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REPORT

on

BULLET-RESISTING MATERIAL DEVICES, MISCELLANEOUS

Safeguard Security Services Inc.
San Antonio, TX

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D E S C R I P T I O N

PRODUCT COVERED:

Bullet resisting plastic armor. Armortex Models O.F. 80 rated Level 1; O.F. 200 rated Level 2 and 6; O.F. 300 rated Level 3; O.F. 400 rated Level 4.

ENGINEERING CONSIDERATIONS (NOT FOR FIELD REPRESENTATIVE'S USE):

The products covered are bullet-resisting plastic armor materials intended for use indoors or outdoors. These materials are intended to be used in bullet-resisting enclosures, armored vehicles and teller fixtures. This material is a fiber reinforced plastic comprised of a number of fabric plies bonded with a rigid plastic resin.

CONSTRUCTION DETAILS:

General - Armortex is a fiberglass reinforced plastic material consisting of multiple layers of woven roving ballistic grade fiberglass cloth impregnated with a thermoset polyester resin and compressed into rigid flat sheets.

<u>Model</u>	<u>Rating</u>	<u>Thickness</u>
O.F. 80	Level 1	0.1875
O.F. 200	Level 2, Level 6	0.3125
O.F. 300	Level 3	0.4375
O.F. 400	Level 4	1.1875

Minimum Size - The minimum overall dimensions shall not be less than 12 by 12 in.

Marking - Each product shall be marked with the manufacturer's name and/or identifying symbol, date of manufacture, model number, and bullet-resisting rating.

T E S T R E C O R D N O. 1SAMPLES:

Four samples of Models Armortex OF80, OF200, and OF300 material rated for Level 1, Level 2, and Level 3, respectively, were submitted by the manufacturer and subjected to the following test program.

BALLISTICS TEST:

General - The ammunition used for the investigation was

Level 1 - 124 grain (8g) 9mm full metal copper jacket with lead core, minimum velocity 1175 fps (358 mps).

Level 2 - 158 grain (10.2g) .357 Magnum jacketed soft point, minimum velocity of 1250 fps (381 mps).

Level 3 - 240 grain (15.6g) .44 Magnum lead semi-wadcutter gas checked, minimum velocity of 1350 fps (411 mps).

All tests were conducted at close range, approximately 15 ft (4.6 m), using the ammunition and weapon specified. The test samples were mounted in a rigidly fixed frame, with 1/8 in. (3.2 mm) thick corrugated cardboard indicator panels placed approximately 18 in. (467 mm) behind the protected side of each test sample. During the test, each bullet velocity was monitored and recorded.

The samples were subjected to two different shot patterns: 2-shot and 3-shot.

The 2-shot pattern consists of two shots fired at the approximate center of the test sample, with the shots spaced between 1-1/4 to 1-3/4 in. (31.8 to 44.5 mm) apart. For both the single-shot and 2-shot pattern, spalling of bullet-resisting material from the protected side of the test sample is acceptable. However, there shall be no penetration of the projectile through the material such that damage to the indicator panels occurs, nor breaking apart of the sample which allows an unobstructed path for additional projectiles through the sample.

The 3-shot pattern consists of three shots spaced $4 \pm 1/2$ in. (102 ± 12.7 mm) apart in a triangular pattern in the approximate center of the test sample. With this shot pattern, there shall be no penetration of projectiles through the test sample, nor spalling of the material on the protected side of the test sample, to the extent that fragments embed in or damage the cardboard indicators.

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OUTDOOR RATING:

METHOD

Four samples were subjected to various ambient conditions. Two separate samples at room temperature, $22 \pm 3^\circ\text{C}$ ($72 \pm 5^\circ\text{F}$), were subjected to the 2-shot and 3-shot patterns. A third sample, after exposure to a temperature of 49°C (120°F) for a period of 3 h to the complete sample, and a fourth sample after exposure to -32°C (-25°F) to the side receiving the shots for a period of 3 h were subjected to the 3-shot pattern. The samples were tested immediately following the exposure to the indicated temperature conditions.

The velocity of each bullet was recorded during the test. The velocity values as recorded for multiple shot tests consist of the first value of the 2-shot pattern being the top point, and the second being the bottom point, the first value of the 3-shot pattern is the top point of the triangle, with the next values going in a clockwise direction around the triangle.

RESULTS

Acceptable results were recorded for all shot patterns at all ambient conditions as outlined above.

ARMORTEX OF80 (LEVEL 1)

<u>Bullet Velocities (fps)</u>	<u>First</u>	<u>Second</u>	<u>Third</u>
2-Shot	1213	1272	
3-Shot (Room Temperature)	1265	1257	1272
3-Shot (High Temperature)	1259	1231	1324
3-Shot (Low Temperature)	1217	1250	1286

ARMORTEX OF200 (LEVEL 2)

<u>Bullet Velocities (fps)</u>	<u>First</u>	<u>Second</u>	<u>Third</u>
2-Shot	1336	1327	
3-Shot (Room Temperature)	1352	1332	1316
3-Shot (High Temperature)	1320	1319	1319
3-Shot (Low Temperature)	1319	1338	1321

ARMORTEX OF300 (LEVEL 3)

<u>Bullet Velocities (fps)</u>	<u>First</u>	<u>Second</u>	<u>Third</u>
2-Shot	1363	1397	
3-Shot (Room Temperature)	1424	1326	1368
3-Shot (High Temperature)	1416	1482	1449
3-Shot (Low Temperature)	1462	1470	1426

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T E S T R E C O R D N O. 2SAMPLES:

Three samples of Model Armortex OF400 material rated for Level 4 were submitted by the manufacturer and subjected to the following test program.

BALLISTICS TEST:

General - The ammunition used for the investigation was 180 grain (11.7g) .30 caliber rifle lead core soft point, minimum velocity of 2540 fps (774 mps).

All tests were conducted at close range, approximately 15 ft (4.6 m), using the ammunition and weapon specified. The test samples were mounted in a rigidly fixed frame, with 1/8 in. (3.2 mm) thick corrugated cardboard indicator panels placed approximately 18 in. (467 mm) behind the protected side of each test sample. During the test, each bullet velocity was monitored and recorded.

The samples were subjected to a 1-shot test.

The 1-shot pattern consists of a single shot in the approximate center of the test sample. With this shot pattern, there shall be no penetration of the projectile through the test sample, nor spalling of the material on the protected side of the test sample, to the extent that fragments embed in or damage the cardboard indicators.

OUTDOOR RATING:

METHOD

Three samples were subjected to various ambient conditions. One sample at room temperature, $22 \pm 3^{\circ}\text{C}$ ($72 \pm 5^{\circ}\text{F}$), was subjected to a 1-shot pattern, center. A second sample, after exposure to a temperature of 49°C (120°F) for a period of 3 h to the complete sample, and a third sample, after exposure to -32°C (-25°F) to the side receiving the shot for a period of 3 h were subjected to the 1-shot pattern in the approximate center of the sample. The samples were tested immediately following the exposure to the indicated temperature conditions.

RESULTS

Acceptable results were recorded for all shot patterns at all ambient conditions as outlined above.

ARMORTEX OF400 (LEVEL 4)

Bullet Velocities (fps)

Single Shot - Center (Room Temperature)	2598
Single Shot - Center (High Temperature)	2626
Single Shot - Center (Low Temperature)	2610

T E S T R E C O R D N O. 3SAMPLES:

One sample of Model Armortex OF200 material rated for Level 6 was submitted by the manufacturer and subjected to the following test program.

BALLISTICS TEST:

General - The ammunition used for the investigation was 124 grain (8g) 9mm full metal copper jacket with lead core, minimum velocity of 1400 fps (427 mps).

All tests were conducted at close range, approximately 15 ft (4.6 m), using the ammunition and weapon specified. The test samples were mounted in a rigidly fixed frame, with 1/8 in. (3.2 mm) thick corrugated cardboard indicator panels placed approximately 18 in. (467 mm) behind the protected side of each test sample. During the test, each bullet velocity was monitored and recorded.

The sample was subjected to one 5-shot test.

The 5-shot pattern consists of five shots placed in a square pattern that is 4-1/2 by 4-1/2 in. (114 by 114 mm) located in the center of the test sample. With this shot pattern, there shall be no penetration of the projectile through the test sample, nor spalling of the material on the protected side of the test sample, to the extent that fragments embed in or damage the cardboard indicators.

The velocity of each bullet was recorded during the test.

RESULTS

Acceptable results were recorded for all shot patterns as outlined above.

ARMORTEX OF200 (LEVEL 6)

Bullet Velocities (fps)

Shot No. 1	1485 fps
Shot No. 2	1476 fps
Shot No. 3	1505 fps
Shot No. 4	1508 fps
Shot No. 5	1491 fps

C O N C L U S I O N

Samples of the products covered by this Report have been found to comply with the requirements covering the class and the products are judged to be eligible for Listing and Follow-Up Service. The manufacturer is authorized to use the Laboratories' Mark on such products which comply with the Follow-Up Service Procedure and any other applicable requirements of Underwriters Laboratories Inc. Only those products which properly bear the Laboratories' Mark are considered as Listed by Underwriters Laboratories Inc.

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