Ballistic Resistance – Test Report

Client:	**Caliber Armor** 1421 Selinda Ave Louisville, KY 40213
Report date:	**25 November 2019**
Job number:	000009810A
Test procedure and supporting documentation:	Per Customer Instructions NIJ-STD-0101.07 DRAFT (MODIFIED)
Sample receipt, identification information, and disposition:	The sample(s) were received on **4 November 2019** and **18 November 2019**. Sample item identification and description details are provided on the attached data record(s). The test sample(s) were inspected prior to testing and no anomalies were discovered. Sample(s) will be returned or discarded per customer instructions. H.P. White will only hold sample(s) as required by specific test protocols.
Test date(s) and location:	Testing commenced on **7 November 2019**, at the H.P. White Laboratory, Inc. facilities located at 3114 Scarboro Road, Street, Maryland. Testing concluded on **19 November 2019**.
Report prepared by:	Ashley Gowland, Customer Operations Coordinator
Report reviewed by:	Wesley Mason, Manager of Technical Operations - Hard Armor
Revision number and date:	NA
Supplement to report:	NA
Test data transmittal method and storage location:	This test report and test data were transmitted via email in a manner compliant with ISO 17025 requirements. Permanent electronic and hardcopy files are maintained in accordance with HPWLI data storage policy on data storage systems, filed by job number.
Disclaimer:	Testing was performed on sample(s) provided by the client. H.P. White Laboratory, Inc. holds no responsibility for sample selection methods. This report is based on data obtained from testing only the sample(s) submitted and should NOT be interpreted as an endorsement by H.P. White Laboratory, Inc. of the continuing quality or performance of any other items of the same, or similar, design. This report must not be used by the client to claim product certification, approval, or endorsement by NVLAP, NIST, or any agency of the Federal Government. This testing was performed by H.P. White Laboratory, Inc. to client specification, and the test results are the property of the client, who holds all rights of reproduction or publication of this report and related test data.
Destination control statement:	This document may contain items controlled by the U.S. government and authorized for export only to the country of ultimate destination for use by the ultimate consignee or end-user(s) herein identified. They may not be resold, transferred, or otherwise disposed of, to any other country or to any person other than the authorized ultimate consignee or end-user(s), either in their original form or after being incorporated into other items, without first obtaining approval from the U.S. government or as otherwise authorized by U.S. law and regulations.

Test Procedures

Ballistic Resistance Testing: All testing was conducted on an indoor range at ambient conditions, in accordance with your instructions and the modified provisions of NIJ-STD-0101.07, DRAFT. Testing was conducted using caliber 7.62 x 39mm Surrogate, 123 grain, 5.56mm, M855 BT, 62 grain, 7.62 x 51mm, M80 Ball, 149 grain, and 5.56mm, M193, 56 grain ammunition. The test sample(s) were positioned 25.00 feet from the muzzle of the barrel to produce zero (0°) degree obliquity impacts. Photoelectric infrared screens were located at 10.20 feet and 15.53 feet which, in conjunction with electronic chronographs, were used to compute bullet velocities at 12.86 feet forward of the muzzle. The striking velocity was computed using standard drag formulas. Penetrations were determined by visual examination of the 5.5-inch-thick clay backing material witness plate. Table I provides a summary of information on the attached data record(s).

Table I: Ballistic Resistance, Summary of Results

Sample No.	Thickness (in)	Weight (lbs.)	Conditioning	Caliber	Obliquity (degrees°)	Shots	Velocity (fps)		Penetrations	Deformations (mm)	
							Max	Min		Max	Min
14646-00000056	NA	8.57	AMBIENT	7.62 x 39mm	0	6	2405	2367	0	9.87	7.61
14646-00000058	NA	8.60	AMBIENT	5.56mm, M855	0	6	3126	3096	0	5.76	1.77
14646-00000059	NA	8.80	AMBIENT	7.62 x 51mm, M80	0	6	2772	2751	0	24.87	12.72
14646-00000070	NA	8.78	AMBIENT	5.56mm, M193	0	6	3174	3134	0	12.31	1.21

(a) See individual data record(s) for specific footnotes/remarks

Report prepared by:

Ashley Gowland

Ashley Gowland
Customer Operations Coordinator

Report reviewed by:

Wesley Mason

Wesley Mason
Manager of Technical Operations - Hard Armor

HP WHITE LABORATORY, INC.

An Intertek Company

Protection, Resistance to Penetration, V_0 RTP

Client: 7434: Caliber Armor

Job No: 9810 **Test Date: 11/7/2019**

SAMPLE INFO

Manufacturer: Caliber Armor
Size: 10 x 12 in.
Protection Level: RF2
Description: 2 - AR550 Panel
Model: 19-AR550-1012-SPC, Lot Number: N14646

Serial Number: 14646-00000056
Weight: 8.57 lbs.
Condition: Ambient

Date Rec'd: 11/4/2019

SET-UP

Shot Spacing: NIJ-STD-0101.07
Witness Panel: N/A
Obliquity: 0˚
Backing Material: 5.5" Clay/Plywood

Muzzle to Screen 1 (ft.): 10.20
Distance 1-4 (ft.): 5.33
Distance 2-3 (ft.): 4.64
Screen 4 to Target (ft.): 9.47
Muzzle to Target (ft.): 25.00
Target to Witness ():
Velocity Midpoint: 12.86 ft. From Muzzle

Range No: 1
Temp (°F): 67
BP (in. Hg): 30.26
RH%: 47
Barrel No/Gun: 7.62x39 / R1
Gunner: Ches/Chronister
Recorder: Skrocki

AMMUNITION

Projectile: 7.62x39mm Surrogate
Powder: IMR 4227

Nominal Grain Weight: 123 gr.
Projectile Lot No: HPW-8307

CLAY

Block No: R1 B3
Temp (°F): 104

Time of Drops

APPLICABLE STANDARDS OR PROCEDURES

(1): NIJ-STD-0101.07 DRAFT (MODIFIED)
(2):
(3):

Clay Drops (mm.)

1	27.93
2	24.38
3	26.04

Remarks

1: All Yaw measured less than 5 degrees

Footnotes

a: SHOT IMPACTED TOO CLOSE TO EDGE

V_0 Summary:

Intended Velocity (ft/s): **2380**
No. of Shots: **6**

Shot No:	(µsec)		Velocity Measurements						Shot Angle	Results	BFD (mm)	Yaw	Footnotes
	Time 1	Time 2	V_I 1		V_I 2		AVG V_I						
			ft/s	m/s	ft/s	m/s	ft/s	m/s					
1	2223	1939	2398	730.8	2393	729.4	2395	730.1	0˚	PP	7.61	Good	
2	2215	1931	2406	733.4	2403	732.4	2405	732.9	0˚	PP	7.80	Good	a
3	2232	1949	2388	727.9	2381	725.6	2384	726.8	0˚	PP	9.87	Good	
4	2243	1957	2376	724.3	2371	722.7	2374	723.5	0˚	PP	7.76	Good	
5	2249	1963	2370	722.4	2364	720.5	2367	721.4	0˚	PP		Good	
6	2234	1951	2386	727.2	2378	724.9	2382	726.1	0˚	PP		Good	

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Job No: 9810 **Test Date: 11/7/2019**

SAMPLE INFO

Manufacturer: Caliber Armor
Size: 10 x 12 in.
Protection Level: RF2
Description: 4 - AR550
Model: 19-AR550-1012-SPC, Lot Number: N14646

Serial Number: 14646-00000058
Weight: 8.6 lbs.
Condition: Ambient

Date Rec'd: 11/4/2019

SET-UP

Shot Spacing: NIJ-STD-0101.07
Witness Panel: N/A
Obliquity: 0˚
Backing Material: 5.5" Clay/Plywood

Muzzle to Screen 1 (ft.): 10.20
Distance 1-4 (ft.): 5.33
Distance 2-3 (ft.): 4.64
Screen 4 to Target (ft.): 9.47
Muzzle to Target (ft.): 25.00
Target to Witness ():
Velocity Midpoint: 12.86 ft. From Muzzle

Range No: 1
Temp (°F): 67
BP (in. Hg): 30.26
RH%: 47
Barrel No/Gun: .223 / R1
Gunner: Ches/Chronister
Recorder: Skrocki

AMMUNITION

Projectile: 5.56mm M855 BT
Powder: N120

Nominal Grain Weight: 62 gr.
Projectile Lot No: HPW-0028

CLAY

Block No: R1 B2
Temp (°F): 102.3

Time of Drops

APPLICABLE STANDARDS OR PROCEDURES

(1): NIJ-STD-0101.07 DRAFT (MODIFIED)
(2):
(3):

Clay Drops (mm.)

1	24.31
2	24.58
3	25.11

Remarks

1: All Yaw measured less than 5 degrees

Footnotes

V_0 Summary:

Intended Velocity (ft/s): **3115**
No. of Shots: **6**

Shot No:	(µsec)		Velocity Measurements						Shot Angle	Results	BFD (mm)	Yaw	Footnotes
	Time 1	Time 2	V_I 1		V_I 2		AVG V_I						
			ft/s	m/s	ft/s	m/s	ft/s	m/s					
1	1715	1494	3108	947.3	3106	946.6	3107	947.0	0˚	PP	2.19	Good	
2	1703	1486	3130	954.0	3122	951.7	3126	952.8	0˚	PP	1.77	Good	
3	1718	1499	3102	945.6	3095	943.5	3099	944.6	0˚	PP	5.76	Good	
4	1710	1491	3117	950.0	3112	948.5	3114	949.3	0˚	PP	4.43	Good	
5	1709	1491	3119	950.6	3112	948.5	3115	949.6	0˚	PP		Good	
6	1720	1500	3099	944.5	3093	942.8	3096	943.7	0˚	PP		Good	

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Client: 7434: Caliber Armor

Job No: 9810 **Test Date: 11/7/2019**

SAMPLE INFO

Manufacturer: Caliber Armor
Size: 10 x 12 in.
Protection Level: RF2
Description: 1 - AR550
Model: 19-AR550-1012-SPC, Lot Number: N14646

Serial Number: 14646-00000059
Weight: 8.8 lbs.
Condition: Ambient

Date Rec'd: 11/4/2019

SET-UP

Shot Spacing: NIJ-STD-0101.07
Witness Panel: N/A
Obliquity: 0˚
Backing Material: 5.5" Clay/Plywood

Muzzle to Screen 1 (ft.): 10.20
Distance 1-4 (ft.): 5.33
Distance 2-3 (ft.): 4.64
Screen 4 to Target (ft.): 9.47
Muzzle to Target (ft.): 25.00
Target to Witness ():
Velocity Midpoint: 12.86 ft. From Muzzle

Range No: 1
Temp (°F): 67
BP (in. Hg): 30.26
RH%: 47
Barrel No/Gun: .308 / R1
Gunner: Ches/Chronister
Recorder: Skrocki

AMMUNITION

Projectile: 7.62x51mm M80 Ball
Powder: N140

Nominal Grain Weight: 149 gr.
Projectile Lot No: HPW-M80SJ-01

CLAY

Block No: R1 B1
Temp (°F): 103.8

Time of Drops

APPLICABLE STANDARDS OR PROCEDURES

(1): NIJ-STD-0101.07 DRAFT (MODIFIED)
(2):
(3):

Clay Drops (mm.)

1	26.92
2	25.38
3	24.22

Remarks

1: All Yaw measured less than 5 degrees

Footnotes

V_0 Summary:

Intended Velocity (ft/s): **2780**
No. of Shots: **6**

Shot No:	(µsec)		Velocity Measurements						Shot Angle	Results	BFD (mm)	Yaw	Footnotes
	Time 1	Time 2	V_I 1		V_I 2		AVG V_I						
			ft/s	m/s	ft/s	m/s	ft/s	m/s					
1	1932	1686	2759	840.9	2752	838.8	2755	839.9	0˚	PP	12.72	Good	
2	1920	1676	2776	846.1	2768	843.8	2772	845.0	0˚	PP	20.15	Good	
3	1935	1689	2755	839.6	2747	837.3	2751	838.5	0˚	PP	24.87	Good	
4	1924	1680	2770	844.4	2762	841.8	2766	843.1	0˚	PP	23.22	Good	
5	1921	1676	2775	845.7	2768	843.8	2772	844.8	0˚	PP		Good	
6	1922	1678	2773	845.3	2765	842.8	2769	844.0	0˚	PP		Good	

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Protection, Resistance to Penetration, V_0 RTP

Client: 7434: Caliber Armor

Job No: 9810 **Test Date: 11/19/2019**

SAMPLE INFO

Manufacturer: Caliber Armor
Size: 10 x 12 in.
Protection Level: RF2
Description: AR550 PANEL
Model: 19-AR550-1012-SPC, Lot Number: N14646

Serial Number: 14646-00000070
Weight: 8.78 lbs.
Condition: Ambient

Date Rec'd: 11/18/2019

SET-UP

Shot Spacing: NIJ-STD-0101.07
Witness Panel: N/A
Obliquity: 0˚
Backing Material: 5.5" Clay/Plywood

Muzzle to Screen 1 (ft.): 10.20
Distance 1-4 (ft.): 5.33
Distance 2-3 (ft.): 4.64
Screen 4 to Target (ft.): 9.47
Muzzle to Target (ft.): 25.00
Target to Witness ():
Velocity Midpoint: 12.86 ft. From Muzzle

Range No: 1
Temp (°F): 65
BP (in. Hg): 29.81
RH%: 50
Barrel No/Gun: .223 / R1
Gunner: Ches/Chronister
Recorder: Skrocki

AMMUNITION

Projectile: 5.56mm M193 BT
Powder: N120

Nominal Grain Weight: 56 gr.
Projectile Lot No: HPW-0078

CLAY

Block No: R1 B1
Temp (°F): 101.6

Time of Drops

APPLICABLE STANDARDS OR PROCEDURES

(1): NIJ-STD-0101.07 DRAFT (MODIFIED)
(2):
(3):

Clay Drops (mm.)

1	25.98
2	24.55
3	24.91

Remarks

1: All Yaw measured less than 5 degrees

Footnotes

V_0 Summary:

Intended Velocity (ft/s): **3150**
No. of Shots: **6**

Shot No:	(µsec)		Velocity Measurements						Shot Angle	Results	BFD (mm)	Yaw	Footnotes
	Time 1	Time 2	V_i 1		V_i 2		AVG V_i						
			ft/s	m/s	ft/s	m/s	ft/s	m/s					
1	1678	1463	3176	968.2	3172	966.7	3174	967.4	0˚	PP	1.21	Good	
2	1690	1474	3154	961.3	3148	959.5	3151	960.4	0˚	PP	12.31	Good	
3	1699	1482	3137	956.2	3131	954.3	3134	955.2	0˚	PP	5.61	Good	
4	1695	1478	3145	958.5	3139	956.9	3142	957.7	0˚	PP	8.58	Good	
5	1698	1481	3139	956.8	3133	954.9	3136	955.9	0˚	PP		Good	
6	1691	1475	3152	960.7	3146	958.8	3149	959.8	0˚	PP		Good	