



Laboratory: physic-chemical

File N°: 1902660 -1-1

Receipt date: 04/04/2019

Sample N°/ Your Reference:

1902660.01: Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

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 : 1902660 .01  
 Your reference : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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/m<sup>2</sup>  
 Gas used : Propane  
 Type of calorimeter used : Method A

**Results:**

	t <sub>12</sub> (s)	t <sub>24</sub> (s)
Specimen 1	3.5	4.9
Specimen 2	3.6	5.0
Specimen 3	3.8	5.2
<b>Average</b>	3.63	5.03
<b>Heat transfer index HTI<sub>24</sub> (s)</b>		<b>5</b>

<b>Requirements according to ISO 11612 § 7.2</b>	level B1 : 4 s ≤ HTI24 < 10 s level B2 : 10 s ≤ HTI24 < 20 s level B3 : 20 s ≤ HTI24
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<b>Classification according to ISO 11612 § 7.2</b>	<b>Level B1</b>
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Test carried out under accreditation



**Test method** : Heat transfer - Radiance (Codification letter C)  
**Test date** : 11-04-2019  
**Our reference** : 1902660 .01  
**Your reference** : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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/m<sup>2</sup>  
**Number of specimens** : 3

**Results:**

Specimen N° :	Heat flow density Q <sub>c</sub> (kW/m <sup>2</sup> )	Heat transfer factor TF (20)
1	14.678	0.725
2	15.012	0.742
3	14.359	0.709

	t <sub>24</sub> (s)	t <sub>24</sub> (s) – t <sub>12</sub> (s)
Specimen 1	10	4.5
Specimen 2	9.5	4.4
Specimen 3	10.2	4.6

<b>Heat transfer index RHTI<sub>24</sub> (20) (s)</b>	<b>10</b>
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Requirements according to ISO 11612 § 7.3	Level C1 : 7 s ≤ RHTI <sub>24</sub> < 20 s
	Level C2 : 20 s ≤ RHTI <sub>24</sub> < 50 s
	Level C3 : 50 s ≤ RHTI <sub>24</sub> < 95 s
	Level C4 : 95 s ≤ RHTI <sub>24</sub>

Classification according to ISO 11612 § 7.3	Level C1
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Test carried out under accreditation



**Test method** : Contact heat transmission (codification letter F)  
Test date : 09-04-2019  
Our reference : 1902660 .01  
Your reference : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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	5.8
Specimen 2	5.6
Specimen 3	5.9
Average	5.8

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** : 1902660 .01  
**Your reference** : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)02B

**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	-0.12	-0.12	0	0
(%) Dimensional variation	Width direction	0	-0.24	-0.24	0

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

<b>Requirements according to ISO 11612 § 6.2.1</b>	shrinkage ≤ 5 % Inflammation: No Melting : No
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<b>Conformity assessment according to ISO 11612 § 6.2.1</b>	<b>PASS</b>
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Test carried out under accreditation

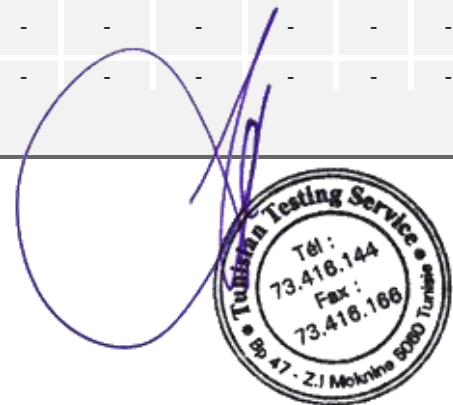


**Test method** : Limited flame spread (Codification letter A1)  
**Test date** : 08-04-2019  
**Our reference** : 1902660 .01  
**Your reference** : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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												
Sample	Length direction						Width direction					
	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** : 1902660 .01  
**Your reference** : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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

Test carried out under accreditation



**Test method** : Limited flame spread (Codification letter A2)  
**Test date** : 09-04-2019  
**Our reference** : 1902660 .01  
**Your reference** : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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	48	53	43				47	50	48			





**Test method** : Limited flame spread (Codification letter A2)  
**Test date** : 09-04-2019  
**Our reference** : 1902660 .01  
**Your reference** : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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	40	50	44				52	48	46			

Conformity assessment according to ISO ISO 11612 § 6.3.3 **PASS Level A2**

Test carried out under accreditation



**Test method** : Dimensional change  
Test date : 08-04-2019  
Our reference : 1902660 .01  
Your reference : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

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 (%)	-1.5 %
Width direction (%)	-2.0 %

**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



**Test method** : Tensile strength  
 Test date : 08-04-2019  
 Our reference : 1902660 .01  
 Your reference : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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

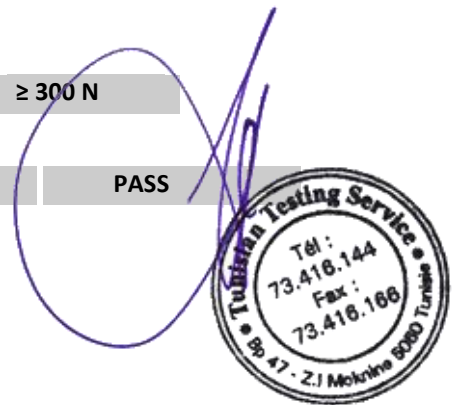
**Results:**

		Tensile strength (N)
<b>Warp direction</b>	Specimen 1	1700
	Specimen 2	1700
	Specimen 3	1600
	Specimen 4	1600
	Specimen 5	1700
	<b>Average</b>	<b>1700</b>
<b>Weft direction</b>	Specimen 6	1300
	Specimen 7	1400
	Specimen 8	1400
	Specimen 9	1400
	Specimen 10	1400
	<b>Average</b>	<b>1400</b>

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** : 1902660 .01  
**Your reference** : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

**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)
<b>Warp direction</b>	Specimen 1	51
	Specimen 2	50
	Specimen 3	51
	Specimen 4	45
	Specimen 5	45
	<b>Average</b>	<b>48</b>
<b>Weft direction</b>	Specimen 6	43
	Specimen 7	44
	Specimen 8	43
	Specimen 9	42
	Specimen 10	43
	<b>Average</b>	<b>43</b>

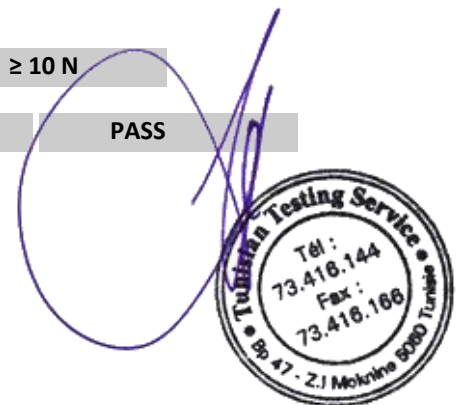
Requirements according to ISO 11612 § 6.5.2

≥ 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 : 1902660 .01  
Your reference : Woven Fabric EBRFR02B: %93 MetaAramid %5 ParaAramid %2 Carbon (250 g/m<sup>2</sup>)

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	0.89
Specimen 2	< 0.01	0.88
Specimen 3	< 0.01	0.9
Average	< 0.01	0.89

### Test under accreditation



End of report