



Laboratory: physic-chemical

File N°: 1902662-1

Receipt date: 04/04/2019

Sample N°/ Your Reference:

1902662.01: Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Requested tests:

-NF EN ISO 9151: NF EN ISO 11612	Convective heat transmission
-NF EN ISO 6942: NF EN ISO 11612	Heat transfer - Radiance
-NF EN ISO 12127-1: NF EN ISO 11612	Contact heat transmission
-NF ISO 17493: NF EN ISO 11612	Convective heat resistance
-NF EN ISO 15025: NF EN ISO 11612	Limited flame spread
-NF EN ISO 5077: NF EN ISO 11612	Dimensional change
-NF EN ISO 13934-1: NF EN ISO 11612	Tensile strength
-NF EN ISO 13937-2: NF EN ISO 11612	Determination of tear force of trouser shaped test specimen
-NF EN 1149-3	Determination of Induction Decay

Moknine : 12-04-2019

The Manager



Note :

The results of this report relate only to the samples submitted to the lab TTS and cannot in any case be extrapolated to other samples even if they are of the same lot. Any partial reproduction of this report is prohibited unless it is subject to written approval by the laboratory of TTS.
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Test method : Convection heat transmission (Codification letter B)
Test date : 10-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN ISO 9151: 2017
Product standard : NF EN ISO 11612 § 7.2: 2015
Standard deviation : No
Pretreatment : 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry + ironing
Conditioning : 24h à 20°C /65%HR
test atmosphere : 23 °C / 40 % HR
Face tested : In front
Heat Flow Density : 80 kW/m²
Gas used : Propane
Type of calorimeter used : Method A

Results:

	t ₁₂ (s)	t ₂₄ (s)
Specimen 1	3.8	5.5
Specimen 2	3.9	5.5
Specimen 3	3.8	5.4
Average	3.8	5.47

Heat transfer index HTI₂₄ (s)

5

Requirements according to ISO 11612 § 7.2

level B1 : 4 s ≤ HTI₂₄ < 10 s
level B2 : 10 s ≤ HTI₂₄ < 20 s
level B3 : 20 s ≤ HTI₂₄

Classification according to ISO 11612 § 7.2

Level B1

Test carried out under accreditation



Test method : Heat transfer - Radiance (Codification letter C)
Test date : 11-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN ISO 6942: 2002 /METHOD B
Product standard : NF EN ISO 11612 § 7.3: 2015
Standard deviation : No
Pretreatment : After 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry +ironing
Conditioning: : 20°C /65%HR
Test atmosphere : 26 °C/ 45 % HR
Density of heat flow : 20 kW/m²
Number of specimens : 3
Results:

Specimen N° :	Heat flow density Q _c (kW/m ²)	Heat transfer factor TF (20)
1	14.678	0.725
2	14.023	0.709
3	14.054	0.694

	t ₂₄ (s)	t ₂₄ (s) – t ₁₂ (s)
Specimen 1	10	4.5
Specimen 2	10.6	4.7
Specimen 3	10.5	4.7

Heat transfer index RHTI₂₄ (20) (s)

10

Requirements according to ISO 11612 § 7.3

Level C1 : 7 s ≤ RHTI₂₄ < 20 s
Level C2 : 20 s ≤ RHTI₂₄ < 50 s
Level C3 : 50 s ≤ RHTI₂₄ < 95 s
Level C4 : 95 s ≤ RHTI₂₄

Classification according to ISO 11612 § 7.3

Level C1

Test carried out under accreditation



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Test method : Contact heat transmission (Codification letter F)
Test date : 09-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN ISO 12127-1: 2017
Product standard : NF EN ISO 11612 § 7.6: 2015
Standard deviation : No
Pretreatment : After 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry+ ironing
Conditioning : 20 °C /65 % HR
Contact temperature : 250 °C
Results:

	Threshold time (s)
Specimen 1	6.9
Specimen 2	6.8
Specimen 3	6.9
Average	6.9

Note : slight change in appearance

Requirements according to ISO 11612 § 7.6

level F1 : 5 s ≤ Threshold time < 10 s
level F2 : 10 s ≤ Threshold time < 15 s
level F3 : 15 s ≤ Threshold time

Classification according to ISO 11612 § 7.6

Level F1

Test carried out under accreditation



Test method : Convective heat resistance (180 ± 5) °C
Test date : 11-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF ISO 17493: 2017
Product standard : NF EN ISO 11612 § 6.2.1: 2015
Standard deviation : No
Pretreatment : 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry +Ironing
Conditioning : 20°C /65%HR
Test temperature : 180°C
Exposure duration : 5 min

Results

		Specimen 1	Specimen 2	Specimen 3	Moyenne
(%) Dimensional variation	length direction	0	-0.24	0.12	0
(%) Dimensional variation	Width direction	-0.24	0	0.12	0

Observations :

Inflammation: No
 Melting: No
 Charring: No
 Embrittlement: No
 Hole formation: No
 Separation: No
 Other: No

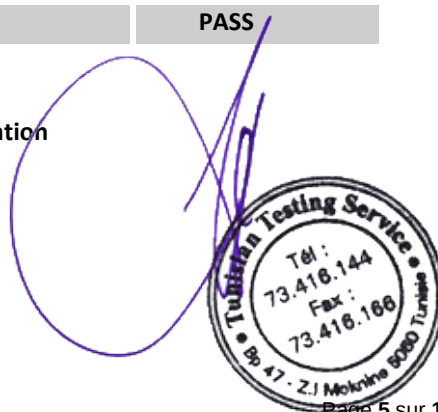
Requirements according to ISO 11612 § 6.2.1

shrinkage ≤ 5 %
 Inflammation: No
 Melting : No

Conformity assessment according to ISO 11612 § 6.2.1

PASS

Test carried out under accreditation

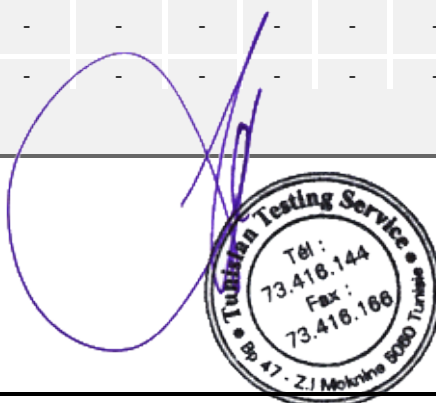


Test method : Limited flame spread (Codification letter A1)
Test date : 08-04-2019
Our reference : 1902662.01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN ISO 15025: 2017 / METHOD A
Product standard : NF EN ISO 11612 § 6.3.2: 2015
Standard deviation : No
Pretreatment : Without
Conditioning : 20 °C /65 %HR
Test atmosphere : 19°C / 46 % HR
Ignition time : 10 s
Type of gas used : Propane

Results

➤ Surface ignition												
	Length direction						Width direction					
Sample	1	2	3	4	5	6	1	2	3	4	5	6
Layer exposed to flame	Outer	Outer	Outer	back	back	back	Outer	Outer	Outer	back	back	back
Ignition of specimens (yes/no)	No	No	No	No	No	No	No	No	No	No	No	No
Upper border reached (yes/no)	No	No	No	No	No	No	No	No	No	No	No	No
Duration of flame persistence (s)	-	-	-	-	-	-	-	-	-	-	-	-
Incandescence (yes / no)	No	No	No	No	No	No	No	No	No	No	No	No
Residual incandescence time(s)	-	-	-	-	-	-	-	-	-	-	-	-
Production of debris (yes / no)	No	No	No	No	No	No	No	No	No	No	No	No
Debris having ignited the filter paper	No	No	No	No	No	No	No	No	No	No	No	No
Merger (yes / no)	No	No	No	No	No	No	No	No	No	No	No	No
Hole formation (yes / no)	No	No	No	No	No	No	No	No	No	No	No	No
Number of holes	-	-	-	-	-	-	-	-	-	-	-	-
Dimensions of the largest hole	-	-	-	-	-	-	-	-	-	-	-	-
Length damaged / charred	-	-	-	-	-	-	-	-	-	-	-	-



Test method : Limited flame spread (Codification letter A1)
Test date : 08-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN ISO 15025: 2017 / METHOD A
Product standard : NF EN ISO 11612 § 6.3.2: 2015
Standard deviation : No
Pretreatment : 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry +ironing
Conditioning : 20 °C /65 %HR
Test atmosphere : 19°C / 46 % HR
Ignition time : 10 s
Type of gas used : Propane

Results

➤ Surface ignition												
	Length direction						Width direction					
Sample	1	2	3	4	5	6	1	2	3	4	5	6
Layer exposed to flame	Outer	Outer	Outer	back	back	back	Outer	Outer	Outer	back	back	back
Ignition of specimens (yes/no)	No	No	No	No	No	No	No	No	No	No	No	No
Upper border reached (yes/no)	No	No	No	No	No	No	No	No	No	No	No	No
Duration of flame persistence (s)	-	-	-	-	-	-	-	-	-	-	-	-
Incandescence (yes / no)	No	No	No	No	No	No	No	No	No	No	No	No
Residual incandescence time(s)	-	-	-	-	-	-	-	-	-	-	-	-
Production of debris (yes / no)	No	No	No	No	No	No	No	No	No	No	No	No
Debris having ignited the filter paper	No	No	No	No	No	No	No	No	No	No	No	No
Merger (yes / no)	No	No	No	No	No	No	No	No	No	No	No	No
Hole formation (yes / no)	No	No	No	No	No	No	No	No	No	No	No	No
Number of holes	-	-	-	-	-	-	-	-	-	-	-	-
Dimensions of the largest hole	-	-	-	-	-	-	-	-	-	-	-	-
Length damaged / charred	-	-	-	-	-	-	-	-	-	-	-	-

Requirement according to ISO 11612 § 6.3.2

Inflammation: No
 Flaming debris: No
 Hole > 5mm: No
 Residual glow time <2s
 Flame persistence time <2s

Conformity assessment according to ISO 11612 § 6.3.2

PASS Level A1

Test carried out under accreditation



Test method : Limited flame spread (Codification letter A2)
Test date : 09-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN ISO 15025: 2016 / METHOD B
Product standard : ISO 11612 § 6.3.3: 2015
Standard deviation : No
Pretreatment : Without
Conditioning : 20 °C /65 %HR
Test atmosphere : 21°C / 49 % HR
Ignition time : 10 s
Type of gaz used : Propane

Result

➤ Edge ignition												
	Length direction						Width direction					
Sample	1	2	3	4	5	6	1	2	3	4	5	6
Layer exposed to flame	Outer	Outer	Outer				Outer	Outer	Outer			
Ignition of specimens (yes/no)	No	No	No				No	No	No			
Upper border reached (yes/no)	No	No	No				No	No	No			
Duration of flame persistence (s)	-	-	-				-	-	-			
Incandescence (yes / no)	No	No	No				No	No	No			
Residual incandescence time(s)	-	-	-				-	-	-			
Production of debris (yes / no)	No	No	No				No	No	No			
Debris having ignited the filter paper	No	No	No				No	No	No			
Merger (yes / no)	No	No	No				No	No	No			
Hole formation (yes / no)	No	No	No				No	No	No			
Number of holes	-	-	-				-	-	-			
Dimensions of the largest hole	-	-	-				-	-	-			
Length damaged / charred	46	44	45				47	50	47			



Test method : Limited flame spread (Codification letter A2)
Test date : 09-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

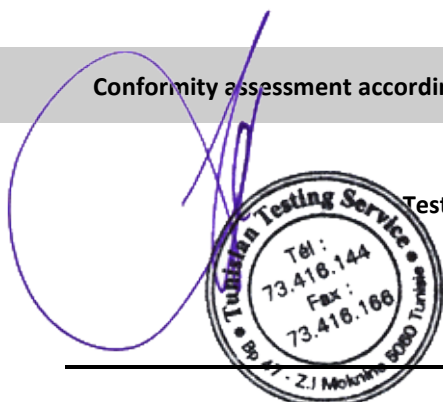
Standard used : NF EN ISO 15025: 2016 / METHOD B
Product standard : ISO 11612 § 6.3.3: 2015
Standard deviation : No
Pretreatment : 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry +ironing
Conditioning : 20 °C /65 %HR
Test atmosphere : 21°C / 49 % HR
Ignition time : 10 s
Type of gaz used : Propane

Result

➤ Edge ignition												
	Length direction						Width direction					
Sample	1	2	3	4	5	6	1	2	3	4	5	6
Layer exposed to flame	Outer	Outer	Outer				Outer	Outer	Outer			
Ignition of specimens (yes/no)	No	No	No				No	No	No			
Upper border reached (yes/no)	No	No	No				No	No	No			
Duration of flame persistence (s)	-	-	-				-	-	-			
Incandescence (yes / no)	No	No	No				No	No	No			
Residual incandescence time(s)	-	-	-				-	-	-			
Production of debris (yes / no)	No	No	No				No	No	No			
Debris having ignited the filter paper	No	No	No				No	No	No			
Merger (yes / no)	No	No	No				No	No	No			
Hole formation (yes / no)	No	No	No				No	No	No			
Number of holes	-	-	-				-	-	-			
Dimensions of the largest hole	-	-	-				-	-	-			
Length damaged / charred	45	43	40				50	50	45			

Conformity assessment according to ISO 11612 § 6.3.3

PASS Level A2



Test carried out under accreditation

Test report: 1902664-2
Date: 12-04-2019

Test method : **Dimensional change**
Test date : 08-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : **NF EN ISO 5077: 2008**
Product standard : **NF EN ISO 11612 § 6.4: 2015**
Standard deviation : No
Pretreatment : 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry +ironing
Conditioning : 20°C /65%HR
Number of measures : 3
Number of specimens : 3

Results:

	% of variation change
Length direction (%)	-2.0 %
Width direction (%)	-0.5 %

Requirement according to ISO 11612 § 6.4**Woven materials : ± 3 %**
knitted materials : ± 5 %**Conformity assessment according to ISO 11612 § 6.4****PASS****Test carried out under accreditation**

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Test method : Tensile strength

Test date : 08-04-2019

Our reference : 1902662 .01

Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN ISO 13934-1: 2013

Product standard : NF EN ISO 11612 § 6.5.1: 2015

Standard deviation : No

Pretreatment : 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry +ironing

Conditioning: : 20 °C /65 %HR

Width of the specimen : 50 mm

Elongation speed : 100 mm/min

Test length used : 200 mm

Applied claim : 5 N

State of specimens : Conditioned

Number of specimens : 5 in each direction

Results:

		Tensile strength (N)
Warp direction	Specimen 1	1600
	Specimen 2	1700
	Specimen 3	1600
	Specimen 4	1700
	Specimen 5	1600
	Average	1700
Weft direction	Specimen 6	1400
	Specimen 7	1300
	Specimen 8	980
	Specimen 9	1000
	Specimen 10	900
	Average	1100

Requirements according to ISO 11612 § 6.5.1

≥ 300 N

Conformity assessment according to ISO 11612 § 6.5.1

PASS

Test under accreditation



Test method : Determination of tear force of trouser shaped test specimen
Test date : 08-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN ISO 13937-2: 2000
Product standard : ISO 11612 § 6.5.2: 2015
Standard deviation : No
Pretreatment: : 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry +ironing
Conditioning: : 20 °C /65 %HR
Specimen length: : 100 mm
Number of specimens: : 5 in each direction

Results:

		Tear resistance (N)
Warp direction	Specimen 1	119
	Specimen 2	101
	Specimen 3	100
	Specimen 4	105
	Specimen 5	100
	Average	105
Weft direction	Specimen 6	142
	Specimen 7	141
	Specimen 8	148
	Specimen 9	134
	Specimen 10	148
	Average	143

Requirements according to ISO 11612 § 6.5.2

≥ 10 N

Conformity assessment according to ISO 11612 § 6.5.2

PASS

Test under accreditation



Test method : Electrostatic properties: Test methods for measurement of charge decay
Test date : 10-04-2019
Our reference : 1902662 .01
Your reference : Woven Fabric EBRFR02A: %93 MetaAramid %5 ParaAramid %2 Carbon (240 g/m²)

Standard used : NF EN 1149-3: 2004 / Method 2
Standard deviation : No
Pretreatment : 05 washing cycles at 60°C (6N/F) according to ISO 6330 + tumbler dry +ironing
Conditioning : 24h à (23°C / 25% HR)
Atmosphere of test : 23°C / 25% HR
Number of specimens : 3
Specimen size: : 350 mm x 350 mm

Results

	Half decay time t50 (s)	Shielding Factor S
Specimen 1	< 0.01	0.88
Specimen 2	< 0.01	0.87
Specimen 3	< 0.01	0.86
Average	< 0.01	0.87

Test under accreditation



End of report