Ballistic Rubber
Picatinny Arsenal Test Review

Ricochet, repeated-fire and flame-exposure observations

REVIEW COPY | Customer-identifying information omitted
Test date: not stated in the supplied source documents

This report reorganizes the supplied Picatinny Arsenal ballistic and flammability evaluation into a readable technical record. It preserves the recorded outcomes, scanned result tables and all eight numbered photographs or thermal figures. Picatinny Arsenal is retained as the source organization; this is a CRS compilation, not a newly issued or signed Picatinny report.

Range-safety priorities

CRS identifies range safety, ricochet mitigation, impact management and durability as the priorities of its ballistic rubber products. Projectile capture is a separate, configuration-dependent capability. These source records provide direct ricochet-test observations and repeated-fire observations for the tested samples; they do not establish a universal ammunition rating or qualify every current product or installation.

Test element	Reported finding
Ricochet evaluation	The source identifies 15 degrees as the no-ricochet threshold for its test setup. The shot table records capture at tested angles from 15 to 45 degrees; jacket or penetrator escape occurred at 12 and 13.5 degrees.
100-round M249 evaluation	The panel was reported intact after 100 rounds in six bursts at 10 m. Five burst inspections state no noticeable damage; the 20-round cumulative inspection was not performed.
Tracer observations	The panel trials describe short-duration flames. Five M856 tracer rounds were reportedly captured in a separately tested, treated 8 x 8 x 16-inch block, with no rear cardboard holes observed.
Torch observations	After a 30-second exposure, the source reports flame extinction in about 7 seconds for untreated rubber and about 5 seconds for treated rubber. These are test-specific observations, not a fire classification.

How to read the findings

Reported result means a finding in the supplied record, not an independently repeated test. **Interpretation** explains the limited relevance of that finding. Planned procedures are separated from reported execution. Original scans are reproduced without reconstructing obscured detail or changing the damage shown. Source-page references refer to the supplied ten-page summary.

No NIJ protection rating, government endorsement, blanket certification, fireproofing claim or approval of tracer use is established by this compilation. Rubber and backing must be evaluated as part of the complete intended range system.

Test articles, facility and equipment

The source names the Armament Technology Facility (ATF), Building 7, Picatinny Arsenal, New Jersey, and a 300 m indoor range. The equipment scan states that firearms were fixed to a Bond Mount with weapon-specific aluminum adapters; the target was on a rolling lift table. Distance and target angle were varied. [Source pp. 1, 3, 5-7]

Test article	Documented information
Rubber panels	Panel thickness, face dimensions, compound, density, lot and reinforcement are not identified in the supplied report. Separate treated and untreated panel samples appear in flame trials.
Rubber block	8 x 8 x 16 inches, described as treated with fire retardant. The bullet-path dimension and material specification are not stated.
Backing and witnesses	Steel/armored backing is explicit in tracer observations and photographs of the high-rate test. Ricochet witnesses were 1/2-inch Celotex with kraft-paper covers, overhead and opposite the wall. Cardboard was placed behind the tracer-test block.

Weapons and imaging equipment - as listed

Equipment	Description / model	Source serial number
M249	5.56 mm machine gun / SAW	157517
M4	5.56 mm rifle carbine	W450663
Normal-speed video	DCR-VX2100	1320203
FLIR infrared video	A40	23600364
High-speed video	Phantom V7.0	3735

Ammunition inventory - as listed

Code	Designation / source description	Source lot
A059	M855 5.56 mm Ball CLPD	LC-04E158-274
A066	M193 5.56 mm Ball CLPD	LC-93G006-533
A063	M856 5.56 mm Tracer S/L	LC-90G094-252
A062	M855 5.56 mm Ball LNKD	LC-00F108-024

Equipment and lot identifiers are transcribed from the equipment scan for traceability; CLPD, S/L and LNKD are retained as source abbreviations. Calibration records, raw videos and measured projectile velocities were not supplied. No individual authors, receiving-customer names, logos or contact details are reproduced.

Ricochet test: shot-by-shot record

The protocol describes fresh impact areas, two witness panels and a 33 cm muzzle-to-target distance. The original result table lists 13 inches for every shot. SS is the table's single-shot fire designation; the shot number below preserves the cumulative Total column. Each row lists one loaded and one fired. [Source pp. 3-4, 6]

Shot	Loaded	Fired	Fire	Angle (deg)	Ammo	Distance	Result transcribed / lightly standardized
1	1	1	SS	12	M855	13 in	Round penetrated; penetrator and jacket came out and bounced off corner piece.
2	1	1	SS	12	M855	13 in	Round penetrated; penetrator and jacket came out and bounced off corner piece.
3	1	1	SS	12	M193	13 in	Round penetrated; jacket came out and bounced off corner piece.
4	1	1	SS	45	M855	13 in	Round penetrated and was captured.
5	1	1	SS	45	M855	13 in	Round penetrated and was captured.
6	1	1	SS	22.5	M855	13 in	Round penetrated and was captured.
7	1	1	SS	17	M855	13 in	Round penetrated and was captured.
8	1	1	SS	17	M855	13 in	Round penetrated and was captured.
9	1	1	SS	17	M855	13 in	Round penetrated and was captured.
10	1	1	SS	15	M855	13 in	Round penetrated and was captured.
11	1	1	SS	15	M856*	13 in	Round penetrated and was captured.
12	1	1	SS	15	M855	13 in	Round penetrated; rubber fragment came off; no perforation of witness paper.
13	1	1	SS	15	M855	13 in	Round penetrated and was captured.
14	1	1	SS	13.5	M855	13 in	Round penetrated; penetrator and jacket came out and bounced off corner piece.
15	1	1	SS	13.5	M855	13 in	Round penetrated; penetrator and jacket came out and bounced off corner piece.

***Scan uncertainty:** row 11 appears to read M856, while the narrative frames the critical-angle evaluation around M855. This designation is retained with a flag rather than silently changed. Obtain the original log to resolve it. Row 12 records a rubber fragment with no witness-paper perforation; it is not worded as ordinary capture.

Interpretation: the source reports a 15-degree threshold and a broader 15-to-90-degree conclusion. This table documents discrete angles only through 45 degrees; 90 degrees appears in separate tests. It does not establish every intervening angle or a universal safe firing angle. The source's angle convention is not fully defined.

Ricochet findings and repeated-fire results

What the ricochet record supports

The dedicated test records favorable capture or witness observations at its tested angles of 15 degrees and above, and records outgoing projectile components at 12 and 13.5 degrees. The narrative states that, on ricocheting shots, the M855 lead core remained in the rubber while the penetrator and jacket exited. A single M193 comparison shot also retained the lead core but released the copper jacket. [Source pp. 4, 6]

These findings are relevant to ricochet mitigation, CRS's primary range-safety objective. They must remain tied to the ammunition, fresh impact areas, fixture, angle convention and complete tested setup. Lead-core retention alone is not full projectile or fragment containment.

100-round M249 high-rate evaluation

The reported execution used an M249 SAW at 10 m, with the panel at 90 degrees to the line of fire. One hundred rounds were fired in six bursts. The conclusion gives an approximate rate of 725 rounds/minute and describes the panel as intact, self-healing and performing as designed. That description is the source's qualitative assessment, not a measured lifetime or proof of rubber-only capture. [Source pp. 2-4, 7-8]

Burst	Loaded	Fired	Cumulative total	Fire	Recorded inspection
1	10	10	10	Auto	No noticeable damage
2	10	10	20	Auto	Did not check
3	10	10	30	Auto	No noticeable damage
4	20	20	50	Auto	No noticeable damage
5	20	20	70	Auto	No noticeable damage
6	30	30	100	Auto	No noticeable damage

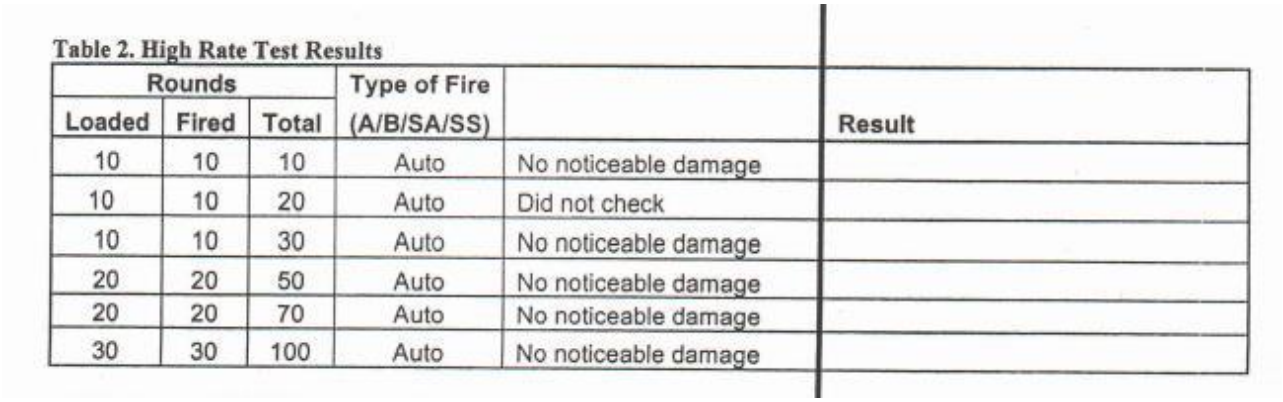


Table 2. High Rate Test Results

Rounds			Type of Fire		
Loaded	Fired	Total	(A/B/SA/SS)		Result
10	10	10	Auto	No noticeable damage	
10	10	20	Auto	Did not check	
10	10	30	Auto	No noticeable damage	
20	20	50	Auto	No noticeable damage	
20	20	70	Auto	No noticeable damage	
30	30	100	Auto	No noticeable damage	

Original high-rate result table, source p. 7. The first 100-round series is one test, not six independent durability tests.

The inventory lists linked M855 ammunition, but the execution narrative does not explicitly assign an ammunition lot to this subtest. Photographs identify a back plate and the rubber panel after firing. No exit velocity, recovered projectile inventory, quantified damage score or comparison with another product was supplied.

Longevity and shot distribution

The repeated-fire observation supports the reported structural condition after this limited series. It does not establish comparative service life. Actual wear depends on shot distribution, ammunition, firing volume, installation and accumulated damage. The source describes an impact area and measurable dispersion but supplies no measured shot map.

Tracer and sustained-flame observations

The following preserves historical observations for the particular samples. It does not designate CRS current products as flame resistant or fireproof, authorize tracer use, or establish a standardized fire classification. Treated and untreated samples must not be conflated. [Source pp. 2-4, 7, 9-10]

M856 tracer tests

Configuration	Reported execution / outcome
Panel, single shot	One M856 tracer into a treated panel, nominally 1.63 m and 90 degrees. Flame reportedly extinguished in about 1 second.
Panel, two bursts	Two five-round bursts: one into treated rubber and one into untreated rubber. Each flame reportedly extinguished in less than 2 seconds. Highest observed heat was between rubber and the steel/armored plate.
Treated block	Five tracer rounds into a treated 8 x 8 x 16-inch block, with cardboard behind it. Brief external flare reportedly went out immediately. All five were reported encapsulated; no rear cardboard holes and no apparent front-face damage were observed. Actual block-test distance is not specified in the execution account.

Thermal readings in the supplied figures

Figure / condition	Highest reported (F)	Entry area (F)	Displayed scale low (F)
4: one tracer round	117.6	110	69.9
5: five-round burst, treated	247.3	115	68.5
6: five-round burst, untreated	228.4	160	70.4
7: torch, untreated	Camera limit 1,076.2; image >1,076.2	Not stated	67.5
8: torch, treated	Camera limit 1,076.2; image >1,076.2	Not stated	69.7

All temperatures are Fahrenheit. Displayed scale lows are image-scale endpoints, not confirmed ambient measurements. In Figs. 5-6 the highest temperature is attributed to flame between rubber and backing, not uniform rubber temperature. The caption under Fig. 4 is split across source image blocks; source p. 9 states 117.6 F peak and 110 F near entry.

Oxyacetylene torch exposure

The narrative describes 30 seconds of direct torch exposure to each sample. After removal, untreated rubber reportedly remained aflame for about 7 seconds and treated rubber for about 5 seconds. Figures 7-8 are captioned as images after 15 seconds of torch application. The FLIR camera saturated at its upper measurement range; 1,076.2 F is not an established maximum exposure temperature.

The source mentions approximately 6,000 F as a general oxyacetylene flame temperature, not a measured rubber or assembly temperature. No treatment identity, dosage, standardized rating, smoke-toxicity measurement or installed-system fire evaluation is supplied.

Planned scope versus reported execution

The source combines an appended statement of work with result narratives. The plan is preserved below for completeness, but it is not counted as additional completed testing. The plan lists the schedule as "to be determined" and special-skills requirement as "none." [Source pp. 5-6]

Element	Appended plan	Reported execution / qualification
Objective	Determine ricochet protection and encapsulation for use in Army live-fire shoot houses; the plan refers to certification.	An objective is not proof that certification or installation approval was granted. No certificate is supplied.
Oblique panel test	Four single 5.56 mm training rounds, 10-degree angle of incidence, close range 12-18 inches.	Result table contains 15 single shots at 12, 13.5, 15, 17, 22.5 and 45 degrees, each at 13 inches. Narrative states 33 cm and elsewhere 15 inches (33 cm).
Perpendicular panel test	100 rounds in three-round bursts, evenly distributed into an 18-inch circle, at 90 degrees and 12-18 inches.	Execution reports 100 rounds in six bursts of 10, 10, 10, 20, 20 and 30 at 10 m, with measurable dispersion.
Panel tracer combustion	Five randomly distributed single tracer shots at 12-18 inches.	Execution describes one single shot plus two five-round bursts, 11 panel rounds total, at 1.63 m.
Block test	Repeat panel tests 1-3 at 12-18 inches using 5.56 mm training ammunition.	The supplied result narrative specifically documents five block tracer rounds. Other proposed block trials are not separately logged.

Reconciliation notes

13 inches is approximately 33 cm; 15 inches is not. The result table and primary protocol agree approximately, while one narrative distance is inconsistent. The conclusion extends from a stated 15-degree threshold to 90 degrees, but the dedicated ricochet table ends at 45 degrees. No missing angle trials are invented.

Appendix titles and cross-references are inconsistent: the narrative refers to ricochet results as Appendix A and repeated-fire results as Appendix B, while the appended plan is labeled Appendix A and the scanned ricochet table appears under Appendix B. Figure numbers and source page numbers are used here to avoid ambiguity.

The report describes normal-speed, high-speed and infrared documentation. Those raw recordings were not supplied. Repeated summary statements are not additional rounds, tests or independent replications.

Source photographs: equipment and range setup

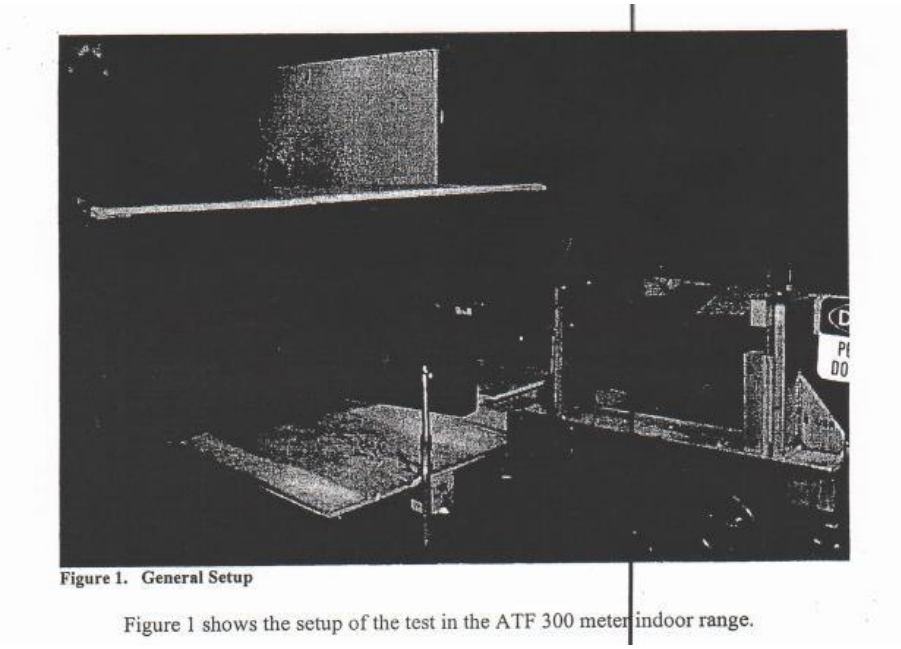


Figure 1. General Setup

Figure 1 shows the setup of the test in the ATF 300 meter indoor range.

Figure 1. General setup at the ATF 300 m indoor range. Reproduced from source p. 3. Original scan artifacts and limited contrast are retained.

Equipment List

Weapons:		
M249	Machine Gun 5.56mm SAW	S/N: 157517
M4	Rifle Carbine 5.56mm	S/N: W450663
Ammunition:		
A059	M855 5.56mm Ball CLPD	LC-04E158-274
A066	M193 5.56mm Ball CLPD	LC-93G006-533
A063	M856 5.56mm Tracer S/L	LC-90G094-252
A062	M855 5.56mm Ball LNKD	LC-00F108-024
Video:		
Normal Speed Video	M/N: DCR-VX2100	S/N: 1320203
FLIR Infrared Video	M/N: A40	S/N: 23600364
High Speed Video	M/N: Phantom V7.0	S/N: 3735

Range Setup

The range setup for the entire test followed the same general layout and is shown in Figure 1. The variables that were changed during the test were the target's angle and the distance from the muzzle to the target. The weapons were fired using a Bond Mount and weapon specific aluminum hard mount adapters. The Bond Mount allowed for precise adjustment of the weapon's aim point. The target was mounted on a rolling lift table to allow for adjustment of the distance from muzzle to target impact.

Equipment and setup record. Original source p. 1 equipment list and mounting description. A readable transcription is provided in the equipment section. No customer identity is visible in this reproduced portion.

Source photographs: after 100 rounds

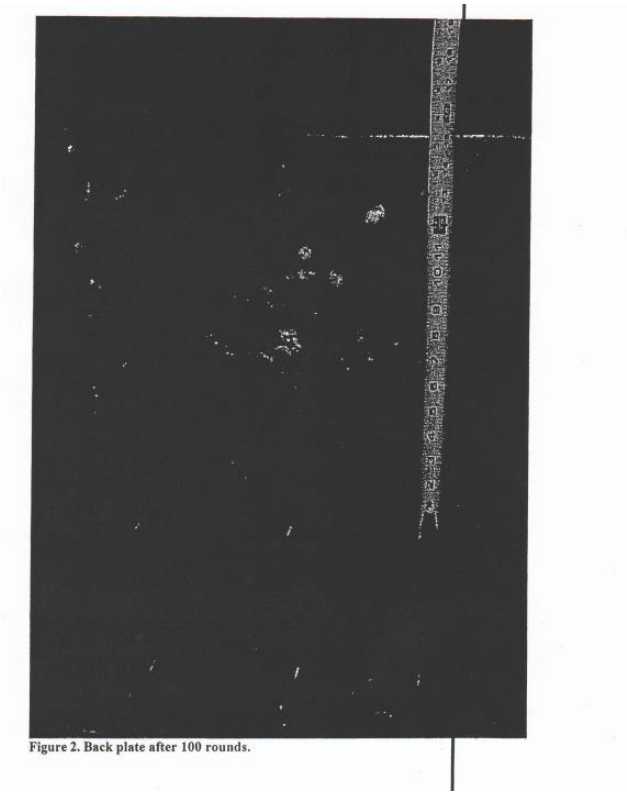


Figure 2. Back plate after 100 rounds. Source p. 8.

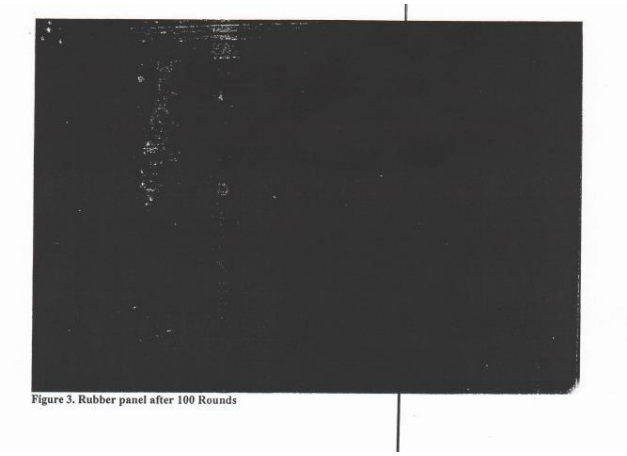


Figure 3. Rubber panel after 100 rounds. Source p. 8.

Reading these photographs

The photographs accompany the source's qualitative conclusion that the panel remained intact after the recorded high-rate series. The presence of a separately identified back plate is important context. These images do not quantify residual projectile energy, prove rubber-only stopping performance or establish comparative wear against another product.

All figures are reproduced from the supplied scans. Dark regions, vertical scan lines, grain and low resolution are source limitations, not reconstructed image detail. No contrast enhancement, damage retouching or AI image generation has been applied.

Source thermal photographs: tracer tests

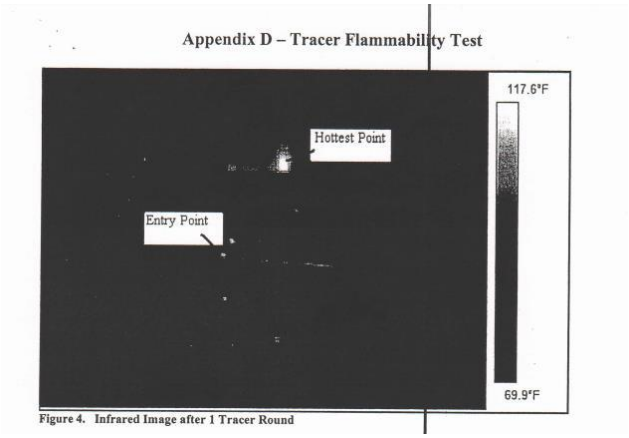


Figure 4. After one tracer round. Peak reported 117.6 F; entry area 110 F.

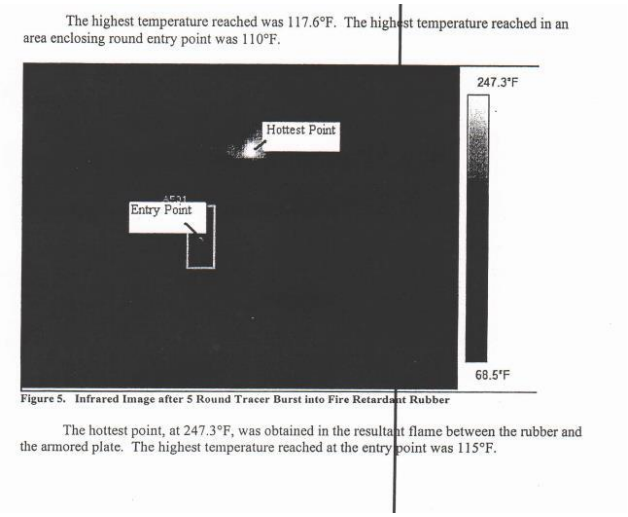


Figure 5. Five-round burst into treated rubber. Peak reported 247.3 F; entry area 115 F.

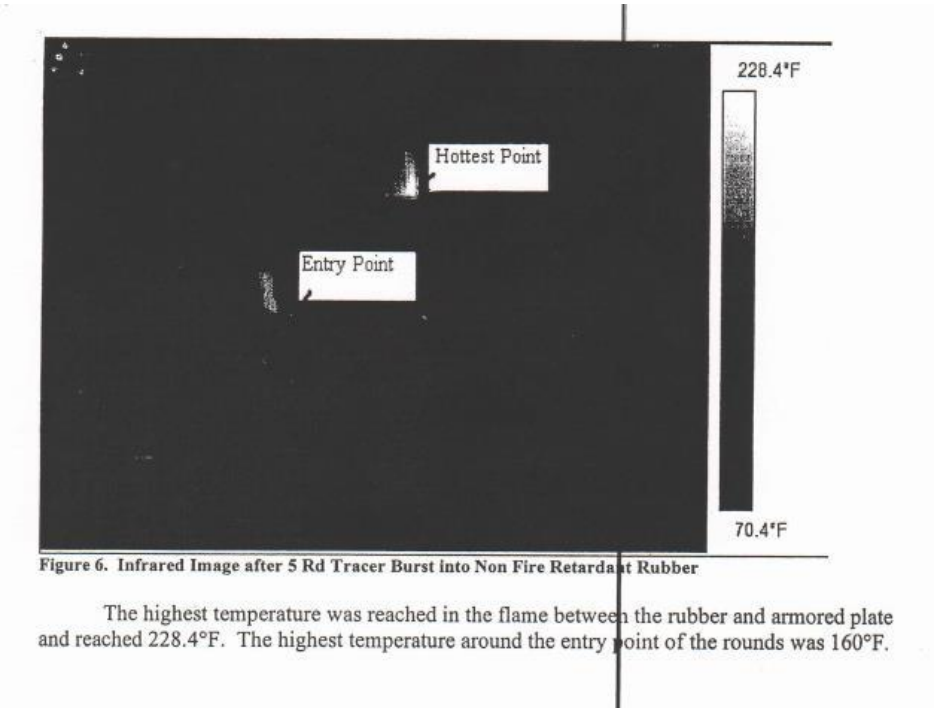


Figure 6. Five-round burst into untreated rubber. Peak reported 228.4 F, attributed to flame between rubber and armored backing; entry area 160 F. All three figures are from source p. 9.

These are individual thermal views, not time-resolved maximum-temperature records. Flame extinction times are taken from the narrative, not inferred from the still images. Source treatment labels describe historical samples and are not current-product fire-resistance claims.

Source thermal photographs: torch exposure



Figure 7. Torch on Non-Fire Retardant Rubber

The image shows the reaction of the Non-Fire Retardant Rubber after 15 seconds of applying the torch to a spot on the rubber. The highest temperature recorded is 1076.2°F.



Figure 8. Torch on Fire Retardant Rubber

This image shows the reaction of the Fire Retardant Treated Rubber after 15 seconds of applying the torch to a spot on the rubber. Again the highest temperature recorded is 1076.2°F.

Figures 7 and 8. Original paired scan from source p. 10: untreated rubber above, treated rubber below. Captions identify 15-second views during the narrative's 30-second applications. The scale indicates saturation above 1,076.2 F. Original captions are retained as historical evidence.

Reported post-removal flame duration: approximately 7 seconds untreated and 5 seconds treated. This demonstration is not a standardized fire classification, evidence of fireproofing or authorization to expose installed rubber to flame.

Original ricochet table and evidence limits

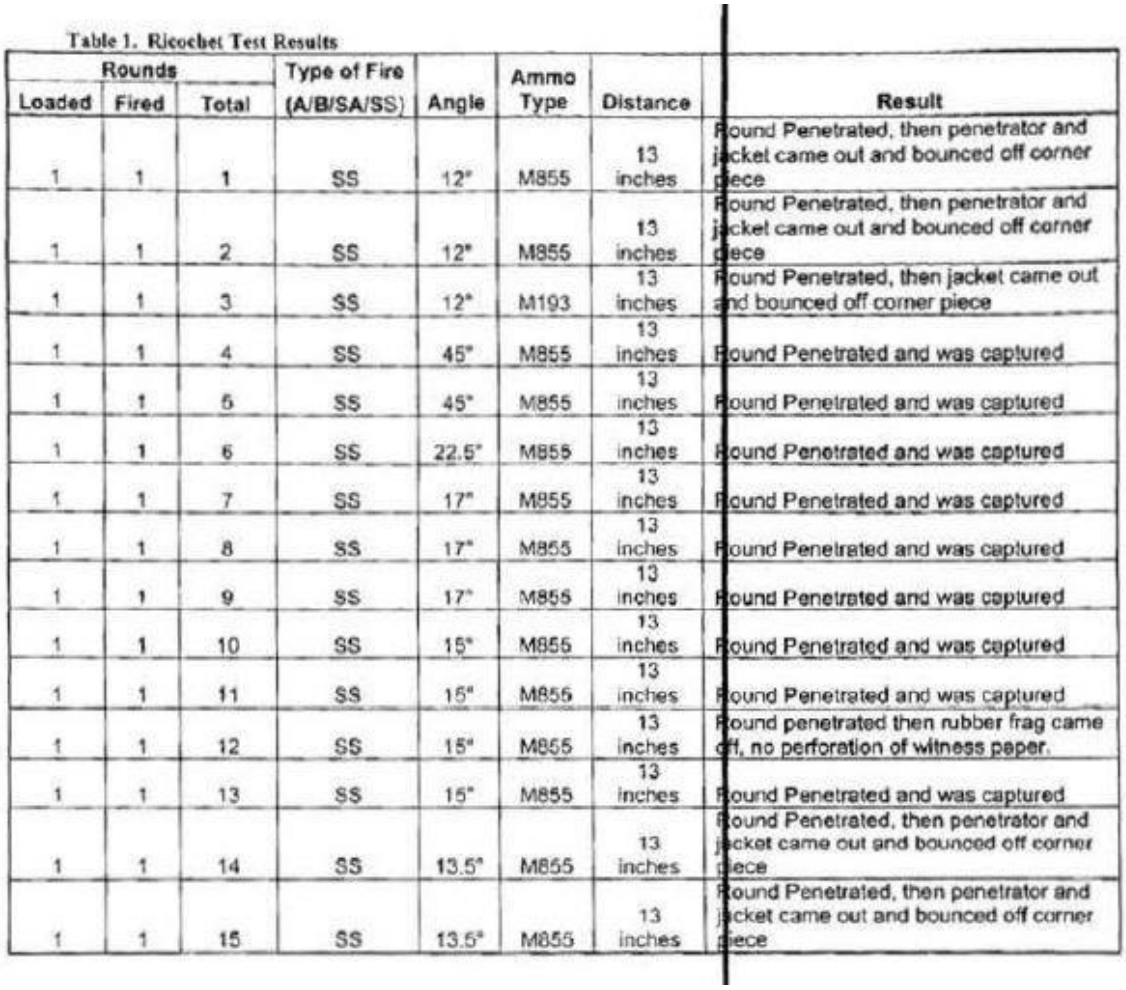


Table 1. Ricochet Test Results

Rounds			Type of Fire	Angle	Ammo Type	Distance	Result
Loaded	Fired	Total	(A/B/SA/SS)				
1	1	1	SS	12°	M855	13 inches	Round Penetrated, then penetrator and jacket came out and bounced off corner piece
1	1	2	SS	12°	M855	13 inches	Round Penetrated, then penetrator and jacket came out and bounced off corner piece
1	1	3	SS	12°	M193	13 inches	Round Penetrated, then jacket came out and bounced off corner piece
1	1	4	SS	45°	M855	13 inches	Round Penetrated and was captured
1	1	5	SS	45°	M855	13 inches	Round Penetrated and was captured
1	1	6	SS	22.5°	M855	13 inches	Round Penetrated and was captured
1	1	7	SS	17°	M855	13 inches	Round Penetrated and was captured
1	1	8	SS	17°	M855	13 inches	Round Penetrated and was captured
1	1	9	SS	17°	M855	13 inches	Round Penetrated and was captured
1	1	10	SS	15°	M855	13 inches	Round Penetrated and was captured
1	1	11	SS	15°	M855	13 inches	Round Penetrated and was captured
1	1	12	SS	15°	M855	13 inches	Round penetrated then rubber frag came off, no perforation of witness paper.
1	1	13	SS	15°	M855	13 inches	Round Penetrated and was captured
1	1	14	SS	13.5°	M855	13 inches	Round Penetrated, then penetrator and jacket came out and bounced off corner piece
1	1	15	SS	13.5°	M855	13 inches	Round Penetrated, then penetrator and jacket came out and bounced off corner piece

Original Table 1. Ricochet results scan, source p. 6. The readable shot-by-shot transcription earlier in this report preserves the outcomes and flags the row 11 ammunition designation.

Source register

Primary source: *Test Summary Report.pdf*, ten supplied pages titled *Ballistic and Flammability Evaluation*. Includes narrative, equipment list, plan, two result tables and Figures 1-8. **Provenance source:** *Ballistic & Flammability Evaluatin-1.pdf*, one scanned cover naming Picatinny Arsenal and the Armament Systems Evaluation Branch / Armament Research, Development and Engineering Center. It adds provenance, not a second experimental dataset. Individual names on the cover are omitted.

Scope and traceability

The supplied sources state no test date. Receiving-customer names, attribution, contact details and logos are not reproduced. The original cover is omitted; Picatinny Arsenal is retained as the source organization. This report contains all eight numbered source figures, both original result tables and the equipment scan, together with readable transcriptions and narrative outcomes.

Before application-specific reliance, verify the original dated report, panel specifications, sample/treatment identity, angle convention and backing arrangement. No claim is made that these historical samples match every current CRS product. No .308, .50 BMG, July 2021 customer data or later modeled penetration values are combined with this dataset.