

Draft
NIJ Standard 0112.04
Semiautomatic Pistols for Law Enforcement

National Institute of Justice

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Introduction

This draft document specifies minimum performance requirements and test methods for semiautomatic service pistols used by U.S. law enforcement. It is a proposed revision of NIJ Standard 0112.03 (Revision A), *Autoloading Pistols for Police Officers*, published in 1999.¹ The final version of this document is anticipated to be published in late 2019 as NIJ Standard 0112.04, *Semiautomatic Pistols for Law Enforcement*. Its primary purpose will be for use by the NIJ Compliance Testing Program (CTP) for testing and evaluation of semiautomatic pistols for certification by NIJ. It will be used by both ballistics laboratories that test firearms and firearms manufacturers participating in the NIJ CTP. This standard will be included in the scope of accreditation used by the National Voluntary Laboratory Accreditation Program (NVLAP) to accredit ballistics laboratories.

NIJ develops and publishes voluntary equipment standards that specifically address the needs of law enforcement, corrections, and other criminal justice agencies to ensure that equipment is safe, reliable, and performs according to established minimum performance requirements. NIJ standards are consensus-based and designed to articulate the criminal justice end user community's operational requirements regarding equipment performance. They are designed to provide a level of confidence in a product's fitness for purpose and allow comparison of products based on standardized test methods. NIJ maintains active standards for a variety of equipment, including ballistic-resistant body armor, stab-resistant body armor, restraints, bomb suits, CBRN protective ensembles, and offender tracking systems. More information on NIJ standards is available at <http://www.nij.gov/standards>.

NIJ Standard 0112.00 was first published in 1986,² followed by 0112.01 in 1989,³ and 0112.02 in 1995.⁴ This draft revision departs considerably from the current NIJ Standard 0112.03. This document is greatly expanded with more performance requirements, more test requirements, and a much higher round count required to complete all tests. Several of the notable updates are a 10,000-round endurance test, environmental exposure tests, and an augmented drop test.

This draft standard has been developed in coordination with NIJ's Special Technical Committee (STC) for Law Enforcement Firearms. The purpose of the STC is to update NIJ Standard 0112.03 (Revision A), NIJ Standard 0113.00, *12-Gauge Shotguns for Police Use*,⁵ and to develop a new minimum performance standard for patrol rifles. The STC is

¹ NIJ Standard 0112.03 (Revision A), *Autoloading Pistols for Police Officers*, National Institute of Justice, Washington, DC, July 1999, <https://www.ncjrs.gov/pdffiles1/nij/249929.pdf>.

² NIJ Standard 0112.00, *9 mm/45 Caliber Autoloading Pistols*, National Institute of Justice, Washington, DC, April 1986, <https://www.ncjrs.gov/pdffiles1/Digitization/101681NCJRS.pdf>.

³ NIJ Standard 0112.01, *9 mm/45 Caliber Autoloading Pistols*, National Institute of Justice, Washington, DC, May 1989, <https://www.ncjrs.gov/pdffiles1/Digitization/117433NCJRS.pdf>.

⁴ NIJ Standard 0112.02, *Autoloading Pistols for Police Officers*, National Institute of Justice, Washington, DC, January 1995, <http://www.ncjrs.gov/pdffiles1/Digitization/153210NCJRS.pdf>.

⁵ NIJ Standard 0113.00, *12-Gauge Shotguns for Police Use*, National Institute of Justice, Washington, DC, March 1989, <https://www.ncjrs.gov/pdffiles1/photocopy/244968NCJRS.pdf>.

comprised of individual firearms subject matter experts from federal, state, and local law enforcement agencies; ballistics test laboratories; firearms industry associations; and other relevant technical or governmental organizations. Participation in the STC was solicited through the Federal Register in early 2017.⁶ Individuals from the following agencies and organizations currently participate on the STC:

- Michigan State Police
- Pennsylvania State Police
- Texas Department of Public Safety
- Virginia State Police
- Ontario Provincial Police
- Jackson County Sheriff's Office (TX)
- Los Angeles County Sheriff's Department (CA)
- Orange County Sheriff's Department (CA)
- York County Sheriff's Office (SC)
- West Brandywine Township Police Department (PA)
- Miracosta College Police Department (CA)
- Federal Bureau of Investigation
- United States Marshals Service
- Bureau of Alcohol, Tobacco, Firearms, and Explosives
- U.S. Department of Homeland Security, Immigration and Customs Enforcement
- U.S. Army Armament Research, Development and Engineering Center
- Chesapeake Testing
- H.P. White Laboratory, Inc.
- Oregon Ballistics Laboratories

Development of the test methods in this draft document were informed in part by the test methods described recent procurement activities by the Federal Bureau of Investigation⁷ and Immigration and Customs Enforcement.⁸ Various U.S. Army documents, such as Test Operations Procedure 3-2-045, *Small Arms - Hand and Shoulder Weapons and Machineguns*,⁹ military semiautomatic pistol specifications,^{10,11} and recent procurement activities by the U.S. Army,¹² as well as the U.S. Department of Defense document

⁶ "Special Technical Committee on Law Enforcement Firearms," *Federal Register*, 82 FR 871, January 4, 2017, <https://www.federalregister.gov/d/2016-31876>.

⁷ Request for Proposal OSCU-DSU1503, "9mm Luger Pistols / Replacement Parts," Federal Bureau of Investigation, Contracting Field Office, Winchester, VA, October 7, 2015. Available on <http://www.fbo.gov>.

⁸ Request for Proposal HSCEMS-16-R-00003, "New Duty Pistol Solicitation," Immigration and Customs Enforcement, Office of Acquisition Management, Washington, DC, May 18, 2016. Available on <http://www.fbo.gov>.

⁹ Test Operations Procedure (TOP) 3-2-045, *Small Arms - Hand and Shoulder Weapons and Machineguns*, U.S. Army Aberdeen Test Center, Aberdeen Proving Ground, MD, September 17, 2007.

¹⁰ MIL-P-48655(AR), *Military Specification, Pistol, Semiautomatic, 9mm: M9*, U.S. Army Armament, Munitions and Chemical Command, Picatinny Arsenal, NJ, December 16, 1987.

¹¹ MIL-P-71012A(AR), *Military Specification, Pistol, Semiautomatic, Compact, 9mm: M11*, U.S. Army Armament Research, Development and Engineering Center, Picatinny Arsenal, NJ, February 15, 1994.

¹² Request for Proposal W15QKN-15-R-0002, "Modular Handgun System (MHS)," U.S. Army Contracting Command, Picatinny Arsenal, NJ, September 29, 2014. Available on <http://www.fbo.gov>.

*Environmental Engineering Considerations and Laboratory Tests*¹³ were useful resources to consult during the drafting of this standard. Private-sector standards, such the *American National Standard Voluntary Industry Performance Standards Criteria for Evaluation of New Firearms Designs Under Conditions of Abusive Mishandling for the Use of Commercial Manufacturers*,¹⁴ were also useful resources to consult. The U.S. Army documents *Guidelines for Developing Reliability Failure Definition and Scoring Criteria*¹⁵ and *Reliability Failure Definition and Scoring Criteria (FDSC) for the Individual Carbine (IC) Increment I*¹⁶ helped inform the development of Chapter 5 of this document.

NIJ anticipates that its Compliance Testing Program (CTP) will incorporate the final published version of this standard in its program requirements to certify pistols submitted to the CTP. NIJ currently certifies ballistic-resistant body armor, stab-resistant body armor, and autoloading pistols through this program. More information on the Autoloading Pistols CTP is available at <https://justnet.org/compliant/Autoloading-Pistols.html>.

This document uses the following in accordance with international standards:

- “shall” indicates a requirement;
- “should” indicates a recommendation;
- “may” indicates a permission;
- “can” indicates a possibility or a capability.

Please send all written comments on this draft document to Mark Greene, Policy and Standards Division Director, Office of Science and Technology, National Institute of Justice in electronic format by email at mark.greene2@usdoj.gov. Please send all other written comments and suggestions to the Director, National Institute of Justice, Office of Justice Programs, U.S. Department of Justice, 810 7th Street NW, Washington, DC 20531.

Nothing in this document is intended to create any legal or procedural rights enforceable against the United States. Moreover, nothing in this document creates any obligation for any individual or organization to follow or adopt this voluntary standard nor does it create any obligation for manufacturers, suppliers, law enforcement agencies, or others to follow or adopt voluntary NIJ equipment standards.

¹³ MIL-STD-810G w/ Change 1, *Environmental Engineering Considerations and Laboratory Tests*, U.S. Department of Defense, April 15, 2014.

¹⁴ ANSI/SAAMI Z299.5 – 2016, *American National Standard Voluntary Industry Performance Standards Criteria for Evaluation of New Firearms Designs Under Conditions of Abusive Mishandling for the Use of Commercial Manufacturers*, Sporting Arms and Ammunition Manufacturers’ Institute, 2016.

¹⁵ *Guidelines for Developing Reliability Failure Definition and Scoring Criteria*, 3rd ed., U.S. Army Training and Doctrine Command, Army Capabilities Integration Center, April 2012.

¹⁶ *Reliability Failure Definition and Scoring Criteria (FDSC) for the Individual Carbine (IC) Increment I*, U.S. Army, Training and Doctrine Command, Reliability, Availability, and Maintainability Engineering Branch, Fort Benning, GA, October 18, 2010.

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1 Scope

- 1.1** This document defines requirements for semiautomatic law enforcement service pistols.
- 1.2** This standard specifies requirements for new pistols.
- 1.3** This standard does not specify requirements for firearms accessories, such as weapon-mounted lights.
- 1.4** Nothing herein shall be understood to restrict any supplier or other entity from exceeding the requirements of this standard.
- 1.5** No supplier or other entity shall claim conformance to this standard using only selected portions of this standard.
 - 1.5.1** Conformity assessment shall be based on pistol models meeting *all* requirements stated in this standard.
 - 1.5.2** Law enforcement end users are advised to distinguish between (1) a supplier declaring conformance of a pistol model to this standard and (2) a conformity assessment body attesting to a pistol model's conformance, for example through a third-party product certification program.
- 1.6** This document shall not be understood as addressing all of the safety risks associated with testing firearms. Users of this document are responsible for following appropriate safety practices when handling or operating firearms.

2 Normative references

2.1 Terminology references

Glossary of the Association of Firearm and Toolmark Examiners, 5th Ed., Association of Firearm and Toolmark Examiners, 2007.

“Glossary of Industry Terms,” Sporting Arms and Ammunition Manufacturers’ Institute website, accessed December 10, 2018, <https://saami.org/saami-glossary/>.

Siegmund Halpern, *The Assurance Sciences: An Introduction to Quality Control and Reliability*, Englewood Cliffs, NJ: Prentice-Hall, 1978.

Chester Mueller and John Olson, *Shooter’s Bible Small Arms Lexicon and Concise Encyclopedia*, 1st Ed., South Hackensack, NJ, Shooter’s Bible, Inc.; distributed by Stoeger Arms Corp., 1968.

2.2 Referenced standards

ANSI/SAAMI Z299.3 – 2015, *American National Standard Voluntary Industry Performance Standards for Pressure and Velocity of Centerfire Pistol and Revolver Ammunition for the Use of Commercial Manufacturers*, Sporting Arms and Ammunition Manufacturers’ Institute, 2015.

ASTM C144-17, *Standard Specification for Aggregate for Masonry Mortar*, ASTM International, West Conshohocken, PA, 2017.

3 Terms and definitions

- 3.1** *accuracy* – measure of the ability of the firearm-ammunition system to center projectile impacts on the point of aim.
- 3.2** *ANSI* – American National Standards Institute.
- 3.3** *autoloading* – a repeating firearm requiring a separate pull of the trigger for each shot fired, which uses the energy of discharge to perform a portion of the firing cycle (usually the loading portion). Firearms of this type are also referred to as *semiautomatic*.
- 3.4** *barrel* – that part of a firearm through which a projectile or shot charge travels under the impetus of powder gasses, compressed air, or other like means. A barrel may be rifled or smooth.
- 3.5** *(in) battery* – a condition of a firearm where it is loaded, round chambered with the action closed, cocked and ready to fire (with the possible exception of an engaged safety catch).
- 3.6** *breech* – the end of the barrel where the ignition of the propellant takes place.
- 3.7** *breechblock* – the locking and cartridge head support mechanism of a firearm that does not operate in line with the axis of the bore.
- 3.8** *cartridge* – unit of ammunition consisting of a projectile, a casing that houses the propellant, and primer.
- 3.9** *chamber* – the rear part of the barrel that has been formed to accept a specific cartridge or shotshell.
- 3.10** *chambering* – actuation that inserts a cartridge or round into the chamber.
- 3.11** *cock* – to place a firing mechanism (hammer, firing pin, or striker) under spring tension so that this firearm is ready for firing.
- 3.12** *cycle of operation* – the repeatable series of actions that describes the normal functioning of a firearm that are generally understood to include feeding, chambering, locking, and firing of a cartridge, followed by extraction and ejection of a case.
- 3.13** *dispersion* – extent to which projectile impacts spread about the center of impact because of shot-to-shot variations.

- 3.14 *double action* – mode of operation that permits a single pull of the trigger to cock and fire the pistol.
- 3.15 *durability* – resistance to wear, damage, or degradation.
- 3.16 *ejecting* – the act of expelling a cartridge or fired case from a firearm.
- 3.17 *extracting* – the act of withdrawing a cartridge or fired case from the chamber of a firearm.
- 3.18 *failure* – specific cause of a malfunction
- 3.19 *feeding* – actuation that moves ammunition from a housing device, such as a magazine, toward the chamber.
- 3.20 *firearm frame or receiver* – as defined at 27 CFR 478.11, that part of a firearm which provides housing for the hammer, bolt or breechblock, and firing mechanism, and which is usually threaded at its forward portion to receive the barrel.
- 3.21 *firing* – actuation that activates the primer to cause the propellant to ignite and jettison the projectile through the barrel and out the muzzle.
- 3.22 *grip* – in handguns, the handle. In long guns, that portion of the stock behind the trigger which is grasped by the hand.
- 3.23 *grip safety* – passive safety device that requires an applied force on the grip before the firearm can be fired.
- 3.24 *group* – a cluster of impacts on a target, typically used to demonstrate the precision of a firearm or the proficiency of a shooter. Also referred to as a grouping.
- 3.25 *hammer* – a component of the firing mechanism which gives impulse to the firing pin or primer.
- 3.26 *hammer spur* – extension of the hammer used to cock the hammer manually.
- 3.27 *headspace* – distance between the closed breech face of the firearm and the surface of the chamber on which the cartridge case seats.
- 3.28 *headspace gauge* – device used to facilitate measurement of headspace.
- 3.29 *locking* – actuation that firmly secures a cartridge in the chamber.
- 3.30 *magazine* – a secure storage place for gunpowder, ammunition, or explosives. A container for cartridges which has a spring and follower to feed those cartridges

into the chamber of a firearm. The magazine may be detachable or an integral part of the firearm.

- 3.31** *magazine safety* – passive safety device that prevents firing of the pistol unless a magazine is in place.
- 3.32** *malfunction* – deviation from the normal functioning of a firearm or one of its components.
- 3.33** *misfire* – failure to fire a round.
- 3.34** *model* – the supplier’s designation which uniquely identifies a specific design of pistol.
- 3.35** *muzzle* – the end of a firearm barrel from which the bullet or shot emerges.
- 3.36** *pistol* – as defined at 27 CFR 478.11, a weapon originally designed, made, and intended to fire a projectile (bullet) from one or more barrels when held in one hand, and having (a) a chamber(s) as an integral part(s) of, or permanently aligned with, the bore(s); and (b) a short stock designed to be gripped by one hand and at an angle to and extending below the line of the bore(s).
- 3.37** *PMS* – preventative maintenance schedule.
- 3.38** *precision* – measure of the ability of the firearm-ammunition system to cluster multiple impacts in the same location.
- 3.39** *recoil spring* – a spring used to store some recoil energy and subsequently close the action and feed the next round in semiautomatic firearms. In other designs, a recoil spring may serve to absorb recoil energy or perform other functions. Also known as: counter recoil spring, operating spring, retracting spring.
- 3.40** *reliability* – probability that a device will perform its intended function for a specified period of time under stated conditions (Halpern).
- 3.41** *round* – unit of ammunition when counted.
- 3.42** *SAAMI* – Sporting Arms and Ammunition Manufacturers’ Institute.
- 3.42** *safe action* – striker fire action. See also 3.48 *striker fire action*.
- 3.42** *semiautomatic* – a repeating firearm requiring a separate pull of the trigger for each shot fired, which uses the energy of discharge to perform a portion of the firing cycle (usually the unloading and loading portion). See also 3.3 *autoloading*.

- 3.43** *semiautomatic pistol* – as defined at 27 CFR 478.11, any repeating pistol which utilizes a portion of the energy of a firing cartridge to extract the fired cartridge case and chamber the next round, and which requires a separate pull of the trigger to fire each cartridge.
- 3.44** *single action* – mode of operation that uses the trigger to fire the pistol only. See also 3.14 *double action*.
- 3.45** *slide* – a member attached to and reciprocating with the breechblock.
- 3.46** *stoppage* – any interruption in the cycle of operation of the firearm.
- 3.47** *striker* – a rod-like firing pin or a separate component which impinges on the firing pin.
- 3.48** *striker fire action* – pistol design which employs a mechanism to detonate the primer using a firing pin driven by spring tension to fire the pistol.
- 3.49** *supplier* – the party that is responsible for ensuring that products meet the requirements of the standard. For products that are certified, this is the party that is responsible for ensuring that products meet and, if applicable, continue to meet, the requirements on which the certification is based.
- 3.50** *test item* – representative sample of a pistol model subjected to testing and evaluation.
- 3.51** *trigger* – the part of a firearm mechanism which is moved manually to cause the firearm to discharge.
- 3.52** *trigger pull* – force that must be applied to the trigger to fire the pistol.

4 Feature requirements

- 4.1** Pistols shall be semiautomatic, recoil-operated, and magazine-fed.
- 4.2** Pistols shall use current, commercially available ammunition produced for the law enforcement market.
 - 4.2.1** Widely used law enforcement pistol calibers are 9mm Luger, .40 Smith & Wesson, .45 Auto, .357 Sig, and .380 Auto. Unless specified otherwise, pistols tested to this standard shall be in one of these five calibers.
 - 4.2.2** Law enforcement end users of this document may specify another caliber, so long as the pistol meets all the requirements of this document.
 - 4.2.3** A conformity assessment system may limit the scope of its activities to pistols in the calibers listed in 4.2.1.
- 4.3** Pistols shall be chambered for cartridges that conform to standards or specifications published by SAAMI.
 - 4.3.1** A conformity assessment system may specify that pistols shall be chambered for cartridges that conform to a specific ANSI/SAAMI standard or specification, such as ANSI/SAAMI Z299.3 – 2015 or a subsequent standard or specification.
- 4.4** Pistols shall be capable of firing ammunition that conforms to standards published by SAAMI.
 - 4.4.1** A conformity assessment system may specify that pistols shall be capable of firing ammunition that conforms to a specific ANSI/SAAMI standard or specification, such as ANSI/SAAMI Z299.3 – 2015 or a subsequent standard or specification.
- 4.5** Magazines shall have a minimum capacity of seven rounds.
- 4.6** Pistols shall have one or more safety features to prevent inadvertent firing, one of which shall be manipulated by hand.
- 4.7** Pistols should be easily operated by both right-handed and left-handed shooters.
- 4.8** All pistol features shall be manipulated by hand and not require any special tools, accessories, or power sources to function normally.
- 4.9** Safety and magazine release shall be manipulated using the firing hand only.

- 4.10 The magazine release should be configurable for both right-handed and left-handed shooters, or should be ambidextrous. Section 7.2 describes how testing shall be partitioned between the two configurations, or for ambidextrous magazine releases.
- 4.11 Pistols with fixed right-handed and left-handed versions shall be considered separate models. Each version shall be tested separately in accordance with this standard.
- 4.12 Pistols shall not be susceptible to radiofrequency signals or interference.
- 4.13 Pistols shall not generate any radiofrequency signals or interference.
- 4.14 Pistols shall not be susceptible to electronic tampering.
- 4.15 Documentation regarding the operation of the pistol and magazine that accompanies the commercial product, including a preventative maintenance schedule (PMS), shall be provided with the test items (e.g., an operator's manual).

NOTE: Firearms suppliers are advised to become familiar with the different tests required by this performance standard and the number of rounds required to be fired when developing a PMS.

- 4.16 The documentation provided with the test items shall include a diagram of parts with the barrel, frame, and slide clearly labeled.

NOTE: See 3.20 for a definition of frame. The frame may support various components and may be included in assemblies known by such terms as the fire control module, grip module, or trigger housing, and may contain rails for the slide.

5 Essential functions and malfunctions

5.1 Essential functions

5.1.1 The five essential functions enumerated below represents the core operational functions that pistols tested to this standard shall be capable of performing.

5.1.1.1 The operator shall be able to install a full load of rounds into the ammunition magazine and subsequently both insert the magazine into and remove it from the pistol.

5.1.1.2 Safety mechanisms shall function properly and remain in the selected state until actuated by the operator.

5.1.1.3 The pistol shall feed and properly chamber each individual round/cartridge without inducing a stoppage that requires corrective action.

5.1.1.4 The pistol shall fire chambered rounds by centrally striking the primer of each individual cartridge with sufficient impact to initiate firing in all firing modes available on the pistol without inducing a stoppage that requires corrective action.

5.1.1.5 The pistol shall extract and eject empty casings and unfired cartridges without inducing a stoppage that requires corrective action.

5.2 Stoppages

5.2.1 All stoppages shall be documented.

5.2.2 When a stoppage occurs during the cycle of operation of the pistol, the source or underlying cause of the stoppage shall be attributed to one or more of the following categories:

- *ammunition* – problem induced by a defect with the ammunition.
- *pistol* – malfunction induced by the pistol itself.
- *magazine* – malfunction induced by the magazine.
- *personnel* – problem induced by operator error.
- *test* – problem induced by the test setup.
- *unknown* – source of the problem is undetermined.

5.3 Corrective action

5.3.1 For any stoppage, the operator shall take corrective action to return the pistol to operational status.

5.3.2 The type of corrective action required to return the pistol to operational status shall be classified as follows:

- *Class 1* – the operator is able to return the firearm to operational status without tools or additional assistance using the following immediate action procedures.
- *Class 2* – the operator is not able to return the firearm to operational status using immediate action procedures. The operator is able to clear the stoppage and return the firearm to operational status with a field strip.
- *Class 3* – the operator is not able to return the firearm to operational status either through immediate action procedures or a field strip.

5.3.3 Class 1 immediate action procedures are defined as follows:

5.3.3.1 Tap bottom of the magazine to ensure it is fully seated in the frame, cycle the action (i.e., pull the slide fully to the rear and release, allowing it to return to battery under full recoil spring tension), and fire the pistol.

5.3.3.2 Lock the slide to the rear, remove the magazine, cycle the slide twice, lock the slide to the rear, insert the magazine, release the slide, and fire the pistol.

5.4 Malfunctions induced by the pistol or magazine

5.4.1 For any stoppage attributed to a malfunction induced by the pistol or magazine, the level of corrective action (e.g., class 1, class 2, or class 3) shall be recorded.

5.4.2 The malfunction shall be further attributed to a specific cause and recorded (e.g., failure to feed, failure to extract).

5.4.3 A class 2 or class 3 stoppage attributed to a malfunction induced by the pistol or magazine shall constitute failure of the pistol model to meet the requirements of this standard.

5.4.4 Any part replaced prescribed in the PMS shall not constitute a malfunction induced by the pistol or magazine.

5.4.5 The barrel, frame, or slide shall not be replaced at any time during testing.

5.4.6 Failure of the barrel, frame, or slide shall constitute failure of the pistol model to meet the requirements of this standard.

6 Functional requirements

6.1 Acceptance criteria for pistol models

6.1.1 To be tested under the performance requirements of this standard (Chapter 7), pistol models shall meet or exceed all functional requirements specified in the categories below:

- Surface quality and presence of particles (See Section 6.3)
- Hammer (See Section 6.4)
- Headspace (See Section 6.5)
- Slide (See Section 6.6)
- Magazine (See Section 6.7)
- Cycle of operation (See Section 6.8)
- Trigger (See Section 6.9)
- Safety features (See Section 6.10)

6.2 Test items

6.2.1 All test items shall be identical in their form and function, use the same caliber ammunition, and represent a single model of pistol.

6.2.2 Test items shall be as shipped as new production units from the manufacturing facility.

6.2.3 All test items shall be photographed as received prior to performing any tests referenced in this chapter.

6.2.4 Pistols models that are configurable for both left-handed and right-handed shooters, or are ambidextrous, shall be tested both right-handed and left-handed.

6.2.4.1 For pistols that have a configurable magazine release for right-handed and left-handed shooters, two test items shall be tested right-handed in the right-handed configuration and one test item shall be tested left-handed in the left-handed configuration for each test conducted.

6.2.4.2 For pistols that have an ambidextrous magazine release for right-handed and left-handed shooters, two test items shall be tested right-handed and one test item shall be tested left-handed for each test conducted.

6.2.5 All test items shall be required to meet the functional requirements enumerated in this chapter through all referenced test methods prior to undergoing testing to the performance requirements of this standard (Chapter 7).

<p>6.2.6 Failure of any individual test item to meet any of the requirements of this chapter shall constitute a failure of the pistol model to meet the requirements of this standard.</p>

6.3 Surface quality and presence of particles

6.3.1 The pistol shall have no surface anomalies, such as chips, scratches, burrs, sharp edges, rust spots or corners that could cut the shooter's hand while firing or during manual cycling of the pistol.

6.3.2 There shall be no particles, such as loose chips, shavings, or filings in the pistol.

6.3.3 Test items shall be evaluated in accordance with Section 9.2.

6.4 Hammer

6.4.1 This section only applies to pistol models that are hammer fired.

6.4.2 The hammer shall have sufficient over-travel to assure achievement of the fully cocked position in single-action mode.

6.4.3 The hammer shall operate smoothly without binding.

6.4.4 The hammer shall not release under an applied load of 10.25 lb \pm 0.25 lb (46.0 N \pm 1.0 N).

6.4.5 Test items shall be evaluated in accordance with Section 9.3.

6.5 Headspace

6.5.1 The headspace shall be in accordance with SAAMI specifications for the caliber for which the pistol is chambered.

6.5.2 Test items shall be evaluated in accordance with Section 9.4.

6.6 Slide

6.6.1 The slide should operate smoothly without binding or sticking.

6.6.2 The slide shall achieve battery under spring tension of the recoil spring.

6.6.3 No more than 21 lb. shall be required to fully retract the slide.

6.6.4 Test items shall be evaluated in accordance with Section 9.5.

6.7 Magazine

6.7.1 Magazines shall hold their stated capacity.

6.7.2 Magazines shall properly seat in the magazine well.

6.7.3 When the pistol is in a horizontal orientation with respect to the ground (e.g., the barrel is parallel to the ground), the magazine shall drop freely when released, regardless of how many rounds are loaded in the magazine.

6.7.6 Test items, including all magazines employed in testing, shall be evaluated in accordance with Section 9.5.

6.8 Cycle of operation

6.8.1 The normal cycle of operation is understood to include feeding, chambering, locking, and firing a cartridge, followed by extraction and ejection of a case.

6.8.2 Pistols shall complete the cycle of operation without a malfunction induced by either the pistol or magazine when fired by an operator in a typical shooting stance using three fully loaded magazines.

6.8.3 The ejection pattern should be consistent and should not be erratic.

6.8.4 When the pistol is fired by a person in a typical shooting stance, ejected cases should not strike the shooter in the head or torso.

6.8.5 Test items shall be evaluated in accordance with Section 9.6.

6.9 Trigger

6.9.1 The minimum trigger pull weight shall be 3.50 lb (15.57 N).

6.9.2 The maximum trigger pull weight shall be 10.00 lb (44.48 N).

6.9.3 The range on the trigger pull weight shall be ± 1.50 lb (± 6.67 N) over the life of the firearm during endurance testing, not to exceed the absolute minimum or maximum trigger pull weights.

6.9.4 Test items shall be evaluated in accordance with Section 9.7.

6.10 Safety features

6.10.1 User manipulated safety devices shall be designed so that the pistol can be made fire-ready by releasing the safety devices with the firing hand.

6.10.2 Test items shall be evaluated in accordance with Section 9.8.

7 Performance requirements

7.1 Acceptance criteria for pistol models

7.1.1 Test items shall meet or exceed all performance requirements specified in the categories below:

- Precision grouping (See Section 7.3)
- Point of aim/point of impact (See Section 7.4)
- Endurance (See Section 7.5)
- Pistol drop (See Section 7.6)
- Magazine drop (See Section 7.7)
- High temperature exposure (See Section 7.8)
- Low temperature exposure (See Section 7.9)
- Salt water exposure (See Section 7.10)
- Sand exposure (See Section 7.11)
- Catastrophic failure due to obstructed bore (See Section 7.12)

7.2 Test items

7.2.1 All test items used for performance testing shall complete the basic function tests referenced in Chapter 6 and shall meet all the requirements of Chapter 6 prior to performance testing.

7.2.2 The number of test items required for each test are as follows:

- Endurance: Three pistols
- Precision grouping: Same test items used for endurance testing
- Point of aim/point of impact: Same test items used for endurance testing
- Pistol drop: Three pistols
- High temperature exposure: Three pistols
- Low temperature exposure: Three pistols
- Salt water exposure: Three pistols
- Sand exposure: Three pistols
- Catastrophic failure due to obstructed bore: Three pistols

- 7.2.3 Pistols models that are configurable for both left-handed and right-handed shooters, or are ambidextrous, shall be tested both right-handed and left-handed.
- 7.2.3.1 For pistols that have a configurable magazine release for right-handed and left-handed shooters, two test items shall be tested right-handed in the right-handed configuration and one test item shall be tested left-handed in the left-handed configuration for each test conducted.
- 7.2.3.2 For pistols that have an ambidextrous magazine release for right-handed and left-handed shooters, two test items shall be tested right-handed and one test item shall be tested left-handed for each test conducted.
- 7.2.4 Test items may be used for more than one test.
- 7.2.5 Test items used for endurance testing shall also be used for precision grouping and point of aim/point of impact testing.
- 7.2.6 No specific test sequence is required, however a test plan shall be developed prior to conducting any tests in Chapter 9 to ensure a logical sequence of tests.

NOTE: Pistol suppliers should develop the test plan in coordination with a firearms testing laboratory.

7.2.7 Unless the performance requirement is specifically stated as an average result, failure of any individual test item to meet the performance requirements of this chapter shall constitute a failure of the pistol model to meet the requirements of this standard.

7.3 Precision grouping

- 7.3.1 Pistols shall demonstrate a maximum mean radius of 2 inches for the group size at 25 yards with the pistol fixed in a mechanical mount, such as a Ransom Rest.
- 7.3.2 Pistols shall demonstrate an extreme spread of 4 inches or less (i.e., the maximum shot-to-shot distance shall be 4 inches) at 25 yards with the pistol fixed in a mechanical mount, such as a Ransom Rest.
- 7.3.3 Test items shall be evaluated in accordance with Section 9.9.

7.4 Point of aim/point of impact

- 7.4.1 Pistols shall demonstrate a maximum point of impact 4 inches from the point of aim at 25 yards with the pistol fixed in a mechanical mount, such as a Ransom Rest

7.4.2 The sights shall not be at the maximum point of the adjustable area to achieve the point of impact requirement.

7.4.3 The sights should be as close to center as possible to achieve the point of impact requirement, and should be no more than 20 percent of available adjustable range off center.

7.4.4 Test items shall be evaluated in accordance with Section 9.10.

7.5 Endurance

7.5.1 Pistols shall be durable and exhibit no failures due to wear or damage for a total of 10,000 rounds.

7.5.2 Pistols shall exhibit either (1) a mean failure rate (MRF) of no greater than 1 in 2,000 or (2) a mean rounds between failure (MRBF) of no less than 2,000.

7.5.3 The performance criteria shall only consider failures causing a stoppage attributed to a malfunction induced by the pistol or magazine.

7.5.4 For a stoppage attributed to a malfunction induced by the pistol or magazine, only Class 1 stoppages are allowed.

7.5.5 Three test items shall be evaluated in accordance with Section 9.11.

7.5.6 Data from multiple test items shall not be pooled.

7.5.71 The MFR and MRBF shall be computed for each test item.

7.6 Pistol drop

7.6.1 Pistols shall not malfunction after being dropped on a concrete floor in various orientations.

7.6.2 Three test items shall be evaluated in accordance with Section 9.12.

7.6.3 Three test items shall be evaluated, with one magazines each.

7.6.4 Any malfunctions induced by the pistol or magazine shall constitute a failure of the pistol model to meet the requirements of this standard.

7.7 Magazine drop

7.7.1 Ammunition shall remain intact in the magazine in partially loaded and fully loaded magazines after being dropped on a concrete floor.

7.7.2 Pistols or magazines shall not malfunction after the magazine is dropped on a concrete floor empty, partially loaded, and fully loaded.

7.7.3 Test items shall be evaluated in accordance with Section 9.13.

7.7.4 Any malfunctions induced by the pistol or magazine shall constitute a failure of the pistol model to meet the requirements of this standard.

7.8 High temperature exposure

7.8.1 Pistols shall not malfunction after exposure to high temperatures.

7.8.2 Test items shall be evaluated in accordance with Section 9.14.

7.8.3 Three test items shall be evaluated, with three magazines each.

7.8.4 Any malfunctions induced by the pistol or magazine shall constitute a failure of the pistol model to meet the requirements of this standard.

7.9 Low temperature exposure

7.9.1 Pistols shall not malfunction after exposure to low temperatures.

7.9.2 Test items shall be evaluated in accordance with Section 9.15.

7.9.3 Three test items shall be evaluated, with three magazines each.

7.9.4 Any malfunctions induced by the pistol or magazine shall constitute a failure of the pistol model to meet the requirements of this standard.

7.10 Salt water exposure

7.10.1 Pistols shall not malfunction after exposure to salt water.

7.10.2 Test items shall be evaluated in accordance with Section 9.16.

7.10.3 Three test items shall be evaluated

7.10.4 Any malfunctions induced by the pistol or magazine shall constitute a failure of the pistol model to meet the requirements of this standard.

7.11 Sand exposure

7.11.1 Pistols shall not malfunction after exposure to sand.

7.11.2 Test items shall be evaluated in accordance with Section 9.17.

7.11.3 Three test items shall be evaluated.

7.11.4 Any malfunctions induced by the pistol or magazine shall constitute a failure of the pistol model to meet the requirements of this standard.

7.12 Catastrophic failure due to obstructed bore

7.12.1 Pistols shall not sustain a catastrophic failure upon firing with a service round lodged in the barrel.

7.12.2 A catastrophic failure shall be defined as:

- A fracture and or rupture of the barrel.
- A fracture or structural damage to the frame.
- A fracture or structural damage to the slide.

7.12.3 Test items shall be evaluated in accordance with Section 9.18.

7.12.4 Three test items shall be evaluated.

7.12.5 Any catastrophic failure shall constitute a failure of the pistol model to meet the requirements of this standard.

8 Ammunition requirements

- 8.1** Ammunition used for testing shall be representative of a manufacturer’s dedicated law enforcement product line and available to law enforcement for duty use.
- 8.2** Ammunition used for testing shall conform to standards published by SAAMI for the caliber of pistol being tested.
- 8.2.1** A conformity assessment system may specify that ammunition used for testing shall conform to a specific ANSI/SAAMI standard or specification, such as ANSI/SAAMI Z299.3 – 2015 or a subsequent standard or specification.
- 8.3** Ammunition used for testing in widely used law enforcement pistol calibers shall use projectiles in commonly used bullet weights in the following ranges:
- 9mm Luger: 115 – 147 gr
 - .40 S&W: 155 – 180 gr
 - .45 Auto: 185 – 230 gr
 - .357 Sig: 125 – 150 gr
 - .380 Auto: 90 – 100 gr
- 8.4** Ammunition used for testing in widely used law enforcement pistol calibers shall use projectiles traveling at velocities to achieve a power factor in the following ranges:^{17,18}
- 9mm Luger: 130 – 150 kgr · ft/s
 - .40 S&W: 165 – 195 kgr · ft/s

¹⁷ The ranges above balance the need to have adequate kinetic energy for real-world law enforcement shooting scenarios versus the need to have reasonably durable firearms. Prolonged use of highly powerful ammunition may expose firearms to excessive wear that may adversely impact their endurance, requiring more frequent maintenance, servicing, or complete replacement.

¹⁸ Velocities used to calculate power factor are from ANSI/SAAMI Z299.3 – 2015 velocity and pressure data.

9mm Luger: 115 gr * 1,210 ft/s ÷ 1000 ≅ 139 kgr · ft/s
 147 gr * 985 ft/s ÷ 1000) ≅ 145 kgr · ft/s

.40 S&W: 155 gr * 1,195 ft/s ÷ 1000 ≅ 185 kgr · ft/s
 180 gr * 985 ft/s ÷ 1000 ≅ 177 kgr · ft/s

.45 Auto: 185 gr * 995 ft/s ÷ 1000 ≅ 184 kgr · ft/s
 230 gr * 915 ft/s ÷ 1000 ≅ 210 kgr · ft/s

.357 Sig: 125 gr * 1,350 ft/s ÷ 1000 ≅ 169 kgr · ft/s
 150 gr * 1,130 ft/s ÷ 1000 ≅ 170 kgr · ft/s

.380 Auto: 90 gr * 980 ft/s ÷ 1000 ≅ 88 kgr · ft/s
 100 gr * 910 ft/s ÷ 1000 ≅ 91 kgr · ft/s

- .45 Auto: 175 – 220 kgr · ft/s
- .357 Sig: 160 – 180 kgr · ft/s
- .380 Auto: 80 – 100 kgr · ft/s

8.5 Ammunition shall use projectiles that exhibit controlled expansion suitable for law enforcement use.

8.6 Ammunition used for testing shall be manufactured of new, unfired materials and components and should be manufactured within 24 months of the date of testing.

8.7 The manufacturer of ammunition used for testing shall have an active quality management system in place (e.g., ISO 9001).

9 Test methods

9.1 General considerations

CAUTION: Prior to evaluating pistols in accordance with this chapter, verify that pistols are unloaded, and only load pistols when required for testing, as indicated in the test methods.

- 9.1.1 Testing shall be overseen by a testing supervisor who supervises an operator, who fires the pistol.
- 9.1.2 Identify all test items, including all magazines employed in testing, with a unique letter or number (e.g., A, B, C; 1, 2, 3).
- 9.1.3 When a stoppage occurs, the operator shall cease firing and alert the testing supervisor.
- 9.1.4 The testing supervisor in consultation with the operator shall determine the cause of the stoppage.
 - 9.1.4.1 All stoppages shall be attributed to one of the categories listed in Section 5.2.2 prior to any corrective action being taken.
 - 9.1.4.2 The type of corrective action taken to clear the stoppage shall use the classification in Section 5.3.2.
 - 9.1.4.3 For any stoppage where the cause cannot be determined, the testing supervisor may consult with independent experts to determine the cause of the stoppage.
 - 9.1.3.4 The manner in which the testing supervisor may consult with independent experts shall be determined prior to testing.
- 9.1.5 All test results and observations shall be documented and reported.
 - 9.1.5.1 Round count shall be the primary method of reporting where in the testing process a testing event occurs, such as a stoppage, magazine change, or preventative maintenance action.
 - 9.1.5.2 The round count at each testing event shall be recorded.
 - 9.1.5.3 Testing personnel may photograph or videotape any test item, any portion of testing, or any testing event which, at their discretion, has documentary value.

9.2 Visual examination

- 9.2.1 This test shall be used to determine the presence of any surface anomalies on or particles in a pistol that could adversely affect its operation.
- 9.2.2 Examine the pistol for any surface anomalies, such as chips, scratches, burrs, sharp edges, rust spots, or corners that could cut the shooter's hand while firing or during manual cycling of the pistol.
- 9.2.3 Record and photograph the presence and location of any surface anomalies.
- 9.2.4 Examine the pistol for any particles, such as loose chips, shavings, or filings.
- 9.2.5 Record and photograph the presence and location of any particles that should not be inside the pistol.
- 9.2.6 Remove or clean any particles found inside the pistol.

9.3 Hammer

- 9.3.1 This test shall be used to verify the operation of the hammer.
- 9.3.2 This test only applies to pistol models that are hammer fired.

CAUTION: To ensure the safety of test personnel, the manufacturer should indicate the correct procedure to lower the hammer without firing the pistol when there is a live round in the pistol's chamber.

- 9.3.3 Cock the hammer to the single-action, fully cocked position.
 - 9.3.3.1 Verify that there is perceptible travel past this position.
 - 9.3.3.2 Record if there is no perceptible travel past this position.
- 9.3.4 With the pistol empty, cock the hammer and release it by pulling the trigger ten times to verify that the hammer does not prevent operation of the firearm.
 - 9.3.4.1 Record any sticking, binding, grittiness, or hesitation when operating the hammer.
- 9.3.5 Fully cock the hammer and load it with a 10.25 lb \pm 0.25 lb (46.0 N \pm 1.0 N) force applied to the rearmost part of the hammer spur and tangential to hammer's arc.

9.3.5.1 Verify that the hammer does not release under the applied load.

9.3.5.2 Record if the hammer releases under the applied load.

9.4 Headspace

9.4.1 This test shall be used to measure the headspace of a pistol.

9.4.2 The headspace gauges to be used in this testing shall be commercially available hardened steel gauges used to verify the headspace of pistols firing from a locked breech condition.

9.4.2.1 The “Go” gauge verifies that the headspace of the pistol is equal to or greater than the SAAMI-specified minimum headspace for the caliber for which the pistol is chambered.

9.4.2.2 The “No-Go” gauge verifies that the headspace of the pistol is not greater than the SAAMI-specified maximum headspace for the caliber for which the pistol is chambered.

CAUTION: Do not force the gauges or allow the mechanism to slam shut on a gauge, since either may be damaged.

9.4.3 Verify that the extractor does not prevent the slide from reaching its “forwardmost” position.

9.4.3.1 If the extractor does catch on the gauge, manipulate the slide until the extractor slides over the rim of the gauge, permitting the slide to move to its “forwardmost” position.

9.4.4 Examine the firing mechanism of the pistol to determine if the slide is physically restrained in a fixed position relative to the barrel when the weapon is ready to fire but without a cartridge in the chamber.

9.4.5 For pistols designed to physically lock the slide to the barrel in the firing position, verify that the headspace of the pistol meets the headspace requirements of this standard (Section 6.5) in the following manner:

9.4.5.1 Insert a “Go” headspace gauge into the chamber.

9.4.5.2 Release the slide slowly until the slide stops and verify that the slide reached its mechanically locked position.

- 9.4.5.3 Remove the “Go” headspace gauge, and install a “No-Go” headspace gauge into the chamber.
- 9.4.5.4 Release the slide slowly until the slide stops and verify that the slide did not reach its mechanically locked position.
- 9.4.6 For pistols designed with slides that are not locked to the barrel in the firing position, verify that the headspace of the pistol meets the headspace requirements of this standard (Section 6.5) in the following manner:
 - 9.4.6.1 Determine the location of the slide relative to the barrel at which the hammer will fall or the striker will be released when all safeties are disengaged and the trigger is pulled without a round in the chamber.
 - 9.4.6.2 Insert a “Go” headspace gauge into the chamber.
 - 9.4.6.3 Release the slide slowly until the slide stops and verify that the slide travelled at least to the location noted in 9.4.6.1.
 - 9.4.6.4 Insert a “No-Go” headspace gauge into the chamber.
 - 9.4.6.2 Release the slide slowly until the slide stops and verify that the slide will not travel to the location noted in 9.4.6.1.
- 9.4.7 Record any instance where the test item does not meet the headspace requirements of this standard (Section 6.5).

9.5 Loading and unloading

- 9.5.1 This test shall be used to assess the operation of loading and unloading a pistol and the major components involved.
- 9.5.2 Check slide operation.
 - 9.5.2.1 On an unloaded pistol with the magazine removed, pull the slide fully to the rear and release, allowing it to return to battery.
 - 9.5.2.2 Verify that it has locked into the battery position.
 - 9.5.2.3 Record any sticking, binding, grittiness, or hesitation.
- 9.5.3 Check proper seating and release of magazines.
 - 9.5.3.1 Insert an unloaded magazine into the pistol.
 - 9.5.3.2 Verify that the magazine properly seats in the magazine well.

- 9.5.3.3 Pull the slide all the way back.
- 9.5.3.4 Verify that the slide remains open.
- 9.5.3.5 Release the magazine one-handed with the shooting hand.
- 9.5.3.6 Verify that the magazine drops free from the pistol.
- 9.5.3.7 Verify that the slide remains open.
- 9.5.3.8 Record any binding or sticking when inserting or releasing the magazine.
- 9.5.3.9 Record any sticking, binding, grittiness, or hesitation when operating the slide.
- 9.5.4 Check inserting a fully loaded magazine and chambering a round.
 - 9.5.4.1 Load a magazine to its full stated capacity with ammunition.
 - 9.5.4.2 Record any problems loading the magazine.
 - 9.5.4.3 Point the pistol at a bullet trap or other suitable device.
 - 9.5.4.4 With the slide still open, insert the loaded magazine into the pistol. Undo force should not be necessary to insert the magazine.
 - 9.5.4.5 Verify that the magazine properly seats in the magazine well.
 - 9.5.4.6 Record any binding or sticking when inserting the magazine.
 - 9.5.4.7 Release the slide lock to chamber a round.
 - 9.5.4.8 Verify that the slide has returned to battery.
 - 9.5.4.9 Record any sticking, binding, grittiness, or hesitation when operating the slide.

9.6 Cycle of operation

- 9.6.1 This test shall be used to assess the cycle of operation of a pistol.
- 9.6.2 A video shall be recorded of the test.
- 9.6.3 Three fully loaded magazines are required for the test.
- 9.6.4 Load each magazine with ammunition to its maximum stated capacity.

- 9.6.5** Fire three fully loaded magazines through the pistol.
- 9.6.5.1** Firing shall take no greater than 2 minutes.
- 9.6.5.2** Load the first magazine into the pistol and chamber a round.
- 9.6.5.3** Remove the magazine, load an additional round of ammunition into the magazine, and reload the magazine into the pistol.
- 9.6.5.4** Fire the pistol fire into a bullet trap or other suitable device until the magazine is empty.
- For pistols with both a single and double action mode, fire the first round in double action mode.
 - For double action pistols, decock the hammer so that the first round can be fired in double action mode.
- 9.6.5.5** Eject the magazine.
- 9.6.5.6** Immediately reload with the second magazine.
- 9.6.5.7** Fire the pistol fire into a bullet trap or other suitable device until the magazine is empty.
- 9.6.5.8** Eject the magazine.
- 9.6.5.9** Immediately reload with the third magazine.
- 9.6.5.10** Fire the pistol fire into a bullet trap or other suitable device until the magazine is empty.
- 9.6.5.11** Eject the magazine.
- 9.6.6** All test results and observations shall be documented and reported.
- 9.6.6.1** Record whether the slide remains open after the last round in each magazine has been fired.
- 9.6.6.2** Record whether each magazines drop freely from the pistol.
- 9.6.6.3** Record whether any cases strike the operator in the head or torso.
- 9.6.6.4** Record any peculiarities regarding operation of the pistol, such as sticking,

binding, grittiness, or hesitation of any component.

9.7 Trigger

- 9.7.1** This test shall be used to determine the trigger pull weight of a pistol.
- 9.7.2** The trigger pull weight shall be measured using NRA Official Universal Trigger Weight System (i.e., “NRA weights”).
- 9.7.3** The unloaded pistol shall be mounted in a fixture with the barrel vertical and the muzzle up.
- 9.7.4** With the pistol empty, apply loads to the rearmost part of the front surface of the trigger so that the load is parallel to the barrel to within 5°.
- 9.7.5** The trigger pull weight shall be measured in the following manner for single action pistols.
 - 9.7.5.1** Cock the hammer.
 - 9.7.5.2** Apply a 3 ¼ lb. load to the trigger.
 - 9.7.5.3** Increase the load in ¼ lb. increments until 10.0 lb. has been applied or until the pistol fires on the empty chamber.
 - 9.7.5.4** When adding a new increment of weight, cycle the pistol to reset all components and mechanisms.
 - 9.7.5.5** Record the load that causes the hammer to release.
 - 9.7.5.6** Conduct this measurement five times.
 - 9.7.5.6** To expedite the measurement, coarse measurement may be done using a electronic measurement device to determine the trigger pull weight, then confirm the measurement with the NRA weights. If this approach is used, begin with a load ½ lb. less than the electronically determined trigger pull weight and continue the measurement in accordance with 9.7.5.2 through 9.7.5.5.
- 9.7.6** The trigger pull weight shall be measured in the following manner for double action and striker-fired pistols.
 - 9.7.6.1** Apply a 3¼ lb. load to the trigger.
 - 9.7.6.2** Increase the load in ¼ lb. increments until 10.0 lb. has been applied or until the pistol fires on the empty chamber.

- 9.7.6.3 When adding a new increment of weight, cycle the pistol to reset all components and mechanisms.
- 9.7.6.4 Record the load that causes the striker to release.
- 9.7.6.5 Conduct this measurement five times.
- 9.7.5.6 To expedite the measurement, coarse measurement may be done using a electronic measurement device to determine the trigger pull weight, then confirm the measurement with the NRA weights. If this approach is used, begin with a load $\frac{1}{2}$ lb. less than the electronically determined trigger pull weight and continue the measurement in accordance with 9.7.6.2 through 9.7.6.5.

9.8 Safety features

- 9.8.1 This test shall be used to assess the operation of the safety features of a pistol.
- 9.8.2 Obtain from the pistol manufacturer a description of the design feature(s) included in the pistol to ensure that the pistol will discharge only through the proper operation of the trigger mechanism, the list of parts that implement the design feature(s), and the manner in which the safety feature(s) operate. This should be included with the documentation provided in Section 4.15.
- 9.8.3 Verify that all of the safety parts are present, that they operate in the manufacturer's intended manner, and that the feature(s) perform their intended function.
 - 9.8.3.1 Chamber a primed case (no propellant or projectile) and attempt to fire the pistol, with the safety device engaged, into a bullet trap or other suitable device to determine whether the round discharges.
 - 9.8.3.2 If a pistol has more than one safety device, disengage all but one to conduct the test.
 - 9.8.3.3 Repeat using the second safety device independently.
 - 9.8.3.4 Continue in this manner until all safety devices have been tested independently.
- 9.8.4 In some designs, the removal of parts to disable one safety feature may affect the functioning of another safety feature. If assistance is needed to test each safety feature independently, consult with the pistol supplier.

9.8.5 In some designs, safety devices may be integrated into the design of the pistol in such a way as to be inaccessible to or not manipulated by the operator. In these cases, destructive removal may be the only way to disengage these features. Destructive removal of safety devices shall not be required.

9.8.6 Record any instance of a safety feature malfunctioning.

9.9 Precision grouping

9.9.1 This test shall be used to determine the precision of the pistol at a relevant tactical range.

9.9.2 Five groups of five shots shall be fired.

9.9.3 A suitable target positioned at a range of 25 yards shall be used to record each group.

9.9.4 A new target shall be used for each group.

9.9.5 Firing shall be done indoors at typical ambient conditions.

9.9.6 The test item shall be mounted in a suitable mechanical mount, such as a Ransom Rest, in accordance with the instructions for the device using grip inserts provided by the pistol supplier.

9.9.7 The pistol supplier shall provide settings for the mechanical mount.

9.9.8 The test item shall be zeroed in accordance with the supplier's instructions.

9.9.9 At least 45 "settling" rounds shall be fired to ensure that the pistol has stabilized in the mechanical mount.

9.9.10 In addition to the initial settling rounds fired in Section 9.9.9, each time a new magazine is loaded the first two rounds shall be fired as settling rounds before precision grouping data is collected.

9.9.11 The centroid of each five-shot group shall be computed.

9.9.12 The mean radius of each five-shot group shall be computed with respect to its centroid.

9.9.13 The shot center-to-center distances shall be measured for each five-shot group and recorded.

9.10 Point of aim/point of impact

9.10.1 This test shall be used to determine the point of impact relative to the point of aim of the test firearm at a relevant tactical range.

9.10.2 Five groups of five shots shall be fired.

9.10.3 A target of crosshair design shall be positioned at a range of 25 yards to record each group.

9.10.4 A new target shall be used for each group.

9.10.5 Firing shall be done indoors at typical ambient conditions.

9.10.6 The test item shall be mounted in a suitable mechanical mount, such as a Ransom Rest, in accordance with the instructions for the device using grip inserts provided by the pistol supplier.

9.10.7 The pistol supplier shall provide settings for the mechanical mount.

9.10.8 The test item shall be zeroed in accordance with the pistol supplier's instructions.

9.10.8.1 The sights shall not be at the maximum point of the adjustable area to achieve the point of impact requirement.

9.10.8.2 The sights should be as close to center as possible to achieve the point of impact requirement, and should be no more than 20 percent of available adjustable range off center (e.g., no more than 0.100 in. off center line).

NOTE: Unless otherwise specified by the pistol supplier, the center is considered the point where the aperture is equidistant of the limits of the sight's functional means of travel. When the test item is zeroed, these sight marks should be adjusted to the central point of impact of a shot group.

9.10.9 An optical or laser bore sight may be used as necessary to check alignment to the target aiming point.

9.10.10 At least 45 "settling" rounds shall be fired as to ensure that the pistol has come to a stable position in the mount.

9.10.11 In addition to the initial settling rounds fired in Section 9.10.10, each time a new magazine is loaded the first two rounds shall be fired as settling rounds before precision grouping data is collected.

9.10.12 Sight alignment shall be checked before each shot is fired.

9.10.13 The distance between point of impact and point of aim shall be measured for each shot and recorded.

9.11 Endurance

9.11.1 This test shall be used to assess the durability and reliability of the pistol model over 10,000 rounds fired.

CAUTION: Always be alert for significant changes in firearm performance that may suggest imminent failure that could impact operator safety. These indications may include an increase in muzzle flash, erratic flight of bullets, or an increase in the malfunction rate.

9.11.2 Suitable personal protective equipment shall be donned during firing such as gloves, pads, and other appropriate attire for protection from hot gun barrels and expended cartridge cases.

9.11.3 The firing range shall have adequate ventilation to reduce the exposure to toxic fumes, or may be outdoors. The nature of this test requires firing an unusually large number of rounds per day which may also increase toxic fumes to levels above those more typically encountered.

9.11.4 Magazines shall be included in the endurance testing.

9.11.4.1 Only three magazines shall be used for the first 5,000 rounds.

9.11.4.2 Additional magazines may be used for the second 5,000 rounds.

9.11.5 The basic firing cycle for test items shall be defined according to the following.

9.11.5.1 Two hundred fifty (250) rounds shall be fired.

9.11.5.2 The operator shall fire the test item handheld from a typical shooting stance at a regular cadence of approximately one shot per second, but no less than one shot every two seconds, with no delays except to reload or to determine causes of stoppages.

9.11.5.3 Fire into a bullet trap or other suitable device until the magazine is empty.

9.11.5.4 Reload and continue firing until the basic firing cycle is complete.

9.11.5.5 The basic firing cycle shall take no greater than 40 minutes.

9.11.6 A firing procedure shall be developed prior to testing that specifies the sequence of actions for the test item and includes the following elements.

NOTE: Pistol suppliers should develop the firing procedure in coordination with a firearms testing laboratory.

- 9.11.6.1** Ten thousand rounds (10,000) shall be fired.
- 9.11.6.2** The test item shall be field stripped, cleaned, and lubricated at the beginning of endurance testing before any shots have been fired.
- 9.11.6.3** Headspace measurement shall be performed in accordance with Section 9.4 at the beginning of endurance testing before any shots have been fired, midway through testing after 5,000 have been fired, and at the end after 10,000 rounds have been fired.
- 9.11.6.4** Trigger pull weight testing shall be performed in accordance with Section 9.7 at the beginning of endurance testing before any shots have been fired and at the end after 10,000 rounds have been fired.
- 9.11.6.5** Precision grouping testing shall be performed in accordance with Section 9.9 at the beginning of endurance testing and at the end of the 10,000 round count.
- 9.11.6.6** Point of aim/point of impact testing shall be performed in accordance with Section 9.10 at the beginning of endurance testing and at the end of the 10,000 round count.
- 9.11.6.7** After accounting for precision grouping testing and point of aim/point of impact testing, the firing procedure shall include enough basic firing cycles to reach a total round count of 10,000 rounds.
- 9.11.6.8** Basic firing cycles shall be fired in accordance with Section 9.11.5.
- 9.11.6.9** The test item may not be cleaned until the initial 1,000 rounds have been fired.
- 9.11.6.10** During the initial 1,000 rounds, the test item shall be lubricated after precision grouping testing and point of aim/point of impact testing and after each basic firing cycle.
- 9.11.6.11** After the initial 1,000 rounds have been fired, the test item shall be cleaned and lubricated at the end of each basic firing cycle (i.e., every 250 rounds).
- 9.11.6.12** Parts may be replaced in accordance with the pistol's PMS.

- 9.11.6.13 The replacement of parts per the pistol's PMS shall not constitute a pistol malfunction.
- 9.11.6.14 Breaks between basic firing cycles shall take no more than 10 minutes if no cleaning or other maintenance activities defined in the PMS are required.
- 9.11.6.15 Breaks between basic firing cycles shall take no more than 30 minutes if cleaning, lubrication, or other maintenance activities defined in the PMS are required.
- 9.11.7 The firing procedure developed in accordance with 9.11.6 shall be completed for the test item.
- 9.11.8 All test results and observations shall be documented and reported in accordance with 9.6.6.

9.12 Pistol drop test

- 9.12.1 This test shall be used to assess the operation of the pistol when dropped from a height of 5 ft (1.524 m) and making impact with a concrete floor.

CAUTION: This test may damage the test item and therefore should be done last in a test sequence if a pistol is being used for multiple tests.

- 9.12.2 The test item shall be dropped onto a clean, level concrete surface.
 - 9.12.2.1 A flat, hardened concrete surface with a thickness of at least 3 inches (76.2 mm) shall be used.
 - 9.12.2.2 Damaged or pitted areas on the concrete surface shall be avoided for testing.

NOTE: The following guidance provides further recommendations regarding the concrete surface. The concrete surface should be made from 3000 psi cement concrete with a minimum thickness of 4 inches (101.6 mm). The surface should be metal float finished with a dry coefficient of friction between 0.4 and 0.6. The concrete surface should be level throughout with a slope of zero degrees. The concrete should be constructed in accordance with American Concrete Institute 318 (ACI 318).

- 9.12.3 The test item shall be dropped from a height of 5 ft. (1.524 m), measured from the surface of the concrete to the lower most point of the test item.
- 9.12.4 The test item shall be dropped one time in each of the following orientations:
 1. Normal firing orientation, barrel horizontal

2. Upside down, barrel horizontal
 3. On grip or butt, barrel vertical
 4. On muzzle, barrel vertical
 5. On left side, barrel horizontal
 6. On right side, barrel horizontal
 7. On grip or butt, barrel 45° from vertical, sights up
 8. On muzzle, barrel 45° from vertical, sights up
 9. On grip or butt, barrel -30° from vertical, sights up
 10. On muzzle, barrel -30° from vertical, sights up
 11. If the test item has an exposed hammer or striker, on the rearmost point of that device. Otherwise, on the rearmost point of the test item.
- 9.12.5** The order of orientations that the test item shall be dropped shall be randomized using a suitable randomization method.
- 9.12.6** The test item shall be dropped from a fixture. One fixture found to be suitable consists of a short piece of string with the pistol attached at one end and the other end held in an air vise until the drop is initiated.
- 9.12.7** The test item shall be dropped in the condition that it would be in if it were dropped when in hand and ready to fire.
- 9.12.8** All safety devices shall be disengaged. However, if the design of the pistol is such that upon leaving the hand a safety device is automatically applied by the pistol as a matter of normal operation, this feature shall not be defeated.
- 9.12.9** A video shall be recorded of each drop to verify the impact orientation.
- 9.12.10** The test item shall be chambered with a primed but otherwise empty cartridge.
- 9.12.10.1** Pull the slide back and lock it in the rear position.
- 9.12.10.2** Insert a primed case (no powder or projectile) into the chamber.
- 9.12.10.3** Release the slide, allowing it to achieve battery under the impetus of the recoil spring.
- 9.12.11** In addition to the primed empty cartridge in the chamber, the firearm shall be loaded to capacity with ammunition.
- 9.12.12** The test item shall be dropped and the primer shall be examined.

- 9.12.12.1** Place the test item in the drop fixture.
- 9.12.12.2** Drop the test item from a height of 5 ft. (1.524 m) in the first orientation specified in Section 9.12.5.
- 9.12.12.3** After the drop, inspect the test item for damage.
- 9.12.12.3** Examine the primer for indentations after the drop. Firing of the primer due to dropping constitutes failure of the test.
- 9.12.12.4** Fire the primed case to verify that the primer would have gone off.
- 9.12.13** Repeat 9.12.10 through 9.12.12 until the test item has been dropped in the first four randomly ordered orientations or until the primer is fired due to dropping.
- 9.12.14** Fire the fully loaded magazine.
- 9.12.14.1** Fire the pistol fire into a bullet trap or other suitable device until the magazine is empty.
- 9.12.14.2** Eject the magazine.
- 9.12.15** Repeat 9.12.10 through 9.12.12 until the test item has been dropped in next four randomly ordered orientations or until the primer is fired due to dropping.
- 9.12.16** Repeat 9.12.14.
- 9.12.17** Repeat 9.12.10 through 9.12.12 until the test item has been dropped in final three randomly ordered orientations or until the primer is fired due to dropping.
- 9.12.18** Repeat 9.12.14.
- 9.12.19** All test results and observations shall be documented and reported in accordance with 9.6.6.
- 9.12.19.1** Record the condition of the primed cartridge after each drop.
- 9.12.19.2** Record any damage noted during inspection.

9.13 Magazine drop test

9.13.1 This test shall be used to assess the operation of the pistol after a magazine is dropped from a height of 5 ft (1.524 m) and makes impact with a concrete floor.

CAUTION: This test may damage the test item.

9.13.2 Magazines shall be dropped onto a clean, level concrete surface.

9.13.2.1 A flat, hardened concrete surface with a thickness of at least 3 inches (76.2 mm) shall be used.

9.13.2.2 Damaged or pitted areas on the concrete surface shall be avoided for testing.

NOTE: The following guidance provides further recommendations regarding the concrete surface. The concrete surface should be made from 3000 psi cement concrete with a minimum thickness of 4 inches (101.6 mm). The surface should be metal float finished with a dry coefficient of friction between 0.4 and 0.6. The concrete surface should be level throughout with a slope of zero degrees. The concrete should be constructed in accordance with American Concrete Institute 318 (ACI 318).

9.13.3 Magazines shall be dropped from a height of 5 ft. (1.524 m), measured from the surface of the concrete to the lower most point of the magazine.

9.13.4 The test item shall be dropped one time in each of the following orientations:

1. On base plate
2. On feed lips

9.13.5 Magazines shall be dropped from a fixture. One fixture found to be suitable consists of a short piece of string with the magazine attached at one end and the other end held in an air vise until the drop is initiated.

9.13.6 A video shall be recorded of each drop to verify the impact orientation.

9.13.7 Three unloaded magazines shall be dropped.

9.13.7.1 Place the first unloaded magazine in the drop fixture.

9.13.7.2 Drop the magazine from a height of 5 ft. (1.524 m) in the first orientation specified in Section 9.13.4.

9.13.7.3 After the drop, inspect the magazine for damage.

- 9.13.7.4 Place the magazine back in the drop fixture.
- 9.13.7.5 Drop the magazine from a height of 5 ft. (1.524 m) in the second orientation specified in Section 9.13.4.
- 9.13.7.6 After the drop, inspect the test item for damage.
- 9.13.7.7 Repeat 9.13.7.1 through 9.13.7.6 with the other two unloaded magazines.
- 9.13.8 Fully load the three magazines dropped in 9.13.7.
- 9.13.9 Fire the fully loaded magazines dropped in 9.13.7 in accordance with 9.6.5.
- 9.13.10 Three partially loaded magazines shall be dropped.
 - 9.13.10.1 Load the three magazines with half their stated capacity. If the capacity is an odd number, load up one round (e.g., load 9 rounds in a 17-round magazine).
 - 9.13.10.2 Place the first partially loaded magazine in the drop fixture.
 - 9.13.10.3 Drop the magazine from a height of 5 ft. (1.524 m) in the first orientation specified in Section 9.13.4.
 - 9.13.10.4 After the drop, inspect the magazine for damage. Note if the ammunition has remained intact, or if it has changed orientation or been ejected from the magazine.
 - 9.13.10.5 Place the magazine back in the drop fixture.
 - 9.13.10.6 Drop the magazine from a height of 5 ft. (1.524 m) in the second orientation specified in Section 9.13.4.
 - 9.13.10.7 After the drop, inspect the test item for damage. Note if the ammunition has remained intact, or if it has changed orientation or been ejected from the magazine.
 - 9.13.10.8 Repeat 9.13.10.2 through 9.13.10.7 with the other two partially loaded magazines.
- 9.13.11 Fire the partially loaded magazines dropped in 9.13.10 in accordance with 9.6.5.
 - 9.13.11.1 The magazines shall be fired partially loaded. Disregard 9.6.5.3.
- 9.13.12 Three fully loaded magazines shall be dropped.
 - 9.13.12.1 Load the three magazines to their stated capacity.

- 9.13.12.2 Place the first fully loaded magazine in the drop fixture.
- 9.13.12.3 Drop the magazine from a height of 5 ft. (1.524 m) in the first orientation specified in Section 9.13.4.
- 9.13.13.4 After the drop, inspect the magazine for damage. Note if the ammunition has remained intact, or if it has changed orientation or been ejected from the magazine.
- 9.13.12.5 Place the magazine back in the drop fixture.
- 9.13.12.6 Drop the magazine from a height of 5 ft. (1.524 m) in the second orientation specified in Section 9.13.4.
- 9.13.12.7 After the drop, inspect the test item for damage. Note if the ammunition has remained intact, or if it has changed orientation or been ejected from the magazine.
- 9.13.12.8 Repeat 9.13.12.2 through 9.13.12.7 with the other two fully loaded magazines.
- 9.13.13 Fire the fully loaded magazines in accordance with 9.6.5.
- 9.13.14 All test results and observations shall be documented and reported in accordance with 9.6.6.

9.14 High temperature exposure

- 9.14.1 This test shall be used to determine the effect of high temperature exposure on the performance of a pistol.
- 9.14.2 This test is the cycle of operation test (Section 9.6) with specific environmental conditioning prior to firing.
- 9.14.3 Prior to conditioning, the test item shall be cleaned and lubricated with a lubricant specified for high temperatures.
- 9.14.4 Prepare for testing in accordance with 9.6.2 through 9.6.4.
- 9.14.5 Prior to firing, the pistol and three magazines shall be conditioned in a climatic chamber for at least 12 hours at no less than 120°F (49°C).
- 9.14.6 After 12 hours, the operator shall remove the pistol and magazines from the climatic chamber with gloves and immediately begin firing in accordance with 9.6.5.

9.14.7 All test results and observations shall be documented and reported in accordance with 9.6.6.

9.14.7.1 Record the conditioning temperature and exposure time.

9.15 Low temperature exposure

9.15.1 This test shall be used to determine the effect of low temperature exposure on the performance of a pistol.

9.15.2 This test is the cycle of operation test (Section 9.6) with specific environmental conditioning prior to firing.

9.15.3 Prior to conditioning, the test item shall be cleaned and lubricated with a lubricant specified for low temperatures.

9.15.4 Prepare for testing in accordance with 9.6.2 through 9.6.4.

9.15.5 Prior to firing, the pistol and three magazines shall be conditioned in a climatic chamber for at least 12 hours at no greater than -20°F (-29°C).

9.15.6 After 12 hours, the operator shall remove the pistol and magazines from the climatic chamber with gloves and immediately begin firing in accordance with 9.6.5.

9.15.7 All test results and observations shall be documented and reported in accordance with 9.6.6.

9.15.7.1 Record the conditioning temperature and exposure time.

9.16 Salt water exposure

9.16.1 This test is to determine the effect of salt water exposure on the performance of a pistol.

9.16.2 A water container that can achieve a covering depth of 6 in (15.24 cm) of water over the uppermost point of the test item and maintain the test item at that depth shall be used.

9.16.3 The temperature of the water shall be 64°F ±9°F (18°C ±5°C).

9.16.4 The water shall contain 5% ±1% NaCl (w/w).

9.16.5 A video shall be recorded of the test.

- 9.16.6** The test item shall be field stripped, cleaned, and lubricated at the beginning of testing prior to any conditioning or firing.
- 9.16.6.1** In addition, a complete visual examination of the test firearm shall be conducted prior to immersion with special attention to sealed areas, gaskets, seals, and structural integrity, and the results shall be documented.
- 9.16.6.2** Additional sealing, taping, caulking, or other means to resist water leakage shall not be used on the test firearm.
- 9.16.7** Insert a fully loaded magazine into the pistol.
- 9.16.8** Immerse test item for a depth of 6 inches for 1 minute.
- 9.16.9** Remove from the water and fire into a bullet trap or other suitable device until the magazine is empty within 1 minute.
- 9.16.10** Immediately place the test item in an environmental chamber at 73°F ±5°F (23°C ±3°C) at 30% ±5% relative humidity for 24 hours.
- 9.16.11** After 24 hours, remove the test item from the environmental chamber.
- 9.16.12** Immediately eject the magazine, reload the magazine, and insert into the pistol.
- 9.16.13** Immediately fire into a bullet trap or other suitable device until the magazine is empty within 1 minute.
- 9.16.14** At the end of firing, immediately disassemble the pistol and thoroughly inspect for corrosion.
- 9.16.15** All test results and observations shall be documented and reported in accordance with 9.6.6.
- 9.16.15.1** Record the immersion container dimensions, the position of the test item while in the immersion container, the water temperature, and immersion time.
- 9.16.15.2** Record the environmental chamber dimensions, the position of the test item while in the chamber, the chamber temperature, relative humidity, and exposure time.
- 9.16.15.3** Record any corrosion noted during inspection.

9.17 Sand exposure

- 9.17.1 This test is to determine the effect of sand exposure on the performance of pistols.
- 9.17.2 A container that can achieve a complete covering of sand on all sides of the test item shall be used.
- 9.17.3 The sand shall conform to ASTM C144-17.
- 9.17.4 The test item shall be field stripped, cleaned, and lubricated at the beginning of testing prior to any conditioning or firing.
 - 9.17.4.1 A complete visual examination of the test firearm shall be conducted prior to burying with special attention to sealed areas, gaskets, seals, and structural integrity, and the results shall be documented.
 - 9.17.4.1 Additional sealing, taping, caulking, or other means to resist sand penetration shall not be used on the test firearm.
- 9.17.5 Insert a fully loaded magazine into the pistol.
- 9.17.6 Cover the test item completely in sand and allow to stand for 1 minute.
- 9.17.7 Remove the test item from the sand and shake it off for 15 seconds.
- 9.17.8 Immediately fire into a bullet trap or other suitable device until the magazine is empty within 1 minute.
- 9.17.9 All test results and observations shall be documented and reported in accordance with 9.6.6.

9.18 Obstructed bore

- 9.18.1 This test is to determine if a catastrophic failure will result from firing a pistol with a service projectile lodged in the barrel.

CAUTION: A catastrophic failure is an event which could reasonably cause serious physical injury to the shooter. Firing shall be done remotely. This test may also damage the test item.

- 9.18.2 A video shall be recorded of the test.
- 9.18.3 Remove the barrel from the pistol.

- 9.18.4** Lodge a bullet chosen for testing by mechanically pressing it into the barrel from the breech end so as to locate its base approximately 1 inch forward of a live chambered cartridge.
- 9.18.5** Reassemble the barrel to the pistol.
- 9.18.6** The test item shall be mounted in suitable mechanical mount, such as a Ransom Rest, in accordance with the instructions for the device.
- 9.18.7** Load one round in the chamber.
- 9.18.9** Remote fire the pistol.
- 9.18.10** Record the outcome of the test and whether catastrophic failure occurred.