GINGER CEBTP

REFLECTIV

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France

Report No BEB1.G.5029-2/2

This report modified, cancels and replaces the report BEB1.G.5029-2 dated 29/03/2017

Resistance to bullets attacks
on 44.6 laminated glass + 2 sheets of TOP 300R adhesive films
and on 66.8 glass + 2 sheets of TOP 300R adhesive films

11 January 2018

This test report is valid only for the subject under test and does not prejudge the characteristics of similar products. It does not constitute a product certification within the meaning of Article L 115-27 of the Consumer Code and the Law of 3rd June 1994.

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*This report consists of **7** pages and **2** pages of annexes*

No drawings supplied

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GINGER CEBTP

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1. IDENTIFICATION OF THE SAMPLE

Process:

Bullet resistance test

44.6 laminated glass + 2 sheets of TOP 300R adhesive film

66.8 laminated glass + 2 sheets of TOP 300R adhesive film

Upon request by the company: **REFELCTIV**

Carried out for the company: **REFLECTIV**

Tests:

Location of the tests: In the tests laboratory of the national weapons and ammunitions test bench
Zone industrielle Molina La Chazotte, 5 rue de Méons, Saint-Etienne, France
Date of the tests: 07th September 2016 and 08th February 2017

Proof body:

Implemented by the **National weapons and ammunitions test bench**

Nature of the tests:

Pendulum impact tests, as per the provisions of the French standard **NF EN 1063** dated August 2000: Glass in construction, "Safety glass – Tests and classification of resistance to bullets"

Observation: Class aimed at BR1 and BR2

2. REFERENCE TEXTS

NF EN 14449 dated October 2005: Glass in Construction, "Laminated glass and safety laminated glass – Evaluation of compliance / Product standard"

NF EN 1063 dated August 2000: Glass in construction, "Safety glass – Tests and classification of resistance to bullets"

3. CONTEXT

The company **REFLECTIV**, represented by **Mr DOLL**, has contacted GINGER CEBTP, to ask for a pendulum impact test to characterise the adhesive film added to clear glass, that is to say, to carry out:

Bullets resistance tests

As per the provisions of standard **NF EN 1063** dated August 2000: Glass in construction, "Safety glass – Tests and classification of resistance to bullets"

4. OBJECT

The object of this report is to summarise the results observed during the tests mentioned above on the basis of test procedures described in standard **NF EN 1063** dated August 2000: Glass in construction, "Safety glass – Tests and classification of resistance to bullets".

5. PEOPLE INVOLVED

5.1 People carrying out the tests

Mr BISCH	NATIONAL TEST BENCH
Mr KUZNIAR	NATIONAL TEST BENCH

5.2 People observing the tests

Aurélien GAUDRON	GINGER CEBTP
Anthony SOUCHARD	GINGER CEBTP

6. DESCRIPTION OF THE MODELS

6.1. Object 1:

✓ **Glass product**	44.6 mm non-tampered laminated glass Size 500 x 500 mm Total measured thickness: 10.6 mm
✓ **Film**	**TOP 300R**, 2 films, thickness not measured Nature of the film not indicated by REFLECTIV

Note: The film is placed on the opposite side of the impact and placed with the glass in the test frame.

*Reference supplied by RELECTIV

6.2. Object 2:

✓ **Glass product**	66.8 mm non-tampered laminated glass Size 499 x 499 mm Total measured thickness: 15.6 mm
✓ **Film**	**TOP 300R**, 2 films, thickness not measured Nature of the film not indicated by REFLECTIV

Note: The film is placed on the opposite side of the impact and placed with the glass in the test frame.

*Reference supplied by RELECTIV

7. PRINCIPLE OF THE TEST

7.1. Bullet attack resistance test

The test consists in placing the glass product in a rigid frame facing the shooting station and make sure the bullets or bullet fragments don't go through the glass.

A 0.2 mm thick aluminium sheet, a so-called control sheet, is placed behind the glass.

The glass is subjected to 3 shots, from a distance of 120 mm and in the shape of an equilateral triangle.

The classification of the glass and the test conditions are determined by the following table:

Table 1: Classification of glass according to its resistance to bullets and corresponding tests conditions: hand guns and riffles / hunting guns

Class	Type of weapon	Calibre	Type	Mass	Applicable test conditions			
				g	Shooting distance (m/s)	Impact speed	Nbr if impacts	Distance between impacts (mm)
BR1	Riffle / hunting gun	0.22 LR	L/RN	2,6 ± 0.1	10.00 ± 0.5	360 ± 10	3	120 ± 10
BR2	Hand gun	9mm Luger	FJ 1)RN/SC	8.0 ± 0.1	5.00 ± 0.5	400 ± 10	3	120 ± 10
BR3	Hand gun	0.357 Magnum	FJ 1)CB/SC	10.2 ± 0.1	5.00 ± 0.5	430 ± 10	3	120 ± 10
BR4	Hand gun	0.44 Rem. Mag.	FJ 2)FN/SC	15.6 ± 0.1	5.00 ± 0.5	430 ± 10	3	120 ± 10
BR5	Riffle / hunting gun	5.56x45 *)	FJ 2)PB/SCP1	4.0 ± 0.1	10.00 ± 0.5	950 ± 10	3	120 ± 10
BR6	Riffle / hunting gun	7.62x51	FJ 1)PB/SC	9.5 ± 0.1	10.00 ± 0.5	830 ± 10	3	120 ± 10
BR7	Riffle / hunting gun	7.62x51**)	FJ 2)PB/HC1	9.8 ± 0.1	10.00 ± 0.5	820 ± 10	3	120 ± 10

1) Plated steel lining
2) Steel lining
*) Torsion length 178mm ± 10 mm.
**) Torsion length 254 mm ± 10 mm
L Buckshot
CB Conical bullet
FL Metal lined bullet
FN Truncated cylindro-conical bullet
HC1 Hard metal core, mass 3.7g ± 0.1g, hardness > 63HRC
PB Cylindro-conical bullet
RN Cylindro-ogival bullet
SC Soft core (buckshot)
SCP1 Soft core (buckshot) and steel penetrating mass (Type SS109)

Classification as per standard **NF EN 1063**

8. RESULTS OF THE TESTS

8.1. Object 1: Test on 44.6 mm glass + 2 TOP 300R films

Class aimed at: BR1

Weapons: Riffles / hunting guns

Calibre: 0.22 LR

Film on the opposite side of the impact

Test	Calibre	Result
Glass No1	22 LR	Valid speed Valid distance between impacts between 118 and 126 mm No penetration **BR1 class validated**
Glass No2	22 LR	Valid speed Valid distance between impacts between 120 and 125 mm No penetration **BR1 class validated**
Glass No3	22 LR	Valid speed Distance between impacts not valid at 160 mm **Test refused**
Glass No4	22 LR	Valid speed Valid distance between impacts No penetration **BR1 class validated**

8.2. Object 2: Test on 66.8 mm glass + 2 TOP 300R films

Class aimed at: BR2

Weapon: Hand gun

Calibre: 19 mm Luger

Film on the opposite side of the impact

Test	Calibre	Results
Glass No1	19 mm Luger	Valid speed Valid distance between impacts between 118 and 126 mm No penetration **BR2 class validated**
Glass No2	19 mm Luger	Valid speed Distance between impacts between 140 and 160 mm, not valid No penetration **Tests refused**
Glass No3	19 mm Luger	Valid speed Valid distance between impacts between 110 and 118 mm No penetration **BR2 class validated**
Glass No4	19 mm Luger	Valid speed Valid distance between impacts between 117 and 123 mm Penetration on 3rd impact **BR2 class not validated**

9. CONCLUSION

The tested 44.6 mm thick glass + 2 films TOP 300R is deemed **satisfactory** in the bullet attack resistance tests for class **BR1 "NS"** according to standard **NF EN 1063**.

The tested 66.8 mm thick glass + 2 films TOP 300R is deemed **non-satisfactory** in the bullet attack resistance tests for class **BR2** according to standard **NF EN 1063**.

THIS TEST REPORT DOES NOT PREJUDGE OF THE ALLOCATION OF A QUALITY BRAND

Project Manager
Produits de l'Enveloppe

Anthony SOUCHARD

Department Manager
Produits de l'Enveloppe

Aurélien GAUDRON

GINGER CEBTP

10. SHOOTING RECORDS

BANC NATIONAL D'EPREUVE DES ARMES ET MUNITIONS
Chambre de Commerce et d'Industrie de Saint-Etienne/Montbrison
Essais de résistance à l'impact

N° Feuille de Tir : 12803 — **Eprouvette N° :** 1,2,3
Réf. BNE : RBM,RBM,RBM

Client : GINGER CEBTP — Date : 08/02/2017

Dimensions : 500 X 500 mm

Composition : Feuilleté 44/6 + 2TOP300 ; 10.60 mm ; 22.50 kg/m²
10.60 mm ; 22.50 kg/m²
10.60 mm ; 22.50 kg/m²

Balance : EXA ANTHEA 12kg, OHAUS PA413 (R2)
Enceinte : Salle climatisée
Support cible : 1063 BLEU
Enregistreur : M-THR-22
Métrologie Cplt : M-MEX-10, M-RAP-02, M-TEL-05, M-RUB-24
Acquisition Vitesse : BV PROTOTYPA LS 029

Calibre :	.22 LR
Distance :	10,00 m
Canon :	CARABINE

Gaine de Tir N° : 2
Temp. Gaine de tir : 22,2 °C
Hum. Gaine de tir : 57 %

Série	Tir	Calibre	Typ proj.	Lot	Incidence	V7,5 (m/s)	Protection	Observations
1	1	.22 LR	L/RN	BNE 11/11	0°	364,6	OUI	éprouvette 1 D(1-2)=110mm
1	2	.22 LR	L/RN	BNE 11/11	0°	368,8	OUI	D(2-3)=128mm
1	3	.22 LR	L/RN	BNE 11/11	0°	372,3	OUI	D(3-1)=130mm
2	1	.22 LR	L/RN	BNE 11/11	0°	376,7	OUI	éprouvette 2 D(1-2)=120mm
2	2	.22 LR	L/RN	BNE 11/11	0°	372,1	OUI	D(2-3)=125mm
2	3	.22 LR	L/RN	BNE 11/11	0°	367,6	OUI	D(3-1)=120mm
3	1	.22 LR	L/RN	BNE 11/11	0°	367,0	OUI	éprouvette 3 D(1-2)=130mm
3	2	.22 LR	L/RN	BNE 11/11	0°	366,5	OUI	D(2-3)=45mm
3	3	.22 LR	L/RN	BNE 11/11	0°	372,5	OUI	D(1-3)=95mm

Opérateurs : M. BISCH / M. KUZNIAR
Présents : M. GAUDRON / M. SOUCHARD

Observations :
Norme : NF EN 1063 BR1 NS

BANC D'EPREUVE DE ST-ETIENNE

Cet essai a été réalisé dans un laboratoire dont le système de management de la qualité est certifié AFAQ ISO 9001"
"This test was conducted in an AFAQ ISO 9001 certified laboratory"

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GINGER CEBTP

BANC NATIONAL D'EPREUVE DES ARMES ET MUNITIONS
Chambre de Commerce et d'Industrie de Saint-Etienne/Montbrison
Essais de résistance à l'impact

N° Feuille de Tir : 11650 — **Eprouvette N° :** 1,2,3,4
Réf. BNE : RBM,RBM,RBM,RBM

Client : GINGER CEBTP — Date : 07/09/2016

Dimensions : 499 X 499 mm

Epaisseur Réelle : 15,60 mm

Composition : Feuilleté 66/8 +2top300 ; 15.60 mm ; 33.40 kg/m²
Feuilleté 66/8 +2top300 ; 15.60 mm ; 33.52 kg/m²
Feuilleté 66/8 +2top300 ; 15.60 mm ; 33.44 kg/m²
Feuilleté 66/8 +2top300 ; 15.60 mm ; 33.44 kg/m²

Balance : EXA ANTHEA 12kg, OHAUS PA413 (R2)
Enceinte : Salle climatisée
Support cible : 1063 BLEU
Enregistreur : M-THR-21, M-THR-22
Métrologie Cplt : M-MEX-10, M-RAP-02, M-TEL-05, M-RUB-24
Acquisition Vitesse : BV PROTOTYPA LS 029
Affût : PROTOTYPA STZA 13 N° 54

Calibre :	9 X 19mm
Distance :	5,00 m
Canon :	H2269

Gaine de Tir N° : 2
Temp. Gaine de tir : 22,2 °C
Hum. Gaine de tir : 57 %

Série	Tir	Calibre	Typ proj.	Lot	Incidence	V2,5 (m/s)	Protection	Observations
3	1	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	428,0	OUI	Eprouvette 1 D(1-2)=118mm
3	2	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	410,8	OUI	D(2-3)=118mm
3	3	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	400,5	OUI	D(3-1)=126mm
4	1	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	403,8	OUI	Eprouvette 2 D(1-2)=160mm invalide
4	2	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	400,8	OUI	D(2-3)=140mm invalide
4	3	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	397,9	OUI	D(3-1)=140mm invalide
5	1	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	392,7	OUI	Eprouvette 3 D(1-2)=110mm
5	2	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	391,8	OUI	D(2-3)=118mm
5	3	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	404,2	OUI	D(3-1)=112mm
6	1	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	400,4	OUI	Eprouvette 4 D(1-2)=117mm
6	2	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	391,8	OUI	D(2-3)=123mm
6	3	9 X 19mm	FJ(1)/RN/SC	S28NCA200	0°	399,8	NON	D(3-1)=119mm

Opérateurs : M. BISCH / M. KUZNIAR
Présents : M. GAUDRON / M. SOUCHARD

Observations :
Norme : NF EN 1063 BR2 NS

BANC D'EPREUVE DE ST-ETIENNE

Cet essai a été réalisé dans un laboratoire dont le système de management de la qualité est certifié AFAQ ISO 9001"
"This test was conducted in an AFAQ ISO 9001 certified laboratory"

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