

POC: Mr. Julio Rodriguez P.O. No.: Prepaid Test Date: 13 January 2021 Job No.: 3350-018

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

Prepared by:

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NTS-Chesapeake Testing

4603B Compass Point Road Belcamp, MD 21017

26 January 2021

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OPTIMA BALLISTIC GLASS COLOMBIA S.A. PROPRIETARY INFORMATION



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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 13 January 2021.

2 Threats and Instrumentation

2.1 Threats

• 7.62 x 39-mm, 123-grain PS Ball 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 VPAM Level 6 and the customer's request. Shot spacing between multiple impacts against a single sample was in accordance with the reference performance standard. Shots against the transparent armor samples were performed at 0.0° obliquity and ambient range temperature (68 ±1 °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 \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 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.



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Job	Sample				Target	Shot	Penetration Data		
No.	No.	Size (in)	Weight (lbs)	Threat	Obliq. (deg)	No.	Velocity (ft/s)	Result	
3350-018-1 9351-110		15.00 x 15.00	24.72			1	2382	None	
	9351-116			7.62 x 39-mm, 123-grain PS Ball	0.0	2	2378	None	
				125 grain i 5 Ban		3	2365	None	
3350-018-2 9351-117		15.00 x 15.00	24.76		0.0	1	2375	None	
	9351-117			7.62 x 39-mm, 123-grain PS Ball		2	2369	None	
				125 grain 15 Dan		3	2375	None	
		15.00 x 15.00	24.63		0.0	1	2389	None	
3350-018-3	9351-118			7.62 x 39-mm, 123-grain PS Ball		2	2375	None	
				125-grain 15 Dall		3	2368	None	

Table 1. Summary of Ballistic Resistance Testing

OPTIMA BALLISTIC GLASS COLOMBIA S.A. PROPRIETARY INFORMATION

ITS-Chesapeak 603B Compass Point Ro. elcamp, MD 21017	-]		Client: Optima Ballistic Glass Columbia S.A. Job No.: 3350-018-1 Test Date: 1/13/2021								
est Panel	Description	: Transpare										
anufacturer: Optim	na Ballistic Gl	ass Columbia	ole No.:	9351-116	1							
Size: Avg. Thick: Thickness:	Plie	Weight: 24.72 lbs Plies/Laminates: NA Returned: FedEx					x					
etup												
Shot Spacing: Witness Panel: Backing Material: Condition:	ו Primary R	Primary Vel. Screens (ft): 20.000, 20.333, 29.667, 30.000 Range No.: 2 Primary Vel. Location (ft): 25.000 BP: 40.2 inHg Range to Target (ft): 32.750 RH: 41.6% Target to Witness (in): 19.680 Barrel/Gun: Test Barre Gunner: Glenn Snyc Recorder: Bret DeMon					2 inHg 6% t Barrel :nn Snyder					
mmunition						r						
Proje	ctile			Lot No.				Powder				
) 7.62 x 39-mm, 12	-			Russian 3-58 N 110								
 Pplicable Star VPAM Level 06 Customer request 		Procedu	res									
Shot No. Ammo	Weight (gr)	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Ve	/g. el. l /s)	Penetration	Obliq. (°)	Footnotes		
1 1 2 1 3 1	121.4 121.4 121.5	4198 4208 4230	2382 2376 2364	3917 3922 3944	2383 2380 2366	23	82 78 65	None None None	0.0 0.0 0.0			

	B	ALLI	STI	C R	RESIS	STA	NC	Е Т	ES	т			
NTS-Chesapea 4603B Compass Point F Belcamp, MD 21017		Client: Optima Ballistic Glass Columbia S.A. Job No.: 3350-018-2 Test Date: 1/13/2021											
Test Panel	Description	n: Transpa											
Manufacturer: Optima Ballistic Glass Columbia S.A. Sample No.: 9351-117													
Size: 15.00 x15.00 in Avg. Thick: 1.378 in Thickness: 1.379 in; 1.379 in; 1.376 in; 1.379 in					Weight: 24.76 lbs Plies/Laminates: NA Returned: FedEx						X		
Setup													
Shot Spacing: VPAM Level 06 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 Range No.: 2 Primary Vel. Location (ft): 25.000 BP: 40.9 inHg Range to Target (ft): 32.750 RH: 42.5% Target to Witness (in): 19.680 Barrel/Gun: Test Barr Gunner: Glenn Sn Recorder: Bret DeM						9 inHg 5% t Barrel nn Snyder		
Ammunition													
Pro	jectile			Lot No.					Powder				
(1) 7.62 x 39-mm, 1	23-grain PS Ba	II		Russian 3-58					N 110				
Applicable Sta	andards or	Proced	dures	5									
(1) VPAM Level 06(2) Customer reque	st												
Shot No. Ammo	Weight (gr)	Time 1 (µs)		el. 1 ft/s)	Time 2 (µs)		el. 2 t/s)	Avg. Vel. (ft/s	P	enetration	Obliq. (°)	Footnotes	
1 1 2 1 3 1	121.5 121.5 121.6	4212 4225 4212	2	2374 2367 2374	2	377 371 375	2375 2369 2375)	None None None	0.0 0.0 0.0			
Remarks: Required Velocity: 2	362 ± 32 ft/s.											·	
Footnotes:													

		B	ALLI	STI	IC R	RESI	ST/	٩N	CE	TE	ST				
NTS-Chesapeake Testing 4603B Compass Point Road Belcamp, MD 21017									Client: Optima Ballistic Glass Columbia S.A. Job No.: 3350-018-3 Test Date: 1/13/2021						
Test Panel Description: Transparent Armor.															
Manufacturer: Optima Ballistic Glass Columbia S.A. Sample No.: 93									9351-1	18					
Size: 15.00 x 15.00 in Avg. Thick: 1.371 in Thickness: 1.369 in; 1.372 in; 1.372 in; 1.372 in					Plie	Weight: 24.63 lbs Plies/Laminates: NA Date Received: 1/12/20 Via: FedEx Returned: FedEx					X				
Setup					I										
Shot Spacing: VPAM Level 06 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 Range No.: 2 Primary Vel. Location (ft): 25.000 BP: 40.6 inHo Range to Target (ft): 32.750 RH: 49.8% Target to Witness (in): 19.680 Barrel/Gun: Test Barr Gunner: Glenn Sn Recorder: Bret DeM						6 inHg 3% t Barrel nn Snyder				
Ammunition	า														
	Projec	tile			Lot No.					Powder					
(1) 7.62 x 39-mm	n, 123	-grain PS Bal	I		Russian 3-58					N 110					
Applicable	Stan	dards or	Proce	dure	s										
(1) VPAM Level ((2) Customer red															
Shot No. Am	nmo	Weight (gr)	Time 1 (µs)		/el. 1 [ft/s)	Time (µs)		Vel. 2 (ft/s)	2	Avg. Vel. (ft/s)	Penetration	Obliq. (°)	Footnotes		
2	1 1 1	121.9 121.9 122.0	4188 4212 4225	2388 3905 2 2374 3927 2 2367 3939 2						2389 2375 2368	None None None	0.0 0.0 0.0			
Remarks: Required Velocit	y: 236	2 ± 32 ft/s.													
Footnotes:															



ATTACHMENT A CALIBRATION DATA

ics Glass	D	ate: 01/13/21		
	Range Le	ad: BAD		
Serial Number	NTS I.D. #	Cal. Date	Due Date	Range Lead Initials
103	WC027146	8/14/2020	8/14/2021	BAD
113	WC067023	8/14/2020	8/14/2021	BAD
A06233026	WC060532	12/7/2020	12/7/2021	BAD
25459071	WC060652	12/9/2019	12/9/2021	BAD
103	WC060412	7/1/2019	7/1/2021	BAD
WC074972	WC074972	8/24/2020	8/24/2021	BAD
192140234	WC067353	4/27/2019	4/27/2021	BAD
19/010036	WC067357	7/20/2020	7/20/2021	BAD
12/450046	WC064227	12/9/2020	12/9/2021	BAD
840	WC027021	5/19/2020	5/19/2021	BAD
200597950	WC075050	10/06/2020	10/06/2022	BAD
	Serial Number 103 113 A06233026 25459071 103 WC074972 192140234 19/010036 12/450046 840	Serial Number NTS I.D. # 103 WC027146 113 WC067023 A06233026 WC060532 25459071 WC060652 103 WC060412 WC074972 WC074972 192140234 WC067353 19/010036 WC064227 840 WC027021	Range Lead: BAD Serial Number NTS I.D. # Cal. Date 103 WC027146 8/14/2020 113 WC067023 8/14/2020 A06233026 WC060532 12/7/2020 25459071 WC060652 12/9/2019 103 WC060412 7/1/2019 103 WC067353 4/27/2019 103 WC067353 4/27/2019 103 WC067353 4/27/2019 103 WC067357 7/20/2020 192140234 WC067357 12/9/2020 12/450046 WC064227 12/9/2020 840 WC027021 5/19/2020	Range Lead: BADSerial NumberNTS I.D. #Cal. DateDue Date103WC0271468/14/20208/14/2021113WC0670238/14/20208/14/2021A06233026WC06053212/7/202012/7/202125459071WC06065212/9/201912/9/2021103WC0604127/11/20197/11/2021103WC0749728/24/20208/24/2021192140234WC0673534/27/20194/27/202119/010036WC0673577/20/20207/20/202112/450046WC06422712/9/202012/9/2021840WC0270215/19/20205/19/2021



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