



Designation: F3398 – 21

# Standard Specification for Face and Ear Protective Devices for Air Soft Sports<sup>1</sup>

This standard is issued under the fixed designation F3398; 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 applies to face and ear protective devices (FEPDs) designed for use by participants in the sport of air soft with 6-mm air soft projectiles. These FEPDs are designed to be used in conjunction or in some cases include the eye protection discussed in Specification F2879 to minimize or significantly reduce injury to the face and ears as a result of impact and penetration of air soft projectiles.

1.2 FEPDs meeting the requirements of this specification offer protection to portions of the face and ears of the user and not necessarily the entire head.

1.3 *Units*—The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard.

1.4 The following information is provided for the laboratory conducting the test for the protection of their personnel: *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

F2679 Specification for 6 mm Projectiles Used with Airsoft Guns

F2748 Specification for Airsoft Guns

F2879 Specification for Eye Protective Devices for Airsoft Sports

2.2 *CSA Standards*:<sup>3</sup>

Z262.6-02 Specifications for Facially Featured Head Forms

Z262.6-14 Specifications for Facially Featured Head Forms

2.3 *EN Standard*:<sup>4</sup>

EN 168 Personal Eye Protection—Non-Optical Test Method—Section 17 Head Forms

## 3. Terminology

3.1 *Definitions of Terms Specific to This Standard*:

3.1.1 *air soft field, n*—area where participants actively target and shoot each other with air soft projectiles using air soft guns.

3.1.2 *air soft gun, n*—device specifically designed to expel air soft projectiles as the result of the release of energy by compressed air, compressed carbon dioxide (CO<sub>2</sub>), mechanical springs, battery, or a combination thereof as defined in Specification F2748.

3.1.3 *air soft projectile, n*—6 mm projectiles used with an air soft gun which is defined in Specification F2679.

3.1.4 *cleanable, adv*—ability of an FEPD to be made readily free of dirt or grime without being damaged during an appropriate cleaning process, such as the use of soap and water.

3.1.5 *dislodgement, n*—relating to the movement or shifting during impact testing as described in Section 7 that would result in a gap between the eye protection device used in conjunction with the FEPD of more than 3.0 mm that did not exist prior to the testing or the breaking free of any FEPD components.

3.1.6 *eye protective device (EPD), n*—device that provides protection to the wearer's eyes against specific hazards encountered in sports.

3.1.7 *face and ear protective device (FEPD), n*—device that provides protection to the wearer's face and ears against specific hazards encountered in sports.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.57 on Eye Safety for Sports.

Current edition approved May 1, 2021. Published June 2021. DOI: 10.1520/F3398-21.

<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.

<sup>3</sup> Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada, http://www.csagroup.org.

<sup>4</sup> Available from European Committee for Standardization (CEN), Avenue Marnix 17, B-1000, Brussels, Belgium, http://www.cen.eu.

3.1.8 *FEPD retention component(s), n*—components that are designed to retain FEPD on the users face and ears.

3.1.9 *fracture, n*—any breach, rip, rupture, or visible crack in the FEPDs components.

3.1.10 *head form, n*—as utilized within this standard for the as-worn assessment of FEPDs, key dimensions of which are as provided in CSA Z262.6-02, CSA Z262.6-14 (see notations in 6.4.2.1 and 6.4.2.2 related to this head form) or EN 168.

3.1.11 *tactical sport, n*—within the context of this standard, an activity in which participants actively target and shoot at each other with air soft projectiles using an air soft gun.

## 4. Performance Requirements

### 4.1 Mechanical Requirements:

4.1.1 When tested in accordance with 7.2 (Projectile Test Procedure):

4.1.1.1 Any visible damage of the FEPD that results in any component of the FEPD to become dislodged or allows the passing through the protector of an air soft projectile as defined in 3.1.3 constitutes a failure.

4.1.1.2 Any dislodging of a retention component from the FEPD constitutes a failure.

4.1.1.3 Any opening in the FEPD that would permit contact of a 4.5 mm diameter +0.10 mm and –0.10 probe to the face or inner ear canal area of the head form constitutes a failure. No significant force is to be applied to force the probe through any opening.

4.1.1.4 Any visible fracture of any FEPD component constitutes a failure.

4.1.1.5 Any dislodging of any FEPD component constitutes a failure.

4.2 *Ventilation Openings Requirements*—Any ventilation opening in the FEPD that would permit direct contact of a 4.5 mm diameter probe +0.10 mm and –0.10 to the protected facial area of the head form constitutes a failure. No significant force is to be applied to force the probe through any opening. Any evaluation must be conducted with the FEPD installed in accordance with the manufacturer’s instruction manual on the head form as specified in 6.4.

## 5. General Requirements

### 5.1 Materials of Construction:

5.1.1 The manufacturer is responsible that the materials selected meet the following criteria and may confirm compliance by providing the testing laboratory with a declaration letter regarding the suitability of the materials for inclusion with the final test report:

5.1.1.1 Materials exposed to sunlight shall not undergo significant loss of physical properties.

5.1.1.2 Materials coming into contact with the wearer’s face shall not be of a type known to cause skin irritation.

5.1.1.3 Materials coming into contact with the wearer’s face shall not undergo significant loss of strength, flexibility, or other physical change as a result of perspiration, oil, or grease from the wearer’s skin and hair.

### 5.2 Openings:

5.2.1 All openings in the FEPD, such as those for ventilation, shall not allow the passage of a 4.5 mm diameter probe +0.10 mm and –0.10. In cases where a foam or air permeable barrier is used to cover ventilation openings of the FEPD, the underlying structure (under the foam or air permeable barrier) shall not allow the passage of a 4.5 mm diameter probe +0.10 mm and –0.10.

5.2.2 All opening for ventilation on the FEPD shall be inspected by the method described in 4.2.

5.3 *Level of Head Coverage*—The level of head coverage provided by a FEPD will be described as indicated in Table 1. The testing and requirements for each level of coverage is referenced on this chart as well.

## 6. Sample Preparation

### 6.1 Face and Ear Protective Devices:

6.1.1 Only new and complete FEPDs as offered for sale shall be tested.

6.1.2 A minimum of five FEPDs will be required for the tests.

6.1.3 The FEPD and the air soft projectiles shall be conditioned for a minimum of 4 h at the specified conditioning temperature before each test.

### 6.2 Conditioning Temperatures:

6.2.1 *Cold Conditioning*,  $-12.2 \pm 2^\circ\text{C}$ .

6.2.2 *Ambient Conditioning*,  $23 \pm 2^\circ\text{C}$ .

6.2.3 *Hot Conditioning*,  $37.8 \pm 2^\circ\text{C}$ .

6.3 *Air Soft Projectiles*—Air soft projectiles used in the tests contained within this specification shall be in conformity with Specification F2679 with a stated weight of 0.25 g. A manufacturer’s declaration of compliance with the standard will be considered acceptable verification.

### 6.4 Head Form:

6.4.1 The manufacturer shall normally specify to the testing facility the type and size of head form to be used for testing within this standard. This selection will be based upon the design and size of the FEPD.

6.4.2 In the case where the head form referenced in CSA Z262.6-14 is used, the following information may serve as guidance:

6.4.2.1 *Youth (Small)*—50th percentile 6-year-old child (CSA Z262.6-14 Size 515, 50 Shore A Cadex Head Form Part Number DM185-5150).

6.4.2.2 *Adult (Medium)*—50th percentile 25-year old adult female (CSA Z262.6-14 Size 535, 50 Shore A Cadex Head Form Part Number DM185-5350).

6.4.3 In the case where the manufacturer does not specify a specific head form or size the testing laboratory may select the head form based on availability and suitability.

## TEST METHODS

### 7. Mechanical Tests

#### 7.1 Test Equipment:

7.1.1 The propelling device(s) shall be capable of hurling 0.25-g air soft projectiles horizontally at  $175 -0/+3$  m/s. Each test velocity shall be measured and, if not within this tolerance, that impact is not valid.

**TABLE 1 Levels of Head Coverage Provided by a FEPD**

Protection Level	Description	Required Testing
Basic Protection	This type of protector is used in conjunction with eye protection as defined in Specification <b>F2879</b> . This is a non-rigid face protection system that minimally covers the nasal and mouth openings. It may offer ear coverage and limit entry of airsoft BB's to the ear canals. Examples of this type of protection are shemaghs, neoprene face protectors or other non-rigid cloth protectors. This style of protector often is form fitting (similar to a balaclava) or wrapped around the head in the case of a shemagh.	All requirements of the standard with the exception of impact testing in Section 7.
Moderate Protection	This type of protector is used in conjunction with eye protection as defined in Specification <b>F2879</b> . This is a partially rigid or rigid protection system that minimally covers the nasal and mouth openings. This style does not include any ear protection. Examples of this type of protective mask are metal mesh, molded plastic, heavy structured cloth, molded EVA or any combination of these or other appropriate material.	All requirements of the standard with the exception of impact testing in 7.2.3.
Full Protection	This type of protector is used in conjunction with eye protection as defined in Specification <b>F2879</b> . This is a partially rigid or rigid protection system that covers the nasal, mouth openings and ears. Examples of this type of protective mask are metal mesh, molded plastic, heavy structured cloth, molded EVA or any combination of these or other appropriate material.	Must meet all the requirements of the standard.
Integrated Moderate Protection	This type of protector includes an eye protector as defined in Specification <b>F2879</b> . A partially rigid or rigid protection system that covers the nasal and mouth openings. This style does not include any ear protection. The eye and face protection must be provided partially or fully assembled by the manufacturer when sold to the end user. Examples of this type of protective mask, molded plastic, heavy structured cloth cover or any combination of these or other appropriate material.	All requirements of the standard with the exception of impact testing in 7.2.3.
Integrated Full Protection	This type of protector includes an eye protector as defined in Specification <b>F2879</b> . A partially rigid or rigid protection system that covers the nasal, mouth openings and ears. The eye, face and ear protection must be provided partially or fully assembled by the manufacturer when sold to the end user. Examples of this type of protection metal mesh, molded plastic, heavy structured cloth cover or any combination of these or other appropriate material.	Must meet all the requirements of the standard.

ITeH Standards  
 (https://standards.iteh.ai)

7.1.1.1 If a failure occurs on an FEPD because of a shot that was out of the speed range of the air soft projectile or the shot location was incorrect, the test will be halted at that point and repeated on a new sample.

7.1.2 Impact testing will be performed at the temperatures specified in 6.2 and velocities as listed in 7.1.1 testing shall be completed within 3 min after removal of the FEPD from the temperature-conditioning atmosphere.

7.1.3 Projectiles shall be 6-mm air soft ammunition per specified in 6.3.

7.1.4 Equipment used to measure the speed of the test air soft projectile shall be placed within 1.0 m of impact and accurate to within  $\pm 0.5$ -m/s muzzle velocity.

7.1.5 The test head form shall be of the size and type specified in 3.1.10 and 6.4.

7.1.6 The test head form should be placed in an enclosed area during impact testing to contain air soft projectiles. The enclosure should be of a design to reduce the potential of secondary impact from air soft projectiles due to ricochet.

## 7.2 Projectile Test Procedure:

7.2.1 Mount the FEPD to be tested on the head form and secure in accordance with the manufacturer's instructions. If not specified by the manufacturer, the best fit as normally worn by the end user.

### 7.2.2 High-Velocity Impact Test—Facial Protection Area:

7.2.2.1 *Sample Size*, five FEPDs (two cold, two hot, and one ambient conditioning temperature) (three impacts each).

7.2.2.2 Projectiles used in a high-velocity impact test shall have a stated weight of 0.25 g and be shot at the velocity as indicated in section 7.1.1.

7.2.2.3 *Conditioning Temperature*, cold, ambient temperature, and hot. Condition samples at each of the respective temperatures specified in 6.2.1 – 6.2.3.

7.2.2.4 For cold and hot conditioning temperature:

(1) Impact the FEPD once at a point overlying mouth area of the head form approximately perpendicular to the protector. Rotate the head form 10° temporally; repeat this impact. Rotate the head form 20° in opposite direction; repeat this impact.

(2) Repeat 7.2.2.4(1) using a new FEPD, conditioned sample.

7.2.2.5 *Ambient Conditioning Temperature*—Repeat 7.2.2.4 under ambient temperature, using one sample only.

7.2.2.6 After each series of impacts, remove the FEPD from the head form. Examine the FEPD for evident of failure as defined in 4.1.1.

### 7.2.3 High-Velocity Impact Test—Ear Protection Area:

7.2.3.1 *Sample Size*, five FEPDs (two cold, two hot, and one ambient conditioning temperature) (three impacts each).

7.2.3.2 Projectiles used in a high-velocity impact test shall have a stated weight of 0.25 g and be shot at the velocity as indicated in section 7.1.1.

7.2.3.3 *Conditioning Temperature*, cold, ambient and hot. Condition samples at each of the respective temperatures specified in 6.2.1 – 6.2.3.

7.2.3.4 For cold and hot conditioning temperature:

(1) Impact the right side of the FEPD once at a point overlying ear area of the head form approximately perpendicular to the protector. Rotate the head form 5° temporally; repeat this impact. Rotate the head form 10° in opposite direction; repeat this impact.

(2) Repeat 7.2.3.4(1) on the left side of the FEPD using a new, conditioned sample.

7.2.3.5 *Ambient Conditioning Temperature*—Repeat 7.2.3.4 under ambient temperature, using one sample only.

7.2.3.6 After each series of impacts, remove the FEPD from the head form. Examine the FEPD for evident of failure as defined in 4.1.1.

## 8. Product Marking

8.1 Each FEPD shall bear the following permanent marking.

8.1.1 Manufacturer's identity and

8.1.2 Month and year of manufacture.

8.2 *Instructions*—A label, tag, or owner's manual conveying the following information shall be attached to, or accompany the FEPD, at the time it leaves the manufacturer:

8.2.1 Warning that failure to follow all these instructions or adhere or both to all these warnings may result in serious or permanent injury;

8.2.2 Warning never to remove the FEPD while on the playing field;

8.2.3 Warning to always wear the FEPD whenever shooting an air soft gun and whenever in or near an area where air soft guns are being shot;

8.2.4 A statement that this FEPD is designed to be effective with impacts up to 500 FPS using 0.25 g air soft projectile compliant with Specification F2679, or impact energy of up to 2.9 J;

8.2.5 Warning to observe at all times the rules of participation and the rules of air soft gun handling;

8.2.6 Warning to check the FEPD before and after use and to replace the FEPD immediately if any damage is observed on the protector;

8.2.7 Warning to leave the area of air soft activity if the FEPD is subject to a direct impact and develops a crack or fracture or damage of any kind and replace the FEPD immediately;

8.2.8 Warning to leave the area of air soft activity if the FEPD is subjected to a direct impact from an air soft gun from a distance under 3 m and inspect the FEPD;

8.2.9 Instructions on when, how and with what materials or solutions to clean the FEPD;

8.2.10 Warning not to use other substance(s) on the FEPD for cleaning;

8.2.11 Instructions on how to store the FEPD;

8.2.12 Instructions on how to fit the FEPD on the head properly for various head sizes;

8.2.13 Instructions regarding the use and fitting of the FEPD for use with the various styles of Eye Protective Devices (EPD) as defined in Specification F2879.

8.2.14 Warning, in the case that gaps exist of more than 3 mm between the EPD and the FEPD when used together as a protective system; this could allow the passage of an airsoft BB resulting in injury.

8.3 *Packaging for FEPD:*

8.3.1 The size of the print for warnings, instructions, and manufacturer's information on packaging shall be of a type size of at least eight points. The letters in the word WARNING shall be at least 50 % larger than the letters in the other words in the cautionary statement.

8.3.2 *Warning Information*—A cautionary statement on packaging of all FEPD shall convey the following information or its equivalent at a minimum:

8.3.2.1 A signal word "WARNING;"

8.3.2.2 A warning that air soft guns are not toys;

8.3.2.3 A warning that misuse may cause serious injury, especially to the eye;

8.3.2.4 A warning that eye protection designed for air soft guns shall be worn by the user and any person within range;

8.3.2.5 The following cautionary statement may be used: WARNING: Air soft guns are not toys. Misuse may cause serious injury, especially to the eye. Eye protection designed for air soft guns shall be worn by the user and any person within range.

8.4 *Additional Information*—The following information or its equivalent shall be provided with the FEPD:

8.4.1 The name and address of the manufacturer or distributor of the FEPD;

8.4.2 Instructions to the effect that identify the intended use of this product, such as: "The FEPD is intended only for use with air soft guns;" and

8.4.3 Instructions to the effect that users should follow all rules of the sports.

## 9. Keywords

9.1 air soft; air soft sports; eye protective device; eye protector; FEPD; goggles; low-energy air guns