
**Unequal Technologies Company,
Armor Protection Ballistic Resistance
and Stab Resistance Test**

Prepared by:

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NTS-Chesapeake Testing

*4603B Compass Point Road
Belcamp, MD 21017*

31 May 2018

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Unequal Technologies Company, May 2018.***

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1 Introduction

Unequal Technologies Company provided four armor samples to NTS-Chesapeake Testing for testing on 30 May 2017. This is a two part report. Section 2 is the Ballistic Resistance test report; and Section 3 is the Stab Resistance test report.

2 Ballistic Resistance Testing

Three samples were used for ballistic resistance testing.

2.1 Threats and Instrumentation

2.1.1 Threats*

- 12-gauge 00 Buckshot projectiles
- 12 gauge, 2-3/4 in. 1 oz. rifled slug projectiles
- 12-gauge Bird Shot (8 shot) Lead projectiles
- 12-gauge Bird Shot (7 shot) Steel 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.

2.1.2 Instrumentation

Projectile velocity measurements were obtained using Oehler Research model No. 57 infrared screens with Hewlett-Packard (HP) counter chronographs (universal counters, HP model No. 53131A). A digital caliper was used to measure the post-impact deformations observed in the backing clay.

2.2 Details of Test

The objective of this test was to conduct a ballistic resistance test on the samples in accordance with the customer's request. A single shot was fired at each sample in accordance with the customer's request. Shots against the armor samples were performed at 0.0° obliquity and ambient range temperature (68 ± 1 °F).

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 velocities used for the test were in accordance with the customer's request.

2.3 Summary of Results

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

Table 1. Summary of Ballistic Resistance Test Results

Job No.	Sample No.	Size (in)	Weight (lbs)	Threat	Target Obliq. (deg)	Penetration Data		
						Velocity (ft/s)	Result	Def. (mm)
2389-086-1	SafeShield- Shot Gun V0 (Buck shot)	10.00 x 12.00	1.52	12-gauge 00 Buckshot	0.0	1373	None	40.7
2389-086-2	SafeShield - Shot Gun V0 (Slug)	10.00 x 12.00	1.52	12 gauge, 2-3/4 in. 1 oz. rifled slug	0.0	1163	None	29.9
2389-086-3	SafeShield - Shotgun V0 (Lead)	10.00 x 15.00	1.61	12-gauge Bird Shot (8 shot) Lead	0.0	1203	None	15.4
2389-086-4	SafeShield - Shotgun V0 (Steel)	10.00 x 15.00	1.51	12-gauge Bird Shot (7 shot) Steel	0.0	1172	None	16.8

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Unequal Technologies Company

Job No.: 2389-086-1

Test Date: 5/30/2018

Test Panel

Description: SafeShield

Manufacturer: Unequal Technologies Company

Sample No.: SafeShield- Shot Gun V0 (Buck shot)

Size: 10.00 x 12.00 in
Avg. Thick: NA
Thickness: NA

Weight: 1.52 lbs
Plies/Laminates: NA

Date Received: 5/30/2018
Via: Hand Carried
Returned: Hand Carried

Setup

Shot Spacing: Customer request
Witness Panel: Clay
Backing Material: 5.5-in clay/plywood
Condition: Ambient

Primary Vel. Screens (ft): 5.000, 5.333,
9.667, 10.000
Primary Vel. Location (ft): 7.500
Range to Target (ft): 15.000
Target to Witness (in): 0.000

Range No.: 2
Temp: 68.0 °F
BP: 29.9 inHg
RH: 47.7%
Barrel/Gun: CT-0406
Gunner: Glenn Snyder
Recorder: Lance Eveland

Ammunition

Projectile	Lot No.	Powder
(1) 12-gauge 00 Buckshot	Remington	Factory load

Applicable Standards or Procedures

Clay Drop 1 - Drop Time: 11:22 PM; Block No. 53; Temp: 95 °F; Drop Depths: 22.0mm,20.3mm,21.2mm,20.6mm,16.8mm
(1) 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	Deformation (mm)	Obliq. (°)	Footnotes
1	1	NA	3644	1372	3155	1373	1373	None	40.7	0.0	

Remarks:

Footnotes:

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Unequal Technologies Company

Job No.: 2389-086-2

Test Date: 5/30/2018

Test Panel

Description: SafeShield

Manufacturer: Unequal Technologies Company

Sample No.: SafeShield - Shot Gun V0 (Slug)

Size: 10.00 x 12.00 in
Avg. Thick: NA
Thickness: NA

Weight: 1.52 lbs
Plies/Laminates: NA

Date Received: 5/30/2018
Via: Hand Carried
Returned: Hand Carried

Setup

Shot Spacing: Customer request
Witness Panel: Clay
Backing Material: 5.5-in clay/plywood
Condition: Ambient

Primary Vel. Screens (ft): 5.000, 5.333,
9.667, 10.000
Primary Vel. Location (ft): 7.500
Range to Target (ft): 15.000
Target to Witness (in): 0.000

Range No.: 2
Temp: 68.0 °F
BP: 29.9 inHg
RH: 47.9%
Barrel/Gun: CT-0406
Gunner: Glenn Snyder
Recorder: Lance Eveland

Ammunition

Projectile	Lot No.	Powder
(1) 12 gauge, 2-3/4 in. 1 oz. rifled slug	Winchester Ranger A1HB00	Factory load

Applicable Standards or Procedures

Clay Drop 1 - Drop Time: 11:22 PM; Block No. 53; Temp: 95 °F; Drop Depths: 22.0mm,20.3mm,21.2mm,20.6mm,16.8mm
(1) 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	Deformation (mm)	Obliq. (°)	Footnotes
1	1	NA	4300	1163	3724	1164	1163	None	29.9	0.0	

Remarks:

The sample was previously impacted with 1 shot of 12-gauge 00 Buckshot during Job No. 2389-086-1.

Footnotes:

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Unequal Technologies Company

Job No.: 2389-086-3

Test Date: 5/30/2018

Test Panel

Description: SafeShield

Manufacturer: Unequal Technologies Company

Sample No.: SafeShield - Shotgun V0 (Lead)

Size: 10.00 x 15.00 in
Avg. Thick: NA
Thickness: NA

Weight: 1.61 lbs
Plies/Laminates: NA

Date Received: 5/30/2018
Via: Hand Carried
Returned: Hand Carried

Setup

Shot Spacing: Customer request
Witness Panel: Clay
Backing Material: 5.5-in clay/plywood
Condition: Ambient

Primary Vel. Screens (ft): 5.000, 5.333,
9.667, 10.000
Primary Vel. Location (ft): 7.500
Range to Target (ft): 15.000
Target to Witness (in): 0.000

Range No.: 2
Temp: 67.8 °F
BP: 29.9 inHg
RH: 47.7%
Barrel/Gun: CT-0406
Gunner: Glenn Snyder
Recorder: Lance Eveland

Ammunition

Projectile	Lot No.	Powder
(1) 12-gauge Bird Shot (8 shot) Lead	Winchester 20W3ME10	Factory load

Applicable Standards or Procedures

Clay Drop 1 - Drop Time: 11:22 PM; Block No. 53; Temp: 95 °F; Drop Depths: 22.0mm,20.3mm,21.2mm,20.6mm,16.8mm
(1) 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	Deformation (mm)	Obliq. (°)	Footnotes
1	1	NA	4134	1209	3624	1196	1203	None	15.4	0.0	

Remarks:

Footnotes:

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Unequal Technologies Company

Job No.: 2389-086-4

Test Date: 5/30/2018

Test Panel

Description: SafeShield

Manufacturer: Unequal Technologies Company

Sample No.: SafeShield - Shotgun V0 (Steel)

Size: 10.00 x 15.00 in
Avg. Thick: NA
Thickness: NA

Weight: 1.51 lbs
Plies/Laminates: NA

Date Received: 5/30/2018
Via: Hand Carried
Returned: Hand Carried

Setup

Shot Spacing: Customer request
Witness Panel: Clay
Backing Material: 5.5-in clay/plywood
Condition: Ambient

Primary Vel. Screens (ft): 5.000, 5.333,
9.667, 10.000
Primary Vel. Location (ft): 7.500
Range to Target (ft): 15.000
Target to Witness (in): 0.000

Range No.: 2
Temp: 67.8 °F
BP: 29.9 inHg
RH: 47.0%
Barrel/Gun: CT-0406
Gunner: Glenn Snyder
Recorder: Lance Eveland

Ammunition

Projectile	Lot No.	Powder
(1) 12-gauge Bird Shot (7 shot) Steel	Winchester	Factory load

Applicable Standards or Procedures

Clay Drop 1 - Drop Time: 11:22 PM; Block No. 53; Temp: 95 °F; Drop Depths: 22.0mm,20.3mm,21.2mm,20.6mm,16.8mm
(1) 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	Deformation (mm)	Obliq. (°)	Footnotes
1	1	NA	4244	1178	3719	1165	1172	None	16.8	0.0	

Remarks:

Footnotes:

4 Introduction

One sample was used for stab resistance testing.

4.1 Threats and Instrumentation

*4.1.1 Threats**

- S1
- P1
- Spike

4.2.2 Instrumentation

Threat velocity measurements were obtained using a Magatron - Munchen model 4620 Linear potentiometer with Biokinetics and Associates Ltd., NIJ stab10, VI software operating on a DELL Vostro 1000 computer.

4.2 Details of Test

The objective of this test was to conduct a stab resistance test on the armor samples in accordance with NIJ-0115.00 and the customer's request. Impacts were performed at 0.0° obliquity and ambient laboratory temperature (76 ± 3 °F).

For each impact, the sample was placed onto a NIJ foam backing material and strapped to the stab apparatus test table. The threat was held in a drop mass with a total weight of 1.91 kg. The drop mass was then released from a specified distance in a drop tube test apparatus. Following the impact, the length of the threat protruding from the rear surface of the panel was measured for a penetration depth. The velocity and energy level for each impact were in accordance with the referenced performance standard.

4.3 Summary of Results

The results of the stab resistance test are presented in Table 2. The detailed data sheets for all stab resistance testing performed are presented on the following pages.

Table 2. Summary of Stab Resistance Test Results

Job No.	Sample No.	Drop Mass (Kg)	Impact No.	Protection Level	Threat	Angle of Incidence (deg)	Penetration Data				
							Energy Level	Drop Height (m)	Velocity (m/s)	Strike Energy (J)	Depth of Penetration (mm)
2389-086-A	Stab Test- SafeShield (Level 1, Blade)	1.91	1	1	S1	0.0	E2	1.96	6.11	35.65	0.00
			2	1	P1	0.0	E2	1.96	6.11	35.65	7.00
			3	1	Spike	0.0	E2	1.96	6.12	35.77	12.00
2389-086-B	Stab Test- SafeShield (Level 1, Spike)	1.91	1	1	Spike	0.0	E2	1.96	6.12	35.77	12.00
2389-086-C	Stab Test- SafeShield (Blade, Level 2)	1.91	1	2	S1	0.0	E2	2.74	7.20	49.51	1.00
			2	2	P1	0.0	E2	2.74	7.20	49.51	13.00
2389-086-D	Stab Test- SafeShield (Spike, Level 2)	1.91	1	2	Spike	0.0	E2	2.74	7.23	49.92	30.00
2389-086-E	Stab Test- SafeShield (Blade, Level 3)	1.91	1	3	S1	0.0	E2	3.57	8.22	64.53	9.00
			2	3	P1	0.0	E2	3.57	8.22	64.53	24.00
2389-086-F	Stab Test- SafeShield (Spike, Level 3)	1.91	1	3	Spike	0.0	E2	3.57	8.22	64.53	48.00

STAB RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Rd
Belcamp, MD 21017

Client: Unequal Technologies Company
Job No.: 2389-086-A
Test Date: 5/30/2018

Test Panel Description: SafeShield

Manufacturer: Unequal Technologies Company **Sample No.:** Stab Test- SafeShield (Level 1, Blade)

Model No.: NA	Plies: 1	Date Received: 5/30/2018
Lot No.: NA	Weight: 1.52 lbs	Via: Hand Carried
Gender: NA	Coverage Area: NA	Returned: Hand Carried
Size: 10.00 x 12.00 in	Areal Density: NA	

Setup

Temp: 73.40 °F	Armor Condition: Ambient	Ball Drop Bounces: 17.00 in 17.50 in
BP: 29.99 inHg	Drop Mass: 1.91 kg	Tester: Lance Eveland
RH: 59.00 %	Witness Material: NIJ backing	Recorder: Lance Eveland

Applicable Standards or Procedures

- (1) NIJ-0115.00
- (2) Customer request

Impact No.	Threat	Tip Sharpness (HRC)	Level	Energy Level	Angle of Incidence (deg.)	Drop Height (m)	Impact Velocity (m/s)	Strike Energy (J)	Depth of Penetration (mm)	Footnotes
1	S1	-60	1	E2	0.0	1.96	6.11	35.65	0.00	
2	P1	-60	1	E2	0.0	1.96	6.11	35.65	7.00	
3	Spike	-60	1	E2	0.0	1.96	6.12	35.77	12.00	

Remarks:

Footnotes:

STAB RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Rd
Belcamp, MD 21017

Client: Unequal Technologies Company

Job No.: 2389-086-B

Test Date: 5/30/2018

Test Panel Description: SafeShield

Manufacturer: Unequal Technologies Company **Sample No.:** Stab Test- SafeShield (Level 1, Spike)

Model No.: NA
Lot No.: NA
Gender: NA
Size: 10.00 x 12.00 in

Plies: 1
Weight: 1.52 lbs
Coverage Area: NA
Areal Density: NA

Date Received: 5/30/2018
Via: Hand Carried
Returned: Hand Carried

Setup

Temp: 76.10 °F
BP: 29.98 inHg
RH: 57.00 %

Armor Condition: Ambient
Drop Mass: 1.91 kg
Witness Material: NIJ backing

Ball Drop Bounces: 17.00 in 17.50 in
Tester: Lance Eveland
Recorder: Lance Eveland

Applicable Standards or Procedures

- (1) NIJ-0115.00
- (2) Customer request

Impact No.	Threat	Tip Sharpness (HRC)	Level	Energy Level	Angle of Incidence (deg.)	Drop Height (m)	Impact Velocity (m/s)	Strike Energy (J)	Depth of Penetration (mm)	Footnotes
1	Spike	-60	1	E2	0.0	1.96	6.12	35.77	12.00	

Remarks:

Footnotes: