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Standard Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear¹

This standard is issued under the fixed designation F2413; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

INTRODUCTION

For more than sixty years, the predecessor to this specification, ANSI Z41, established the performance criteria for a wide range of footwear to protect from hazards that affect the personal safety of workers.

The value of these standards was recognized early in the history of Occupational Safety and Health Administration (OSHA) and incorporated as a reference standard in the Code of Federal Regulations (29 CFR Part 1910.132 and 29 CFR Part 1910.136).

The principal purpose of this standard is the certification of protective footwear. Certification must be performed by independent third party laboratories in order for footwear to bear the ASTM marking.

1. Scope

1.1 This specification covers minimum requirements for the performance of footwear to provide protection against a variety of workplace hazards that can potentially result in injury.

1.2 This specification is not intended to serve as a detailed manufacturing or purchasing specification, but can be referenced in purchase contracts to ensure that minimum performance requirements are met.

1.3 Controlled laboratory tests used to determine compliance with the performance requirements of this specification shall not be deemed as establishing performance levels for all situations to which individuals may be exposed.

1.4 Any changes to the original components of safety toe footwear such as replacing or adding after-market footbeds/inserts, or resoling of the footwear, could cause failure to meet this standard rendering the ASTM marking invalid.

1.5 This specification is not applicable to overshoes with safety toe caps or strap on devices with safety toes.

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

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

B117 Practice for Operating Salt Spray (Fog) Apparatus

F2412 Test Methods for Foot Protection

F2913 Test Method for Measuring the Coefficient of Friction for Evaluation of Slip Performance of Footwear and Test Surfaces/Flooring Using a Whole Shoe Tester

2.2 Federal Standards:³

29 CFR Part 1910.132 Personal Protective Equipment—General Requirements

29 CFR Part 1910.136 Personal Protective Equipment—Occupational Foot Protection

¹ This specification is under the jurisdiction of ASTM Committee F13 on Pedestrian/Walkway Safety and Footwear and is the direct responsibility of Subcommittee F13.30 on Footwear.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. 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.

2.3 *Canadian Standards Association Standard*.⁴
CAN/CSA Z195 Protective Footwear

3. Terminology

3.1 Definitions:

3.1.1 *certification (recertification)*, *n*—testing of product as required by this standard using the most recently published methods of test and obtain a Certificate of Conformance (see Section 7).

3.1.2 *footbed (removable)*, *n*—also known as ‘insock,’ a component typically made of a foam material with a leather or fabric cover/sockliner and often shaped or contoured covering the entire insole board which can be inserted between the foot and insole board.

3.1.3 *insole*, *n*—foundation of the shoe; the inner sole of the shoe which is next to the foot, under the sockliner or the insert, onto which the upper is lasted.

3.1.4 *last*, *n*—solid hinged form, in the general shape of a foot, around which footwear is constructed.

3.1.5 *lasting*, *v*—building of footwear around a specific foot last.

3.1.6 *lining*, *n*—term used to describe all components that can be used to construct the interior of the upper part of the footwear.

3.1.7 *product category*, *n*—group of similar footwear items manufactured for a specific hazard or hazards and that meets all the following conditions:

- Have same protective toe cap, protective insole or metguard materials.
- Have the same supplier for each of those components.
- Have the same thickness (within a ± 12.5 % range) of upper, lining, and insole.
- Are manufactured using the same method of construction; cemented, welted, etc.
- Are manufactured in the same factory.
- Are manufactured using the same last.

3.1.8 *product classification*, *n*—footwear manufactured to meet a minimum performance requirement for a specific hazard or hazards.

3.1.9 *protective footwear*, *n*—footwear that is designed, constructed, and tested in accordance with noted ASTM standards to protect the wearer from a potential hazard or hazards.

3.1.10 *protective toe cap*, *n*—component designed to provide toe protection that is an integral and permanent part of the footwear.

3.1.11 *puncture resistant device*, *n*—component designed to provide penetration protection to the bottom of the foot – the device shall be an integral and permanent part of the footwear.

3.1.12 *quarter*, *n*—entire back portion of the footwear upper.

3.1.13 *size*, *n*—length and breadth measurements of footwear determined by using a specific grading; the American system of footwear grading.

⁴ Available from Canadian Standards Association (CSA), 178 Rexdale Blvd., Toronto, ON Canada M9W1R3.

3.1.14 *soling material*, *n*—exterior bottom platform of the footwear; the bottom surface that is exposed to wear.

3.1.15 *upper*, *n*—parts of a shoe or boot that are above the bottom of the foot.

4. Significance and Use

4.1 This specification contains requirements to evaluate the performance of footwear for the following:

4.1.1 Impact resistance for the toe area of footwear, (I),

4.1.2 Compression resistance for the toe area of footwear, (C),

4.1.3 Metatarsal protection that reduces the chance of injury to the metatarsal bones at the top of the foot, (Mt),

4.1.4 Conductive properties which reduce hazards that may result from static electricity buildup, and reduce the possibility of ignition of explosives and volatile chemicals, (Cd),

4.1.5 Electric hazard to protect the wearer when accidentally stepping on live electric wires (EH).

4.1.6 Static dissipative properties to reduce hazards that result from a build up of static charge where there is an underlying risk of accidental contact with live electrical circuits (SD), and

4.1.7 Puncture resistance footwear devices (PR).

4.1.8 Slip resistance of whole footwear (SR or SRO).

4.1.8.1 SR is for general wear environments and tests on dry and wet clay quarry tile.

4.1.8.2 SRO is for oily wet wear environments and tests on dry, wet, and oily/wet clay quarry tile.

4.2 Any changes to the original components of the (safety toe) protective footwear such as replacing or adding aftermarket footbeds/inserts, or resoling of the footwear, could cause failure to any or all parts of this standard rendering the ASTM MARKING INVALID. Protective footwear specimens or samples shall be retested for any of the following changes:

4.2.1 Change in material used to make protective toe cap, change in protective cap manufacturer, change in the design of the toe cap.

4.2.2 Change in construction method used to make footwear or change in factory in which footwear is produced.

4.2.3 Change in the upper or insole material thickness greater than 25 %.

4.2.4 Change in the supplier or specification of the outsole, solid midsole, or cushion midsole.

4.2.5 Change in the production site of the outsole or cushion midsole, or both.

4.2.6 Change in shape last used in the manufacturing of footwear.

4.2.7 Change in material or supplier of protective insole.

4.2.8 Change in material or supplier of the metatarsal guard.

5. Performance Requirements for Foot Protection

5.1 Impact (I) and Compression (C) Resistant Footwear:

5.1.1 Footwear shall meet the requirements of both 5.2 for impact resistance and 5.3 for compression resistance. Any specimen that does not meet the minimum impact or compression performance resistance requirement constitutes a non-compliance for the product category.