
Optima Ballistic Glass Colombia S.A., Armor Protection Ballistic Resistance Test

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has no affiliation with Optima Ballistic Glass Colombia S.A.

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1 Introduction

Optima Ballistic Glass Colombia S.A., provided three armor samples to NTS-Chesapeake Testing for ballistic resistance testing on 30 August 2019.

2 Threats and Instrumentation

2.1 Threats

- 7.62 x 51-mm, 149-grain M80 full metal jacketed (FMJ) projectiles

*All projectiles were fired from a universal receiver which was fitted with the appropriate barrel and mounted on a NTS-Chesapeake Testing mount.

*The threat projectiles were required to have no greater than 5° total yaw. Projectile yaw was measured to ensure that the test impacts were within this constraint by placing a yaw card at the appropriate gun-to-target range during velocity verification shots.

2.2 Instrumentation

Projectile velocity measurements were obtained using Oehler Research model No. 57 infrared screens with Y.I.S. Cowden Group Chrono-USB chronographs.

3 Details of Test

The objective of this test was to conduct a ballistic resistance test on the transparent armor samples in accordance with EN 1063 BR6 and the customer's request. Shot spacing between multiple impacts against a single sample was in accordance with the reference performance standard. All shots against the transparent armor samples were performed at 0.0° obliquity and ambient range temperature (69.4 °F).

For each shot, the target was mounted in a rigid frame and clamped to a rigid test fixture. A piece of 0.0254 mm thick (0.001 in) aluminum foil with splinter box was mounted along the shotline, approximately 500 mm ±13 mm (19.666 in ±0.5 in) behind the target, to verify complete penetrations. A complete penetration was scored only when the witness material was perforated (i.e., light was visible through the material). All firings were conducted at 32.750 ft from the target. The projectile velocities used for the test were in accordance with the referenced performance standard.

4 Summary of Results

The results of the ballistic resistance test are shown in Table 1. The round-by-round ballistic data sheets for all testing performed are provided on the following pages.

Table 1. Summary of Ballistic Resistance Testing

Job No.	Sample No.	Size (in)	Weight (lbs)	Threat	Target Obliq. (deg)	Shot No.	Penetration Data	
							Velocity (ft/s)	Result
3350-012-1	5993-105	19.50 x 19.50	47.88	7.62 x 51-mm, 149-grain M80 FMJ	0.0	1	2692	None
						2	2692	None
						3	2716	None
3350-012-2	5995-105	19.50 x 19.50	47.88	7.62 x 51-mm, 149-grain M80 FMJ	0.0	1	2694	None
						2	2731	None
						3	2717	None
3350-012-3	5994-105	19.50 x 19.50	47.84	7.62 x 51-mm, 149-grain M80 FMJ	0.0	1	2727	None
						2	2741	None
						3	2708	None

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Optima Ballistic Glass Colombia S.A.

Job No.: 3350-012-1

Test Date: 8/30/2019

Test Panel

Description: Transparent Armor

Manufacturer: Optima Ballistic Glass Colombia S.A.

Sample No.: 5993-105

Size: 19.50 x 19.50 in
Avg. Thick: 1.539 in
Thickness: 1.539 in; 1.539 in;
1.537 in; 1.541 in

Weight: 47.88 lbs
Plies/Laminates: NA

Date Received: 8/23/2019
Via: FedEx
Returned: FedEx

Setup

Shot Spacing: EN 1063 BR6
Witness Panel: .001 in Aluminum foil with
splinter box
Backing Material: NA
Condition: Ambient

Primary Vel. Screens (ft): 20.000, 20.333,
29.667, 30.000
Primary Vel. Location (ft): 25.000
Range to Target (ft): 32.750
Target to Witness (in): 19.666

Range No.: 2
Temp: 69.4 °F
BP: 29.9 inHg
RH: 47.0%
Barrel/Gun: Test Barrel
Gunner: Matt Rixham
Recorder: Matt Rixham

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 149-grain M80 FMJ	Military	N 110

Applicable Standards or Procedures

- (1) EN 1063 BR6
- (2) Customer request

Shot No.	Ammo	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes
1	1	NA	3714	2693	3468	2691	2692	None	0.0	
2	1	NA	3714	2693	3468	2691	2692	None	0.0	
3	1	NA	3680	2717	3439	2714	2716	None	0.0	

Remarks:

Required velocity: 2691 to 2755 ft/s

Footnotes:

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Optima Ballistic Glass Colombia S.A.

Job No.: 3350-012-2

Test Date: 8/30/2019

Test Panel

Description: Transparent Armor

Manufacturer: Optima Ballistic Glass Colombia S.A.

Sample No.: 5995-105

Size: 19.50 x 19.50 in
Avg. Thick: 1.533 in
Thickness: 1.529 in; 1.537 in;
1.536 in; 1.530 in

Weight: 47.88 lbs
Plies/Laminates: NA

Date Received: 8/23/2019
Via: FedEx
Returned: FedEx

Setup

Shot Spacing: EN 1063 BR6
Witness Panel: .001 in Aluminum foil with
splinter box
Backing Material: NA
Condition: Ambient

Primary Vel. Screens (ft): 20.000, 20.333,
29.667, 30.000
Primary Vel. Location (ft): 25.000
Range to Target (ft): 32.750
Target to Witness (in): 19.666

Range No.: 2
Temp: 69.4 °F
BP: 29.9 inHg
RH: 46.8%
Barrel/Gun: Test Barrel
Gunner: Matt Rixham
Recorder: Matt Rixham

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 149-grain M80 FMJ	Military	N 110

Applicable Standards or Procedures

- (1) EN 1063 BR6
- (2) Customer request

Shot No.	Ammo	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes
1	1	149.0	3717	2690	3461	2697	2694	None	0.0	
2	1	149.0	3661	2731	3417	2731	2731	None	0.0	
3	1	149.0	3683	2715	3434	2718	2717	None	0.0	

Remarks:

Required velocity: 2691 to 2755 ft/s

Footnotes:

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Optima Ballistic Glass Colombia S.A.

Job No.: 3350-012-3

Test Date: 8/30/2019

Test Panel

Description: Transparent Armor

Manufacturer: Optima Ballistic Glass Colombia S.A.

Sample No.: 5994-105

Size: 19.50 x 19.50 in
Avg. Thick: 1.538 in
Thickness: 1.537 in; 1.538 in;
1.537 in; 1.540 in

Weight: 47.84 lbs
Plies/Laminates: NA

Date Received: 8/23/2019
Via: FedEx
Returned: FedEx

Setup

Shot Spacing: EN 1063 BR6
.001 in Aluminum foil with
Witness Panel: splinter box
Backing Material: NA
Condition: Ambient

Primary Vel. Screens (ft): 20.000, 20.333,
29.667, 30.000
Primary Vel. Location (ft): 25.000
Range to Target (ft): 32.750
Target to Witness (in): 19.666

Range No.: 2
Temp: 69.2 °F
BP: 29.9 inHg
RH: 46.6%
Barrel/Gun: Test Barrel
Gunner: Matt Rixham
Recorder: Matt Rixham

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 149-grain M80 FMJ	Military	N 110

Applicable Standards or Procedures

- (1) EN 1063 BR5
- (2) Customer request

Shot No.	Ammo	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes
1	1	149.0	3670	2725	3421	2728	2727	None	0.0	
2	1	149.0	3649	2740	3404	2742	2741	None	0.0	
3	1	149.0	3692	2709	3448	2707	2708	None	0.0	

Remarks:

Required velocity: 2691 to 2755 ft/s

Footnotes: