Designation: E3342/E3342M – 22ε1

Specification for Nonballistic-resistant Helmets Specifically Designed to be Worn by Law Enforcement and Corrections Officers When Maintaining Order in Violent Situations[1]

This standard is issued under the fixed designation E3342/E3342M; 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 (ε) indicates an editorial change since the last revision or reapproval.

ε[1] NOTE—Editorial corrections were made to Table A1.1 in December 2022.

1. Scope

1.1 This specification specifies performance requirements, conditioning procedures, and test methods for assessing nonballistic-resistant head protection (that is, helmet and face shield) specifically designed to be worn by law enforcement and corrections officers when maintaining order in violent situations.

1.2 This specification does not address eye protection other than face shields that are attached to the helmet.

1.3 The threats and hazards addressed in this specification were identified by officers specially trained and equipped to manage any form of public gathering, ranging from concerts, parades, marches, and demonstration events to violent unrest.

1.4 It is anticipated that this specification will be referenced by suppliers, certifiers, purchasers, or other users to meet their specific needs.

1.5 The user of this specification may choose to specify additional requirements, and some options are provided in Appendix X1.

1.6 *Units*—The values stated in either SI units or inch-pound units are to be regarded separately as standard. The values stated in each system are not necessarily exact equivalents; therefore, to ensure conformance with the standard, each system shall be used independently of the other, and values from the two systems shall not be combined.

1.7 *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.*

1.8 *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:*[2]

E2771 Terminology for Homeland Security Applications

E3343/E3343M Test Methods for Nonballistic-resistant Helmets Worn by Law Enforcement and Corrections

F2220 Specification for Headforms

2.2 *ANSI Standards:*[3]

ANSI/ISEA Z87.1-2020 American National Standard for Occupational and Educational Personal Eye and Face Protection Devices

EN 168:2001 Personal Eye-Protection - Non-Optical Test Methods

2.3 *CSA Standards:*[4]

CSA Z262.6-14 Specifications for Facially Featured Headforms

3. Terminology

3.1 The following definitions of Terminology E2771 apply: *conditioning*, *controlled ambient*, *fair hit*, *test item*, and *unfair hit*.

3.2 *Definitions:*

3.2.1 *retention system, n*—the complete assembly that secures the helmet, in a stable position, on the wearer's head.

3.2.2 *test area, n*—the area of the helmet on or above a specified reference plane, subject to impact or penetration testing.

[1] This specification is under the jurisdiction of ASTM Committee E54 on Homeland Security Applications and is the direct responsibility of Subcommittee E54.04 on Public Safety Equipment.

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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 American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, http://www.ansi.org.

[4] Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON M9W 1R3, Canada, http://www.csagroup.org.

4. Significance and Use

4.1 The purpose of this specification is to specify performance requirements, conditioning procedures, and test methods for nonballistic-resistant head protection used in public order police applications.

4.2 It is anticipated that this specification will be referenced by certifiers, purchasers, or other users in order to meet their specific needs.

5. Design Requirements

5.1 The helmet shall have a nape guard.

5.2 The complete helmet, including the helmet shell, suspension system, retention system, face shield, and nape guard, shall weigh no more than 2.3 kg [5 lb].

6. Test Item Requirements

6.1 Test item details, including quantities and sizes, for each test procedure are specified in subsequent sections and Annex A1. A recommended testing order is also provided.

7. Performance Requirements for Helmet Impact Attenuation

7.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 13 on the Helmet Impact Attenuation Test Method, with the following modifications:

7.1.1 Six test items are required: two smallest, two mid-sized, and two largest available from the supplier are required;

NOTE 1—The supplier may choose to use helmet shells that were previously tested for face shield deflection and impact.

7.1.2 The headform shall be selected as appropriate for the helmet sizes; and

7.1.3 The test anvils used shall be the flat anvil, triangular anvil, and hemispherical anvil.

7.1.4 *Procedure:*

7.1.4.1 Deliver three impacts on the same impact location, once each with the flat anvil, the triangular anvil, and the hemispherical anvil in the order listed in Annex A2.

7.2 Each test item shall have a maximum recorded acceleration for each impact of less than 2452 m/s^2 [250 *g*].

8. Performance Requirements for Helmet Shell Penetration Resistance

8.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 14 on the Helmet Shell Penetration Resistance Test, with the following modifications:

8.1.1 Six test items are required: two smallest, two mid-sized, and two largest available from the supplier are required;

NOTE 2—The supplier may choose to use helmet shells that were previously tested for face shield deflection and impact.

8.1.2 The headform(s) shall be selected as appropriate for the helmet sizes; and

8.1.3 *Procedure:*

8.1.3.1 The location of the first impact on every test item shall be in the crown area; the location of the second impact shall be selected by the test laboratory and shall be a different location for each test item.

8.2 The test result shall be considered a pass if there is no contact between the striker tip and the headform.

9. Performance Requirements for Face Shield Deflection and Impact

9.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 15 on the Face Shield Deflection and Impact Test Method, with the following modifications:

9.1.1 Four test items, sized to most closely match the head form, are required.

NOTE 3—The supplier may choose to use helmet shells that were previously tested for impact attenuation or penetration.

9.2 The deflection test result shall be considered a pass if each face shield did not contact the headform nose and remains attached by all of its fasteners.

9.3 The impact test result shall be considered a pass if each face shield *(1)* has no visible cracks or splitting, *(2)* is able to be raised and lowered, and *(3)* remains fully attached.

10. Performance Requirements for Face Shield Projectile Resistance

10.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 16 on the Face Shield Projectile Resistance Test, with the following modifications:

10.1.1 6 test items are required;

10.1.2 The test projectile shall be the ½-in. chrome steel ball bearing; and

10.1.3 An impact shall be a complete penetration if any part of the test projectile, or any part or fragment of the test item, has damaged the witness panel such that the light from a light source of at least 800 lm can be seen through the witness panel.

10.2 The test result shall be considered a pass if *(1)* each face shield shows no visible cracks or splitting and *(2)* the witness material has no complete penetrations.

11. Performance Requirements for Flammable Liquid Trap

11.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 17 on the Flammable Liquid Trap Test, with no modifications.

11.2 The test result shall be considered a pass if flames are extinguished within 15 s of the fluid being ignited.

11.3 The test result shall be considered a failure if flames continue for more than 15 s or if there are visual signs of fire damage on the inside liner of the test item.

12. Performance Requirements for Liquid Penetration Resistance

12.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 18 on the Liquid Penetration Resistance Test, with no modifications.

12.2 The test result shall be considered a pass if no red color is above the test item outline.

12.3 Any "creeping" of red color immediately at the edges of the test item outline shall be permitted, provided the creeping does not extend further than 5 mm from the test item outline.

13. Performance Requirements for Dynamic Retention System

13.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 19 on the Dynamic Retention System Test, with no modifications.

13.2 The test result shall be considered a pass if the retention system for each test item remains intact during the test and elongation does not exceed 30 mm [1.2 in.].

14. Performance Requirements for Face Shield Optics

NOTE 4—These tests may be performed before other face shield tests because they are nondestructive.

14.1 When tested in accordance with ANSI/ISEA Z87.1, Section 9.4, Refractive Power, *Astigmatism and Resolving Power Tests*, the tolerance on prism and prism imbalance shall be:

14.1.1 *Refractive power,* ±0.06 D,

14.1.2 *Astigmatism,* <0.06 D, and

14.1.3 *Resolving power,* Pattern 20.

14.2 When tested in accordance with ANSI/ISEA Z87.1, Section 9.5, *Prismatic Power Test*, the tolerance on prism and prism imbalance shall be:

14.2.1 *Prism,* <0.25 Δ,

14.2.2 *Vertical imbalance,* <0.125 Δ,

14.2.3 *Base in imbalance,* <0.125 Δ, and

14.2.4 *Base out imbalance,* <0.50 Δ.

15. Performance Requirements for Accelerated Corrosion

15.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 24 on the Accelerated Corrosion Test, with no modifications.

15.2 The test result shall be considered a pass if there is no visible evidence of corrosion.

16. Performance Requirements for Helmet Shell Spike Penetration

16.1 The test item shall be tested as specified in Test Methods E3343/E3343M, Section 25 on the Helmet Shell Spike Penetration Resistance Test, with the following modifications:

16.1.1 Four test items are required: two smallest and two largest available from the supplier are required;

16.1.2 The headform shall be selected as appropriate for the helmet sizes; and

16.1.3 The required energy shall be 18.0 ± 1.2 J [13.3 ± 0.9 ft-lb], unless the supplier chooses to increase the energy to 24.0 ± 1.2 J [17.7 ± 0.9 ft-lb]. The energy value used shall be documented.

16.2 The test result shall be considered a pass if there is no contact between the spike and the headform.

17. Keywords

17.1 corrections; helmet; law enforcement; protective helmet

ANNEXES

(Mandatory Information)

A1. SUMMARY OF TEST ITEM REQUIREMENTS AND RELATED DETAILS

A1.1 See Table A1.1.

TABLE A1.1 Summary of Test Item Requirements and Related Details

Recommended Testing Order	Test	Destructive or Not	Test Items	Headform
1	Face shield refractive power, astigmatism and resolving power	Nondestructive to face shields Nondestructive to helmet	4 face shields and one helmet	EN 168:2001
2	Face shield prismatic power	Nondestructive to face shields Destructive to shell	4 face shields and one helmet	EN 168:2001
3	Face shield projectile resistance	Destructive to face shield Nondestructive to shell	6 face shields, installed on complete helmet, sized to fit headform	CSA Z262.6-14 Size 575
4	Face shield deflection and impact	Destructive to face shield Destructive to shell	4 complete helmets sized to headform	CSA Z262.6-14 Size 575
5	Liquid penetration resistance	Nondestructive to face shield Nondestructive to helmet	4 complete helmets: 2 size 535† and 2 size 605	CSA Z262.6 Sizes 535† and 605
6	Flammable liquid trap	Destructive to shell and face shield	2 complete helmets sized to headform	Specification F2220 Size J
7	Dynamic retention system	Destructive to retention system Nondestructive to shell	4 complete helmets: 2 smallest and 2 largest	To be specified from 6 choices: Specification F2220 Sizes A, C, E, J, M, O
8	Resistance to corrosion	Destructive to metal parts	2 complete helmets	Not required
9	Helmet impact attenuation	Destructive to shell	6 helmet shells, with suspension and retention systems; 2 smallest, 2 mid-sized, 2 largest	To be specified from 4 choices: Department of Transportation MAG.K1A Sizes A, B, C, D
10	Helmet shell penetration resistance	Destructive to shell	6 helmet shells, with suspension and retention systems; 2 smallest, 2 mid-sized, 2 largest	To be specified from 6 choices: Specification F2220 Sizes A, C, E, J, M, O
11	Helmet shell penetration resistance to spike	Destructive to shell	4 helmet shells, with suspension and retention systems; 2 smallest, 2 largest	To be specified from 6 choices: Specification F2220 Sizes A, C, E, J, M, O

†Editorially corrected.