

Element U.S. Space & Defense Test Report for Ballistic Resistance Testing

Project No.: PH00011672 Tested: 31 May 2024 P.O. No.: Signed Quote OH18565

Prepared For

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Further dissemination only as directed by MGCG SPA, June 2024.

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Revision History

Rev.	Description	Issue Date
0	Initial Release	13 June 2024

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1 Introduction

MGCG SPA provided two armor samples to Element U.S. Space & Defense for ballistic resistance testing on 31 May 2024.

2 Threats and Instrumentation

2.1 Threats*

- .44 Mag, 240-grain semi jacketed hollow point (SJHP) projectiles
- 9-mm, 124-grain full metal jacketed (FMJ) projectiles

*All projectiles were fired from a universal receiver which was fitted with the appropriate barrel and mounted on an Element U.S. Space & Defense mount.

*The threat projectiles were required to have no greater than 3° 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. A digital caliper was used to measure post-impact deformations observed in the backing clay. A real-time digital video camera was used to document the test. Real-time video will be uploaded separately via LabInsight. 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 armor samples in accordance with NIJ-STD-0101.07 Level HG2 (Modified) and the customer's request. Shot spacing between multiple impacts on a single sample was in accordance with the referenced performance standard. Shots against the armor samples were performed at 0°, 30° or 45° obliquity and ambient range temperature (68.0 °F).

Each sample was conditioned to a specific parameter prior to testing as referenced on each data sheet. For each shot, the target was strapped to a 5.5-in clay/plywood backing that was clamped to a rigid test fixture. All firings were conducted at 15.000 ft from the target. The projectile velocity for each armor sample was in accordance with the referenced performance standard.

4 Summary of Results

The results of the ballistic resistance test are summarized in Table 1. The detailed ballistic data sheets for all testing performed are provided on the following pages.

Table 1. Summary of Ballistic Resistance Test Results

Project No.	Sample No.	Size	Weight (lbs)	Threat	Target Obliq. (deg)	Shot No.	Penetration Data		
							Velocity (ft/s)	Result	Def. (mm)
PH00011672-1	2403942001 Front	Large	2.350	.44 Mag, 240-grain SJHP	0	1	1432	None	33.0
						2	1415	None	33.4
						3	1431	None	29.1
					45	4	1415 ^a	None	29.5
					30	5	1427	None	25.7
					45	6	1404	None	6.1
					0	7	1422	None	25.3
PH00011672-2	2403942001 Back	Large	2.410	9-mm, 124-grain FMJ	0	1	1468	None	23.4
						2	1460	None	25.0
						3	1455	None	22.2
					45	4	1452 ^a	None	22.8
					30	5	1458	None	8.7
					45	6	1453	None	3.2
					0	7	1451	None	11.2

^a Edge shot at neck area.

BALLISTIC RESISTANCE TEST

Element U.S. Space & Defense

4603B Compass Point Road
Belcamp, MD 21017

Client: MGCG SPA

Project No.: PH00011672-1

Test Date: 05/31/2024

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Test Panel

Description: Soft armor

Manufacturer: MGCG SPA

Sample No.: 2403942001 Front

Size: Large
Avg. Thickness: N/A
Thicknesses: N/A

Weight: 2.350 lbs
Plies/Laminates: N/A

Date Received: 05/28/2024
Received Via: FEDEX, Express
Saver
Returned Via: FEDEX, Express
Saver

Setup

Shot Spacing: NIJ-STD-0101.07
Level HG2
Witness Panel: Clay
Backing Material: 5.5-in clay/plywood
Condition: Wet per NIJ-STD-0101.07

Primary Vel. Screens (ft): 5.000, 5.333,
9.666, 10.000
Primary Vel. Location (ft): 7.500
Range to Target (ft): 15.000
Target to Witness (in): 0.000

Range No.: Range 4
Temp: 68 °F
BP: 29.9 inHg
RH: 44 %
Barrel/Gun: CT-3108
Gunner: Matthew Settle
Recorder: Joshua Petty

Ammunition

Projectile	Lot No.	Manufacturer	Powder
(1) .44 Mag, 240-grain SJHP	J28W	Speer	Accurate No. 5

Applicable Standards or Procedures

Clay Drop 1 - Drop Time: 8:40 AM; Block No. WC074174; Temp: 93.4 °F; Drop Depths: 19.4 mm,18.1 mm,17.1 mm,18.5mm, 19 mm

(1) NIJ-STD-0101.07 Level HG2 (Modified)

(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)	Penetration	Deformation (mm)	Obliq. (°)	Footnotes
1	1	13.6	240.6	3492	1432	3026	1432	1432	None	33.0	0	(a)
2	1	13.6	240.3	3534	1415	3063	1415	1415	None	33.4	0	
3	1	13.6	240.8	3495	1431	3028	1431	1431	None	29.1	0	
4	1	13.6	241.0	3534	1415	3063	1415	1415	None	29.5	45	
5	1	13.6	240.3	3504	1427	3038	1426	1427	None	25.7	30	
6	1	13.6	240.5	3561	1404	3087	1404	1404	None	6.1	45	
7	1	13.6	240.7	3517	1422	3048	1422	1422	None	25.3	0	

Remarks:

Required Velocity: 1400-1460 ft/s.

Projectile yaw check: 0° yaw on all impacts

Footnotes:

(a) Edge shot at neck area

BALLISTIC RESISTANCE TEST

Element U.S. Space & Defense

4603B Compass Point Road
Belcamp, MD 21017

Client: MGCG SPA

Project No.: PH00011672-2

Test Date: 05/31/2024

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Test Panel

Description: Soft armor

Manufacturer: MGCG SPA

Sample No.: 2403942001 Back

Size: Large
Avg. Thickness: N/A
Thicknesses: N/A

Weight: 2.410 lbs
Plies/Laminates: N/A

Date Received: 05/28/2024
Received Via: FEDEX, Express
Saver
Returned Via: FEDEX, Express
Saver

Setup

Shot Spacing: NIJ-STD-0101.07
Level HG2
Witness Panel: Clay
Backing Material: 5.5-in clay/plywood
Condition: Wet per NIJ-STD-0101.07

Primary Vel. Screens (ft): 5.000, 5.333,
9.666, 10.000
Primary Vel. Location (ft): 7.500
Range to Target (ft): 15.000
Target to Witness (in): 0.000

Range No.: Range 4
Temp: 68 °F
BP: 29.9 inHg
RH: 42 %
Barrel/Gun: WC060666
Gunner: Matthew Settle
Recorder: Joshua Petty

Ammunition

Projectile	Lot No.	Manufacturer	Powder
(1) 9-mm, 124-grain FMJ	23558	Remington	Accurate No. 2

Applicable Standards or Procedures

Clay Drop 1 - Drop Time: 8:00 AM; Block No. WC074174; Temp: 93.5 °F; Drop Depths: 18.1 mm, 17.7 mm, 16.5 mm, 19.8mm, 17 mm

(1) NIJ-STD-0101.07 Level HG2 (Modified)

(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)	Penetration	Deformation (mm)	Obliq. (°)	Footnotes
1	1	6.0	125	3406	1468	2950	1469	1468	None	23.4	0	(a)
2	1	6.0	125	3424	1460	2967	1460	1460	None	25.0	0	
3	1	6.0	125	3436	1455	2977	1455	1455	None	22.2	0	
4	1	6.0	125	3446	1451	2982	1453	1452	None	22.8	45	
5	1	6.0	125	3431	1457	2972	1458	1458	None	8.7	30	
6	1	6.0	125	3441	1453	2982	1453	1453	None	3.2	45	
7	1	6.0	125	3445	1451	2985	1452	1451	None	11.2	0	

Remarks:

Required Velocity: 1440-1500 ft/s.

Projectile yaw check: 0° yaw on all impacts

Footnotes:

(a) Edge shot at neck area

ATTACHMENT A CALIBRATION DATA

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC027146	Chronograph 1	YIS/Cowden Group, Inc	Chrono USB	10/16/2023	10/16/2024
WC067022	Chronograph 2	YIS/Cowden Group, Inc	Chrono USB	10/16/2023	10/16/2024
EL00004050	Powder Scale	RCBS	1500	2/21/2024	2/21/2025
WC060530	Floor scale	Ohaus	CD-33	2/21/2024	2/21/2025
WC067386	Therm. Clock. Humidity Monitor	Control Company	4040	9/8/2023	9/8/2024
EL00004000	100 ft Tape Measure	Starrett	530-100	11/11/2022	11/11/2024
EL00004086	Thermometer	Control Company	4378	9/21/2023	9/23/2025
EL00004095	DG Tool	Starrett	3753A-6/150	12/13/2023	12/13/2024
WC060685	Angle Block	SPI	91-316-0	11/13/2023	11/13/2025
WC060379	Digital Caliper	Mitutoyo	500-196-20	4/15/2024	4/15/2025
EL00004015	25' Tape	Craftsman	CMHT3765	7/27/2023	7/27/2024
WC078628	25' Tape	Craftsman	CMHT3765	10/23/2023	10/23/2025
EL00004090	Depth Gage	Starrett	3753A-6/150	12/13/2023	12/13/2024
WC064244	Bridge Gage	BDG06	BDG 06	5/3/2024	8/3/2024

END OF REPORT