



Ballistic Resistance – Test Report

Client:	C-Bond Systems, LLC. Attention: Paul Brogan 410 Pierce St. Houston, TX 77002
Report date:	21 March 2016
Job number:	000005470
Test procedure and supporting documentation:	Per Customer Instructions ANSI/UL-752, Level I
Sample receipt, identification information, and disposition:	The sample(s) were received on multiple dates via Fed Ex. Sample item(s) were identified as ½" annealed glass with C-Bond system. The test sample(s) were inspected prior to testing and no anomalies were discovered. Sample(s) will be discarded after testing, unless otherwise instructed.
Test date(s) and location:	Testing commenced on 6 May 2015 , at the H.P. White Laboratory, Inc. facilities located at 3114 Scarboro Road, Street, Maryland. Testing concluded on 21 March 2016 .
Report prepared by:	Ashley Gowland, Customer Operations Coordinator
Report reviewed by:	Wesley Mason, Manager of Technical Operations - Hard Armor
Revision number and date:	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.
International control statement:	Information contained herein may be subject to the Export Administration Regulations, the Arms Export Control Act and/or the International Traffic in Arms Regulations. These commodities may not be resold, diverted, transferred, made available to, or otherwise disposed of, to any other country or to any person other than the authorized end-user or consignee(s), either in their original form or after being incorporated into other end-items, without first obtaining approval from the U.S. Government.

Test Procedures

Ballistic Resistance Testing: All testing was conducted on an indoor range at ambient conditions in accordance with your instructions and the general provisions of ANSI/UL-752. Testing was conducted at threat level I, using caliber 9mm, 124 grain, FMJ ammunition. The test sample was positioned 15.0 feet from the muzzle of the barrel to produce zero (0) degree obliquity impacts. Photoelectric infrared screens were located at 5.0 feet and 10.0 feet which, in conjunction with electronic chronographs, were used to compute bullet velocities at 7.5 feet forward of the muzzle. Penetrations were determined by visual examination of the 1/8 inch thick corrugated cardboard witness plate, placed 18.0 inches behind and parallel to the test sample. Table I provides a summary of information on the attached data record(s).

Table I: Ballistic Resistance, Summary of Results

Test Sample				Ballistic Threat			Results		
Sample Number	Conditioning	Thickness (in.) (a)	Weight (lbs.)	Caliber	Obliquity	Shots (b)	Velocity (fps)		Penetration(s)
							Max	Min	
153103LGPB	COLD +55°F	0.543	15.17	9mm	0°	3	1235	1186	0
150528LGPB-4	HOT +95°F	0.556	15.34	9mm	0°	3	1255	1237	0
153103CB1A	AMBIENT	0.543	15.19	9mm	0°	1 (c)	1253		0
150528LGPB-2	AMBIENT	0.558	15.48	9mm	0°	1 (c)	1237		0
HPW#3	AMBIENT	0.552	15.37	9mm	0°	3	1275	1229	0
HPW#4	AMBIENT	0.554	15.45	9mm	0°	3	1260	1224	0
CBM128	AMBIENT	0.567	15.59	9mm	0°	2 (d)	1272	1247	0

(a) Based on an average of four corner thicknesses
 (b) 3 shot(s) on 4" triangle
 (c) 1 shot 1.25" from edge
 (d) 2 shots in center spaced 1.5"
 (e) See individual data record(s) for specific footnotes/remarks

Report prepared by:



Ashley Gowland
 Customer Operations Coordinator

Report reviewed by:



Wesley Mason
 Manager of Technical Operations - Hard Armor



TEST PANEL

Manufacturer : C-Bond systems, LLC
Size : 18x18 in.
Thicknesses : 0.542, 0.542, 0.543, 0.544 in.
Avg. Thick : 0.543 in.
Description : 1/2" annealed glass

Sample No. : 153103LGPB (UL1)
Weight : 15.17 lbs.
Hardness : NA
Plies/Laminates : NA

Date Rec'd. : 4/30/15
Via : Federal Express
Returned : N/A

SET-UP

Shot Spacing : 3 SHOTS ON 4" TRIANGLE
Witness Panel : 1/8" CORRUGATED CARDBOARD
Obliquity : 0 deg.
Backing Material : NA
Conditioning : Cold (+55 F)

Primary Vel. Screens : 5.0 ft., 10.0 ft.
Primary Vel. Location : 7.5 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 15.0 ft.
Target to Wit. : 18.0 in.

Range No. : 3
Temp. : 72 F
BP : 30.21 in. Hg
RH : 57%
Barrel No./Gun : R3/ 9mm
Gunner : Ches
Recorder : Bonsall

AMMUNITION

(1) : 9mm, FMJ, 124 gr.
(2) :
(3) :
(4) :

Lot No. : REMINGTON 23558
Lot No. :
Lot No. :
Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

- (1) : Bullet Resistant Equipment, ANSI/UL 752-2005
- (2) : Indoor, Non-Metallic, Protection Level 1 (9mm, 1175-1293 fps.)
- (3) :

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	4215	1186	4215	1186	1186	None	
2	1	4085	1224	4085	1224	1224	None	
3	1	4050	1235	4050	1235	1235	None	

REMARKS :	FOOTNOTES :



TEST PANEL

Manufacturer : C-Bond systems, LLC

Size : 18 x 18 in.

Thicknesses : 0.554, 0.555, 0.556, 0.558 in.

Avg. Thick : 0.556 in.

Description : 1/2" annealed glass

Sample No. : 150528LGPB-4

Weight : 15.34 lbs.

Hardness : NA

Plies/Lamination : NA

Date Rec'd. : 6/2/15

Via : Federal Express

Returned : N/A

SET-UP

Shot Spacing : 3 SHOTS ON 4" TRIANGLE

Witness Panel : 1/8" CORRUGATED CARDBOARD

Obliquity : 0 deg.

Backing Material : NA

Conditioning : Hot (+95 F)

Primary Vel. Screens : 5.0 ft., 10.0 ft.

Primary Vel. Location : 7.5 ft. From Muzzle

Residual Vel. Screens : NA

Residual Vel. Location : NA

Range to Target : 15.0 ft.

Target to Wit. : 18.0 in.

Range No. : 3

Temp. : 72 F

BP : 30.18 in. Hg

RH : 53%

Barrel No./Gun : R3/ 9MM

Gunner : Mason

Recorder : Bonsall

AMMUNITION

(1) : 9mm Luger, FMJ, 124 gr.

(2) :

(3) :

(4) :

Lot No. : REM. 23558

Lot No. :

Lot No. :

Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

(1) : Bullet Resistant Equipment, ANSI/UL 752-2005

(2) : Indoor, Non-Metallic, Protection Level 1 (9mm, 1175-1293 fps.)

(3) :

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	4040	1238	4043	1237	1237	None	
2	1	3981	1256	3985	1255	1255	None	
3	1	4004	1249	4008	1248	1248	None	

REMARKS :	FOOTNOTES :



TEST PANEL

Manufacturer : C-Bond systems, LLC
Size : 18x18 in.
Thicknesses : 0.542, 0.542, 0.544, 0.545 in.
Avg. Thick : 0.543 in.
Description : 1/2" annealed glass

Sample No. : 153103CB1A (UL1)
Weight : 15.19 lbs.
Hardness : NA
Plies/Laminates : NA

Date Rec'd. : 4/30/15
Via : Federal Express
Returned : N/A

SET-UP

Shot Spacing : 1 SHOT 1.25" FROM EDGE
Witness Panel : 1/8" CORRUGATED CARDBOARD
Obliquity : 0 deg.
Backing Material : NA
Conditioning : Ambient (+72 F)

Primary Vel. Screens : 5.0 ft., 10.0 ft.
Primary Vel. Location : 7.5 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 15.0 ft.
Target to Wit. : 18.0 in.

Range No. : 3
Temp. : 72 F
BP : 30.21 in. Hg
RH : 57%
Barrel No./Gun : R3/ 9mm
Gunner : Ches
Recorder : Bonsall

AMMUNITION

(1) : 9mm, FMJ, 124 gr.
(2) :
(3) :
(4) :

Lot No. : REMINGTON 23558
Lot No. :
Lot No. :
Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

- (1) : Bullet Resistant Equipment, ANSI/UL 752-2005
- (2) : Indoor, Non-Metallic, Protection Level 1 (9mm, 1175-1293 fps.)
- (3) :

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	3990	1253	3990	1253	1253	None	

REMARKS : SPALL PERMITTED	FOOTNOTES :
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TEST PANEL

Manufacturer : C-Bond systems, LLC
Size : 18 x 18 in.
Thicknesses : 0.557, 0.558, 0.559, 0.560 in.
Avg. Thick : 0.558 in.
Description : 1/2" annealed glass

Sample No. : 150528LGPB-2
Weight : 15.48 lbs.
Hardness : NA
Plies/Laminates : NA

Date Rec'd. : 6/2/15
Via : Federal Express
Returned : N/A

SET-UP

Shot Spacing : 1 SHOT 1.25" FROM EDGE
Witness Panel : 1/8" CORRUGATED CARDBOARD
Obliquity : 0 deg.
Backing Material : NA
Conditioning : Ambient (+72 F)

Primary Vel. Screens : 5.0 ft., 10.0 ft.
Primary Vel. Location : 7.5 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 15.0 ft.
Target to Wit. : 18.0 in.

Range No. : 3
Temp. : 72 F
BP : 30.18 in. Hg
RH : 53%
Barrel No./Gun : R3/ 9MM
Gunner : Bonsall
Recorder : Bonsall

AMMUNITION

(1) : 9mm Luger, FMJ, 124 gr. Lot No. : REM. 23558
(2) : Lot No. :
(3) : Lot No. :
(4) : Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

- (1) : Bullet Resistant Equipment, ANSI/UL 752-2005
- (2) : Indoor, Non-Metallic, Protection Level 1 (9mm, 1175-1293 fps.)
- (3) :

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	4040	1238	4044	1236	1237	None	

<u>REMARKS :</u> SPALL PERMITTED	<u>FOOTNOTES :</u>
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TEST PANEL

Manufacturer : C-Bond systems, LLC
Size : 18 x 18 in.
Thicknesses : 0.551, 0.551, 0.552, 0.554 in.
Avg. Thick : 0.552 in.
Description : 1/2" annealed glass

Sample No. : HPW#3 (UL1)
Weight : 15.37 lbs.
Hardness : NA
Plies/Laminates : NA

Date Rec'd. : 7/7/15
Via : Federal Express
Returned : N/A

SET-UP

Shot Spacing : 3 SHOTS ON 4" TRIANGLE
Witness Panel : 1/8" CORRUGATED CARDBOARD
Obliquity : 0 deg.
Backing Material : NA
Conditioning : AMBIENT

Primary Vel. Screens : 5.0 ft., 10.0 ft.
Primary Vel. Location : 7.5 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 15.0 ft.
Target to Wit. : 18.0 in.

Range No. : 3
Temp. : 72 F
BP : 29.61 in. Hg
RH : 67%
Barrel No./Gun : R3/ 9MM
Gunner : Ches
Recorder : Bonsall

AMMUNITION

(1) : 9mm Luger, FMJ, 124 gr. Lot No. : REM. 23558
(2) : Lot No. :
(3) : Lot No. :
(4) : Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

- (1) : Bullet Resistant Equipment, ANSI/UL 752-2005
- (2) : Indoor, Non-Metallic, Protection Level 1 (9mm, 1175-1293 fps.)
- (3) :

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	4015	1245	4015	1245	1245	None	
2	1	3923	1275	3923	1275	1275	None	
3	1	4068	1229	4068	1229	1229	None	

<u>REMARKS :</u>	<u>FOOTNOTES :</u>



TEST PANEL

Manufacturer : C-Bond systems, LLC
Size : 18 x 18 in.
Thicknesses : 0.552, 0.553, 0.554, 0.555 in.
Avg. Thick : 0.554 in.
Description : 1/2" annealed glass

Sample No. : HPW#4 (UL1)
Weight : 15.45 lbs.
Hardness : NA
Plies/Lamination : NA

Date Rec'd. : 7/7/15
Via : Federal Express
Returned : N/A

SET-UP

Shot Spacing : 3 SHOTS ON 4" TRIANGLE
Witness Panel : 1/8" CORRUGATED CARDBOARD
Obliquity : 0 deg.
Backing Material : NA
Conditioning : AMBIENT

Primary Vel. Screens : 5.0 ft., 10.0 ft.
Primary Vel. Location : 7.5 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 15.0 ft.
Target to Wit. : 18.0 in.

Range No. : 3
Temp. : 72 F
BP : 29.61 in. Hg
RH : 67%
Barrel No./Gun : R3/ 9MM
Gunner : Ches
Recorder : Bonsall

AMMUNITION

(1) : 9mm Luger, FMJ, 124 gr. Lot No. : REM. 23558
(2) : Lot No. :
(3) : Lot No. :
(4) : Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

- (1) : Bullet Resistant Equipment, ANSI/UL 752-2005
- (2) : Indoor, Non-Metallic, Protection Level 1 (9mm, 1175-1293 fps.)
- (3) :

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	4085	1224	4085	1224	1224	None	
2	1	3977	1257	3977	1257	1257	None	
3	1	3969	1260	3969	1260	1260	None	

<u>REMARKS :</u>	<u>FOOTNOTES :</u>



TEST PANEL

Manufacturer : C-Bond systems, LLC
Size : 18 x 18 in.
Thicknesses : 0.567, 0.567, 0.567, 0.567 in.
Avg. Thick : 0.567 in.
Description : 1/2" annealed glass

Sample No. : CBM128
Weight : 15.59 lbs.
Hardness : NA
Plies/Laminates : NA

Date Rec'd. : 2/18/16
Via : Federal Express
Returned : N/A

SET-UP

Shot Spacing : 2- (2 SHOTS SPACED 1.5")
Witness Panel : 1/8" CORRUGATED CARDBOARD
Obliquity : 0 deg.
Backing Material : NA
Conditioning : AMBIENT

Primary Vel. Screens : 5.0 ft., 10.0 ft.
Primary Vel. Location : 7.5 ft. From Muzzle
Residual Vel. Screens : NA
Residual Vel. Location : NA
Range to Target : 15.0 ft.
Target to Wit. : 18.0 in.

Range No. : 3
Temp. : 68 F
BP : 30.00 in. Hg
RH : 35%
Barrel No./Gun : R3/ 9mm
Gunner : Ches
Recorder : Bonsall

AMMUNITION

(1) : 9mm, FMJ, 124 gr. Lot No. : REM. 23558
(2) : Lot No. :
(3) : Lot No. :
(4) : Lot No. :

APPLICABLE STANDARDS OR PROCEDURES

- (1) : ANSI/UL 752-2005 (MATL.) (ABBREVIATED)
- (2) : LEVEL I
- (3) : REQUIRED VELOCITY: 1175-1293 FPS.

Shot No.	Ammo.	Time 1 (usec)	Velocity 1 (ft/s)	Time 2 (usec)	Velocity 2 (ft/s)	Avg. Vel. (ft/s)	Penetration	Footnotes
1	1	4010	1247	4010	1247	1247	None	
2	1	3932	1272	3932	1272	1272	None	

REMARKS : SAMPLE WAS DAMAGED DURING SHIPMENT	FOOTNOTES :
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