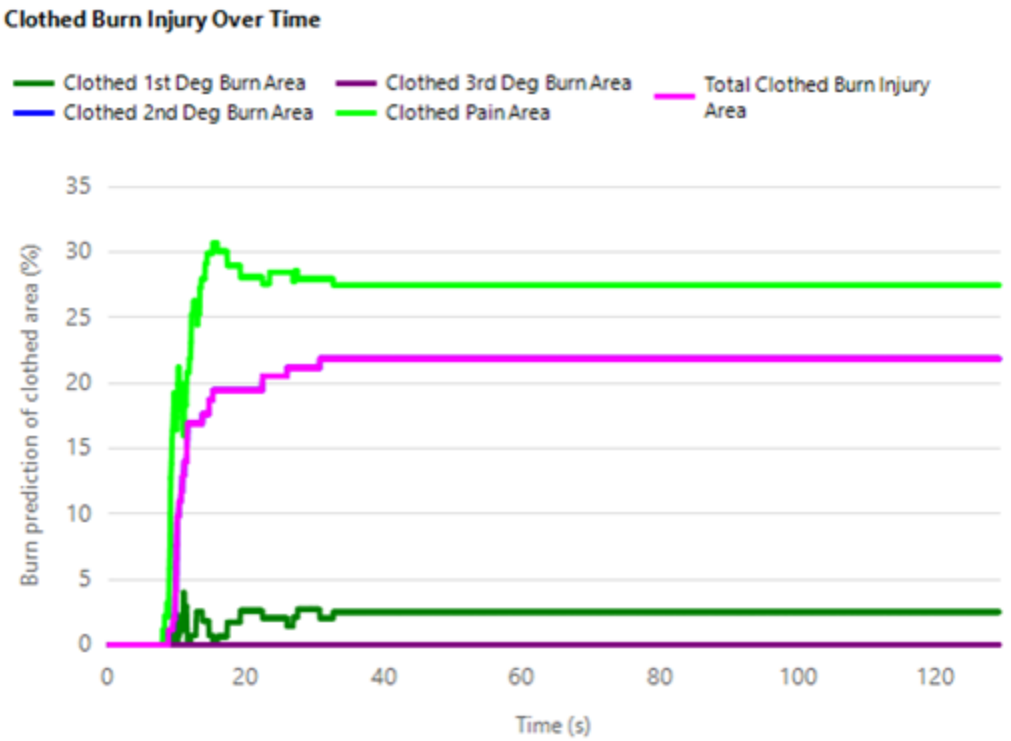
RESULTS

Sample nº 1 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)



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RESULTS

Sample after test nº 1 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

PHOTOS

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RESULTS

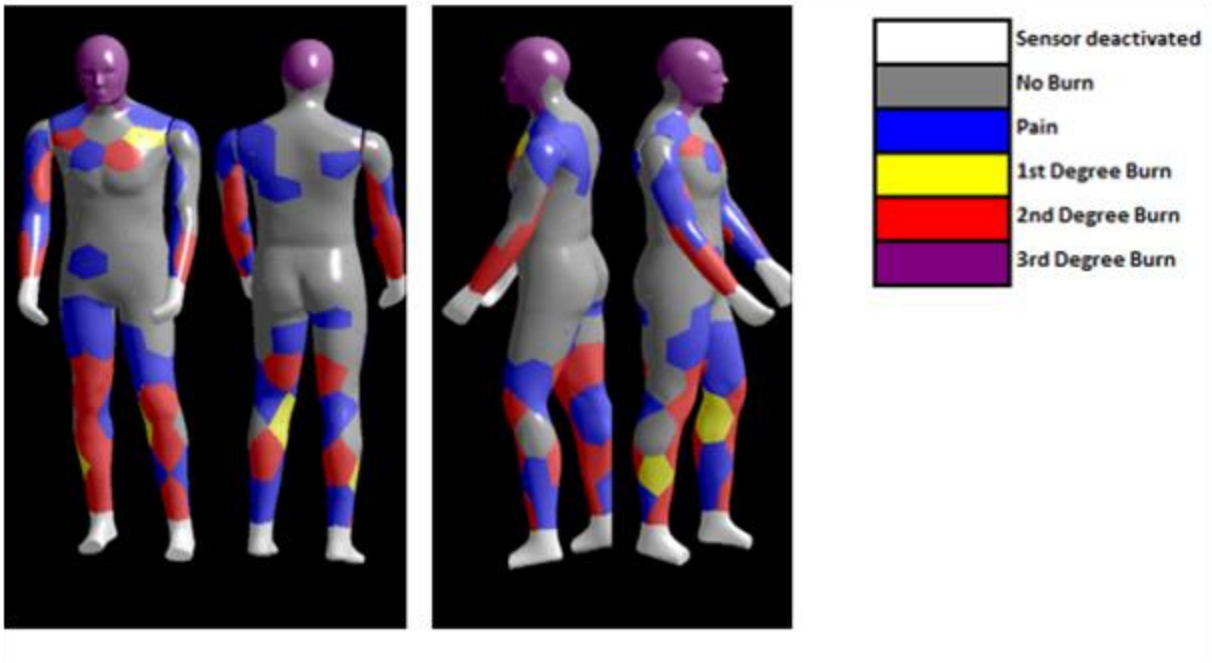
Sample nº 2 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

Duration of the exposure	3s s.
Duration of the data acquisition	120 s.
Temperature of the exposure chamber before the test	23.7 ºC
Total Surface Area	1,80 m²
Total Clothed Surface Area	1,68 m²
Total transferred energy	184,58 kJ

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

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) (%)
2,4	20,3	6,7	27,0



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RESULTS

Sample nº 2 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

Property	Measurement	Sample 2	Remark
Afterflame time	Video	1,3 s.	---
Hole formation	Visual	Yes	---
Melting	Visual	Yes	Label
Embrittlement	Visual	No	---
Smoke	Visual	Yes	---
Dripping	Visual	No	---
Shrinkage	Visual	Yes	---
Functioning of garment accessories	Visual	Correct	---

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RESULTS

Sample nº 2 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

Burns

Sensor/temp	Clothed 1st Deg Burn Area (%)	Clothed 2nd Deg Burn Area (%)	Clothed 3rd Deg Burn Area (%)
Arms	0,0	43,7	0,0
Shanks	10,3	43,9	0,0
Thighs	0,0	17,5	0,0
Trunk	1,3	2,7	0,0
WHOLE MANIKIN	**2,6**	**21,7**	**0,0**

Remark

These percentages are for the total area of the manikin covered by the test specimen

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RESULTS

Sample before test nº 2 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

PHOTOS

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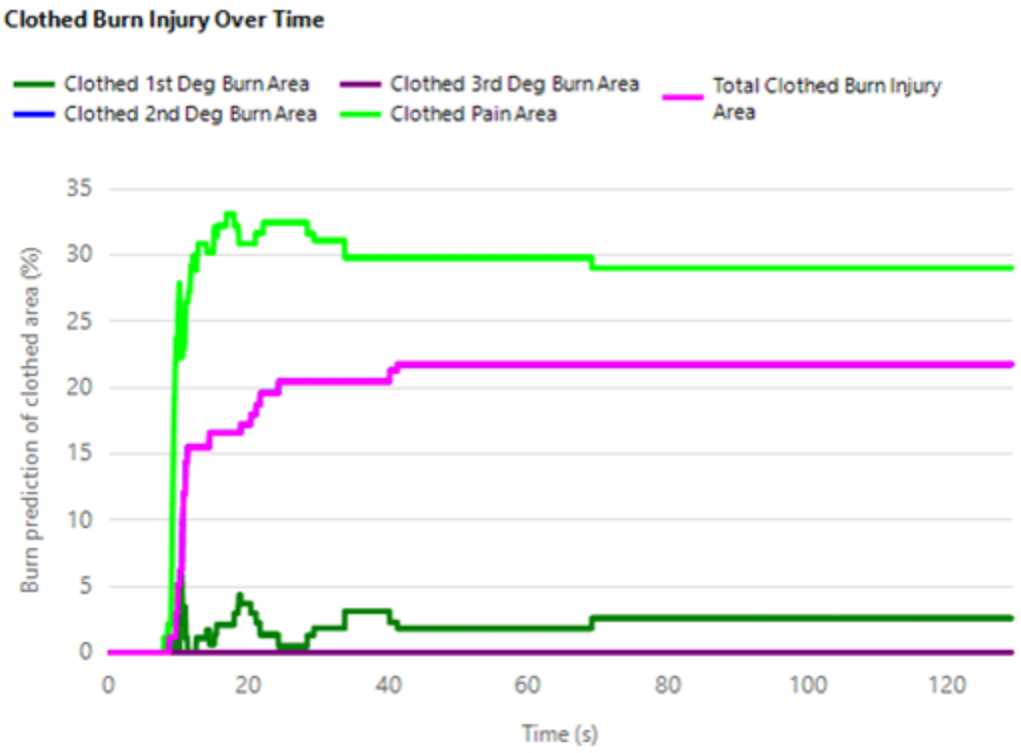
RESULTS

Sample nº 2 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)



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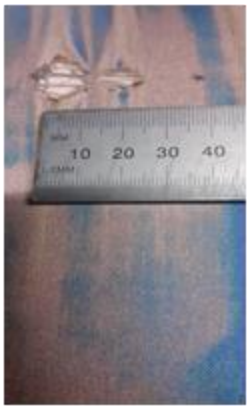
RESULTS

Sample after test nº 2 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

PHOTOS



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RESULTS

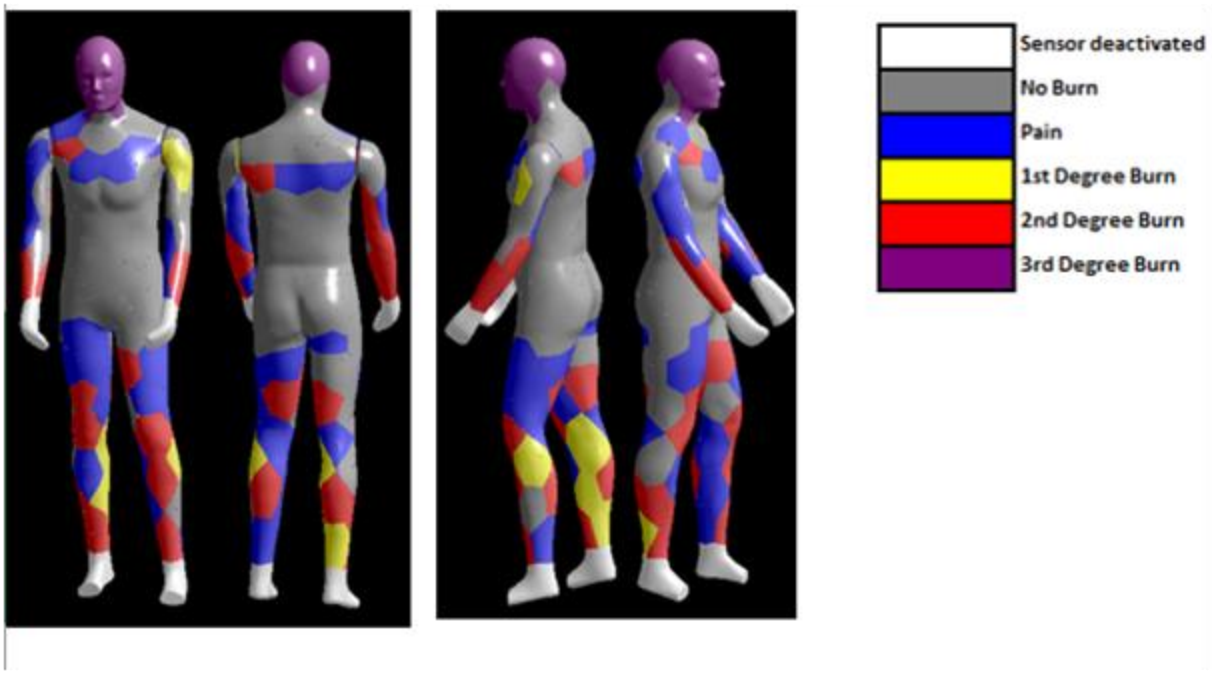
Sample nº 3 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

Duration of the exposure	3s
Duration of the data acquisition	120 s.
Temperature of the exposure chamber before the test	23,8 ºC
Total Surface Area	1,80 m²
Total Clothed Surface Area	1,68 m²
Total transferred energy	175,95 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) (%)
4,8	18,2	6,7	24,9



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Rev.1 This revision cancels and replaces the previous

RESULTS

Sample nº 3 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

Property	Measurement	Sample 3	Remark
Afterflame time	Video	1,0 s.	---
Hole formation	Visual	No	---
Melting	Visual	Yes	Label
Embrittlement	Visual	No	---
Smoke	Visual	No	---
Dripping	Visual	No	---
Shrinkage	Visual	Yes	---
Functioning of garment accessories	Visual	Correct	---

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RESULTS

Sample nº 3 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

Burns

Sensor/temp	Clothed 1st Deg Burn Area (%)	Clothed 2nd Deg Burn Area (%)	Clothed 3rd Deg Burn Area (%)
Arms	4,3	33,1	0,0
Shanks	21,5	39,8	0,0
Thighs	0,0	20,1	0,0
Trunk	0,0	2,9	0,0
WHOLE MANIKIN	**5,1**	**19,6**	**0,0**

Remark

These percentages are for the total area of the manikin covered by the test specimen

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RESULTS

Sample before test nº 3 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

PHOTOS

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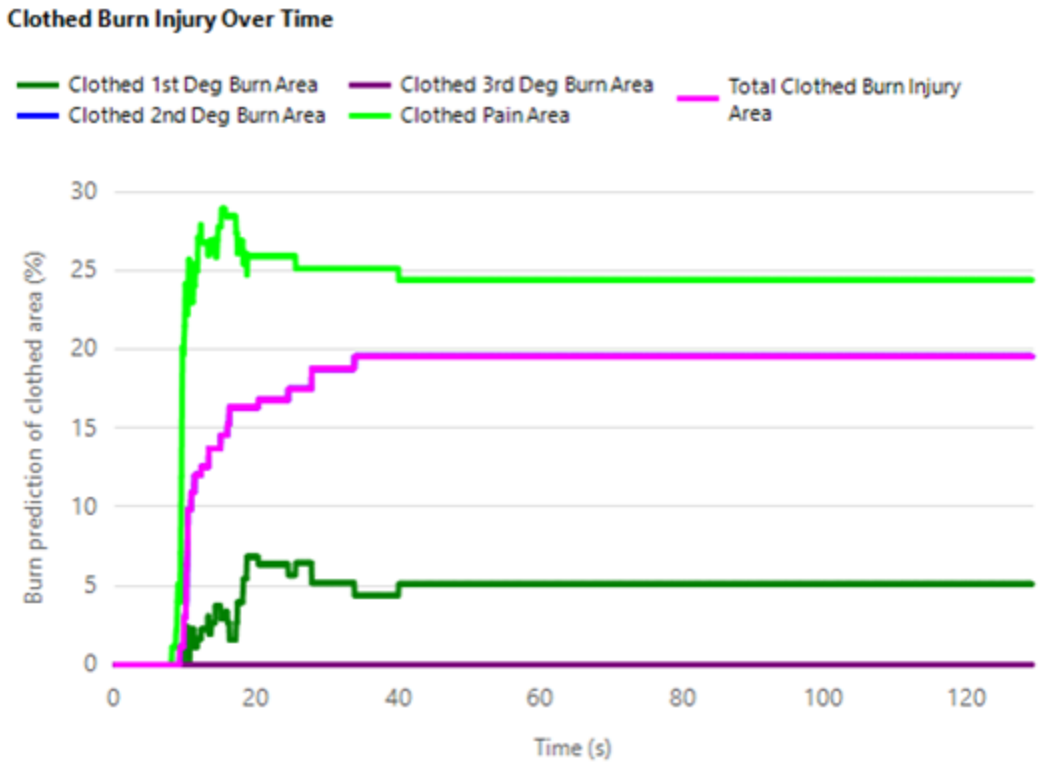
RESULTS

Sample nº 3 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)



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RESULTS

Sample after test nº 3 Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

PHOTOS

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RESULTS

Sample Ref.- SUMMER IFR COVERALL (ZNDSCIFR-001)

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	21,9	0,0	21,9		
2	21,7	0,0	21,7	21,1	1,3
3	19,6	0,0	19,6		

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	20,4	6,7	27,1		
2	20,3	6,7	27,0	26,3	1,2
3	18,2	6,7	24,9		

Evaluation of the protective garments was based on the performance requirements of **section 7.1.5** of **NFPA 2112-2018,** Standard on Flame Resistant Garments for Protection of Industrial Personnel Against Flash Fire, which states:

"Specimen garments shall be tested for overall flash fire exposure as specified in **section 8.5,** Manikin Test, as a qualification test for the material and shall have a body burn rating of not more than 50 %."

For test results in this report, this performance requirement is interpreted as: The percentage of the total mannequin surface reaching the 2nd and 3rd degree burn criteria shall not exceed 50%.

PERFORMANCE LEVEL ACCORDING TO NFPA 2112-18	**PASS**

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Lucia Martinez
Head of PPE and Ballistics department

Digitally signed by ISABEL LLOPIS LUMBRERAS - NIF:21678551Q
Date: 2022.06.03 10:35:11 +02:00
Reason: Autorizado
Location: Alcoy

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