

**Draft**  
**NIJ Standard**  
***Patrol Rifles for Law Enforcement***

**National Institute of Justice**

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## Introduction

This draft document specifies minimum performance requirements and test methods for patrol rifles used by U.S. law enforcement. The final version of this document is anticipated to be published in late 2019 as a new NIJ Standard entitled *Patrol Rifles for Law Enforcement*. Its primary purpose will be for use by the NIJ Compliance Testing Program (CTP) for testing and evaluation of semiautomatic patrol rifles 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>.

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), *Autoloading Pistols for Police Officers*,<sup>1</sup> NIJ Standard 0113.00, *12-Gauge Shotguns for Police Use*,<sup>2</sup> and to develop a new minimum performance standard for patrol rifles. The STC is 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 the STC was solicited through the Federal Register in early 2017.<sup>3</sup> 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

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<sup>1</sup> 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>.

<sup>2</sup> 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>.

<sup>3</sup> "Special Technical Committee on Law Enforcement Firearms," *Federal Register*, 82 FR 871, January 4, 2017, <https://www.federalregister.gov/d/2016-31876>.

- 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 Investigation<sup>4</sup> and Immigration and Customs Enforcement.<sup>5</sup> Various U.S. Army documents, such as Test Operations Procedure 3-2-045, *Small Arms - Hand and Shoulder Weapons and Machineguns*,<sup>6</sup> military rifle specifications,<sup>7,8</sup> and recent procurement activities by the U.S. Army,<sup>9</sup> as well as the U.S. Department of Defense document *Environmental Engineering Considerations and Laboratory Tests*<sup>10</sup> 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*,<sup>11</sup> were also useful resources to consult. The U.S. Army documents *Guidelines for Developing Reliability Failure Definition and Scoring Criteria*<sup>12</sup> and *Reliability Failure Definition and Scoring*

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<sup>4</sup> 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>.

<sup>5</sup> 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>.

<sup>6</sup> 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.

<sup>7</sup> MIL-DTL-70599B w/Amendment 3, *Detail Specification, Carbine, 5.56 Millimeter: M4*, U.S. Army Armament, Research, Development and Engineering Center, Picatinny Arsenal, NJ, July 20, 2012.

<sup>8</sup> MIL-DTL-71186A w/Amendment 4, *Detail Specification, Carbine, 5.56 Millimeter: M4A1*, U.S. Army Armament, Research, Development and Engineering Center, Picatinny Arsenal, NJ, June 15, 2012.

<sup>9</sup> 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>.

<sup>10</sup> MIL-STD-810G w/ Change 1, *Environmental Engineering Considerations and Laboratory Tests*, U.S. Department of Defense, April 15, 2014.

<sup>11</sup> 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.

<sup>12</sup> *Guidelines for Developing Reliability Failure Definition and Scoring Criteria*, 3rd ed., U.S. Army Training and Doctrine Command, Army Capabilities Integration Center, April 2012.

*Criteria (FDSC) for the Individual Carbine (IC) Increment I*<sup>13</sup> 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 patrol rifles submitted to the CTP. NIJ currently certifies ballistic-resistant body armor, stab-resistant body armor, and autoloading pistols through this program.

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](mailto: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.

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<sup>13</sup> *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 patrol rifles.
  - 1.1.1** This does not preclude patrol rifles with selective fire, however only semiautomatic firing mode shall be tested in accordance with this standard. Other firing modes, such as burst firing mode and fully automatic firing mode, are not addressed by this standard and shall not be tested.
- 1.2** This standard specifies requirements for new patrol rifles.
- 1.3** This standard does not specify requirements for firearms accessories, such as weapon-mounted lights or scopes.
- 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 patrol rifle 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 patrol rifle model to this standard and (2) a conformity assessment body attesting to a patrol rifle 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 Z299.4 – 2015, *American National Standard Voluntary Industry Performance Standards for Pressure and Velocity of Centerfire Rifle 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.

STANAG 2310, *Small Arms Ammunition (7.62 mm)*, 3rd Ed., North Atlantic Treaty Organization, November 15, 1976.

STANAG 4172, *5.56 mm Ammunition (Linked or Otherwise)*, 2nd Ed., North Atlantic Treaty Organization, May 5, 1993.

### **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** *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.
- 3.4** *(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).
- 3.5** *bolt* – the locking and cartridge head supporting mechanism of a firearm that operates in line with the axis of the bore.
- 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.
- 3.10** *chamber* – the rear part of the barrel that has been formed to accept a specific cartridge or shotshell.
- 3.12** *chambering* – actuation that inserts a cartridge or round into the chamber.
- 3.13** *cock* – to place a firing mechanism (hammer, firing pin, or striker) under spring tension so that this firearm is ready for firing.
- 3.14** *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 (where applicable), and firing of a cartridge, followed by unlocking (where applicable), extraction and ejection of a case.
- 3.15** *dispersion* – extent to which projectile impacts spread about the center of impact because of shot-to-shot variations.
- 3.16** *durability* – resistance to wear, damage, or degradation.
- 3.17** *ejecting* – the act of expelling a cartridge or fired case from a firearm.

- 3.18 *extracting* – the act of withdrawing a cartridge or fired case from the chamber of a firearm.
- 3.19 *failure* – specific cause of a malfunction.
- 3.20 *feeding* – actuation that moves ammunition from a housing device, such as a magazine, toward the chamber.
- 3.21 *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.
- 3.22 *firing* – actuation that activates the primer to cause the propellant to ignite and jettison the projectile through the barrel and out the muzzle.
- 3.23 *grip* – in handguns, the handle. In long guns, that portion of the stock behind the trigger which is grasped by the hand.
- 3.24 *grip safety* – passive safety device that requires an applied force on the grip before the firearm can be fired.
- 3.25 *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.
- 3.26 *headspace* – distance between the closed breech face of the firearm and the surface of the chamber on which the cartridge case seats.
- 3.27 *headspace gauge* – device used to facilitate measurement of headspace.
- 3.28 *locking* – actuation that firmly secures a cartridge in the chamber.
- 3.29 *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.
- 3.30 *magazine safety* – passive safety device that prevents firing of the patrol rifle unless a magazine is in place.
- 3.31 *malfunction* – deviation from the normal functioning of a firearm or one of its components.
- 3.32 *misfire* – failure to fire a round.

- 3.33** *model* – the supplier’s designation which uniquely identifies a specific design of patrol rifle.
- 3.34** *muzzle* – the end of a firearm barrel from which the bullet or shot emerges.
- 3.35** *NATO* – North Atlantic Treaty Organization.
- 3.36** *PMS* – preventative maintenance schedule.
- 3.37** *precision* – measure of the ability of the firearm-ammunition system to cluster multiple impacts in the same location.
- 3.38** *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.
- 3.39** *reliability* – probability that a device will perform its intended function for a specified period of time under stated conditions (Halpern).
- 3.40** *rifle* – as defined at 27 CFR 478.11, a weapon designed or redesigned, made or remade, and intended to be fired from the shoulder, and designed or redesigned and made or remade to use the energy of the explosive in a fixed metallic cartridge to fire only a single projectile through a rifled bore for each single pull of the trigger.
- 3.41** *round* – unit of ammunition when counted.
- 3.42** *SAAMI* – Sporting Arms and Ammunition Manufacturers’ Institute.
- 3.43** *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).
- 3.44** *semiautomatic rifle* – as defined at 27 CFR 478.11, any repeating rifle 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.
- 3.45** *STANAG* – a standardization agreement promulgated by NATO.
- 3.46** *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.

- 3.47 *test item* – representative sample of a patrol rifle model subjected to testing and evaluation.
- 3.48 *trigger* – the part of a firearm mechanism which is moved manually to cause the firearm to discharge.
- 3.49 *trigger pull* – force that must be applied to the trigger to fire the patrol rifle.

## **4 Feature requirements**

- 4.1** Patrol rifles shall be semiautomatic, or have semiautomatic firing mode, and magazine-fed.
  - 4.1.1** For patrol rifles with selective fire, only semiautomatic firing mode shall be tested in accordance with this standard. Other firing modes, such as burst firing mode and fully automatic firing mode, are not addressed by this standard and shall not be tested.
- 4.2** Patrol rifles shall use current, commercially available ammunition produced for the law enforcement market.
  - 4.2.1** Widely used law enforcement rifle calibers are .223 Remington, 5.56x45mm NATO, .308 Winchester, and 7.62x51mm NATO. Unless specified otherwise, rifles tested to this standard shall be in one of these four calibers.
  - 4.2.2** Law enforcement end users of this document may specify another caliber, so long as the patrol rifle meets all the requirements of this document.
  - 4.2.3** A conformity assessment system may limit the scope of its activities to patrol rifles in the calibers listed in 4.2.1.
- 4.3** Patrol rifles shall be chambered for cartridges that conform to standards or specifications published by SAAMI, NATO, or other cognizant organizations.
  - 4.3.1** A conformity assessment system may specify that patrol rifles shall be chambered for cartridges that conform to a specific ANSI/SAAMI standard, such as ANSI/SAAMI Z299.4 – 2015 or a subsequent standard, or a specific NATO STANAG.
- 4.4** Patrol rifles shall be capable of firing ammunition that conforms to standards or specifications published by SAAMI, NATO, or other cognizant organizations.
  - 4.4.1** A conformity assessment system may specify that patrol rifles shall be capable of firing ammunition that conforms to a specific ANSI/SAAMI standard, such as ANSI/SAAMI Z299.4 – 2015 or a subsequent standard, or a specific NATO STANAG.
- 4.5** The magazine shall have a minimum capacity of twenty rounds.
- 4.6** Patrol rifles shall have one or more safety features to prevent inadvertent firing, one of which shall be manipulated by hand.
- 4.7** Patrol rifles should be easily operated both right-handed and left-handed.

- 4.8 All patrol rifles features shall be manipulated by hand and not require any special tools, accessories, or power sources to function normally.
- 4.9 Safety, fire selector lever, and magazine release shall be manipulated using the firing hand only.

**NOTE:** The fire selector lever may include the safety.

- 4.10 The bolt catch/release should be manipulated using the firing hand only.
- 4.11 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.
- 4.12 Patrol rifles with fixed right-handed and left-handed versions shall be considered separate models. Each version shall be tested separately in accordance with this standard.
- 4.13 Patrol rifles shall not be susceptible to radiofrequency signals or interference.
- 4.14 Patrol rifles shall not generate any radiofrequency signals or interference.
- 4.15 Patrol rifles shall not be susceptible to electronic tampering.
- 4.16 Documentation regarding the operation of the patrol rifle and magazines that accompanies the commercial product, including a preventative maintenance schedule (PMS), shall be provided with the test items.

**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.

- 4.17 The documentation provided with the test items shall include a diagram of parts with the barrel, receiver, bolt, and bolt carrier clearly labeled.

**NOTE:** See 3.21 for a definition of receiver. The receiver may support various components and may be included in assemblies known by such terms as the fire control module and the bolt carrier group.

## 5 Essential functions and malfunctions

### 5.1 Essential functions

- 5.1.1 The five essential functions enumerated below represents the core operational functions that patrol rifles 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 patrol rifle.
- 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 patrol rifle shall feed and properly chamber each individual round/cartridge without inducing a stoppage that requires corrective action.
- 5.1.1.4 The patrol rifle 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 rifle without inducing a stoppage that requires corrective action.
- 5.1.1.5 The patrol rifle 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 patrol rifle, 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.
  - *patrol rifle* – malfunction induced by the patrol rifle 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 rifle to operational status.

5.3.2 The type of corrective action required to return the patrol rifle 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 Class 1 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 receiver, cycle the action (i.e., retract bolt fully to the rear and release, allowing the bolt to return to battery under full recoil spring tension), and fire the patrol rifle.

5.3.3.2 Lock the bolt to the rear, remove the magazine, cycle the action twice, lock the bolt to the rear, insert the magazine, release the bolt, and fire the patrol rifle.

### 5.4 Malfunctions induced by the patrol rifle or magazine

5.4.1 For any stoppage attributed to a malfunction induced by the patrol rifle 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 patrol rifle or magazine shall constitute failure of the patrol rifle 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 patrol rifle or magazine.

**5.4.5** The barrel, receiver, bolt/breechblock, or bolt carrier shall not be replaced at any time during testing.

<p><b>5.4.6</b> Failure of the barrel, receiver, bolt, or bolt carrier shall constitute failure of the rifle model to meet the requirements of this standard.</p>
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## 6 Functional requirements

### 6.1 Acceptance criteria for patrol rifle models

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

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

### 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 patrol rifle.

**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** Patrol rifle 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 patrol rifles 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 patrol rifles 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><b>6.2.6</b> Failure of any individual test item to meet any of the requirements of this chapter shall constitute a failure of the rifle model to meet the requirements of this standard.</p>
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### **6.3 Surface quality and presence of particles**

**6.3.1** The patrol rifle 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 patrol rifle.

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

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

### **6.5 Headspace**

**6.5.1** The headspace shall be in accordance with SAAMI specifications, NATO STANAGs, or other specifications for the caliber for which the patrol rifle is chambered.

**6.5.2** Test items shall be evaluated in accordance with Section 9.3.

### **6.6 Charging and bolt**

**6.6.1** The charging mechanism should operate smoothly without binding or sticking.

**6.6.2** The bolt shall achieve battery without manual assistance.

**6.6.4** Test items shall be evaluated in accordance with Section 9.4.

### **6.7 Magazines**

**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 patrol rifle is in a horizontal orientation with respect to the ground (i.e., the barrel is parallel to the ground) and when the bolt is fully to the rear, 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 9.4.

## **6.8 Cycle of operation**

- 6.8.1 The normal cycle of operation is understood to include feeding, chambering, locking, firing a cartridge, and unlocking, followed by extraction and ejection of a case.
- 6.8.2 Patrol rifles shall complete the cycle of operation without a malfunction induced by either the rifle or magazine when fired by an operator in a typical shooting stance using 60 rounds.
- 6.8.3 The ejection pattern should be consistent and should not be erratic.
- 6.8.4 When the rifle 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 9.5.

## **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  $\pm 1.50$  lb ( $\pm 6.67$  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 9.6.

## **6.10 Safety features**

- 6.10.1 User manipulated safety devices shall be designed so that the patrol rifle can be made fire-ready by releasing the safety devices or toggling the fire selector with the firing hand.
- 6.10.2 Test items shall be evaluated in accordance with Section 9.7.

## 7 Performance requirements

### 7.1 Acceptance criteria for rifle 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)
- Patrol rifle 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)

### 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 patrol rifles
- Precision grouping: Same test items used for endurance testing
- Point of aim/point of impact: Same test items used for endurance testing
- Patrol rifle drop: Three patrol rifles
- High temperature exposure: Three patrol rifles
- Low temperature exposure: Three patrol rifles
- Salt water exposure: Three patrol rifles
- Sand exposure: Three patrol rifles

7.2.3 Patrol rifle 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 patrol rifles 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 patrol rifles 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:** Patrol rifle 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 rifle model to meet the requirements of this standard.

### **7.3 Precision grouping**

- 7.3.1 Patrol rifles shall demonstrate a maximum mean radius of 2 inches for the group size at 100 yards from a supported position or using a mechanical fixture.
- 7.3.2 Patrol rifles shall demonstrate an extreme spread of 4 inches or less (i.e., the maximum shot-to-shot distance shall be 4 inches) at 100 yards from a supported position or using a mechanical fixture.
- 7.3.3 Test items shall be evaluated in accordance with Section 9.8.

### **7.4 Point of aim/point of impact**

- 7.4.1 Patrol rifles shall demonstrate a maximum point of impact 4 inches from the point of aim at 100 yards from a supported position or using a mechanical fixture.
- 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 9.9.

## 7.5 Endurance

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

7.5.2 Patrol rifles 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 patrol rifle or magazine.

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

7.5.5 Three test items shall be evaluated in accordance with Section 9.10.

7.5.6 Data from multiple test items shall not be pooled.

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

## 7.6 Patrol rifle drop

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

7.6.2 Test items shall be evaluated in accordance with Section 9.11.

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

7.6.4 Any malfunctions induced by the rifle or magazine shall constitute a failure of the rifle 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 Patrol rifles 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 9.12.

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

#### **7.8 High temperature exposure**

7.8.1 Patrol rifles shall not malfunction after exposure to high temperatures.

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

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

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

#### **7.9 Low temperature exposure**

7.9.1 Patrol rifles shall not malfunction after exposure to low temperatures.

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

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

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

#### **7.10 Salt water exposure**

7.10.1 Patrol rifles shall not malfunction after exposure to salt water.

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

7.10.3 Three test items shall be evaluated.

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

#### **7.11 Sand exposure**

7.11.1 Patrol rifles shall not malfunction after exposure to sand.

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

7.11.3 Three test items shall be evaluated.

- 7.11.4** Any malfunctions induced by the rifle or magazine shall constitute a failure of the rifle 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 or specifications published by SAAMI, NATO, or other cognizant organizations for the caliber of rifle 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 Z299.4 – 2015 or a subsequent standard or specification, or NATO STANAG.
- 8.3** Ammunition used for testing in widely used law enforcement rifle calibers shall use projectiles in commonly used bullet weights in the following ranges:
- .223 Remington: 45 gr to 77 gr
  - 5.56x45mm NATO (STANAG 4172): 45 gr to 77 gr
  - .308 Winchester: 120 gr to 200 gr
  - 7.62x51mm NATO: (STANAG 2310): 120 gr to 200 gr
- 8.4** Ammunition used for testing in widely used law enforcement rifle calibers shall use projectiles traveling at velocities to achieve a power factor in the following ranges:<sup>14,15</sup>
- .223 Remington: 170 – 250 kgr · ft/s
  - 5.56x45mm NATO (STANAG 4172): 170 – 250 kgr · ft/s
  - .308 Winchester: 170 – 250 kgr · ft/s
  - 7.62x51mm NATO (STANAG 2310): 170 – 250 kgr · ft/s
- 8.5** Ammunition shall use projectiles that exhibit controlled expansion suitable for law enforcement use.

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<sup>14</sup> 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.

<sup>15</sup> Velocities used to calculate power factor are from ANSI/SAAMI Z299.3 – 2015 velocity and pressure data.

.223 Remington :  $55 \text{ gr} * 3,215 \text{ ft/s} \div 1000 \cong 177 \text{ kgr} \cdot \text{ft/s}$   
 $77 \text{ gr} * 2,785 \text{ ft/s} \div 1000 \cong 214 \text{ kgr} \cdot \text{ft/s}$

.308 Winchester:  $150 \text{ gr} * 2,980 \text{ ft/s} \div 1000 \cong 177 \text{ kgr} \cdot \text{ft/s}$   
 $200 \text{ gr} * 2,785 \text{ ft/s} \div 1000 \cong 214 \text{ kgr} \cdot \text{ft/s}$

- 8.6** Ammunition used for testing shall be manufactured of new, unfired materials and components and 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 patrol rifles in accordance with this chapter, verify that rifles are unloaded, and only load rifles 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 patrol rifle.
- 9.1.2 When a stoppage occurs, the operator shall cease firing and alert the testing supervisor.
- 9.1.3 The testing supervisor in consultation with the operator shall determine the cause of the stoppage.
  - 9.1.3.1 All stoppages shall be attributed to one of the categories listed in Section 5.2.2 prior to any corrective action being taken.
  - 9.1.3.2 The type of corrective action taken to clear the stoppage shall use the classification in Section 5.3.2.
  - 9.1.3.3 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.
- 9.1.4 All test results and observations shall be documented and reported.
  - 9.1.4.1 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.
  - 9.1.4.2 The round count at each testing event shall be recorded.
  - 9.1.4.3 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 patrol rifle that could adversely affect its operation.
- 9.2.2 Examine the rifle for any surface anomalies, such as chips, scratches, burrs, sharp edges, rust spots, or corners that could cut any part of the shooter that is normally in contact with the patrol rifle while firing or during manual cycling of the patrol rifle.
- 9.2.3 Record and photograph the presence and location of any surface anomalies.
- 9.2.4 Examine the rifle 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 patrol rifle.
- 9.2.6 Remove or clean any particles found inside the patrol rifle.

## 9.3 Headspace

- 9.3.1 This test shall be used to measure the headspace of a patrol rifle.
- 9.3.2 The headspace gauges to be used in this testing shall be commercially available hardened steel gauges used to verify the headspace of patrol rifles firing from a locked breech condition.
  - 9.3.2.1 The “Go” gauge verifies that the headspace of the patrol rifle is equal to or greater than the minimum headspace for the caliber for which the patrol rifle is chambered.
  - 9.3.2.2 The “No-Go” gauge verifies that the headspace of the patrol rifle is not greater than the maximum headspace for the caliber for which the rifle is chambered.

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

- 9.3.3 Verify that the extractor does not prevent the bolt from reaching its “forwardmost” position.
  - 9.3.3.1 If the extractor does catch on the gauge, manipulate the bolt until the extractor slides over the rim of the gauge, permitting the bolt to move to its “forwardmost” position.

- 9.3.4 Examine the firing mechanism of the patrol rifle to determine if the bolt 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.
- 9.3.5 Verify that the headspace of the patrol rifle meets the headspace requirements of this standard (Section 6.5) in the following manner:
  - 9.3.5.1 Insert a “Go” headspace gauge into the chamber.
  - 9.3.5.2 Release the bolt slowly until the bolt stops and verify that the bolt reached its mechanically locked position.
  - 9.3.5.3 Remove the “Go” headspace gauge, and install a “No-Go” headspace gauge into the chamber.
  - 9.3.5.4 Release the bolt slowly until the bolt stops and verify that the bolt did not reach its mechanically locked position.
- 9.3.6 Record any instance where the test item does not meet the headspace requirements of this standard (Section 6.5).
- 9.3.7 If the patrol rifle does not use conventional headspace gauges as described in this section, the patrol rifle supplier shall include in the documentation in Section 4.16 a procedure to measure the chamber dimensions and shall supply any unique tools required for that specific measurement technique.

## **9.4 Loading and unloading**

- 9.4.1 This test shall be used to assess the operation of loading and unloading a patrol rifle and the major components involved.
- 9.4.2 Identify magazines with a unique letter or number (e.g., A, B, C; 1, 2, 3).
- 9.4.3 Check charging operation.
  - 9.4.3.1 On an unloaded patrol rifle with the magazine removed, retract the bolt fully to the rear and release, allowing the bolt to return to battery.
  - 9.4.3.2 Verify that it has locked into the battery position.
  - 9.4.3.3 Record any sticking, binding, grittiness, or hesitation.
- 9.4.4 Check proper seating and release of magazines.
  - 9.4.4.1 Insert an unloaded magazine into the patrol rifle.

- 9.4.4.2 Verify that the magazine properly seats in the magazine well.
- 9.4.4.3 Actuate the magazine release to remove the magazine.
- 9.4.4.4 Record any binding or sticking when inserting or removing/dropping the magazine.
- 9.4.5 Check inserting a fully loaded magazine and chambering a round.
  - 9.4.5.1 Load a magazine to its full stated capacity with ammunition.
  - 9.4.5.2 Record any problems loading the magazine.
  - 9.4.5.3 Point the patrol rifle at a bullet trap or other suitable device.
  - 9.4.5.4 Insert loaded magazine into the patrol rifle.
  - 9.4.5.5 Verify that the magazine properly seats in the magazine well.
  - 9.4.5.6 Record any binding or sticking when inserting the magazine.
  - 9.4.5.7 Retract the bolt fully to the rear and release, allowing the bolt to strip a round from the magazine and return to battery.
  - 9.4.5.8 Verify that the bolt has returned to battery.
  - 9.4.5.9 Record any sticking, binding, grittiness, or hesitation when charging.

## **9.5 Cycle of operation**

- 9.5.1 This test shall be used to assess the cycle of operation of a patrol rifle.
- 9.5.2 A video shall be recorded of the test.
- 9.5.3 Sixty (60) rounds are required for the test.
- 9.5.4 Load each magazine with ammunition to its maximum stated capacity. If the the magazine capacity does not yield an equal number of fully loaded magazines for the quantity of ammunition to be fired, only the last magazine may be partially loaded.
- 9.5.5 Fire 60 rounds through the patrol rifle.
  - 9.5.5.1 Firing shall take no longer than 2 minutes.

- 9.5.5.2 Load the first magazine into the rifle on an empty chamber with a closed bolt.
- 9.5.5.3 Fire the patrol rifle fire into a bullet trap or other suitable device until the magazine is empty.
- 9.5.5.4 Remove the magazine.
- 9.5.5.5 Immediately reload with the second magazine.
- 9.5.5.6 Fire the patrol rifle into a bullet trap or other suitable device until the magazine is empty.
- 9.5.5.7 Remove the magazine.
- 9.5.5.8 Immediately reload with the third magazine.
- 9.5.5.9 Fire the patrol rifle into a bullet trap or other suitable device until the magazine is empty.
- 9.5.5.10 Remove the magazine.
- 9.5.6 All test results and observations shall be documented and reported.
  - 9.5.6.1 Record whether each magazines drop freely from the patrol rifle.
  - 9.5.6.2 Record whether any cases strike the operator in the head or torso.
  - 9.5.6.3 Record any peculiarities regarding operation of the patrol rifle, such as sticking, binding, grittiness, or hesitation of any component.

## **9.6 Trigger**

- 9.6.1 This test shall be used to determine the trigger pull weight of a rifle.
- 9.6.2 The trigger pull weight shall be measured using NRA Official Universal Trigger Weight System (i.e., "NRA weights").
- 9.6.3 The unloaded rifle shall be mounted in a fixture with the barrel vertical and the muzzle up.
- 9.6.4 With the rifle 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°.
- 9.6.5 The trigger pull weight shall be measured in the following manner.
  - 9.6.5.1 Apply a 3 ¼ lb. load to the trigger.

- 9.6.5.2 Increase the load in  $\frac{1}{4}$  lb. increments until 10.0 lb. has been applied or until the rifle fires on the empty chamber.
- 9.6.5.3 When adding a new increment of weight, cycle the rifle to reset all components and mechanisms.
- 9.6.5.4 Record the load that causes the rifle to fire.
- 9.6.5.5 Conduct this measurement five times.
- 9.6.5.6 To expedite the measurement, coarse measurement may be done using an 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 9.6.5.2 through 9.6.5.5.

## 9.7 Safety features

- 9.7.1 This test shall be used to assess the operation of the safety features of a patrol rifle.
- 9.7.2 Obtain from the rifle manufacturer a description of the design feature(s) included in the rifle to ensure that the rifle 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.
- 9.7.3 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.
  - 9.7.3.1 Chamber a primed case (no propellant or projectile) and attempt to fire the patrol rifle, with the safety device engaged, into a bullet trap or other suitable device to determine whether the round discharges.
  - 9.7.3.2 If a patrol rifle has more than one safety device, disengage all but one to conduct the test.
  - 9.7.3.3 Repeat using the second safety device independently.
  - 9.7.3.4 Continue in this manner until all safety devices have been tested independently.

- 9.7.4 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 patrol rifle supplier.
- 9.7.5 In some designs, safety devices may be integrated into the design of the patrol rifle in such a way as to be inaccessible to or not manipulate 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.
- 9.7.6 Record any instance of a safety feature malfunctioning.

## **9.8 Precision grouping**

- 9.8.1 This test shall be used to determine the precision of the patrol rifle at a relevant tactical range.
- 9.8.2 Five groups of five shots shall be fired.
- 9.8.3 A suitable target positioned at a range of 100 yards shall be used to record each group.
- 9.9.4 A new target shall be used for each group.
- 9.8.5 Firing should be done indoors at typical ambient conditions when indoor range facilities exist.
- 9.8.6 Firing may be done outdoors during mild weather conditions.
  - 9.8.6.1 The temperature should be between 54°F and 86°F (12°C and 30°C).
  - 9.8.6.2 The relative humidity should be between 30% and 70%.
  - 9.8.6.3 Wind parallel and transverse to the line of fire should not exceed 10 mph or vary by more than 5 mph (i.e., wind should not be more than a light breeze).
  - 9.8.6.4 Firing should not be done when wind gusts are present.
  - 9.8.6.5 Firing should not be done when precipitation exists (e.g., rain, hail, mist, or fog).
  - 9.8.6.6 The meteorological conditions shall be recorded.
- 9.8.7 The test item shall be fired from a supported position or mechanical fixture.
- 9.8.8 The test item shall be zeroed in accordance with the supplier's instructions.

- 9.8.9 The centroid of each five-shot group shall be computed.
- 9.8.10 The mean radius of each five-shot group shall be computed with respect to its centroid.
- 9.8.11 The shot center-to-center distances shall be measured for each five-shot group and recorded.

## **9.9 Point of aim/point of impact**

- 9.9.1 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.
- 9.9.2 Five groups of five shots shall be fired.
- 9.9.3 A target of crosshair design shall be positioned at a range of 100 yards to record the groups.
- 9.9.4 A new target shall be used for each group.
- 9.9.5 Firing should be done indoors at typical ambient conditions when indoor range facilities exist.
- 9.9.6 Firing may be done outdoors during mild weather conditions.
  - 9.9.6.1 The temperature should be between 54°F and 86°F (12°C and 30°C).
  - 9.9.6.2 The relative humidity should be between 30% and 70%.
  - 9.9.6.3 Wind parallel and transverse to the line of fire should not exceed 10 mph or vary by more than 5 mph (i.e., wind should not be more than a light breeze).
  - 9.9.6.4 Firing should not be done when wind gusts are present.
  - 9.9.6.5 Firing should not be done when precipitation exists (e.g., rain, hail, mist, or fog).
  - 9.9.6.6 The meteorological conditions shall be recorded.
- 9.9.7 Firing shall be done from a supported position or a mechanical fixture.
- 9.9.8 The test item shall be zeroed in accordance with the patrol rifle supplier's instructions.
  - 9.9.8.1 The sights shall not be at the maximum point of the adjustable area to achieve the point of impact requirement.

- 9.9.8.2** 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 patrol rifle 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.

- 9.9.7** An optical or laser bore sight may be used as necessary to check alignment to the target aiming point.
- 9.9.8** Sight alignment shall be checked before each shot is fired.
- 9.9.9** The distance between point of impact and point of aim shall be measured for each shot and recorded.

## **9.10 Endurance**

- 9.10.1** This test shall be used to assess the durability and reliability of the patrol rifle 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.

- 9.10.2** 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.
- 9.10.3** 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.
- 9.10.4** Magazines shall be included in the endurance testing.
- 9.10.4.1** Only three magazines shall be used for the first 5,000 rounds.
- 9.10.4.2** Additional magazines may be used for the second 5,000 rounds.
- 9.10.5** The basic firing cycle for test items shall be defined according to the following.

- 9.10.5.1 Two hundred fifty (250) rounds shall be fired.
- 9.10.5.2 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.
- 9.10.5.3 Fire into a bullet trap or other suitable device until the magazine is empty.
- 9.10.5.4 Reload and continue firing until the basic firing cycle is complete.
- 9.10.5.5 The basic firing cycle shall take no greater than 40 minutes.
- 9.10.6 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:** Patrol rifle suppliers should develop the firing procedure in coordination with a firearms testing laboratory.

- 9.10.6.1 Ten thousand rounds (10,000) shall be fired.
- 9.10.6.2 The test item shall be field stripped, cleaned, and lubricated at the beginning of endurance testing before any shots have been fired.
- 9.10.6.3 Headspace measurement shall be performed in accordance with Section 9.3 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.
- 9.10.6.4 Trigger pull weight testing shall be performed in accordance with Section 9.6 at the beginning of endurance testing before any shots have been fired and at the end after 10,000 rounds have been fired.
- 9.10.6.5 Precision grouping testing shall be performed in accordance with Section 9.8 at the beginning of endurance testing and at the end of the 10,000 round count.
- 9.10.6.6 Point of aim/point of impact 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.
- 9.10.6.7 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.

- 9.10.6.8 Basic firing cycles shall be fired in accordance with Section 9.10.5.
- 9.10.6.9 The test item may not be cleaned until the initial 1,000 rounds have been fired.
- 9.10.6.10 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.
- 9.10.6.11 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).
- 9.10.6.12 Parts may be replaced in accordance with the patrol rifle's PMS.
- 9.10.6.13 The replacement of parts per the patrol rifle's PMS shall not constitute a patrol rifle malfunction.
- 9.10.6.14 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.
- 9.10.6.15 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.
- 9.10.7 The firing procedure developed in accordance with 9.10.6 shall be completed for the test item.
- 9.10.8 All test results and observations shall be documented and reported in accordance with 9.5.6.

## 9.11 Patrol rifle drop test

- 9.11.1 This test shall be used to assess the operation of the patrol rifle 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 patrol rifle is being used for multiple tests.

- 9.11.2 The test item shall be dropped onto a clean, level concrete surface.
  - 9.11.2.1 A flat, hardened concrete surface with a thickness of at least 3 inches (76.2 mm) shall be used.
  - 9.11.2.2 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).

**9.11.3** 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.

**9.11.4** 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.

**9.11.6** The test item shall be dropped from a fixture. One fixture found to be suitable consists of a short piece of string with the rifle attached at one end and the other end held in an air vise until the drop is initiated.

**9.11.7** 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.

**9.11.8** All safety devices shall be disengaged. However, if the design of the patrol rifle is such that upon leaving the hand a safety device is automatically applied by the patrol rifle as a matter of normal operation, this feature shall not be defeated.

**9.11.9** A video shall be recorded of each drop to verify the proper impact orientation.

- 9.11.10** The test item shall be chambered with a primed but otherwise empty cartridge.
- 9.11.10.1** Open the action by retracting the bolt/breechblock and lock it in the rear position.
- 9.11.10.2** Insert a primed case (no powder or projectile) into the chamber.
- 9.11.10.3** Release the bolt/breech block, allowing it to achieve battery under the impetus of the recoil spring.
- 9.11.11** In addition to the primed empty cartridge in the chamber, the firearm shall be loaded to capacity with ammunition.
- 9.11.12** The test item shall be dropped and the primer shall be examined.
- 9.11.12.1** Place the test item in the drop fixture.
- 9.11.12.2** Drop the test item from a height of 5 ft. (1.524 m) in the first orientation specified in Section 9.12.5.
- 9.11.12.3** After the drop, inspect the test item for damage.
- 9.11.12.3** Examine the primer for indentations after the drop. Firing of the primer due to dropping constitutes failure of the test.
- 9.11.12.4** Fire the primed case to verify that the primer would have gone off.
- 9.11.13** 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.
- 9.11.14** Fire the fully loaded magazine.
- 9.11.14.1** Fire the patrol rifle into a bullet trap or other suitable device until the magazine is empty.
- 9.11.14.2** Eject the magazine.
- 9.11.15** 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.
- 9.11.16** Repeat 9.12.14.
- 9.11.17** 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.

9.11.18 Repeat 9.12.14.

9.13.7 All test results and observations shall be documented and reported in accordance with 9.5.6.

9.11.19.1 Record the condition of the primed cartridge after each drop.

9.11.19.2 Record any damage noted during inspection.

## 9.12 Magazine drop test

9.12.1 This test shall be used to assess the operation of the patrol rifle 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.

9.12.2 Magazines 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 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.

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

1. On base plate
2. On feed lips

9.12.5 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.

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

- 9.12.7** Three unloaded magazines shall be dropped.
- 9.12.7.1** Place the first unloaded magazine in the drop fixture.
- 9.12.7.2** Drop the magazine from a height of 5 ft. (1.524 m) in the first orientation specified in Section 9.12.4.
- 9.12.7.3** After the drop, inspect the magazine for damage.
- 9.12.7.4** Place the magazine back in the drop fixture.
- 9.12.7.5** Drop the magazine from a height of 5 ft. (1.524 m) in the second orientation specified in Section 9.12.4.
- 9.12.7.6** After the drop, inspect the test item for damage.
- 9.12.7.7** Repeat 9.12.7.1 through 9.12.7.6 with the other two unloaded magazines.
- 9.12.8** Fully load the three magazines dropped in 9.12.7.
- 9.12.9** Fire the fully loaded magazines dropped in 9.12.7 in accordance with 9.5.5.
- 9.12.10** Three partially loaded magazines shall be dropped.
- 9.12.10.1** 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).
- 9.12.10.2** Place the first partially loaded magazine in the drop fixture.
- 9.12.10.3** Drop the magazine from a height of 5 ft. (1.524 m) in the first orientation specified in Section 9.12.4.
- 9.12.10.4** 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.
- 9.12.10.5** Place the magazine back in the drop fixture.
- 9.12.10.6** Drop the magazine from a height of 5 ft. (1.524 m) in the second orientation specified in Section 9.12.4.
- 9.12.10.7** 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.

- 9.12.10.8 Repeat 9.12.10.2 through 9.12.10.7 with the other two partially loaded magazines.
- 9.12.11 Fire the partially loaded magazines dropped in 9.12.10 in accordance with 9.5.5.
- 9.12.12 Three fully loaded magazines shall be dropped.
  - 9.12.12.1 Load the three magazines to their stated capacity.
  - 9.12.12.2 Place the first fully loaded magazine in the drop fixture.
  - 9.12.12.3 Drop the magazine from a height of 5 ft. (1.524 m) in the first orientation specified in Section 9.12.4.
  - 9.12.13.4 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.
  - 9.12.12.5 Place the magazine back in the drop fixture.
  - 9.12.12.6 Drop the magazine from a height of 5 ft. (1.524 m) in the second orientation specified in Section 9.12.4.
  - 9.12.12.7 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.
  - 9.12.12.8 Repeat 9.12.12.2 through 9.12.12.7 with the other two fully loaded magazines.
- 9.12.13 Fire the fully loaded magazines in accordance with 9.5.5.
- 9.12.14 All test results and observations shall be documented and reported in accordance with 9.5.6.

### **9.13 High temperature exposure**

- 9.13.1 This test shall be used to determine the effect of high temperature exposure on the performance of a patrol rifle.
- 9.13.2 This test is the cycle of operation test (Section 9.5) with specific environmental conditioning prior to firing.
- 9.13.3 Prior to conditioning, the test firearm shall be cleaned and lubricated with a lubricant specified for high temperatures.

- 9.13.4 Prepare for testing in accordance with 9.5.2 through 9.5.4.
- 9.13.5 Prior to firing, the patrol rifle and magazines shall be conditioned in a climatic chamber for at least 12 hours at no less than 120°F (49°C).
- 9.13.6 After 12 hours, the operator shall remove the patrol rifle and magazines from the climatic chamber with gloves and immediately begin firing in accordance with 9.5.5.
  - 9.13.6.1 Fire from either a supported position or a mechanical fixture.
- 9.13.7 All test results and observations shall be documented and reported in accordance with 9.5.6.
  - 9.13.7.1 Record the conditioning temperature and exposure time.

#### **9.14 Low temperature exposure**

- 9.14.1 This test shall be used to determine the effect of low temperature exposure on the performance of a patrol rifle.
- 9.14.2 This test is the cycle of operation test (Section 9.5) with specific environmental conditioning prior to firing.
- 9.14.3 Prior to conditioning, the test firearm shall be cleaned and lubricated with a lubricant specified for low temperatures.
- 9.14.4 Prepare for testing in accordance with 9.5.2 through 9.5.4.
- 9.14.5 Prior to firing, the patrol rifle and magazines shall be conditioned in a climatic chamber for at least 12 hours at no greater than -20°F (-29°C).
- 9.14.6 After 12 hours, the operator shall remove the patrol rifle and magazines from the climatic chamber with gloves and immediately begin firing in accordance with 9.5.5.
  - 9.14.6.1 Fire from either a supported position or a mechanical fixture.
- 9.14.7 All test results and observations shall be documented and reported in accordance with 9.5.6.
  - 9.14.7.1 Record the conditioning temperature and exposure time.

## 9.15 Salt water exposure

- 9.15.1** This test is to determine the effect of salt water exposure on the performance of a patrol rifle.
- 9.15.2** 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.
- 9.15.3** The temperature of the water shall be 64°F ±9°F (18°C ±5°C).
- 9.15.4** The water shall contain 5% ±1% NaCl (w/w).
- 9.15.5** A video shall be recorded of the test.
- 9.15.6** The test item shall be field stripped, cleaned, and lubricated in accordance in accordance with the patrol rifle supplier's instructions at the beginning of testing prior to any conditioning or firing.
- 9.15.6.1** 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.
- 9.15.6.2** Additional sealing, taping, caulking, or other means to resist water leakage shall not be used on the test firearm.
- 9.15.7** Insert a fully loaded magazine into the patrol rifle with an empty chamber.
- 9.15.8** Immerse test items for a depth of 6 inches for 1 minute.
- 9.15.9** Remove from the water and drain for 15 seconds.
- NOTE:** Water contained inside rifle can cause catastrophic failure. The muzzle should be pointed at the ground and the bolt fully retracted and released to drain the water.
- 9.15.10** Immediately charge a round, then fire into a bullet trap or other suitable device from either a supported position or a mechanical fixture until the magazine is empty within 1 minute.
- 9.15.11** 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.
- 9.15.12** After 24 hours, remove the test item from the environmental chamber.
- 9.15.13** Immediately eject the magazine, fully reload the magazine, and insert into the patrol rifle.

- 9.15.14 Immediately fire into a bullet trap or other suitable device until the magazine is empty within 1 minute.
- 9.15.15 At the end of firing, immediately disassemble the patrol rifle and thoroughly inspect for corrosion.
- 9.15.16 All test results and observations shall be documented and reported in accordance with 9.5.6.
  - 9.15.16.1 Record the immersion container dimensions, the position of the test item while in the immersion container, the water temperature, and immersion time.
  - 9.15.16.2 Record the environmental chamber dimensions, the position of the test item while in the chamber, the chamber temperature, relative humidity, and exposure time.
  - 9.15.16.3 Record any corrosion noted during inspection.

## **9.16 Sand exposure**

- 9.16.1 This test is to determine the effect of sand exposure on the performance of rifles.
- 9.16.2 A container that can achieve a complete covering of sand on all sides of the test item shall be used.
- 9.16.3 The sand shall conform to ASTM C144.
- 9.16.4 The test item shall be field stripped, cleaned, and lubricated in accordance in accordance with the patrol rifle supplier's instructions at the beginning of testing prior to any conditioning or firing.
  - 9.16.4.1 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.
  - 9.16.4.2 Additional sealing, taping, caulking, or other means to resist sand penetration shall not be used on the test firearm.
- 9.16.5 Insert a fully loaded magazine into the patrol rifle with an empty chamber.
- 9.16.6 Close the ejection port cover on the rifle, if equipped.
- 9.16.7 Cover the test item completely in sand and allow to stand for 1 minute.

- 9.16.8** Remove the test item from the sand and shake it off for 15 seconds.
- 9.16.9** Immediately charge a round, then fire into a bullet trap or other suitable device from either a supported position or a mechanical fixture until the magazine is empty within 1 minute.
- 9.16.10** All test results and observations shall be documented and reported in accordance with 9.5.6.