



POC: Mr. Ken Mueller
P.O. No.: Wire
Test Date: 29 November 2017
Job No.: 21124-001

Rheinmetall Ballistic Protection GmbH, Armor Protection Ballistic Resistance Test

Prepared by:

Craig A. Thomas
Laura M. Deptol

NTS-Chesapeake Testing
4603B Compass Point Road
Belcamp, MD 21017

1 December 2017

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1 Introduction

Rheinmetall Ballistic Protection GmbH provided two armor samples to NTS-Chesapeake Testing for ballistic resistance testing on 29 November 2017.

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 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 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 for selected shots. A digital still camera was used to document the test. Photographs are presented 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-0101.06 Level III (Modified) and the customer's request. Shot spacing between multiple impacts on a single plate was in accordance with the referenced performance standard. Shots against the armor samples were performed at 0.0° obliquity and ambient range temperature (65 ± 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 50.200 ft from the target. The velocities used for the test were in accordance with the customer's request.

4 Summary of Results

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

Table 1. Summary of Ballistic Resistance Test Results

Job No.	Sample No.	Size (in)	Weight (lbs)	Threat	Target Obliquity (deg)	Shot No.	Penetration Data		
							Velocity (ft/s)	Result	Def. (mm)
21124-001-1	Lifesaver (Back)	10.00 x 13.00	6.89	7.62 x 39-mm, 123-grain PS Ball	0.0	1	2329 ^{a,b}	None	24.5
						2	2362 ^b	None	18.7
						3	2390	None	19.8
						4	2384	None	NA
						5	2368	None	NA
						6	2377	None	NA
						7	2374	None	NA
21124-001-2	Lifesaver (Front)	10.00 x 13.00	6.85	7.62 x 39-mm, 123-grain PS Ball	0.0	1	2387	None	21.8
						2	2375	None	23.3
						3	2359	None	NA
						4	2370	None	NA
						5	2382	None	NA
						6	2350	None	NA

^a The projectile had insufficient velocity.

^b The spall box was not penetrated.

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Rheinmetall Ballistic Protection GmbH

Job No.: 21124-001-1
Test Date: 11/29/2017

Test Panel

Description: Steel Plate.

Manufacturer: Rheinmetall Ballistic Protection GmbH

Sample No.: Lifesaver (Back)

Size: 10.00 x 13.00 in
Avg. Thick: NA
Thickness: NA

Weight: 6.89 lbs
Plies/Laminates: NA

Date Received: 11/27/2017
Via: FedEx
Returned: FedEx

Setup

Shot Spacing: NIJ-STD-0101.06 Level III
Witness Panel: Clay
Backing Material: 5.5-in clay/plywood
Condition: Ambient

Primary Vel. Screens (ft): 37.000, 37.333,
46.667, 47.000
Primary Vel. Location (ft): 42.000
Range to Target (ft): 50.200
Target to Witness (in): 0.000

Range No.: 6
Temp: 65.4 °F
BP: 30.0 inHg
RH: 39.7%
Barrel/Gun: CT-4052
Gunner: Josh Petty
Recorder: S. McDowell

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 39-mm, 123-grain PS Ball	Russian	N 110

Applicable Standards or Procedures

Clay Drop 1 - Drop Time: 2:30 PM; Block No. 15; Temp: 92.3 °F; Drop Depths: 18.9mm, 18.9mm, 17.5mm, 17.0mm, 17.0mm

(1) NIJ-STD-0101.06 Level III (Modified)

(2) 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	122.5	4295	2328	4007	2329	2329	None	24.5	0.0	(a, b)
2	1	121.4	4234	2362	3951	2362	2362	None	18.7	0.0	(b)
3	1	121.8	4183	2391	3905	2390	2390	None	19.8	0.0	
4	1	121.7	4195	2384	3915	2384	2384	None	NA	0.0	
5	1	121.7	4225	2367	3941	2368	2368	None	NA	0.0	
6	1	122.4	4208	2376	3927	2377	2377	None	NA	0.0	
7	1	121.9	4212	2374	3932	2374	2374	None	NA	0.0	

Remarks:

Requested velocity: 2362 ±30 ft/s

Footnotes:

(a) The projectile had insufficient velocity.
(b) The spill box was not penetrated.

BALLISTIC RESISTANCE TEST

NTS-Chesapeake Testing

4603B Compass Point Road
Belcamp, MD 21017

Client: Rheinmetall Ballistic Protection GmbH
Job No.: 21124-001-2
Test Date: 11/29/2017

Test Panel Description: Steel Plate.

Manufacturer: Rheinmetall Ballistic Protection GmbH

Sample No.: Lifesaver (Front)

Size: 10.00 x 13.00 in
Avg. Thick: NA
Thickness: NA

Weight: 6.85 lbs
Plies/Laminates: NA

Date Received: 11/27/2017
Via: FedEx
Returned: FedEx

Setup

Shot Spacing: NIJ-STD-0101.06 Level III
Witness Panel: Clay
Backing Material: 5.5-in clay/plywood
Condition: Ambient

Primary Vel. Screens (ft): 37.000, 37.333,
46.667, 47.000
Primary Vel. Location (ft): 42.000
Range to Target (ft): 50.200
Target to Witness (in): 0.000

Range No.: 6
Temp: 64.9 °F
BP: 30.0 inHg
RH: 40.0%
Barrel/Gun: CT-4052
Gunner: Josh Petty
Recorder: S. McDowell

Ammunition

Projectile	Lot No.	Powder
(1) 7.62 x 39-mm, 123-grain PS Ball	Russian	N 110

Applicable Standards or Procedures

Clay Drop 1 - Drop Time: 2:00 PM; Block No. 15; Temp: 94.4 °F; Drop Depths: 17.2mm,17.2mm,16.6mm,16.8mm,17.3mm
(1) NIJ-STD-0101.06 Level III (Modified)
(2) 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)	Striking Vel. (ft/s)	Penetration	Def. (mm)	Obliq. (°)	Footnotes
1	1	121.8	4190	2387	3910	2387	2387	2387	None	21.8	0.0	
2	1	121.8	4210	2375	3929	2375	2375	2375	None	23.3	0.0	
3	1	122.5	4237	2360	3959	2357	2359	2359	None	NA	0.0	
4	1	121.5	4220	2370	3937	2371	2370	2370	None	NA	0.0	
5	1	122.4	4200	2381	3917	2383	2382	2382	None	NA	0.0	
6	1	122.3	4256	2350	3971	2350	2350	2350	None	NA	0.0	

Remarks:

Requested velocity: 2362 ±30 ft/s

Footnotes: