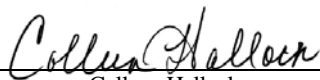


# National Technical Systems Test Report for Ballistic Resistance Testing

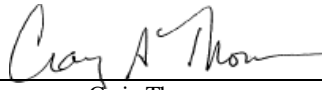
**Project No.:** PH00004888    **Tested:** 6-9 January 2023    **P.O. No.:** Prepaid

**Prepared By**

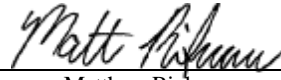
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**Revision History**

Rev.	Description	Issue Date
0	Initial Release	12 January 2023

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## 1 Introduction

Three armor samples to NTS-Belcamp for ballistic resistance testing on 6-9 January 2023.

## 2 Threats and Instrumentation

### 2.1 Threats\*

- .44-mag, 240-grain semi wadcutter gas checked (SWCGC) projectiles

\*The projectiles were fired from a universal receiver which was fitted with the appropriate barrel and mounted on an NTS-Belcamp 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. 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-0108.01 Level IIIA and the customer's request. Shot spacing between multiple impacts on each sample was in accordance with the referenced performance standard. Shots against the armor samples were performed at 0.0° obliquity and ambient range temperature ( $20 \pm 1$  °C).

For each shot, the target was clamped to a rigid test fixture. A piece of 0.508 mm thick (0.020 in) type 2024 T3 aluminum was mounted along the shotline, approximately 152 mm  $\pm 13$  mm (6 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 4.999 m 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 data sheets for all testing performed are provided on the following pages.

Table 1. Summary of Ballistic Resistance Test

Project No.	Sample No.	Size (mm)	Weight (kg)	Threat	Target Obliq. (deg)	Shot No.	Penetration Data	
							Velocity (m/s)	Result
PH00004888-1	Test 001	304.8 x 304.8	0.590	.44-mag, 240-grain SWCGC	0.0	1	422.45	None
						2	419.71	None
						3	427.33	None
						4	416.05	None
						5	424.28	None
PH00004888-2	Test 002	304.8 x 304.8	0.530	.44-mag, 240-grain SWCGC	0.0	1	433.43	None
						2	430.68	None
						3	425.50	None
						4	429.16	None
						5	423.98	None
PH00004888-3	Test 003	304.8 x 304.8	0.660	.44-mag, 240-grain SWCGC	0.0	1	427.94	None
						2	440.74	None
						3	423.06	None
						4	427.94	None
						5	432.51	None

# BALLISTIC RESISTANCE TEST

**NTS-Belcamp**  
4603B Compass Point Road  
Belcamp, MD 21017

Client: Michel Rodriguez Orozco  
Project No.: PH00004888-1  
Test Date: 01/06/2023 - 01/09/2023  
Page 1 of 1

**Test Panel** Description: Rigid armor

**Manufacturer:** Kevlar

**Sample No.:** Test 001

Size: 304.8 x 304.8 mm  
Avg. Thickness: 6.166 mm  
Thicknesses: 6.121 mm, 6.147 mm,  
6.325 mm, 6.071 mm

Weight: 0.590 kg  
Plies/Laminates: N/A

Date Received: 12/15/2022  
Received Via: FEDEX Ground  
Returned Via: FEDEX Ground

## Setup

Shot Spacing: NIJ-STD-0108.01  
Level IIIA  
Witness Panel: 0.02 in 2024-T3 Al  
Backing Material: N/A  
Condition: Ambient

Primary Vel. Screens (m): 1.980, 2.900  
Primary Vel. Location (m): 2.440  
Range to Target (m): 4.999  
Target to Witness (mm): 152.400

Range No.: Range 3  
Temp: 20.3 °C  
BP: 30 inHg  
RH: 44 %  
Barrel/Gun: WC020651  
Gunner: Kevin Guzman  
Recorder: Ramon Chavez

## Ammunition

Projectile	Lot No.	Manufacturer	Powder
(1) .44 Mag., 240-grain SWCGC	NA	Contra Threat Sciences	3 N 38

## Applicable Standards or Procedures

- (1) NIJ-STD-0108.01 Level IIIA  
(2) Customer Request

Shot No.	Ammo	Powder/ Seating	Weight (gr)	Time 1 (μs)	Vel. 1 (m/s)	Time 2 (μs)	Vel. 2 (m/s)	Avg. Vel. (m/s)	Penetration	Obliq. (°)	Footnotes
1	1	12.8	240	2162	423.1	2166	422.1	422.45	None	0	
2	1	12.8	240	2179	419.7	2179	419.7	419.71	None	0	
3	1	12.8	240	2140	427.3	2140	427.3	427.33	None	0	
4	1	12.8	240	2197	416.1	2197	416.1	416.05	None	0	
5	1	12.8	240	2153	424.6	2157	424.0	424.28	None	0	

Remarks:  
Required Velocity: 426 ±15.24 m/s  
Projectile yaw check: 0° yaw on all shots

Footnotes:  
N/A

# BALLISTIC RESISTANCE TEST

## NTS-Belcamp

4603B Compass Point Road  
Belcamp, MD 21017

Client: Michel Rodriguez Orozco

Project No.: PH00004888-2

Test Date: 01/06/2023 - 01/09/2023

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## Test Panel

Description: Rigid armor

Manufacturer: Kevlar

Sample No.: Test 002

Size: 304.8 x 304.8 mm  
Avg. Thickness: 5.112 mm  
Thicknesses: 5.105 mm, 5.080 mm,  
5.080 mm, 5.182 mm

Weight: 0.530 kg  
Plies/Laminates: N/A

Date Received: 12/15/2022  
Received Via: FEDEX Ground  
Returned Via: FEDEX Ground

## Setup

Shot Spacing: NIJ-STD-0108.01  
Level IIIA  
Witness Panel: 0.02 in 2024-T3 Al  
Backing Material: N/A  
Condition: Ambient

Primary Vel. Screens (m): 1.980, 2.900  
Primary Vel. Location (m): 2.440  
Range to Target (m): 4.999  
Target to Witness (mm): 152.400

Range No.: Range 3  
Temp: 20.2 °C  
BP: 30 inHg  
RH: 40 %  
Barrel/Gun: WC020651  
Gunner: Kevin Guzman  
Recorder: Ramon Chavez

## Ammunition

Projectile	Lot No.	Manufacturer	Powder
(1) .44 Mag., 240-grain SWCGC	NA	Contra Threat Sciences	3 N 38

## Applicable Standards or Procedures

- (1) NIJ-STD-0108.01 Level IIIA  
(2) Customer Request

Shot No.	Ammo	Powder/ Seating	Weight (gr)	Time 1 (μs)	Vel. 1 (m/s)	Time 2 (μs)	Vel. 2 (m/s)	Avg. Vel. (m/s)	Penetration	Obliq. (°)	Footnotes
1	1	12.8	240	2110	433.4	2110	433.4	433.43	None	0	
2	1	12.8	240	2123	430.7	2123	430.7	430.68	None	0	
3	1	12.8	240	2149	425.5	2149	425.5	425.50	None	0	
4	1	12.8	240	2131	429.2	2131	429.2	429.16	None	0	
5	1	12.8	240	2157	424.0	2157	424.0	423.98	None	0	

### Remarks:

Required Velocity: 426 ±15.24 m/s  
Projectile yaw check: 0° yaw on all shots

### Footnotes:

N/A

# BALLISTIC RESISTANCE TEST

## NTS-Belcamp

4603B Compass Point Road  
Belcamp, MD 21017

Client: Michel Rodriguez Orozco

Project No.: PH00004888-3

Test Date: 01/06/2023 - 01/09/2023

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## Test Panel

Description: Rigid armor

Manufacturer: Kevlar

Sample No.: Test 003

Size: 304.8 x 304.8 mm  
Avg. Thickness: 6.306 mm  
Thicknesses: 6.325 mm, 6.274 mm,  
6.299 mm, 6.325 mm

Weight: 0.660 kg  
Plies/Laminates: N/A

Date Received: 12/15/2022  
Received Via: FEDEX Ground  
Returned Via: FEDEX Ground

## Setup

Shot Spacing: NIJ-STD-0108.01  
Level IIIA  
Witness Panel: 0.02 in 2024-T3 Al  
Backing Material: N/A  
Condition: Ambient

Primary Vel. Screens (m): 1.980, 2.900  
Primary Vel. Location (m): 2.440  
Range to Target (m): 4.999  
Target to Witness (mm): 152.400

Range No.: Range 3  
Temp: 20.3 °C  
BP: 30 inHg  
RH: 41 %  
Barrel/Gun: WC020651  
Gunner: Kevin Guzman  
Recorder: Ramon Chavez

## Ammunition

Projectile	Lot No.	Manufacturer	Powder
(1) .44 Mag., 240-grain SWCGC	NA	Contra Threat Sciences	3 N 38

## Applicable Standards or Procedures

- (1) NIJ-STD-0108.01 Level IIIA  
(2) Customer Request

Shot No.	Ammo	Powder/ Seating	Weight (gr)	Time 1 (μs)	Vel. 1 (m/s)	Time 2 (μs)	Vel. 2 (m/s)	Avg. Vel. (m/s)	Penetration	Obliq. (°)	Footnotes
1	1	12.8	240	2136	427.9	2136	427.9	427.94	None	0	
2	1	12.8	240	2075	440.7	2075	440.7	440.74	None	0	
3	1	12.8	240	2162	423.1	2162	423.1	423.06	None	0	
4	1	12.8	240	2136	427.9	2136	427.9	427.94	None	0	
5	1	12.8	240	2114	432.5	2114	432.5	432.51	None	0	

### Remarks:

Required Velocity: 426 ±15.24 m/s  
Projectile yaw check: 0° yaw on all shots

### Footnotes:

N/A



## ATTACHMENT A CALIBRATION DATA

Asset Number	Asset Type	Manufacturer	Model	Calibrated	Due
WC079407	Chronograph 1	YIS/Cowden Group, Inc	Chrono USB	7/21/2022	7/21/2023
WC079408	Chronograph 2	YIS/Cowden Group, Inc	Chrono USB	7/21/2022	7/21/2023
WC075109	Powder Scale	RCBS	1500	3/22/2022	3/22/2023
WC060600	Floor scale	Sartorius	Combics	1/9/2023	1/9/2024
WC067384	Therm. Clock. Humidity Monitor	Control Company	4040	6/23/2022	6/23/2023
WC064334	100 ft Tape Measure	Starrett	530-100	3/30/2022	3/30/2024
WC078628	25 ft Tape Measure	Craftsman	CMHT37525	9/1/2021	9/1/2023
WC078630	25 ft Tape Measure	Craftsman	CMHT37525	9/1/2021	9/1/2023
WC074982	Thermometer	Control Company	4371	3/31/2022	3/31/2023
WC079395	BFD Tool	Starrett	3753A-6/150	7/13/2022	7/13/2023
WC079400	BFD Bridge	Starrett	3753A-8/200	7/29/2022	7/29/2023
WC075118	Temp/ Humidity/BP Sensor	Omega Engineering	ZW-CM-BTH	3/18/2022	3/18/2023
WC060650	Angle Block	SPI	91-316-0	10/15/2021	10/15/2023

**END OF REPORT**