

Terminology for Shooting Reconstruction

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Terminology for Shooting Reconstruction

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Foreword

This document provides terminology for shooting reconstruction. These terms address basic shooting reconstruction and related concepts.

This document is intended to be utilized in conjunction with local regulations and any requirements set forth by entities examining collected evidence to inform or augment policies relating to collecting and preserving physical evidence.

The American Academy of Forensic Sciences established the Academy Standards Board (ASB) in 2015 with a vision of safeguarding Justice, Integrity and Fairness through Consensus Based American National Standards. To that end, the ASB develops consensus based forensic standards within a framework accredited by the American National Standards Institute (ANSI), and provides training to support those standards. ASB values integrity, scientific rigor, openness, due process, collaboration, excellence, diversity and inclusion. ASB is dedicated to developing and making freely accessible the highest quality documentary forensic science consensus Standards, Guidelines, Best Practices, and Technical Reports in a wide range of forensic science disciplines as a service to forensic practitioners and the legal system.

This document was revised, prepared, and finalized as a standard by the Crime Scene Investigation Consensus Body of the AAFS Standards Board. The draft of this standard was developed by the Crime Scene Investigation Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science.

Questions, comments, and suggestions for the improvement of this document can be sent to AAFS-ASB Secretariat, asb@aaafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

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ASB procedures are publicly available, free of cost, at www.aaafs.org/academy-standards-board.

Keywords: *crime scene investigation, crime scene reconstruction, shooting reconstruction.*

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Terminology for Shooting Reconstruction

1 Scope

This document defines terms used in the different components of shooting incident reconstruction for forensic science practitioners, investigators, judicial practitioners, and academia.

2 Normative References

The document contains no normative references. See Annex L, Bibliography for other references.

3 Terms and Definitions

For purposes of this document, the following terms and definitions apply

3.1

accidental discharge

The inadvertent discharge of a firearm as a result of a mechanical failure on the part of the firearm.
[AFTE Glossary 6th Ed, Version 6.091922, mod]

3.2

ammunition

An unfired cartridge(s) designed to be discharged in a firearm.

3.3

angle of deflection

The angle formed between the path of the departing projectile subsequent to an impact and the pre-impact path of the projectile's flight (see Figure A.1).
[AFTE Glossary 6th Ed, Version 6.091922]

3.4

angle of incidence

The angle formed between the nominal path of a projectile and the plane of the target (see Figure A.1 and Figure A.2).

NOTE The angle of incidence is also referred to as the angle of impact.

3.5

angle of ricochet

The angle defined by the path taken by the ricocheted projectile as it departs the impacted surface (see Figure A.2).
[AFTE Glossary 6th Ed, Version 6.091922, mod]

3.6

azimuth angle

See **3.46 horizontal angle**.

3.7

ballistics

The science of projectiles in motion. Usually divided into three parts:

3.7.1

interior ballistics

The study of a projectile's initial acceleration and movement inside the firearm.

3.7.2

exterior ballistics

The study of a projectile's movement between the muzzle and the target(s).

3.7.3

terminal ballistics

The study of the effect of a projectile's impact on a target.

3.8

backscatter

The debris ejected rearward from a target when a projectile creates an entrance impact.

3.9

backspatter pattern

A bloodstain pattern resulting from blood drops, which can be produced when a projectile creates an entrance wound.

[ASB TR 033]

3.10

bore

The interior of a barrel forward of the chamber.

[SAAMI Glossary]

3.11

bullet

A projectile, typically non-spherical, designed specifically to be fired from a firearm with a rifled barrel.

3.12

bullet core

The inner portion of a jacketed bullet, often made of lead.

[AFTE Glossary 6th Ed, Version 6.091922, mod]

3.13

bullet drift

The lateral deviation in a bullet's flight through the atmosphere due to the rotational effects imparted by a rifled barrel.

[AFTE Glossary 6th Ed, Version 6.091922 mod]

3.14**bullet drop**

The vertical distance a bullet has fallen, under the influence of gravity, at any point in its flight path.

NOTE The distance is measured from a point on its path to the straight line from the axis of the bore to target.
[AFTE Glossary 6th Ed, Version 6.091922, mod]

3.15**bullet jacket**

The outer covering enclosing the core of a projectile that is typically of metallic construction.
[AFTE Glossary 6th Ed, Version 6.091922, mod]

3.16**bullet path**

See **3.89 trajectory**.

3.17**bullet splash**

A deposit of pulverized or particulate bullet material adjacent to a projectile impact.

NOTE Bullet splash is also known as lead splash.

3.18**bullet wipe**

The discolored area caused by a physical transfer from the surface of a projectile to a target on the immediate periphery of a projectile entrance.

3.19**bullet yaw**

The angle between the longitudinal axis of a projectile and the line of the projectile's trajectory (see Figure A-3).

[SAAMI Glossary, mod]

3.20**caliber**

The nominal diameter of a projectile, the nominal inner diameter of a barrel, or a term also used to designate the specific cartridge(s) for which a firearm is chambered.

3.21**cartridge**

A single unit of ammunition consisting of the case, primer, and propellant with one or more projectiles.

NOTE This also applies to a shotshell.

3.22**cartridge case**

The fired or unfired component of metallic ammunition, the purpose of which is to hold the primer, propellant, and projectile.

NOTE The terms casing, shell, and brass are often used incorrectly for the term cartridge case.

3.23**chamber**

1] In a rifle, shotgun or pistol, the rearmost part of the barrel that has been formed to accept a specific cartridge or shell when inserted

2] In a revolver, the holes in the cylinder that have been formed to accept a cartridge.

[SAAMI Glossary]

3.24**Chisum trail**

An elongated transference of bullet metal at the departure end of a ricochet mark on smooth, flat, unyielding surfaces that indicates the twist direction of the firearm rifling (see Figure A.4).

NOTE A left-side elongation indicates left twist origin and right-side elongation indicates right twist origin.
[AFTE Glossary 6th Ed, Version 6.091922, mod]

3.25**choke**

An interior constriction at or near the muzzle end of a shotgun barrel for the purpose of controlling shot dispersion.

[SAAMI Glossary]

3.26**concentric fractures**

The cracks in brittle materials (e.g., ceramic, glass, bone) that take a generally circular form around an impact site (see Figure A.7)

3.27**cone fracture**

The characteristic cone shape on the exit side of a projectile impact through a relatively brittle medium (e.g., ceramic, glass, bone) caused by spalling around the exit (see Figure A.5 and Figure A.6).

NOTE The cone is also known as a Hertzian cone or beveling.
[AFTE Glossary 6th Ed, Version 6.091922, mod]

3.28**crazing**

See [3.32 dicing](#).

3.29**critical angle**

The angle of incidence at which a projectile transitions from perforation or penetration to ricochet.

NOTE The angle is dependent on bullet type, target material, and velocity.

3.30**defect**

A generic term for any surface damage.

- 149 **3.31**
150 **deflection**
151 A change in the nominal path of a projectile due to an impact.
- 152 **3.32**
153 **dicing**
154 The breaking of tempered glass into small pieces as opposed to large shards.
- 155 NOTE This is also referred to as crazing.
- 156 **3.33**
157 **directional angle**
158 The angle (γ) between the long axis of a projectile impact and a defined reference line on the
159 target.
- 160 **3.34**
161 **directionality**
162 The property of a trajectory or projectile impact that describes which way a projectile was moving.
- 163 **3.35**
164 **distance determination**
165 The process of determining how far away the muzzle of a firearm was from a target at the time a
166 shot was fired, based on one or more methods such as gunshot residue patterns, pellet patterns, or
167 buffer patterns.
- 168 **3.36**
169 **downrange**
170 Any location forward of the plane of a firearm's muzzle.
- 171 **3.37**
172 **drop-off distance**
173 The distance at which a firearm-ammunition combination will no longer leave detectable gunshot
174 residues on a target.
- 175 **3.38**
176 **ejection pattern**
177 The distribution of fired cartridge cases or shotshells relative to the location of a firearm from
178 which they were ejected.
- 179 **3.39**
180 **ejecta**
181 The target material that was expelled as a result of a projectile impact.
- 182 **3.40**
183 **elevation angle**
184 See [3.94 vertical angle](#).
- 185 **3.41**
186 **firearm**
187 Any assembly of a barrel and action designed to expel a projectile with the energy generated by
188 combustion.

3.42**forward spatter**

A bloodstain pattern resulting from blood drops which can be produced when a projectile creates an exit wound.

[ASB TR 033]

3.43**gauge (shotguns)**

A term used in the identification of the internal diameter of a shotgun bore.

[AFTE Glossary 6th Ed, Version 6.091922, mod]

NOTE Table 1 shows the bore diameters in inches and millimeters for common shotgun gauges.

Table 1—Bore Diameters by Gauge

Gauge	Bore Diameter (in.)	Bore Diameter (mm)
10	0.775	19.685
12	0.725	18.415
16	0.665	16.895
20	0.615	15.621
28	0.545	13.843

3.44**gunshot residue****GSR**

The total of all residues resulting from the discharge of a firearm.

NOTE An examination of GSR can include chemical analysis to identify the presence of GSR or interpretation of GSR patterns to determine the location or position of a firearm at the time of discharge.

3.45**gunshot residue pattern**

The form, density, and spatial distribution of all residues deposited on a surface from the discharge of a firearm.

3.46**horizontal angle**

The angle in a horizontal plane between the path of a projectile and an object that was struck, measured at the point of impact.

NOTE A horizontal angle is also known as an azimuth angle.

3.47**keyhole**

A projectile impact that retains the general profile of a bullet that was destabilized and impacted the target surface at a canted angle.

NOTE The term keyhole may be used differently by a forensic pathologist when referring to a bullet wound.

221 **3.48**

222 **laminated glass**

223 Layers of glass bonded together with an interlayer of polymer material, commonly seen in
224 automobile glass.

225 NOTE Laminated glass is also known as safety glass.

226 **3.49**

227 **lead-in mark**

228 A visible, thin, elongated deposition of bullet wipe that is transferred to a surface as a bullet first
229 makes contact with that surface.

230 NOTE The lead-in mark is useful in establishing the entrance side of the projectile impact.

231 *[AFTE Glossary 6th Ed, Version 6.091922, mod]*

232 **3.50**

233 **misfire**

234 A failure of a cartridge to discharge after an adequate primer impact by a firing pin.

235 **3.51**

236 **muzzle**

237 The end of a firearm barrel from which the projectiles emerge.

238 **3.52**

239 **non-penetrating impact**

240 The projectile damage that occurs when the projectile strikes but does not penetrate a target.

241 **3.53**

242 **orthogonal**

243 An angle that is perpendicular or forming a right angle.

244 NOTE An orthogonal angle is also known as a normal angle.

245 **3.54**

246 **pellet pattern**

247 The distribution of projectile impacts from multiple projectiles fired from a shot cartridge or
248 shotshell.

249 NOTE A pellet pattern can be used to estimate the muzzle-to-target distance or angle of incidence or both.

250 **3.55**

251 **penetrating impact**

252 The projectile damage is where the projectile entered and did not exit a target.

253 **3.56**

254 **perforating impact**

255 The projectile damage is where the projectile entered and exited a target.

- 256 **3.57**
257 **pinch point**
258 A small area of surviving original surface within an angled projectile impact that is located at the
259 initial contact point.
- 260 NOTE The pinch point is useful in establishing the entrance side of the projectile impact.
- 261 **3.58**
262 **pistol**
263 A firearm intended to be fired with one hand in which the chamber(s) are integral to the barrel(s).
264 *[SAAMI Glossary]*
- 265 **3.59**
266 **point of aim**
267 The exact point on which the firearm's sights are aligned.
268 *[SAAMI Glossary, mod]*
- 269 **3.60**
270 **point of impact**
271 The point at which a bullet hits a target.
272 *[SAAMI Glossary]*
- 273 **3.61**
274 **powder stippling**
275 (1) On skin or other tissues, small hemorrhagic lesions produced by non-embedded burned and
276 partially burned gunpowder particles.
- 277 (2) On inanimate objects, the creation of small pits or defects caused by the impact of unburned
278 and partially burned gunpowder particles.
279 *[AFTE Glossary 6th Ed, Version 6.091922, mod]*
- 280 **3.62**
281 **powder tattooing**
282 The embedded, unburned, and partially burned gunpowder particles in the skin or other tissue,
283 with accompanying hemorrhagic lesions associated with living tissue.
284 *[AFTE Glossary 6th Ed, Version 6.091922, mod]*
- 285 **3.63**
286 **primer gunshot residue**
287 **pGSR**
288 A subcategory of gunshot residue, considering only chemicals generated from the priming mixture.
- 289 NOTE Typically composed of very small particles containing lead, barium, and antimony, and detected using
290 scanning electron microscopy.
- 291 **3.64**
292 **projectile**
293 An object propelled with an initial velocity then acted upon by gravity, air drag, and other outside
294 forces.
- 295 NOTE A projectile can be complete, fragmented, or other ejected material.

3.65**projectile fragment**

Any portion of a projectile that retains characteristics permitting it to be identified as having been part of a projectile.

3.66**projectile impact**, noun

The damage determined to have been caused by a projectile.

3.67**pseudostippling**

On skin or other tissues, small hemorrhagic lesions produced by the impact of ejecta (e.g., fine fragments of glass or other brittle materials).

3.68**radial fractures**

The cracks in brittle materials (e.g., ceramic, glass, or bone) that extend outward from an impact site (see Figure A.7).

3.69**range**

The distance from a firearm's muzzle to the initial projectile impact.

3.70**rebound**

A projectile impact where the projectile is redirected back toward the origin and is indicative of an orthogonal or near-orthogonal angle of incidence.

3.71**revolver**

A firearm, usually a handgun, with a cylinder having several chambers so arranged as to rotate around an axis and be discharged successively by the same firing mechanism through a common barrel.

[SAAMI Glossary]

3.72**ricochet**

A surface deflection of a projectile without penetration or perforation of the target (see Figure A.2).

3.73**rifle**

A firearm having helical features in the bore to impart spin to a single projectile and designed to be fired from the shoulder.

[SAAMI Glossary]

3.74**rifling**, noun

The helical features inside the barrel that impart spin on the projectile for the purpose of stabilizing it in flight.

NOTE The raised portions of the rifling are known as lands, and the recessed portions are known as grooves.

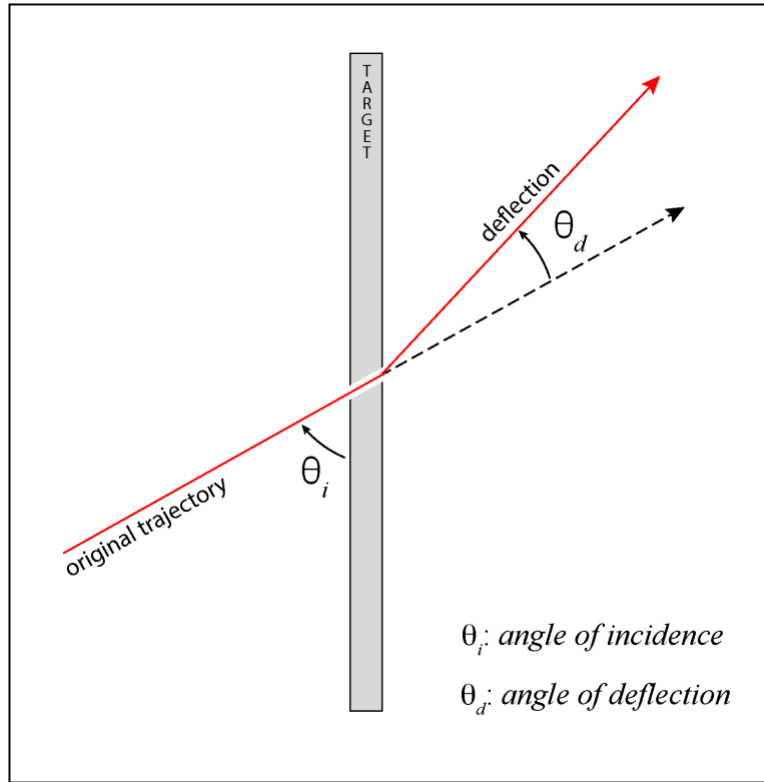
- 337 **3.75**
338 **safety glass**
339 A glass engineered to reduce breakage hazards or increase strength primarily through tempering or
340 lamination.
- 341 **3.76**
342 **secondary projectile**
343 Any object propelled by the energy imparted by the impact of a projectile.
- 344 **3.77**
345 **scene reconstruction**
346 A process to gain explicit knowledge of the series of events that surround a scene using deductive
347 and inductive reasoning, physical evidence, scientific processes, and their interrelationships.
- 348 NOTE In a situation that involves a potential criminal act, the definition in 3.76 would be preceded by "crime"
349 (e.g., crime scene reconstruction).
- 350 **3.78**
351 **shooting reconstruction**
352 A scene reconstruction focused on the discharge of one or more firearms.
- 353 **3.79**
354 **shot**, noun
355 A generally spherical projectile used in loading shotshells.
- 356 NOTE Commonly formed from lead but may be made from steel or other material.
357 *[SAAMI Glossary, mod]*
- 358 **3.80**
359 **shot cartridge**
360 A centerfire or rimfire cartridge loaded with small diameter shot.
- 361 NOTE Shot cartridge is also known as snake shot.
362 *[SAAMI Glossary, mod]*
- 363 **3.81**
364 **shotgun**
365 A long gun designed to shoot from the shoulder, typically having a smooth bore and designed to fire
366 shotshells.
- 367 NOTE Some firearms (not considered shotguns), including derringers, revolvers, and other designs, can
368 sometimes accommodate shotshells.
369 *[AFTE Glossary 6th Ed, Version 6.091922]*
- 370 **3.82**
371 **shot pattern**
372 The distribution of multiple projectile impacts from a single fired shotshell.

- 373 **3.83**
 374 **shotshell**
 375 A unit of ammunition that may contain a single projectile or multiple projectiles/pellets.
- 376 NOTE Generally, shotshells are designed to be fired from shotguns.
 377 *[AFTE Glossary 6th Ed, Version 6.091922, mod]*
- 378 **3.84**
 379 **slug**
 380 A single projectile fired from a shotgun.
- 381 NOTE The term slug is often used incorrectly for a fired bullet.
 382 *[SAAMI Glossary, mod]*
- 383 **3.85**
 384 **spall**
 385 The fragments of target material expelled from the rear surface of a target, sometimes without
 386 complete perforation.
- 387 **3.86**
 388 **stippling**
 389 See **3.61 powder stippling**.
- 390 **3.87**
 391 **target**, noun
 392 Any object struck by a projectile.
- 393 NOTE The target may have been struck intentionally or unintentionally.
- 394 **3.88**
 395 **tempered glass**
 396 A type of safety glass processed by controlled thermal or chemical treatments to increase its
 397 strength compared with normal glass.
- 398 NOTE Tempered glass is commonly seen in side or rear windows of vehicles and glass doors.
- 399 **3.89**
 400 **trajectory**
 401 The arched path that a projectile follows in flight, typically modeled as a straight line for short-
 402 range paths.
- 403 **3.90**
 404 **trajectory analysis**
 405 The determination of a projectile's flight path.
- 406 **3.91**
 407 **twist**
 408 The direction of turn of the rifling helix, such as left-hand or right-hand twist.
 409 *[AFTE Glossary 6th Ed, Version 6.091922]*

- 410 **3.92**
 411 **uprange**
 412 Any location behind the plane of the muzzle of a firearm.
- 413 **3.93**
 414 **unintentional discharge**
 415 The inadvertent discharge of a firearm in the absence of a mechanical malfunction of the firearm.
- 416 **3.94**
 417 **vertical angle**
 418 The angle in a vertical plane typically between the path of a bullet and level.
- 419 NOTE A vertical angle is also known as elevation angle.
- 420 **3.95**
 421 **wad**
 422 A felt, paper, cardboard, or plastic component used in a shotshell for various purposes.
 423 *[AFTE Glossary 6th Ed, Version 6.091922, mod]*
- 424 **3.96**
 425 **wake cracks**
 426 The full or partial crescent cracking around an angled projectile impact into surface-treated
 427 material, such as paint.
- 428 **3.97**
 429 **wound ballistics**
 430 A subset of terminal ballistics that considers projectile impacts to tissue and tissue simulants.
 431 *[ANSI/ASB Std 196]*

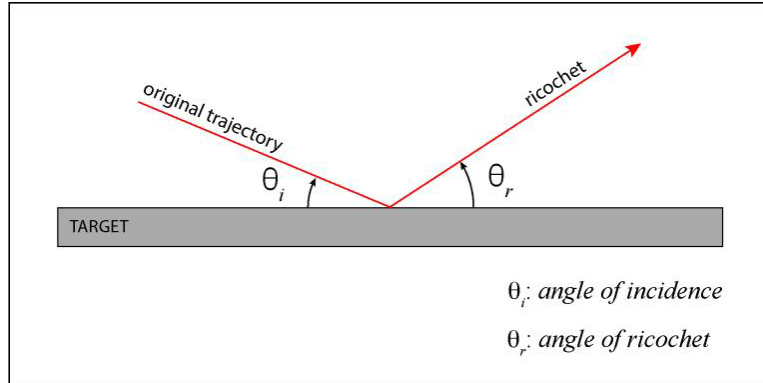
Annex A (informative)

Figures



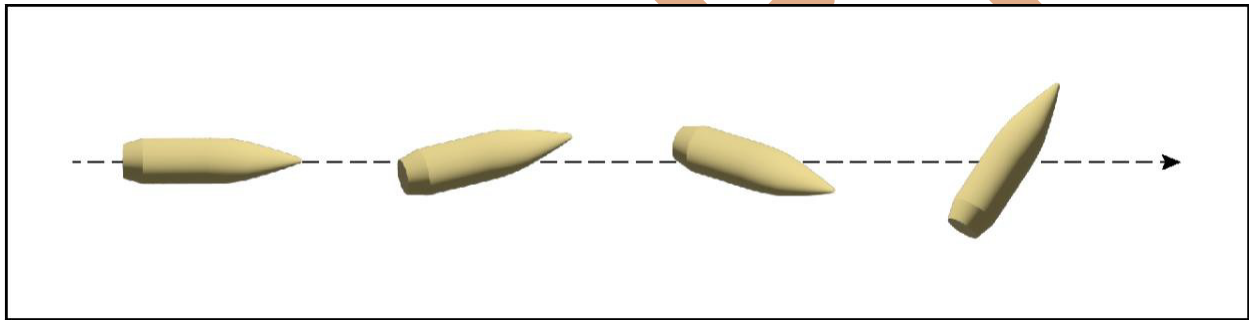
A projectile perforation that shows the original trajectory which forms the *angle of incidence* (3.4) with the target surface and the deflected path of the projectile that forms the *angle of deflection* (3.3) with the unaltered path (dashed line).

Figure A.1—Angles of Incidence and Deflection



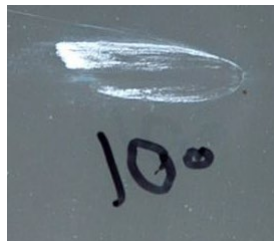
A projectile ricochet that shows the original trajectory which forms the *angle of incidence* (3.4) with the target surface and the deflected path of the *ricochet* (3.68) that forms the *angle of ricochet* (3.5) with the target surface.

Figure A.2—Ricochet



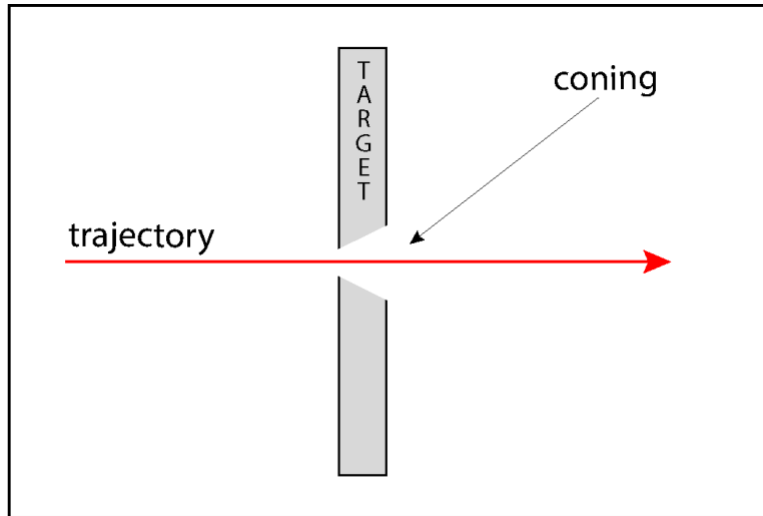
Depiction of *bullet yaw* (3.19). From left to right, the bullet starts in stable flight then yaw becomes increasingly more pronounced.

Figure A.3—Yaw



A *Chisum trail* (3.24) on glass traveling from right to left. The elongation on the top of the mark indicates a bullet originating from a barrel with a right-hand twist.

Figure A.4—Chisum Trail



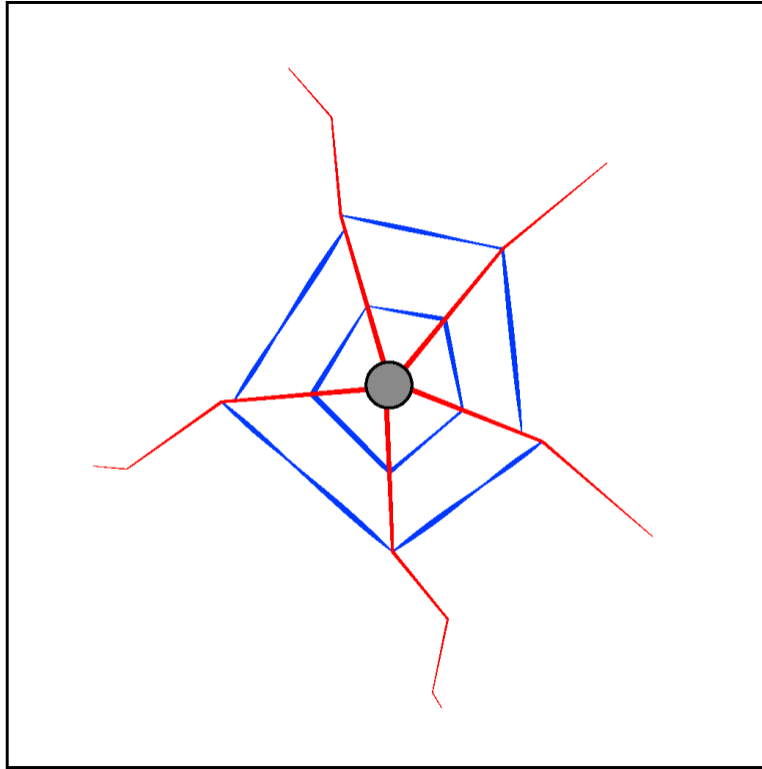
A cross-section of a projectile perforation through a brittle material that shows the orientation of the *cone* (3.27) with the larger diameter side on the exit surface.

Figure A.5—Cone fracture cross-section



A projectile perforation through a brittle material (plexiglass) that shows the orientation of the *cone* (3.27) with the larger diameter side on the exit surface.

Figure A.6— Cone Fracture



Concentric fractures (3.26) (shown in blue) are oriented in a generally circular form around the impact site. *Radial fractures* (3.65) (shown in red) that extend outward from the impact site.

Figure A.7—Concentric and Radial Fractures

Annex B (informative)

Bibliography

The following bibliography is not intended to be an all-inclusive list, review, or endorsement of literature on this topic. The goal of the bibliography is to provide publications cited informationally, and publications relevant to the standard.

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- 2] ANSI/ASB Standard 159, *Standard for Scene Investigation and Reconstruction – Foundational Principles*. 1st Ed. 2024^a.
- 3] ANSI/ASB Standard 196, *Standard for the Documentation and Processing of Shooting Scenes*, 1st Ed. 2026^a
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- 5] Association of Firearm and Tool Mark Examiners (AFTE), *AFTE Glossary*. 6th Ed, Version 6.091922^b.
- 6] Sporting Arms and Ammunition Manufacturers' Institute (SAAMI), *Glossary*^c.

^a Available from: <https://www.aafs.org/academy-standards-board>

^b Available from: <https://afte.org/resources/afte-glossary>

^c Available from: <https://saami.org/saami-glossary/>

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