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AnAmerican National Standard

Standard Specification for Low Energy Air Guns (Less Than 1 Joule)[1]

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INTRODUCTION

To perform as intended, a low energy air gun requires a level of power which, if misused, can cause serious injury. This specification is intended to reduce the hazards associated with low energy air gun use. This specification cannot control careless use or eliminate all hazards of misuse. Terminology is standardized in this specification, so that conforming products will be identified in the same manner, and critical dimensions are standardized to assure safe interchangeability of projectiles in all conforming low energy air guns. Product performance hazards are identified and requirements are established to minimize these hazards. This specification is written within the current state-of-the-art of low energy air gun technology. The intent is to revise this specification whenever substantive information becomes available which justifies revising existing requirements or adding new requirements.

1. Scope

1.1 This specification covers low energy air guns which propel a projectile by means of 1 joule or less of energy released by compressed air, compressed CO_2, mechanical springs, battery or a combination thereof, used in the sport commonly called airsoft or air soft, and is to be used in conjunction with Specification F2654.

1.2 *Limitations*—This specification does not cover the following types of products: Non-powder guns as specifically defined in Consumer Safety Specification F589 and which are commonly referred to as BB or pellet guns; paintball markers as specifically defined in Specification F2272; low energy air guns which propel a projectile by energy of over 1 joule or use gas propulsion other than CO_2; toy products; and non-recreational air guns, for example, those used by law enforcement, scientific, military, industrial, or theatrical entities.

1.3 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

F589 Consumer Safety Specification for Non-Powder Guns

F2272 Specification for Paintball Markers

F2654 Specification for Low Energy Air Gun (LEAG) Warnings

F2679 Specification for 6 mm Projectiles Used with Low Energy Air Guns

2.2 *Code of Federal Regulations:*[3]

15 CFR 1150 Marking of Toy, Look-Alike and Imitation Firearms

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *backstop, n*—object intended to stop a low energy air gun projectile.

3.1.2 *barrel, n*—that portion of a low energy air gun through which the projectile is discharged.

3.1.3 *cocking, v*—action that allows the user to store manual energy.

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[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401, http://www.access.gpo.gov.

3.1.4 *hammer, n*—device which, when released, discharges the stored energy.

3.1.5 *hop-up, n*—device that changes the spin on a projectile to affect its trajectory.

3.1.6 *low energy air gun (LEAG), n*—commonly referred to as airsoft gun or air soft gun, a device specifically designed to expel a low energy air gun projectile, by the release of energy by compressed air, compressed CO_2, mechanical springs, battery, or a combination thereof, at an energy level at 1.0 joule or lower.

3.1.7 *magazine, n*—device used in a low energy air gun to store projectiles.

3.1.8 *projectile (LEAG projectile), n*—spherical, commonly 6 mm (.24 cal), non-metallic and non-liquid filled projectile to be used in a low energy air gun, as specifically referred to in Specification F2679.

3.1.9 *propulsion system, combination, n*—propulsion system in which a combination of spring, spring-piston, pneumatic, or gas systems can be used to provide the energy to propel the projectile.

3.1.10 *propulsion system, electronic, n*—propulsion system in which an electronic system is used to provide the energy to propel the projectile.

3.1.11 *propulsion system, gas, n*—propulsion system in which a gas system, including CO_2, is used to provide the energy to propel the projectile. CO_2 propulsion system is a type of gas propulsion system.

3.1.12 *propulsion system, spring-piston (also known as spring-air), n*—propulsion system in which the projectile is propelled by air pressure that is created by a piston moved by a spring.

3.1.13 *propulsion system, pneumatic, n*—propulsion system in which compressed air is stored under pressure and, when released, provides the energy to propel the projectile.

3.1.13.1 *Discussion*—A pneumatic low energy air gun normally has a pump system to provide the compressed air.

3.1.14 *propulsion system, pre-charged pneumatic, n*—propulsion system in which the energy is provided by compressed gas, normally compressed air, stored in a refillable cylinder charged by an external source.

3.1.14.1 *Discussion*—The release of the compressed gas provides the energy to propel the projectile.

3.1.15 *pumping mechanism (pneumatic gun), n*—mechanical device used to compress air.

3.1.16 *range, n*—maximum distance to which an object may be propelled, whether limited by energy or an obstacle.

3.1.17 *safety device, n*—device which, when activated, disables a part of the low energy air gun, usually the trigger, to prevent unintentional discharges and must be released to allow the low energy air gun to be discharged by the movement of the trigger.

3.1.17.1 *Discussion*—The device is sometimes referred to as the "safety," "safety button," or "safety lever." An electronic on/off switch is considered a safety device when placing it in the "off" position renders the low energy air gun inoperable.

3.1.18 *standard ambient temperature and pressure (SATP), n*—used to describe a substance at the pressure of 1 bar (1.01325 atmospheres, 750 mm Hg, 14.5 psi, 100 kPa) and a temperature of 25°C (77°F).

3.1.19 *target, n*—object at which the low energy air gun is discharged.

3.1.20 *trigger, n*—device operated by the user to discharge a low energy air gun.

3.1.21 *trigger guard, n*—rigid, firmly attached component that must totally enclose the trigger area and be wider than the trigger.

3.1.21.1 *Discussion*—There can be no more than 38 mm (1.5 in.) of space from any point on the face of the trigger to the trigger guard, and no more than 13 mm (0.5 in.) from the lowest point of the trigger to the trigger guard. All measurements under this rule are to be taken after excluding any removable attachments to the trigger.

3.1.22 *trigger pull, n*—force required to move the trigger from its start or recycle/reset position to a position that discharges the low energy air gun.

4. Significance and Use

4.1 This specification establishes performance requirements and test methods for low energy air guns.

5. Conformance

5.1 Low energy air guns shall not, either by label or other means, indicate conformance with this specification unless, at the time of manufacture, they conform with all applicable requirements contained herein.

6. General Requirements

6.1 *Literature*—Each low energy air gun shall include the product literature as specified in Specification F2654.

6.2 *Packaging*—The packaging of each low energy air gun shall comply, as applicable, with Specification F2654.

6.3 *Product Marking*—Low energy air guns shall be marked in accordance with Specification F2654.

6.4 *Finish*—The exposed edges of all low energy air guns shall be smooth and free of sharp edges, burrs, and splinters.

6.5 *Shipping:*

6.5.1 Each low energy air gun shall be shipped in an unloaded, uncharged, and uncocked condition.

6.5.2 All low energy air guns must shoot at an energy level under 1.0 joules at the time of shipment at SATP.

6.6 *Design:*

6.6.1 All low energy air guns with an exposed trigger shall have a trigger guard.

6.6.2 It is the responsibility of the manufacturer to determine whether federal markings are required on its low energy air guns and to follow all applicable regulations (see 15 CFR 1150).

7. Performance Requirements

7.1 *Low Energy Air Gun Function*—Cocking, pumping, loading, or charging of a low energy air gun shall not cause the

low energy air gun to discharge except in accordance with the manufacturer's instructions. This does not limit the use of "auto-triggers."

7.2 *Safety Device*—Safety devices shall be provided on all low energy air guns and all such devices can be activated whether or not the low energy air gun is cocked. All such devices shall be clearly marked to indicate the "safe" and "fire" or "on" and "off" positions, or an indicator on the safety device which exposes both a red color and a groove when the low energy air gun is in the "fire position." All such devices shall be capable of preventing the low energy air guns from being discharged when a weight of 9.1 kg (20 lb) is applied to the trigger. Tests shall be conducted in accordance with 8.3.

7.3 *Accidental Discharge*—Low energy air guns should not accidentally discharge when exposed to a drop in accordance with 8.4.

7.4 *Trigger Mechanism*—The weight applied to the trigger necessary to fire a low energy air gun shall be more than 1 ± 0.05 lb (0.45 ± 0.09 kg) weight and less than 16 ± 0.20 lb (7.3 ± 0.09 kg). Tests shall be conducted in accordance with 8.5.

7.5 *Barrel Diameter Size*—The barrel diameter (excluding hop-up mechanism) of a low energy air gun must be no less than the maximum size of projectile designed for that low energy air gun (for example, 6 mm for a low energy air gun which will shoot 6 mm projectiles).

7.6 *Structural Integrity Requirement for Low Energy Air Guns Using CO_2 Propulsion Systems*—Low energy air guns using CO_2 propulsion systems shall be constructed to prevent the full or partially filled CO_2 cylinder from being propelled from the gun while the cylinder is being emptied, installed, or removed.

7.7 *Temperature Test for Low Energy Air Guns Using CO_2 Propulsion Systems*—Low energy air guns using CO_2 gas propulsion systems shall be capable of retaining the CO_2 and the cylinder in a pierced state when both are heated to a temperature of 160 ± 5°F (71 ± 2.7°C) and maintained for ½ h without structural failure of the low energy air gun. Tests shall be conducted in accordance with 8.6. Seal failure between the low energy air gun and cylinder is acceptable.

7.8 *Muzzle Energy*—Low energy air guns shall have a muzzle energy of 1.0 joule or less. Tests shall be conducted in accordance with 8.8.

8. Test Methods

8.1 No precision statement on any of the following test methods is available at this time.

8.2 *Low Energy Air Gun Function Test:*

8.2.1 *Significance*—This method is performed to ensure that the low energy air gun, when operated in accordance with the manufacturer's operating instructions, will not discharge except in accordance with the manufacturer's instructions during cocking, pumping, loading, and charging.

8.2.2 *Apparatus:*

8.2.2.1 Manufacturer's operating instructions for the low energy air gun.

8.2.2.2 Projectiles conforming to Specification F2679 and manufacturer's recommended propellants.

8.2.2.3 Appropriate back stop.

8.2.3 *Test Specimen*—The test specimen shall consist of a new low energy air gun, selected in accordance with the manufacturer's usual quality assurance practices.

8.2.4 *Procedure:*

8.2.4.1 Conduct the test at room temperature (60 to 80°F (16 to 27°C)).

8.2.4.2 Insert the manufacturer's recommended propellant (if required) and load the projectile magazine or chamber of a low energy air gun to capacity.

8.2.4.3 Operate the low energy air gun in accordance with the manufacturer's instructions. Test fire the low energy air gun until all the projectiles have been discharged. Reload the low energy air gun, if required, and continue to fire until a minimum of 100 projectiles have been discharged.

8.2.4.4 If a low energy air gun has variable functions (power, hop-up, mode, etc.) test the low energy air gun with at least 10 projectiles for each of the possible combination of such variables.

8.2.4.5 The low energy air gun passes the test if no discharge of a projectile occurred except in accordance with manufacturer's instructions.

8.3 *Safety Device Test:*

8.3.1 *Significance*—This method determines if the safety device will withstand a 9.1 kg (20 lb) applied weight without failure, causing the low energy air gun to discharge.

8.3.2 *Apparatus*—A trigger weight system having a 9.1 ± 0.02 kg (20 ± 0.05 lb) weight. Arrange the weight system so that the weight can be picked up by the trigger of the low energy air gun with the low energy air gun in a vertical position, muzzle up. (A spring gauge, capable of measuring the trigger force, can be used instead of weight system.)

8.3.3 *Test Specimen*—The test specimen shall consist of a new low energy air gun, selected in accordance with the manufacturer's usual quality assurance practices.

8.3.4 *Procedure:*

8.3.4.1 Conduct the test at SATP.

8.3.4.2 Conduct all tests without projectiles in the low energy air gun.

8.3.4.3 Place safety device in "safe" position or the electronic switch in the "off" position.

8.3.4.4 Apply a 9.1 kg (20 lb) load at the center point of the trigger for 20 s with the load applied to the center of the face of the trigger and remove the load.

8.3.4.5 Put safety device in the "fire" position or the electronic switch in the "on" position. The low energy air gun must not discharge as the safety is disengaged.

8.3.4.6 Test the low energy air gun for proper trigger and safety device action.

8.3.4.7 The low energy air gun passes the test if it withstands the load applied without causing it to discharge during the application of the load and does not discharge upon the disengagement of the safety device, and the safety device functions properly after testing.

8.4 *Accidental Discharge Test (Drop Test):*