



# Standard Specification for Low Velocity Projectile Marker<sup>1</sup>

This standard is issued under the fixed designation F2574; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope

1.1 This specification covers low velocity projectile markers (herein referred to as LVP marker) that propel a low velocity resilient material projectile (herein referred to as LVRM projectile as defined in Specification F2573) by means of energy released by compressed air, compressed gas, or a combination thereof, with velocity not to exceed 53.34 m/s (175 ft/s).

1.2 LVRM projectiles are made of a resilient material and have a diameter no smaller than 20 mm (0.7874 in) and no greater than 30 mm (1.18 in.). The hardness of the LVRM projectile is to be no greater than 75 Shore 00. The weight of the LVRM projectile is not to exceed 4.0 g.

1.3 The values stated in SI units are to be regarded as standard. The values given in parentheses are for information only.

1.4 The following precautionary caveat pertains only to the test method portion, Section 8, of this specification. *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:<sup>2</sup>

F1750 Specification for Paintball Marker Threaded-Propellant Source Interface

F1776 Specification for Eye Protective Devices for Paintball Sports

F2573 Specification for Low Velocity Resilient Material Projectile

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<sup>2</sup> 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.

### 2.2 ANSI Standard:<sup>3</sup>

Z535.1 Safety Color Code

## 3. Terminology

### 3.1 Definitions of Terms Specific to This Standard:

3.1.1 *auto-trigger*—trigger that, when held in the discharge position, will automatically cause the LVP marker to discharge when the pump or bolt action is manipulated.

3.1.2 *backstop*—object intended to stop a LVRM projectile.

3.1.3 *barrel*—that portion of a LVP marker through which the LVRM projectile is discharged.

3.1.4 *barrel blocking device*—muzzle blocking safety device that when properly installed, reduces the likelihood of an intact LVRM projectile discharging from the marker or leaving the confines of the barrel blocking device. The device is often referred to as a barrel plug or sleeve.

3.1.5 *cautionary statement*—warning outlined in Section 9 that is to be placed on LVP markers, packaging, and literature.

3.1.6 *disabling device*—device that, when activated, disables a part of the LVP marker, usually the trigger, to prevent unintentional discharges and must be released to allow the marker to be discharged by the movement of the trigger. The device is sometimes referred to as the “safety,” “safety button,” or “safety lever.” An electronic on/off switch is considered a disabling device if when placed in the “off” position, it renders the marker inoperable.

3.1.7 *discharge mode*—mode that controls the number of LVRM projectiles discharged per trigger cycle.

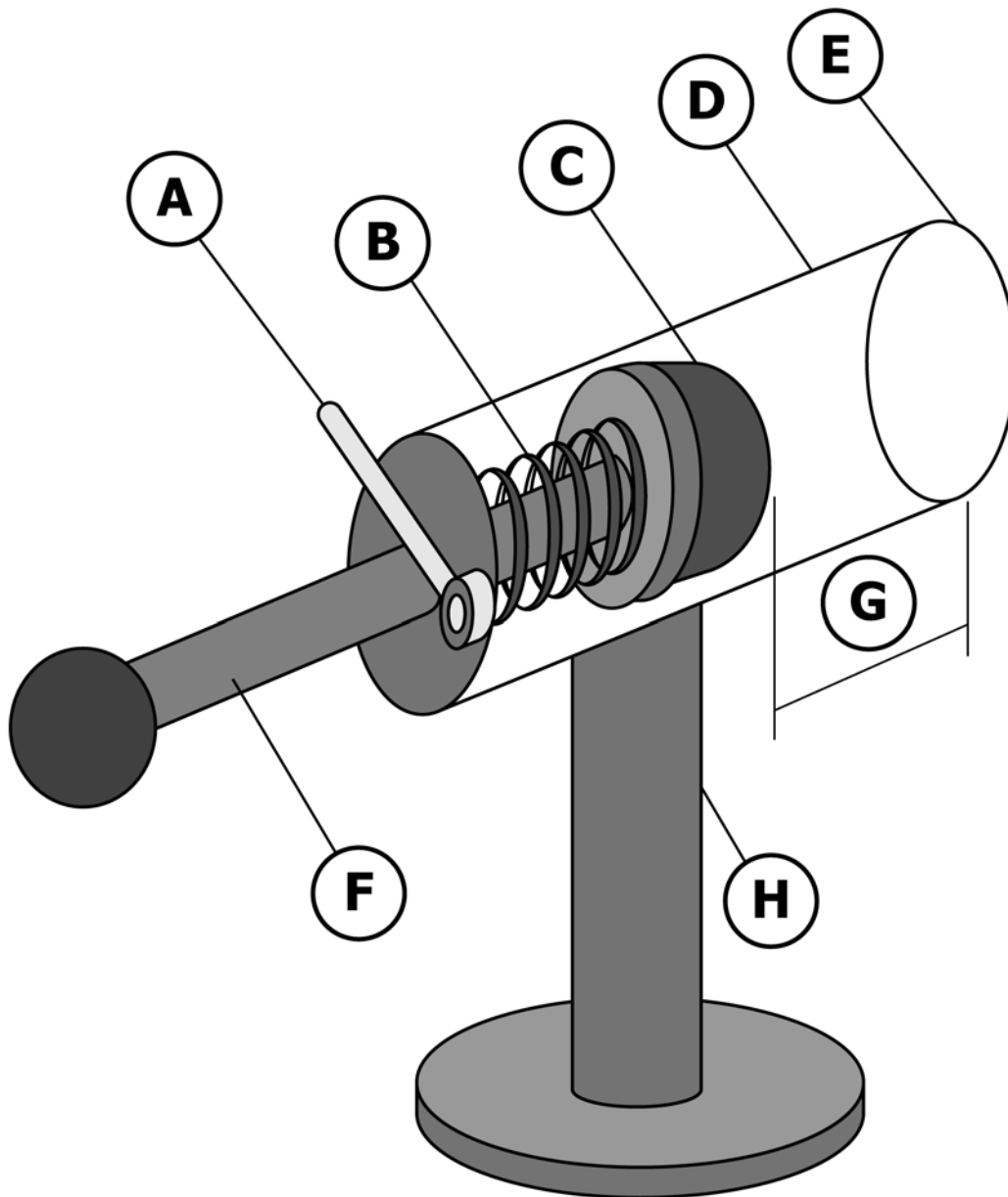
3.1.8 *feed mechanism*—mechanism that stores, transports, and facilitates the loading of LVRM projectiles. It may be gravity, mechanically or air assisted, or automatic in its actions.

3.1.9 *hopper*—device used with a LVP marker to store LVRM projectiles.

3.1.10 *impact tester*—device used to test for accidental discharges of LVP marker. See Fig. 1.

3.1.11 *low velocity resilient material projectile*—object propelled by means of a discharge mechanism, capable of storing and releasing energy under the control of the operator, comprised of a resilient material, and has a diameter no smaller

<sup>3</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036.



- A. Release Latch
- B. Compression Spring (spring rate 1.145 kg/cm or 16.28 lb/in.)
- C. Impact Ball (new pressurized tennis ball with regular felt, total mass of moving parts is 1.13 kg or 2.5 lb)
- D. Plastic tube with 7.62 cm (3 in.) internal diameter
- E. Face placed against marker
- F. Cocking arm
- G. Stroke of 15.21 cm (6 in.)
- H. Secured support base

FIG. 1 Impact Tester

than 20 mm (0.7874 in) and no greater than 30 mm (1.18 in.). The hardness of the low velocity resilient material projectile is to be no greater than 75 Shore 00. The weight is not to exceed 4.0 g.

3.1.12 *low velocity projectile marker*—device specifically designed to discharge low velocity resilient material projectiles.

3.1.13 *pump mode marker*—marker that requires the operator to manually cock or engage the sear of the marker before each shot by a means of a pump, bolt, lever, cocking handle, or similar device.

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

3.1.15 *sear*—catch that holds the mechanism in the ready-to-discharge position until released by the user, usually through trigger movement.

3.1.16 *semi-automatic mode marker*—semi-automatic marker discharges one time with each trigger cycle. Markers that “store” the number of trigger pulls and discharge more than one LVRM projectile at some point do not meet this definition. Markers that operate in any other discharge mode(s) do not meet this definition.

3.1.17 *shore 00*—applicable durometer type scale to measure the hardness of sponge and foam materials.

3.1.18 *standard ambient temperature and pressure (SATP)*—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*—object at which the LVRM projectile shall be discharged.

3.1.20 *trigger*—device operated by the user to discharge a marker.

3.1.21 *trigger cycle*—movement of the trigger through discharge and returning to a reset or recycle position.

3.1.22 *trigger pull*—force required to move the trigger from its start or recycle/reset position to a position that discharges the marker.

## 4. Significance and Use

4.1 This specification establishes performance requirements and test methods for LVP markers.

4.2 This specification identifies the minimum warnings and instructions that are to be provided in literature, on labels, on packaging, and on the marker itself.

## 5. Conformance

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

## 6. Procedure

6.1 *Literature*—Literature shall be provided with each LVP marker and shall include, as applicable, the instructions, cautionary statements, and safety tips specified in Section 11.

6.2 *Packaging*—Packaging shall be labeled in a prominent and conspicuous manner in accordance with the provisions of 10.1.

6.3 *Finish*—The exposed edges of all LVP markers shall be smooth and free of sharp edges and burrs.

### 6.4 *Shipping:*

6.4.1 Each LVP marker shall be shipped in an unloaded and degassed condition.

6.4.2 All LVP markers must shoot at a velocity under 53.34 m/s (175 ft/s) at the time of shipment at SATP.

### 6.5 *Design:*

6.5.1 All LVP markers intended to be used with removable cylinders shall be able to withstand input pressure of 3000

lb/in.<sup>2</sup> 207 bar (3000 psi) without catastrophic failure. Leaking in a manner that would not cause injury to the operator shall not constitute failure in accordance with Specification F1750.

6.5.2 A marker’s performance may not be enhanced, including but not limited to increasing the markers’ velocity without the use of tools or disassembly.

6.5.3 All LVP markers shall only operate in semi-automatic or pump mode and may not operate in other discharge modes.

## 7. Performance Requirements

7.1 *Marker Function*—The cocking or pumping mechanism of a LVP marker shall not cause a marker to discharge unintentionally while a marker is being cocked in accordance with the manufacturer’s instructions. This does not limit the use of “auto-triggers.” Markers shall be a pump or a semi-automatic, or both, as defined in this specification.

7.2 *Disabling Device*—Disabling devices shall be provided on all LVP markers and all such devices shall keep from firing marker whether or not the marker is cocked. All such devices shall be clearly marked to indicate the “safe” and “fire” or “on” and “off” positions in accordance with 3.1.6. All such devices shall be capable of preventing the markers from being discharged when a weight of 13.6 kg (30 lb) is applied to the trigger. Tests shall be conducted in accordance with 8.3.

7.3 *Accidental Discharge*—Markers should not accidentally discharge when exposed testing in accordance with 8.3.

## 8. Test Methods

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

### 8.2 *Disabling Device Test:*

8.2.1 *Significance*—This method determines if the disabling device will withstand a 13.6 kg (30 lb) applied weight without failure, causing the marker to discharge.

8.2.2 *Apparatus*—A trigger weight system having a 13.6 ± 0.02 kg (30 ± 0.05 lb) weight. Arrange the weight system so that the weights can be picked up by the trigger of the marker with the marker in a vertical position, muzzle up. (A spring gage capable of measuring the trigger force can be used instead of the weight system.)

8.2.3 *Test Specimen*—The test specimen shall consist of a new LVP marker selected in accordance with the manufacturer’s usual quality assurance practices.

### 8.2.4 *Procedure:*

8.2.4.1 Conduct the test at SATP.

8.2.4.2 Conduct all tests without LVRM Projectiles in the marker.

8.2.4.3 Place disabling device in “safe” position or the electronic switch in the “off” position.

8.2.4.4 Apply a 13.6 kg (30 lb) load at the center point of the trigger for 30 s with the load applied to the center of the face of the trigger and remove the load.

8.2.4.5 Put disabling device in the “fire” position or the electronic switch in the “on” position. The marker must not discharge as the safety is disengaged.

8.2.4.6 Test the marker for proper trigger and disabling device action.

8.2.4.7 The marker passes the test if it withstands the load applied without causing the marker to discharge during the application of the load and does not discharge upon the disengagement of the disabling device, and the disabling device and trigger function properly after testing.

8.3 *Accidental Discharge Test:*

8.3.1 *Significance*—LVP markers should not discharge while their disabling device is disengaged.

8.3.2 *Test Specimen*—The test specimen shall consist of a new LVP marker, selected in accordance with the manufacturer’s usual quality assurance practices.

8.3.3 *Procedure:*

8.3.3.1 Conduct the test at SATP.

8.3.3.2 Attach a properly charged propellant source if required in accordance with the manufacturer’s instructions. Test discharge the marker.

8.3.3.3 Leave the marker in the ready to discharge condition.

8.3.3.4 Suspend marker using a sling (see Fig. 2).

8.3.3.5 Place the cocked impact tester (see Fig. 1) against the side of the marker centered on the grip frame directly behind the center point of the trigger with the impact tester firmly affixed to an immobile surface.

8.3.3.6 Release the impact tester and observe if the marker discharges.

8.3.3.7 Repeat by impacting the marker on the following axis:

- (1) 180 degrees to the first impact.
- (2) The front of the barrel aligned with the barrel’s axis.

(3) The rearmost point of the marker aligned with the barrel’s axis.

8.3.3.8 The marker fails if it discharges on any impact.

8.4 *Barrel Blocking Device Requirement:*

8.4.1 *Significance*—All LVP markers that include a barrel must be packaged with a barrel blocking device.

8.4.2 *Test Specimen*—The test specimen shall consist of a new LVP marker packaged in the manufacturer’s original packaging.

8.4.3 *Procedure*—Open packaging and inspect for the presence of a barrel blocking device. Any package not containing a barrel blocking device fails this requirement.

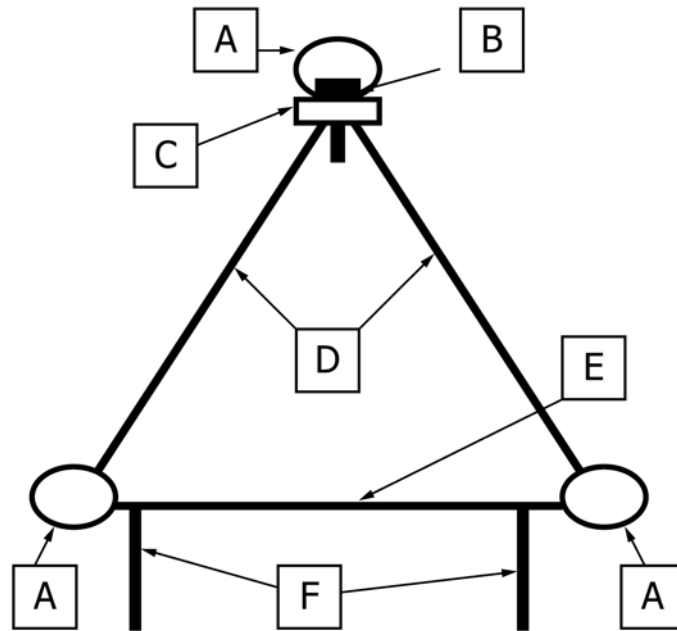
8.5 *Impact Testing:*

8.5.1 *Significance*—The test is intended to simulate situations in which possible damage can occur by reason of its falling or other impact situations that may occur as a result of reasonably foreseeable abuse. After undergoing the appropriate test, the marker shall be examined for damaged or fractured components or parts. The marker is not fit for use if damage or fracture is observed.

8.5.2 *Apparatus:*

8.5.2.1 *Tile Floor Area*—The impact medium shall consist of a 3 mm (1/8 in.) nominal thickness of Type IV vinyl composition tile, composition 1-asbestos free, as specified in Federal Specification SS-T-312B over at least a 64 mm (2.5 in.) thickness of concrete. The impact area shall be at least 0.3 m<sup>2</sup> (3 ft<sup>2</sup>).

8.5.2.2 *Concrete Floor*, on which to place the tiles.



- A. Yoke
- B. Pivot Bolt
- C. Swivel
- D. 91.29 cm (36 in.) Strap or Rope
- E. 60.86 cm (24 in.) aluminum bar with 1.27 cm (0.5 in.) diameter or 1.9 cm (0.75 in.) copper tube
- F. Hook and loop strap able to suspend marker parallel to and 15.21 cm (6 in.) below E

FIG. 2 Sling Example

8.5.2.3 *Measure*, 0.93 m (3 ft, 0.5 in.), to establish the height of the drop.

8.5.2.4 *Projectiles*, to fill the magazine or an equivalent.

8.5.3 *Test Specimen*—The test specimen shall consist of a new LVP marker selected in accordance with the manufacturer's usual quality assurance practices.

8.5.4 *Procedure*:

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

8.5.4.2 The marker shall be dropped onto a specified impact area as a completely assembled operational unit without projectiles.

8.5.4.3 Hold the marker at a height of 0.93 m (3 ft, 0.5 in.) above the tile floor area, measured from the point on the marker that is nearest the tile floor area. The sample shall be allowed to come to rest after each drop and shall be examined and evaluated before continuing.

8.5.4.4 Drop the marker in the following six orientations:

(1) With barrel vertical so that the butt of the marker hits the tile floor area;

(2) With barrel vertical so that the muzzle of the marker hits the tile floor area;

(3) With barrel horizontal so that the bottom of the marker hits the tile floor area;

(4) With barrel horizontal so that the top of the marker hits the tile floor area;

(5) With barrel horizontal so that the right side of the marker hits the tile floor area; and

(6) With barrel horizontal so that the left side of the marker hits the tile floor area.

## 9. Product Marking

9.1 LVP markers shall be prominently and durably marked to convey the following cautionary statement:

9.1.1 A safety alert symbol composed of an equilateral triangle surrounding an exclamation point.

9.1.2 A signal word such as “WARNING” or “DANGER”.

9.1.3 A warning that this is not a toy.

9.1.4 A warning that this is not to be used by persons under the age of 9.

9.1.5 A warning that misuse can cause serious injury.

9.1.6 A warning that full face protection designed specifically for paintball use must be worn by the user and any person within range in accordance with Specification **F1776**.

9.1.7 A warning that adult supervision is required.

9.1.8 A recommendation that this is to be used outdoors or in a supervised environment.

9.1.9 Advice to discharge air from the marker when not in use.

9.1.10 A warning to always put “safety on” when not in use.

9.1.11 A warning to use the barrel blocking device.

9.1.12 Instructions to read the owner's manual before using.

9.1.13 Each LVP marker shall be durably and conspicuously marked to identify the manufacturer, distributor, or the retailer.

9.1.14 Each LVP marker shall be durably marked with a model number or name that will allow proper identification of the marker by the user.

9.1.15 Each LVP marker shall be marked to show the “safe/off” and “fire/on” position of the disabling device.

9.1.16 The muzzle end of the barrel shall be a blaze orange or brighter orange color covering the circumference.

9.1.17 The colored end shall not be recessed more than 6 mm (0.25 in.) from the muzzle end of the barrel.

## 10. Packaging and Package Marking

10.1 The packaging of all LVP markers shall contain a cautionary statement. The statement shall be placed prominently on the package and set distinctively apart from other wording or designs.

10.1.1 Prominence of the statement shall be achieved by placement within the borders of a rectangle and by use of a suitable contrasting background. The statement may be a combination of upper and lower case letters of a size not less than 8-point type. The letters in the signal word shall be at least 50 % larger than the letters in other words in the cautionary statement. The signal word shall be in sans serif letters in upper case only and preceded by a safety alert symbol. It is composed of an equilateral triangle surrounding an exclamation point. The base of the safety alert symbol shall be on the same horizontal line as the base of the letters of the signal word. The height of the safety alert symbol shall equal or exceed the signal word height. The signal word shall be in black letters on an orange background. The solid triangle of the safety alert symbol shall be black and the exclamation point portion orange. The cautionary statement shall have either black lettering on a white background or white lettering on a black background. When special circumstances limit the use of warning in two colors, the colors assigned to the signal word background may also be used for the cautionary statement letters, provided that they contrast with the background color of the product. When special circumstances preclude the use of safety colors on base materials such as wood, cardboard, metal, plastic, etc., the marking used should (when feasible) contrast with the background color of the base material.

10.1.2 The packaging of all low velocity projectile markers shall be prominently and durably marked to convey the following cautionary statement:

10.1.2.1 A safety alert symbol composed of an equilateral triangle surrounding an exclamation point.

10.1.2.2 A signal word such as “WARNING” or “DANGER”.

10.1.2.3 A warning that this is not a toy.

10.1.2.4 A warning that this is not to be used by persons under the age of 9.

10.1.2.5 A warning that misuse can cause serious injury.

10.1.2.6 A warning that full face protection designed specifically for paintball use must be worn by the user and any person within range.

10.1.2.7 A warning that adult supervision is required.

10.1.2.8 A recommendation that this is to be used outdoors or in a supervised environment.

10.1.2.9 A recommendation that a person be at least 18 years of age to purchase.

10.1.2.10 Advice to discharge air from marker when not in use.

10.1.2.11 A warning to always put “safety on” when not in use.

10.1.2.12 A warning to use the barrel blocking device.

10.1.2.13 Instructions to read the owner’s manual before using.

10.2 The packaging for LVP markers shall be clearly marked with the following: a description of the type of LVP marker enclosed, model name and number (if applicable) in the package; size, type, or model of LVRM projectile used.

10.3 The packaging for LVP markers shall conspicuously show the name and address (such as city, state, and zip code) of either the manufacturer, the distributor, or the retailer.

10.4 If an LVP marker is displayed or sold without packaging that would normally contain the information required in 10.1.1 through 10.1.2.13, the information required in these sections shall be placed on the LVP marker itself, either on a label or hang-tag that meets the same requirements for content, prominence, and visibility at the time of sale.

10.5 A warning stating:

**DO NOT REMOVE THE ORANGE MARKING AT THE TIP OF THE BARREL!**

This may be a violation law and will void the warranty!

10.6 If LVP markers are supplied with LVRM projectiles, warning text detailed in Sections 5.1-5.2 of Specification F2573 should be included.

## 11. Literature Accompanying LVP Markers

11.1 The instructions and warnings communicating to the user the information included in this section shall be provided as a leaflet or brochure packed with the LVP marker or attached to the LVP marker.

11.1.1 LVP markers shall be prominently and durably marked to convey the following cautionary statement.

11.1.2 A cautionary statement as noted in 10.1 shall be placed prominently in the literature or attached to the LVP marker. Prominence of the statement shall be achieved by placement within the borders of a rectangle and by use of a suitable contrasting background. The statement may be a combination of upper and lower case letters of a size bearing a

reasonable relationship to the other type on the literature or tag and preceded by a safety alert symbol.

11.1.3 All markers shall be packaged with additional safety tips conveying the following:

11.1.3.1 The warning and instructions as detailed on the LVP marker in accordance with Section 9.

11.1.3.2 Treat every marker as if it were loaded.

11.1.3.3 Never look down into the barrel of a LVP marker.

11.1.3.4 Keep your finger off the trigger until ready to shoot.

11.1.3.5 Never point the marker at anything you do not wish to shoot.

11.1.3.6 Keep the marker on safe until ready to shoot.

11.1.3.7 Always remove LVRM projectiles and propellant source before disassembly.

11.1.3.8 After removing propellant source, point marker in safe direction and discharge until marker is degassed.

11.1.3.9 Store the marker unloaded and discharged in a secure place.

11.1.3.10 Follow warnings listed on propellant source for handling and storage.

11.1.3.11 Do not shoot at fragile objects such as windows.

11.1.3.12 Every person within range must wear full face protection designed specifically for paintball use.

11.1.4 Information shall be provided which identifies the type and caliber or size of the low velocity resilient material projectile or LVRM projectiles intended for use in the marker.

11.1.5 Instructions for proper application and removal of propellant source and degassing of marker shall be provided.

11.1.6 If propellant source allows for continuous pressure to expel projectiles, it is recommended to measure your marker’s velocity before playing and never shoot at velocities in excess of 53.34 m/s (175 ft/s).

11.1.7 Instructions for routine inspection and maintenance of LVP marker shall be provided. Information shall be included to indicate authorized repair shops or the manufacturer, distributor, or retailer, or a combination thereof, who will provide the user with literature for use and information on service.

## 12. Keywords

12.1 low velocity projectile marker; low velocity resilient material projectile

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