



12 July 2021

Optima Ballistic Glass Colombia S.A.
Zona Franca La Cayena Mz K Lote In 45 A.
Barranquilla, Colombia

Attention: Mr. Julio Rodriguez

Subject: Optima Ballistic Glass Colombia S.A., Armor Protection Ballistic Resistance Test:
Job No. 3350-021A, Tested 9 June 2021, Purchase Order No. Prepaid

Dear Mr. Rodriguez:

Please find enclosed a report documenting the subject test series conducted by NTS-Chesapeake Testing on 9 June 2021. This report includes a summary of the test as well as a detailed shot record for each armor sample tested.

If you have any questions related to this test, please call Mr. Craig Thomas at 410-297-8154 or contact him via e-mail at craig.thomas@nts.com.

Sincerely,

A handwritten signature in black ink, appearing to read "CS", is written over a horizontal line.

Chris Schueler
General Manager, NTS-Chesapeake Testing

cdh

Enc. a/s

This report shall not be used to claim product certification, approval or endorsement. The results of the testing relate only to the samples submitted for testing. This test report shall not be interpreted as an endorsement by NTS-Chesapeake Testing as to the continued quality or performance of any items of the same or similar design.

The information contained in this report may be subject to the provisions of the Export Administration Act (50 USC 2401 et seq.), the Export Administration Regulations (15 CFR 768-799), or the U.S. Arms Export Control Act (22 USC 2778 et seq.) and the International Traffic in Arms Regulations (22 CFR 120-130). These statutes and regulations impose restrictions on import, export and transfer to foreign entities and persons, whether within the U.S. or abroad, of certain data and articles without approved licenses from the U.S. Department of State and/or the U.S. Department of Commerce.

NTS-Chesapeake Testing is an independent testing facility
and has no affiliation with Optima Ballistic Glass Class Colombia S.A.

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OPTIMA BALLISTIC GLASS COLOMBIA S.A. PROPRIETARY INFORMATION



POC: Mr. Julio Rodriguez

P.O. No.: Prepaid

Test Date: 9 June 2021

Job No.: 3350-021A

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

Prepared by:

Craig A. Thomas
Colleen D. Hallock

NTS-Chesapeake Testing

*4603B Compass Point Road
Belcamp, MD 21017*

12 July 2021

***Further dissemination only as directed by
Optima Ballistic Glass Colombia S.A., July 2021.***

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OPTIMA BALLISTIC GLASS COLOMBIA S.A. PROPRIETARY INFORMATION



POC: Mr. Julio Rodriguez
P.O. No.: Prepaid
Test Date: 9 June 2021
Job No.: 3350-021A

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P.O. No.: Prepaid
Test Date: 9 June 2021
Job No.: 3350-021A

1 Introduction

Optima Ballistic Glass Colombia S.A., provided three armor samples to NTS-Chesapeake Testing for ballistic resistance testing on 9 June 2021.

2 Threats and Instrumentation

2.1 Threats

- 7.62 x 51-mm, 150-grain M61 AP 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. Calibration data is provided in Attachment A.

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 BR7 and the customer's request. Shot spacing between multiple impacts against a single sample was 3 shots on a 120 mm triangle. Shots against the transparent armor samples were performed at 0.0° obliquity and ambient range temperature (66 ± 2 °F).

Each sample was conditioned to a specific parameter prior to testing as referenced on each data sheet. For each shot, a piece of 0.0254 mm thick (0.001 in) aluminum foil with splinter box was mounted along the shotline, approximately 500 mm \pm 13 mm (19.680 in \pm 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 32.800 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.



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Table 1. Summary of Ballistic Resistance Testing

Job No.	Sample No.	Size (mm)	Weight (lbs)	Threat	Target Obliq. (deg)	Shot No.	Penetration Data	
							Velocity (ft/s)	Result
3350-021-1	Group 2 EP-10252-105	500 x 500	90.42	7.62 x 51-mm, 150-grain M61 AP	0.0	1	2664	None
						2	2682	None
						3	2670	None
3350-021-2	Group 2 EP-10252-106	500 x 500	90.47	7.62 x 51-mm, 150-grain M61 AP	0.0	1	2692	None
						2	2701	None
						3	2669	None
3350-021-3	Group 2 EP-10252-107	500 x 500	90.21	7.62 x 51-mm, 150-grain M61 AP	0.0	1	2673	None
						2	2677	None
						3	2700	None

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Optima Ballistic Glass Colombia S.A.S.
Job No.: 3350-021-1
Test Date: 06/09/2021

Test Panel

Description: Transparent Armor

Manufacturer: Optima Ballistic Glass Colombia S.A.

Sample No.: Group 2 EP-10252-105

Size: 500.00 x 500.00 mm
Avg. Thick: 2.811 in
Thickness: 2.812 in, 2.813 in,
2.810 in, 2.809 in

Weight: 90.42 lbs
Plies/Laminates: N/A

Date Received: 06/07/2021
Received Via:
Returned Via:

Setup

Shot Spacing: 3 shots on 120 mm triangle
Witness Panel: .001 in Aluminum foil with splinter box
Backing Material: N/A
Condition: -32 °C for 12 hour minimum

Primary Vel. Screens (ft): 20.000, 20.333, 29.666, 30.000
Primary Vel. Location (ft): 25.000
Range to Target (ft): 32.800
Target to Witness (in): 19.680

Range No.: Range 1
Temp: 65.1 °F
BP: 29.9 inHg
RH: 42.8 %
Barrel/Gun: WC078544
Gunner: Ramon Chavez
Recorder: William Ellis

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 150-grain M61 AP	Military	N133

Applicable Standards or Procedures

- (1) BS EN 1063 Level BR7
- (2) Customer Request

Shot No.	Ammo	Powder/Seating	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Striking Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes
1	1	41.0	150	3746	2670	3495	2670	2670	2664	None	0	
2	1	41.0	150	3724	2685	3470	2690	2687	2682	None	0	
3	1	41.0	150	3739	2675	3487	2677	2676	2670	None	0	

Remarks:

Footnotes:

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Optima Ballistic Glass Colombia S.A.S.
Job No.: 3350-021-2
Test Date: 06/09/2021

Test Panel

Description: Transparent Armor

Manufacturer: Optima Ballistic Glass Colombia S.A.

Sample No.: Group 2 EP-10252-106

Size: 500.00 x 500.00 mm
Avg. Thick: 2.814 in
Thickness: 2.823 in, 2.815 in,
2.807 in, 2.810 in

Weight: 90.47 lbs
Plies/Laminates: N/A

Date Received: 06/07/2021
Received Via:
Returned Via:

Setup

Shot Spacing: 3 shots on 120 mm
triangle
Witness Panel: .001 in Aluminum foil
with splinter box
Backing Material: N/A
Condition: -32 °C for 12 hour
minimum

Primary Vel. Screens (ft): 20.000, 20.333,
29.666, 30.000
Primary Vel. Location (ft): 25.000
Range to Target (ft): 32.800
Target to Witness (in): 19.680

Range No.: Range 1
Temp: 67.2 °F
BP: 29.9 inHg
RH: 55.8 %
Barrel/Gun: WC078544
Gunner: Ramon Chavez
Recorder: William Ellis

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 150-grain M61 AP	Military	N133

Applicable Standards or Procedures

- (1) BS EN 1063 Level BR7
- (2) Customer Request

Shot No.	Ammo	Powder/Seating	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Striking Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes
1	1	41.2	150	3710	2695	3456	2701	2698	2692	None	0	
2	1	41.2	150	3695	2706	3446	2708	2707	2701	None	0	
3	1	41.2	150	3741	2673	3487	2677	2675	2669	None	0	

Remarks:

Footnotes:

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Optima Ballistic Glass Colombia S.A.S.
Job No.: 3350-021-3
Test Date: 06/09/2021

Test Panel

Description: Transparent Armor

Manufacturer: Optima Ballistic Glass Colombia S.A.

Sample No.: Group 2 EP-10252-107

Size: 500.00 x 500.00 mm
Avg. Thick: 2.812 in
Thickness: 2.812 in, 2.813 in,
2.810 in, 2.811 in

Weight: 90.21 lbs
Plies/Laminates: N/A

Date Received: 06/07/2021
Received Via:
Returned Via:

Setup

Shot Spacing: 3 shots on 120 mm
triangle
Witness Panel: .001 in Aluminum foil
with splinter box
Backing Material: N/A
Condition: -32 °C for 12 hour
minimum

Primary Vel. Screens (ft): 20.000, 20.333,
29.666, 30.000
Primary Vel. Location (ft): 25.000
Range to Target (ft): 32.800
Target to Witness (in): 19.680

Range No.: Range 1
Temp: 67.3 °F
BP: 29.9 inHg
RH: 51 %
Barrel/Gun: CT-3047,
WC078544
Gunner: Ramon Chavez
Recorder: William Ellis

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 51-mm, 150-grain M61 AP	Military	N133

Applicable Standards or Procedures

- (1) BS EN 1063 Level BR7
- (2) Customer Request

Shot No.	Ammo	Powder/Seating	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Striking Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes
1	1	41.2	150	3734	2678	3483	2680	2679	2673	None	0	
2	1	41.2	150	3729	2682	3478	2683	2683	2677	None	0	
3	1	41.2	150	3697	2705	3448	2707	2706	2700	None	0	

Remarks:

Footnotes:



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**ATTACHMENT A
 CALIBRATION DATA**

Job Number: 3350-021					
Customer: Optima Ballistic Glass			Date: 6-9-2021		
Range: 1		Range Lead: Blake Ellis			
Equipment	Serial Number	NTS I.D. #	Cal. Date	Due Date	Range Lead Initials
Chronograph 1	105	WC027147	9/17/2020	9/17/2021	WBE
Chronograph 2	109	WC067008	9/17/2020	9/17/2021	WBE
Powder Scale	A20319477	WC075109	3/12/2021	9/12/2021	WBE
Floor Scale	25359073	WC060708	12/9/2020	12/9/2021	WBE
100 ft. Tape Measure	906	WC064334	3/10/2021	3/10/2022	WBE
25 ft. Tape Measure	WC074988	WC074988	10/19/2020	10/19/2022	WBE
Thermometer	210185096	WC075125	3/9/2021	3/9/2023	WBE
BFD Tool	19/010026	WC067359	1/21/2021	1/21/2022	WBE
BFD Bridge	19/190011	WC074146	12/9/2020	12/9/2021	WBE
Angle Block	842	WC027023	1/22/2021	1/22/2023	WBE
Faro Arm	W25-S5-19-19790	WC067336	2/10/2021	2/10/2022	WBE
Laser Probe	LLPH62023039	WC075079	11/24/2020	11/24/2021	WBE
Temp/Humidity/BP Sensor	M21050295	WC075112	3/23/2021	3/23/2022	WBE



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