1 Introduction

Kejo Limited Company provided one armor sample to Chesapeake Testing for ballistic limit V_{50} BL(P) testing on 31 January 2014. Prior to testing, the sample was dimensioned and weighed. The results are shown in Table 1.

Table 1. Physical Data for Armor Sample

Job No.	Sample No.	Armor Description	Length x Width (in)	Weight (lbs)	Areal Density (lbs/ft^2)
2184-009-1	EOD smock panel	EOD Suit	16.00 x 16.00	2.00	1.13

2 Threats and Instrumentation

2.1 Threats

The threat used for this V_{50} test was .22-cal., 17-grain fragment simulating projectiles (FSP) V2 fired from a universal receiver which was fitted with the appropriate barrel and mounted on a Chesapeake Testing mount.

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).

3 Details of Test

The objective of this test was to conduct a ballistic limit V_{50} performance test on the armor sample in accordance with MIL-STD-662F and the customer's request. Shot spacing between multiple impacts on a single sample was in accordance with the customer's request. All shots against the armor sample were performed at 0.0° obliquity and ambient range temperature (65.4 °F).

For each shot the target was mounted in an ATC approved test fixture that was clamped to a rigid test apparatus. A piece of 0.508-mm-thick (0.020 in) type 2024-T3 aluminum was mounted along the shotline, approximately 76 mm ±13 mm (3 in ±0.5 in) behind the target, to verify complete penetrations. A complete penetration was scored only when the witness material was perforated (i.e., light was visible through the material). All firings were conducted at 15.000 ft from the target. The projectile velocity for the initial shot against the sample was in accordance with the referenced performance standard. Velocities for subsequent shots were based on the result of the previous shot.

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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.

4 Summary of Results

The results of the V_{50} ballistic limit testing are summarized in Table 2. The round-by-round ballistic data sheets and scatter plots for the testing performed is provided on the following page.

The following is a list of abbreviations used in the data sheet:

C = Complete penetration (same as CP).
Gap = For V_{50} data, the difference in velocities between the highest partial penetration and the lowest complete penetration when the complete penetration occurs at a higher velocity than the partial penetration.
HP = For V_{50} data, the highest velocity at which a partial penetration occurred.
LC = For V_{50} data, the lowest velocity at which a complete penetration occurred.
P = Partial penetration (same as PP).
ROR = Range of results; for V_{50} data, the difference between the highest and lowest velocities.
V_{50} = Statistical velocity at which the threat defeats the armor 50% of the time.
RMR = Range of mixed results; for V_{50} data, the difference in velocities between the highest partial penetration and the lowest complete penetration when the partial penetration occurs at a higher velocity than the complete penetration.
True = Round was used in calculating a V_{50} or an approximate V_{50}.
False = Round was not used in calculating a V_{50} or an approximate V_{50}.

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Table 2. Summary of V_{50} Ballistic Limit Test Results

Job No.	Sample No.	Threat	Target Obliquity (deg)	Ballistic Limit Data				
				V_{50} (ft/s)	No. of Points	RMR (ft/s)	GAP (ft/s)	ROR (ft/s)
2184-009-1	EOD smock panel	.22-cal., 17-grain FSP V2	0.0	2013	6	5	NA	110

PROTECTION BALLISTIC LIMIT TEST, V_{50} BL(P)

Chesapeake Testing
4603B Compass Point Road
Belcamp, MD 21017

Client: Kejo Limited Company
Job No.: 2184-009-1
Test Date: 1/31/2014

Test Panel

Description: Kejo Saviour EOD Suit (Smock front, Shoe Cover, Front thigh, Trouser back, Back shin, Back collar)

Manufacturer: Kejo Limited Company

Sample No.: EOD smock panel

Size:	16.00 x 16.00 in	Heat No.:	NA	Date Received:	1/30/2014
Thickness:	NA	Weight:	2.00 lbs	Via:	UPS
Avg. Thick:	NA	Hardness:	NA	Returned:	UPS
Required BL(P):	NA	Plies/Laminates:	NA		

Setup

Shot Spacing:	Customer request	Primary Vel. Screens (ft):	5.000, 5.333, 9.666, 10.000	Range No.:	5
Witness Panel:	0.02 in 2024-T3 Al			Temp:	65.4 °F
Obliquity:	0.0°	Primary Vel. Location (ft):	7.500	BP:	30 inHg
Backing Material:	NA	Range to Target (ft):	15.000	RH:	27.3%
Condition:	Ambient	Target to Witness (in):	3.000	Barrel/Gun:	CT-2009
				Gunner:	Zach Morrison
				Recorder:	Brad Shaffer

Ammunition

Projectile	Lot No.	Powder
(1) .22-cal., 17-grain FSP V2	9184	Bullseye

Applicable Standards or Procedures

(1) MIL-STD-662F
(2) Customer request

Shot No.	Powder/ Seating	Time 1 (µs)	Vel. 1 (ft/s)	Time 2 (µs)	Vel. 2 (ft/s)	Avg. Vel. (ft/s)	Striking Vel. (ft/s)	Result	Include in V_{50}	Footnotes
1	3.0	2209	2263	1912	2266	2265	2168	C	False	
2	2.8	2384	2097	2063	2100	2099	2009	P	True	
3	2.9	2296	2178	1987	2181	2179	2086	C	True	
4	2.8	2368	2111	2049	2115	2113	2023	C	True	
5	2.7	2390	2092	2068	2095	2094	2004	C	True	
6	2.6	2425	2062	2098	2065	2064	1976	P	True	
7	2.7	2417	2069	2092	2071	2070	1982	P	True	

Remarks:
The sample was tested in an ATC approved test fixture.

Footnotes:

V_{50} Summary:

No. Points:	3 and 3
V_{50}:	2013 ft/s
High Partial:	2009 ft/s
Low Complete:	2004 ft/s
Range of Results (ROR):	110 ft/s
Range of Mix Results (RMR):	5 ft/s
Gap:	NA

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PROTECTION BALLISTIC LIMIT TEST, V_{50} BL(P)

Chesapeake Testing
4603B Compass Point Road
Belcamp, MD 21017

Client: Kejo Limited Company
Job No.: 2184-009-1
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Manufacturer: Kejo Limited Company

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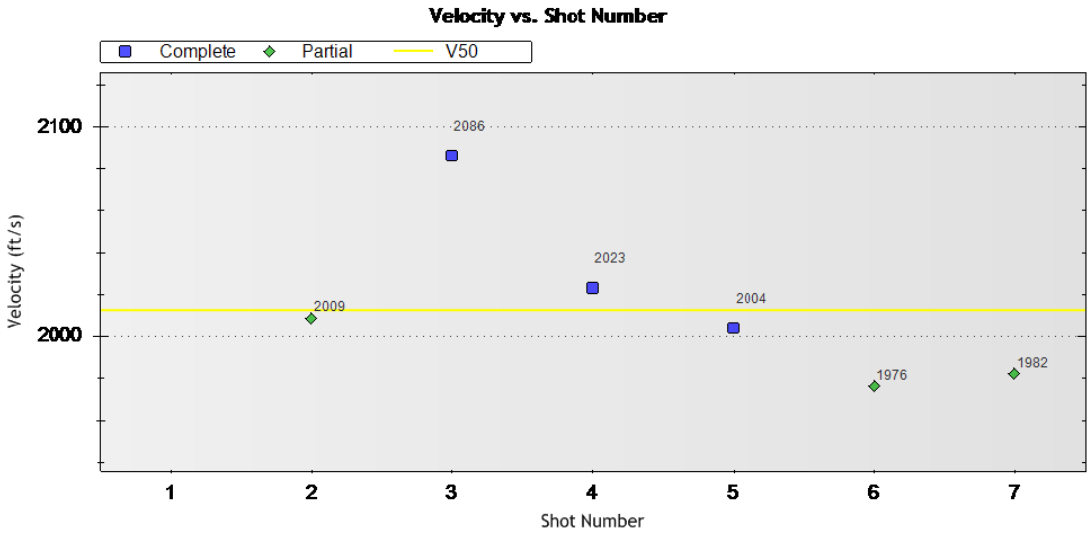
Gap:	NA



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