

## TEST REPORT

**2022EP0486**

### DATE OF RECEPTION

31/03/2022

### DATE TESTS

Starting: 31/03/2022

Ending: 04/05/2022

### APPLICANT

SARENA TEXTILE INDUSTRIES PVT LTD  
21- Waris Road  
PK-54000  
Lahore

Att. Samra Sharif

### IDENTIFICATION AND DESCRIPTION OF SAMPLES

#### REFERENCES

ROCK

### TESTS CARRIED OUT

- SAMPLE IDENTIFICATION.
- PRE-TREATMENT FOR DOMESTIC WASHING AND DRYING PROCEDURES FOR TEXTILE TESTING.
- HEAT TRANSFER EVALUATION OF FLAME RESISTANT MATERIALS.
- FLAME RESISTANCE OF TEXTILES (VERTICAL TEST).
- HEAT RESISTANCE.
- MASS PER UNIT AREA.
- 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.





## RESULTS

### SAMPLE IDENTIFICATION

Reference  
ROCK



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## SAMPLE DESCRIPTION

**REFERENCE:**

ROCK

**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**

<b>Layer 1</b>	Navy woven fabric, style rock, 93% m-aramid; 5% p-aramid and 2% Antistatic, 150 g/m <sup>2</sup> , according to the information supplied by the customer.
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**PARTS OF THE GARMENT**

<b>Collar</b>	Double fabric layer 1.
<b>Front</b>	Four pieces of fabric layer 1.
<b>Back</b>	Three pieces of fabric layer 1.
<b>Sleeves</b>	Long sleeves.
<b>Closure system</b>	Metal Zipper
<b>Collar closure system</b>	No.
<b>Cuff closure system</b>	Hem stitched inwards.
<b>Reflective trim</b>	No.
<b>Pockets</b>	No.
<b>Belt loops</b>	No.
<b>Legs</b>	Longs.
<b>Waistband adjustment system</b>	No.
<b>Bottom</b>	Hem stitched inwards.
<b>Others</b>	---

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## RESULTADOS / RESULTS

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

**Standard**

NFPA 2112:2018 point 8.1.3

**Standard deviation**

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**Reference**

Sample 1 ROCK

**Equipment**

Pillierin Milnor Washing Machine 13197112

**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**

1,930 Kg

7,000 Kg

Lavadora Pellerin Milnor 13197112

**Start and finish date test**

11/04/2022 - 11/04/2022

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## RESULTADOS / RESULTS

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

**Standard**

NFPA 2112:2018 point 8.1.3

**Standard deviation**

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**Reference**

Sample 1 ROCK

**Equipment**

Pillierin Milnor Washing Machine 13197112

**Washing procedure**

Normal

**Washing cycles**

3

**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**

0,160 Kg

8,800 Kg

Lavadora Pellerin Milnor 13197112

**Start and finish date test**

05/04/2022 - 05/04/2022

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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**

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**Reference**

Sample 1 ROCK

**Equipment**

Pillierin Milnor Washing Machine 13197112

**Washing procedure**

Normal

**Washing cycles**

100

**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**

0,090 Kg

8,90 Kg

Lavadora Pellerin Milnor 13197112

**Start and finish date test**

05/04/2022 - 26/04/2022

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## RESULTS

### Reference

ROCK

### Position of the sensor to the specimen

Contact

Specimen	HTP (J/cm <sup>2</sup> )	TPP (cal/cm <sup>2</sup> )
1	27,68	6,61
2	26,05	6,22
3	25,96	6,20
<b>Average</b>	<b>26,56</b>	<b>6,34</b>

### Visual examination and evaluation

Property	1	2	3
Melting	No.	No.	No.
Dripping	No.	No.	No.
Break open	No.	No.	No.
Charring	Slight, discoloration.	Slight, discoloration.	Slight, discoloration.
Embrittlement	Slight, starts to harden.	Slight, starts to harden.	Slight, starts to harden.
Ignition	Slight, slight smoke.	Slight, slight smoke.	Slight, slight smoke.
Shrinkage	No.	No.	No.
Sticking	No.	No.	No.

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## RESULTS

### Reference

ROCK

### Position of the sensor to the specimen

Spaced

Specimen	HTP (J/cm <sup>2</sup> )	TPP (cal/cm <sup>2</sup> )
1	46,52	11,11
2	47,22	11,33
3	47,13	11,26
<b>Average</b>	<b>46,96</b>	<b>11,23</b>

### Visual examination and evaluation

Property	1	2	3
<b>Melting</b>	No.	No.	No.
<b>Dripping</b>	No.	No.	No.
<b>Break open</b>	No.	No.	No.
<b>Charring</b>	Slight, evident charring.	Slight, evident charring.	Slight, evident charring.
<b>Embrittlement</b>	Moderate, small hardened areas.	Moderate, small hardened areas.	Moderate, small hardened areas.
<b>Ignition</b>	Moderate, dark smoke.	Moderate, dark smoke.	Moderate, dark smoke.
<b>Shrinkage</b>	No.	No.	No.
<b>Sticking</b>	No.	No.	No.

### Remark

The uncertainty of the assay of Thermal Protective Performance is  $\pm 8,3\%$  of the value measured, for a coverage factor of  $K=2$  [95%].

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## RESULTS

PERFORMANCE LEVEL ACCORDING TO NFPA 2112:2018 PASS

### Requirements to be met according to NFPA 2112:2018 sec.7.1.1

The spaced HTP rating shall be not less than  $25 \text{ J/cm}^2$  ( $6,0 \text{ cal/cm}^2$ ) and a contact HTP rating shall not be less than  $12.6 \text{ J/cm}^2$  ( $3,0 \text{ cal/cm}^2$ )

### Remark

These results have been obtained by means of a test method intended solely to classify the set of materials and materials not necessarily applicable to the actual conditions of fire or inflammation.

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## RESULTS

### HEAT TRANSFER EVALUATION OF FLAME RESISTANT MATERIALS

**Standard**

ASTM F2700-08(2013) modified by NFPA 2112:2018 sec.8.2

**Apparatus**

Thermal Protective Performance Tester 403-05

**Testing date**

04/05/2022

**Conditioned**

24h in indoor ambient conditions at  $(21 \pm 2) ^\circ\text{C}$  and  $(65 \pm 5) \% \text{ RH}$

**Sample layers**

1

**Sample description**

Navy blue woven fabric

**Pre-Treatment**

3 washing cycles at  $66^\circ\text{C}$ , according to NFPA 2112:2018 point 8.1.3, and tumble drying at  $68^\circ\text{C}$ .

**Radiant incident heat flux**

10,08  $\text{kW/m}^2$

**Total incident heat flux**

82,82  $\text{kW/m}^2$

**Specimen mounting**

Relaxed

**Weight of material as tested**

149  $\text{g/m}^2$

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## RESULTS

### Reference

ROCK

### Position of the sensor to the specimen

Contact

Specimen	HTP (J/cm <sup>2</sup> )	TPP (cal/cm <sup>2</sup> )
1	27,84	6,65
2	27,04	6,46
3	27,13	6,48
<b>Average</b>	<b>27,34</b>	<b>6,53</b>

### Visual examination and evaluation

Property	1	2	3
Melting	No.	No.	No.
Dripping	No.	No.	No.
Break open	No.	No.	No.
Charring	Slight, discoloration.	Slight, discoloration.	Slight, discoloration.
Embrittlement	Slight, starts to harden.	Slight, starts to harden.	Slight, starts to harden.
Ignition	Slight, slight smoke.	Slight, slight smoke.	Slight, slight smoke.
Shrinkage	No.	No.	No.
Sticking	No.	No.	No.

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## RESULTS

### Reference

ROCK

### Position of the sensor to the specimen

Spaced

Specimen	HTP (J/cm <sup>2</sup> )	TPP (cal/cm <sup>2</sup> )
1	44,84	10,71
2	44,65	10,66
3	47,17	11,27
<b>Average</b>	<b>45,55</b>	<b>10,88</b>

### Visual examination and evaluation

Property	1	2	3
<b>Melting</b>	No.	No.	No.
<b>Dripping</b>	No.	No.	No.
<b>Break open</b>	No.	No.	No.
<b>Charring</b>	Slight, evident charring.	Slight, evident charring.	Slight, evident charring.
<b>Embrittlement</b>	Moderate, small hardened areas.	Moderate, small hardened areas.	Moderate, small hardened areas.
<b>Ignition</b>	Moderate, dark smoke.	Moderate, dark smoke.	Moderate, dark smoke.
<b>Shrinkage</b>	No.	No.	No.
<b>Sticking</b>	No.	No.	No.

### Remark

The uncertainty of the assay of Thermal Protective Performance is  $\pm 8,3\%$  of the value measured, for a coverage factor of  $K=2$  [95%].

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## RESULTS

PERFORMANCE LEVEL ACCORDING TO NFPA 2112:2018 PASS

### Requirements to be met according to NFPA 2112:2018 sec.7.1.1

The spaced HTP rating shall be not less than  $25 \text{ J/cm}^2$  ( $6,0 \text{ cal/cm}^2$ ) and a contact HTP rating shall not be less than  $12.6 \text{ J/cm}^2$  ( $3,0 \text{ cal/cm}^2$ )

### Remark

These results have been obtained by means of a test method intended solely to classify the set of materials and materials not necessarily applicable to the actual conditions of fire or inflammation.

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## RESULTS

### FLAME RESISTANCE OF TEXTILES (VERTICAL TEST)

**Standard**

ASTM D6413 / D6413M:15 modified by NFPA 2112:2018 sec.8.3

**Apparatus**

Test cabinet for vertical flammability

**Original and after pre-treatment test date**

11/04/2022 - 04/05/2022

**Conditioned**

24h in indoor ambient conditions at  $(21 \pm 3) ^\circ\text{C}$  and  $(65 \pm 5) \% \text{ RH}$

**Original and after pre-treatment ambient conditions test**

20,4°C and 48,0% RH - 21,4°C and 55,6% RH

**Face exposed to the flame**

Edge: Outer

**Tested material**

Navy blue woven fabric.

**Sample size**

75 mm x 305 mm

**Flame contact time**

12 s

**Deviation from the standard**

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**Reference**

ROCK

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## RESULTS

### Pre-Treatment

As received

### Orientation of the specimen

Warp

Specimen	After flame time (s)	Afterglow time (s)	Melting and Dripping	Char Length (mm)
1	0	21,4	No	57,6
2	0	38,6	No	60,8
3	0	18,6	No	60,8
4	0	17,0	No	57,6
5	0	18,6	No	64,0
Average	0	22,8	No	60,8

### Orientation of the specimen

Weft

Specimen	After flame time (s)	Afterglow time (s)	Melting and Dripping	Char Length (mm)
1	0	11,0	No	60,8
2	0	13,8	No	57,6
3	0	15,6	No	57,6
4	0	18,2	No	57,6
5	0	12,4	No	54,4
Average	0	14,2	No	57,6

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## RESULTS

**Pre-Treatment** 100 washing cycles at 66°C, according to NFPA 2112:2018 point 8.1.3, and tumble drying at 68°C.

### Orientation of the specimen

Warp

Specimen	After flame time (s)	Afterglow time (s)	Melting and Dripping	Char Length (mm)
1	0	44,2	No	57,6
2	0	19,4	No	54,4
3	0	17,4	No	64,0
4	0	29,2	No	54,4
5	0	18,6	No	57,6
<b>Average</b>	<b>0</b>	<b>25,8</b>	<b>No</b>	<b>57,6</b>

### Orientation of the specimen

Weft

Specimen	After flame time (s)	Afterglow time (s)	Melting and Dripping	Char Length (mm)
1	0,0	15,6	No	51,2
2	0	16,6	No	60,8
3	0	19,4	No	54,4
4	0	24,6	No	60,8
5	0	14,6	No	48,0
<b>Average</b>	<b>0</b>	<b>18,2</b>	<b>No</b>	<b>54,4</b>

### Remark

The uncertainty of the assay of flame resistance of textiles (vertical test) is  $\pm 2\%$  of the value measured, for a coverage factor of  $K=2$  (95%).

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## RESULTS

### REMARK

Time values of each sample, are recorded to the nearest 0,2 s. Char length values are calculated to the nearest 3,2 mm

<b>PERFORMANCE LEVEL ACCORDING TO NFPA 2112:2018</b>	<b>PASS</b>
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### Requirements to be met according to NFPA 2112:2018

- |   |
|---|
| a) No specimen shall give flaming or molten debris        |
| b) The mean value of after flame time shall be $\leq 2$ s |
| c) The mean value of char length shall be $\leq 100$ mm   |

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## RESULTS

### HEAT RESISTANCE

**Standard**

ASTM\_F2894:2014 modified according to NFPA 2112:2018 sec.8.4

**Apparatus**

Air stove

**Temperature**

(260 +6/-0) °C

**Length of the test**

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

**Deviation from the Standard**

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**Pre-Treatment**

As received.

**Tested material**

Navy blue woven fabric.

**Reference**

ROCK

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## RESULTS

Fabric					
Flame	Melting	Dripping	Separation	Direction	Shrink (-) Elongation (+)
No	No	No	No	Warp Weft	-0,5 % -0,7 %
No	No	No	No	Warp Weft	-0,7 % -0,8 %
No	No	No	No	Warp Weft	-0,8 % -0,8 %
			Average	Warp % Weft %	-0,7 % -0,8 %

### Remark

The uncertainty of the assay of Heat Resistance is  $\pm 8\%$  of the value measured, for a coverage factor of  $K=2$  (95%).

PERFORMANCE LEVEL ACCORDING TO NFPA 2112:2018

PASS

### Requirements to meet according to NFPA 2112:2018

- |                                    |
|------------------------------------|
| a) No layer can ignite.            |
| b) No layer can melt or drip.      |
| c) No layer can separate.          |
| d) Any layer shrink more than 10%. |

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## RESULTS

### HEAT RESISTANCE

**Standard**

ASTM\_F2894:2014 modified according to NFPA 2112:2018 sec.8.4

**Apparatus**

Air stove

**Temperature**

(260 +6/-0) °C

**Length of the test**

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

**Deviation from the Standard**

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**Pre-Treatment**

3 washing cycles at 66°C, according to NFPA 2112:2018 point 8.1.3, and tumble drying at 68°C.

**Tested material**

Navy blue woven fabric.

**Reference**

ROCK

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## RESULTS

Fabric					
Flame	Melting	Dripping	Separation	Direction	Shrink (-) Elongation (+)
No	No	No	No	Warp Weft	-0,8 % -0,8 %
No	No	No	No	Warp Weft	-0,8 % -0,8 %
No	No	No	No	Warp Weft	-0,7 % -0,7 %
			Average	Warp % Weft %	-0,8 % -0,8 %

### Remark

The uncertainty of the assay of Heat Resistance is  $\pm 8\%$  of the value measured, for a coverage factor of  $K=2$  (95%).

PERFORMANCE LEVEL ACCORDING TO NFPA 2112:2018

PASS

### Requirements to meet according to NFPA 2112:2018

- |                                    |
|------------------------------------|
| a) No layer can ignite.            |
| b) No layer can melt or drip.      |
| c) No layer can separate.          |
| d) Any layer shrink more than 10%. |

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## RESULTS

### MASS PER UNIT AREA

**Standard**

ASTM D3776/3776M-20 (R2020) Option C

**Conditioning date**

04/04/2022

**Test date**

05/04/2022

**Atmosphere for conditioning testing****Temperature** (21±1) °C**Relative humidity**

(65±2) %

**Type of fabric**

Woven fabric

**State of the specimens**

Original

**Number of specimens**

1

**Dimensions of specimens**500 cm<sup>2</sup>**Previous treatment**

Null

**Reference**

ROCK

Mass per unit area (oz/yd <sup>2</sup> )	Mass per unit area (g/m <sup>2</sup> )
4,43	150

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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**

Materials of garment construction evaluation

**Testing date**

02/05/2022

**Reference**

ROCK

**Underwear and accessories****Shirt underwear**

Short sleeves shirt 100% cotton, 140 g/m<sup>2</sup>

**Trousers underwear**

Briefs 100% cotton, 170g/m<sup>2</sup>

**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 °C and 65 ± 5 %HR

**Pre-treatment**

1 washing cycle at 66°C according to standard NFPA 2112:2018 parag. 8.1.3 and tumble drying at 68°C

**Pre-treatment starting date**

11/04/2022

**Pre-treatment ending date**

11/04/2022

**Observation or deviation of the standard**

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 / m<sup>2</sup> ± 5%

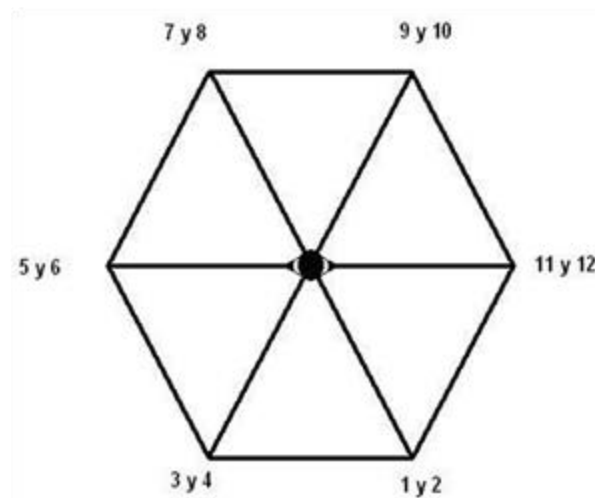
Duration of the exposure 3 s

Duration of the data acquisition 60 s

Level of the exposure	Before the test	After the test	
Average of heat flux density	85.17	84.56	kW/m <sup>2</sup>
Standard deviation of the average of heat flux density	16.3	15.2	-

### Distribution of burners surrounding the mannequin:

Number of burners: 12







## RESULTS

### Sample nº 1 Ref.- ROCK

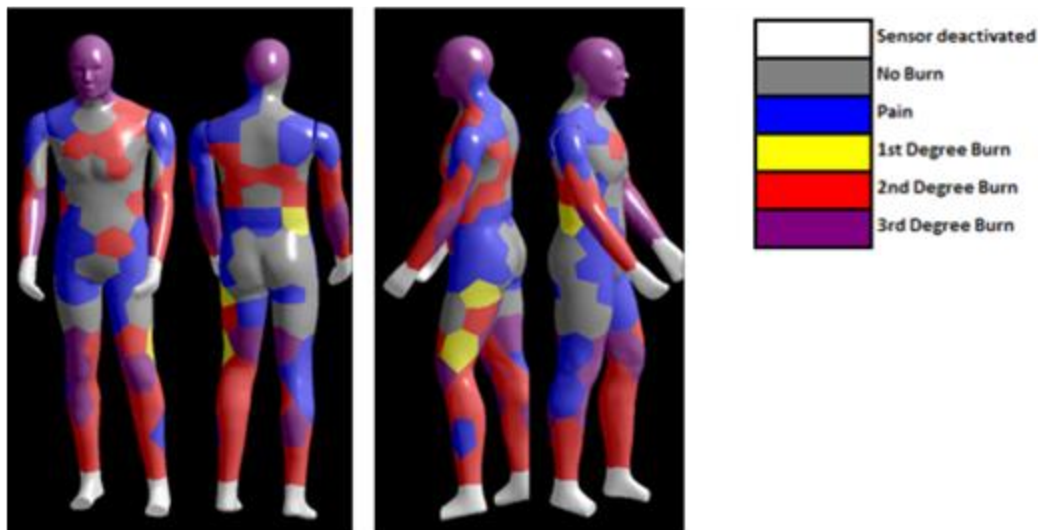
Duration of the exposure	3s
Duration of the data acquisition	120 s.
Temperature of the exposure chamber before the test	27.9 °C

Total Surface Area	1,80 m <sup>2</sup>
Total Clothed Surface Area	1,68 m <sup>2</sup>
Total transferred energy	237,80 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) (%)
2,4	28,2	19,3	47,5





## RESULTS

Sample nº 1 Ref.- ROCK

Property	Measurement	Sample 1	Remark
Afterflame time	Video	1,0 s.	---
Hole formation	Visual	No	---
Melting	Visual	No	---
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.- ROCK

### Burns

Sensor/temp	Clothed 1st Deg Burn Area (%)	Clothed 2nd Deg Burn Area (%)	Clothed 3rd Deg Burn Area (%)
Arms	0,0	32,5	29,3
Shanks	0,0	65,2	21,1
Thighs	8,8	10,8	18,0
Trunk	1,9	21,7	0,0
WHOLE MANIKIN	2,6	30,2	13,5

### 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.- ROCK

PHOTOS



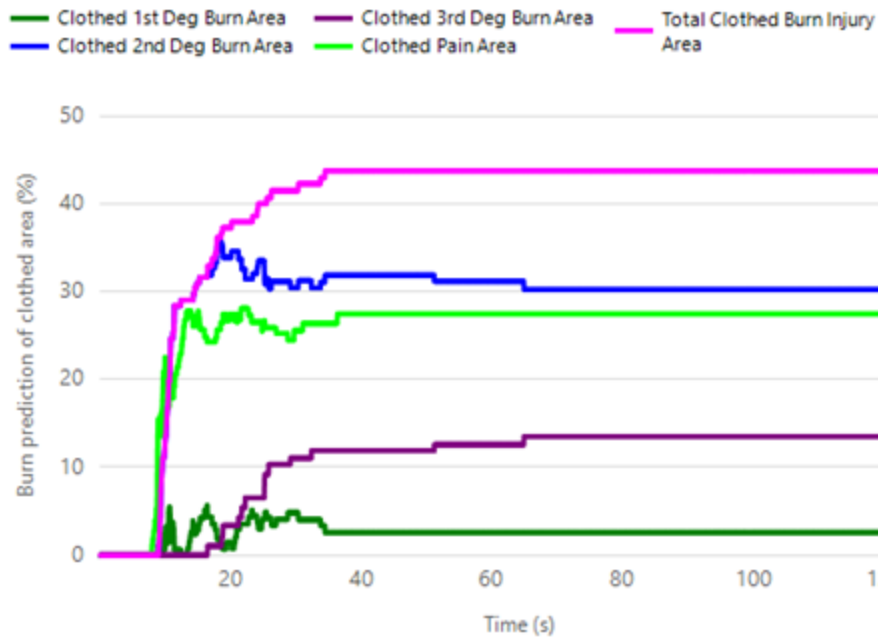
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## RESULTS

Sample nº 1 Ref.- ROCK

Clothed Burn Injury Over Time



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## RESULTS

Sample after test n° 1 Ref.- ROCK

### PHOTOS



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## RESULTS

### Sample nº 2 Ref.- ROCK

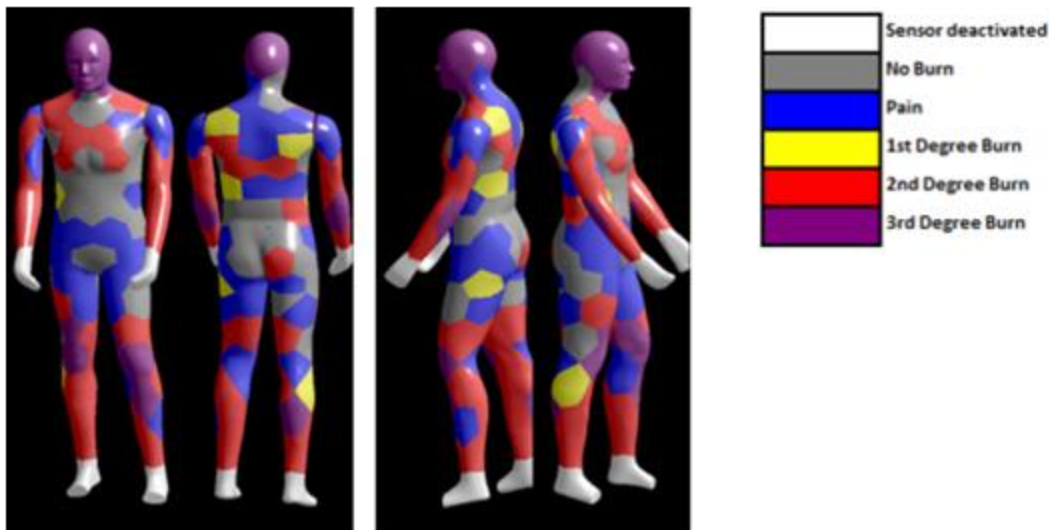
Duration of the exposure	3 s.
Duration of the data acquisition	120 s.
Temperature of the exposure chamber before the test	26,0 °C

Total Surface Area	1,80 m <sup>2</sup>
Total Clothed Surface Area	1,68 m <sup>2</sup>
Total transferred energy	244,06 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) (%)
4,5	34,9	14,0	48,9





## RESULTS

Sample nº 2 Ref.- ROCK

Property	Measurement	Sample 2	Remark
Afterflame time	Video	1,1 s.	---
Hole formation	Visual	No	---
Melting	Visual	No	---
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.- ROCK

### Burns

Sensor/temp	Clothed 1st Deg Burn Area (%)	Clothed 2nd Deg Burn Area (%)	Clothed 3rd Deg Burn Area (%)
Arms	0,0	64,6	12,1
Shanks	5,6	55,9	20,9
Thighs	3,7	28,8	6,6
Trunk	7,3	19,9	0,0
WHOLE MANIKIN	4,9	37,4	7,8

### 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.- ROCK

### PHOTOS



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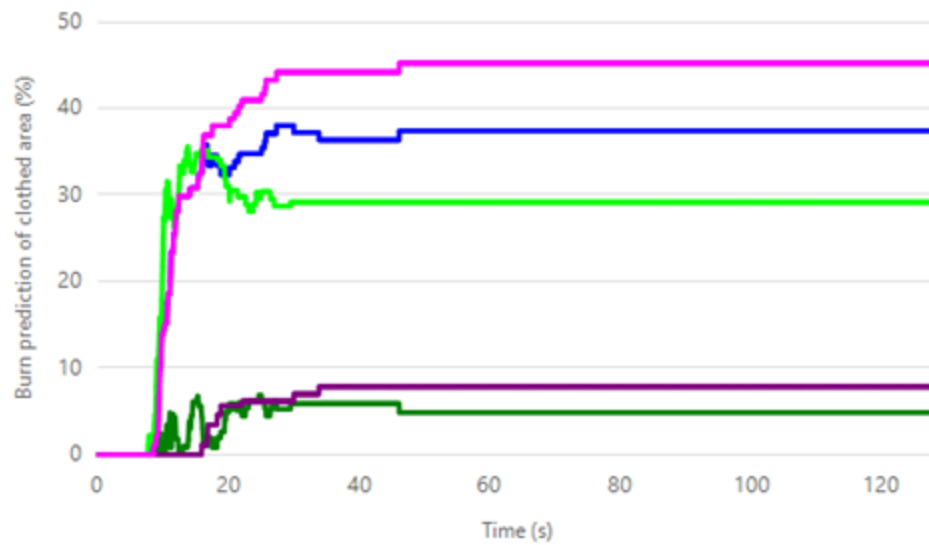


## RESULTS

### Sample nº 2 Ref.- ROCK

#### 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



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## RESULTS

Sample after test n° 2 Ref.- ROCK

### PHOTOS



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## RESULTS

### Sample nº 3 Ref.- ROCK

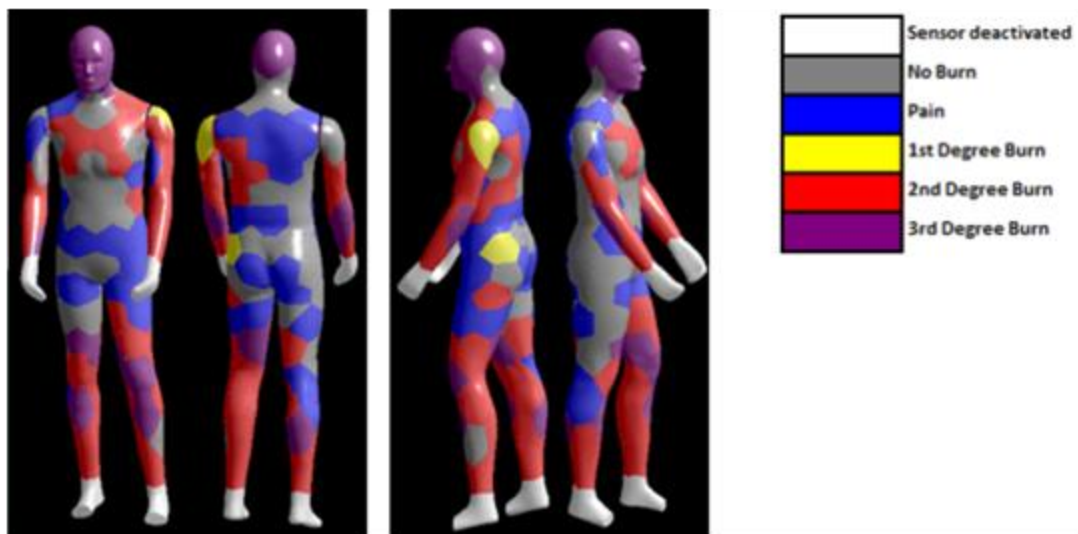
Duration of the exposure	3
Duration of the data acquisition	120 s.
Temperature of the exposure chamber before the test	27.0 °C

Total Surface Area	1,80 m <sup>2</sup>
Total Clothed Surface Area	1,68 m <sup>2</sup>
Total transferred energy	238,90 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) (%)
2,0	33,4	16,2	49,7





## RESULTS

Sample nº 3 Ref.- ROCK

Property	Measurement	Sample 3	Remark
Afterflame time	Video	1,1 s.	---
Hole formation	Visual	No	---
Melting	Visual	No	---
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 3 Ref.- ROCK

### Burns

Sensor/temp	Clothed 1st Deg Burn Area (%)	Clothed 2nd Deg Burn Area (%)	Clothed 3rd Deg Burn Area (%)
Arms	7,1	56,2	15,8
Shanks	0,0	66,3	20,0
Thighs	0,0	24,3	15,6
Trunk	2,0	17,1	0,0
WHOLE MANIKIN	2,2	35,8	10,2

### 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.- ROCK

PHOTOS



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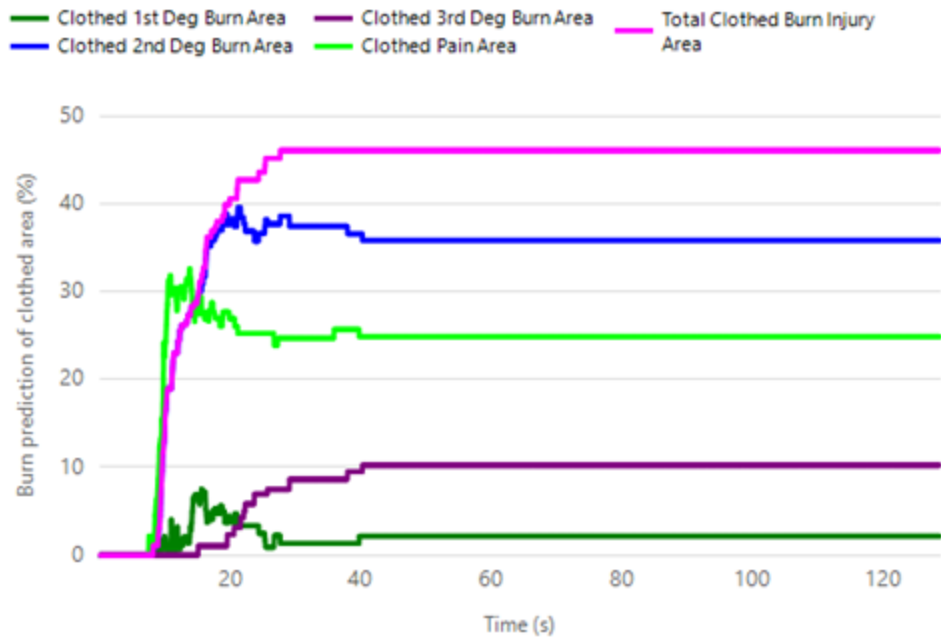




## RESULTS

Sample nº 3 Ref.- ROCK

Clothed Burn Injury Over Time



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## RESULTS

Sample after test n° 3 Ref.- ROCK

### PHOTOS



>>>



## RESULTS

Sample Ref.- ROCK

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	30,2	13,5	43,7	45,0	1,2
2	37,4	7,8	45,2		
3	35,8	10,2	46,1		

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	28,2	19,3	47,5	48,7	1,1
2	34,9	14,0	48,9		
3	33,4	16,2	49,7		

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



**Lucia Martinez**  
**Head of PPE and Ballistics department**

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