



Standard Specification for Performance Requirements for Soft Toe Protective Footwear (Non-Safety / Non-Protective Toe)¹

This standard is issued under the fixed designation F2892; 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.

INTRODUCTION

Current ASTM standards [F2412](#) and [F2413](#) provide test methods and performance requirements for footwear requiring a protective safety toe cap. In industry there are many jobs that do not require toe protection from impact or compression. This committee has developed non-safety toe cap (soft toe) requirements to allow manufacturers to demonstrate the performance level of non-safety toe cap (soft toe) footwear.

1. Scope

1.1 The principle purpose of this specification is the certification of protective footwear. Certification must be performed by independent third party laboratories in order for footwear to bare the ASTM marking.

1.2 The specification contains performance requirements for footwear to protect workers' feet from the following hazards by providing: (1) conductive properties (Cd) which reduce hazards that may result from static electricity buildup; and reduce the possibility of ignition of explosives and volatile chemicals; (2) electric hazard protection (EH), to protect the wearer when accidental contact by stepping on live electric wires; (3) static dissipative properties (SD) to reduce hazards due to excessively low footwear electrical resistance that may exist where SD footwear is required; (4) puncture resistance (PR) footwear devices.

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

1.4 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.

1.5 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 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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1.6 Any changes to the original components of safety footwear such as replacing or adding after market footbeds/ inserts could cause failure to any or all parts, or a combination thereof, of this specification rendering the ASTM Soft Toe Protective Footwear label invalid.

1.7 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.8 *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

[B117 Practice for Operating Salt Spray \(Fog\) Apparatus](#)
[F1646 Terminology Relating to Safety and Traction for Footwear](#)

[F2412 Test Methods for Foot Protection](#)

[F2413 Specification for Performance Requirements for Protective \(Safety\) Toe Cap Footwear](#)

2.2 Federal Standards:³

[29 CFR 1910.132 Personal Protective Equipment—General Requirements](#)

[29 CFR 1910.136 Personal Protective Equipment—Occupational Foot Protection](#)

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 Standardization Documents Order Desk, DODSSP, Bldg. 4, Section D, 700 Robbins Ave., Philadelphia, PA 19111-5098, <http://dodssp.daps.dla.mil>.

2.3 *Canadian Standards Association Standard⁴*
CAN/CSA Z195 Protective Footwear

3. Terminology

3.1 Definitions:

3.1.1 *box toes, n*—are semi-rigid materials which can be molded to the shape of the last during shoe making. This provides the reinforcement and shape retention on the critical area of the toe of the footwear.

3.1.2 *insert/footbed/sockliner, (all removable), n*—footbed normally made of a foam product with leather or fabric cover shaped to cover the entire insole 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 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*—description for a type of footwear designed and manufactured for a specific hazard or hazards.

3.1.8 *protective footwear, n*—footwear that is designed, constructed, and classified to protect the wearer from a potential hazard or hazards.

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

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

3.1.11 *socklining (non-removable), n*—material placed over the insole, footbed or insert which maybe imprinted with a brand name or other designation.

3.1.12 *soft toe (absence of protective toe cap), n*—which are commonly called box toe in footwear industry.

3.1.13 *soling material, n*—exterior bottom platform of the footwear; the bottom surface.

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

4.1.2 Electric hazard by stepping on live wire (EH).

4.1.3 Static dissipative (SD) properties to reduce hazards due to excessively low footwear electrical resistance that may exist where SD footwear is required.

4.1.4 Puncture resistance footwear devices, (PR).

4.2 Any changes to the original components of the soft toe protective footwear such as replacing or adding after market footbeds/inserts could cause failure to any or all parts, or a combination thereof, of this standard rendering the ASTM MARKING INVALID. Soft Toe Protective footwear specimens or samples shall be retested for any of the following changes.

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

4.2.2 Change in the upper or insole material thickness greater than 25 %, change to the soling system, or a change in the hardness of the outsole.

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

4.2.4 Change in material or supplier of protective insole.

5. Performance Requirements for Foot Protection

5.1 *Conductive Protective Footwear (Cd)*:

NOTE 1—Conductive footwear is not intended to be worn by personnel working near open electrical circuits.

5.1.1 Conductive protective footwear shall be constructed and manufactured to provide protection for the wearer through conductance with a maximum 500 000 ohm resistance, against hazards that may result from static electricity buildup, thus reducing the possibility of ignition of an explosion in situations such as munitions manufacture.

5.1.1.1 Footwear shall dissipate static electricity from the body to reduce the possibility of ignition of volatile compounds.

5.1.1.2 Footwear shall be of a construction that facilitates a stable electrically conductive path. All external components shall be made of non metallic materials.

5.1.2 Conductive protective footwear shall be determined by evaluating three specimens in accordance with Test Methods F2412.

5.1.3 The specimens shall demonstrate resistance between 0 and 500 000 ohms.

5.1.4 Any specimen or sample of conductive footwear that does not meet the performance requirement constitutes a non compliance for the product category.

5.2 *Electric Hazard Resistant Footwear (EH)*:

NOTE 2—Electrical hazard protection is severely deteriorated in the following conditions: excessive wear on the soling material or exposure to wet and humid environments, or both. Work footwear can become contaminated with conductive materials. For example, soles can pick up metal shavings etc. which may reduce the effectiveness of the protection. In step potential environments, dielectric overshoes should be used.

5.2.1 Electric hazard footwear shall be constructed, and manufactured so that the footwear outsole can provide a SECONDARY SOURCE OF ELECTRIC HAZARD PROTECTION TO THE WEARER AGAINST THE HAZARDS BY STEPPING ON LIVE ELECTRICAL CIRCUITS, ELECTRICALLY ENERGIZED CONDUCTORS, PARTS OR APPARATUS.

⁴ Available from Canadian Standards Association (CSA), 5060 Spectrum Way, Mississauga, ON L4W 5N6, Canada, <http://www.csa.ca>.

5.2.2 Electric hazard resistance shall be determined by evaluating three specimens in accordance with Test Methods **F2412**.

5.2.2.1 Protective footwear constructed or manufactured to be resistant is capable of withstanding the application of 18 000 V (root mean square (rms)) at 60 Hz for 1 min with no current flow or leakage current in excess of 1.0 mA under dry conditions tested as per lab conditions in Test Methods **F2412**.

5.2.3 Any specimen that does not meet the minimum Electrical Hazard resistant requirements for the product constitutes a non compliance for the product category.

5.3 *Static Dissipative Footwear (SD):*

NOTE 3—The inconsistency of certain hygroscopic materials can result in footwear not being able to consistently meet the performance requirements of static dissipative footwear.

5.3.1 Static dissipative footwear shall be constructed, and manufactured to provide protection through conduction and resistance to the wearer against hazards which may exist due to excessively low footwear resistance in a work environment, as well as maintain a sufficiently high level of resistance to reduce the possibility of electrical shock in work areas where SD footwear is worn such as electrical assembly.

5.3.1.1 Footwear shall reduce the excess static electricity by conducting the charge (from body) to ground while simultaneously maintaining a sufficiently high level of resistance (10^6 ohms) (1 megohm) to protect the wearer when exposed to hazards by stepping on live electric circuits.

5.3.1.2 Using human subjects, a pair of footwear shall have a lower limit of electrical resistance of 10^6 ohms (1 megohm) and have an upper limit electrical resistance of 10^8 ohms (100 megohms) when tested at 50 volts per Test Methods **F2412**.

5.3.2 The footwear shall use any combination of materials that facilitate static dissipation by a consistent path of resistance.

5.3.2.1 Nailed heels shall be attached using non-ferrous heel nails. These nails shall be recessed within the tread surface and then covered with conductive material so they are neither exposed nor visible.

5.3.3 Static dissipation shall be determined by evaluating three pair of specimens in accordance with Test Methods **F2412**.

5.3.3.1 Any specimen that does not meet the Static Dissipative requirements for the product constitutes a non compliance for the product category.

5.4 *Puncture Resistant Footwear (PR):*

5.4.1 Footwear shall be constructed, and manufactured so that a puncture resistant device is positioned between the foot

and outsole or used as the insole and is made an integral and permanent part of the footwear during the manufacturing process.

5.4.2 Puncture resistant footwear shall be determined by evaluating three puncture resistant devices in accordance with Test Methods **F2412**.

5.4.3 The puncture resistant components shall reduce the possibility of injury caused by sharp objects that can penetrate the bottom assembly of the footwear. Testing orientation of the puncture resistant device is per manufacturer recommendation.

5.4.3.1 The puncture resistant device shall cover the maximum area of the foot bottom that is allowed by the construction of the footwear.

5.4.4 When viewed at a 90 degree angle, the puncture resistant device shall pass if the tip of the test pin does not visually penetrate beyond the face of the material nearest the foot, after an applied force of 1200 N (270 lbf).

5.4.5 Measure flex resistance to cracking using CAN/CSA Z195.

5.4.5.1 Puncture resistant devices shall show no signs of de-lamination of layers or cracking after 1.5 million flexes.

5.4.6 Puncture resistant devices shall show no sign of corrosion, de-lamination or deterioration after being exposed to a 5 % salt solution for 24 h, in accordance with Practice **B117**.

5.4.7 Each puncture resistant protective device shall bear the manufacturer's name or trademark or logo, and device number or identification and be permanently stamped or marked in a conspicuous location.

5.4.8 Any specimen that does not meet minimum Puncture Resistant requirements for the product constitutes a non compliance for the product category.

6. Labeling and Identification

6.1 Labeling and identification of (soft toe) safety or occupational footwear is essential to ensure the wearer that footwear meets the required minimum performance as stated in Specification F2892 (see **Table 1**).

6.1.1 The label can be either a stitched in, stamped or pressure sensitive label or a combination of these methods. The label uses a specific two line format that identifies the type of footwear and the hazards for which it is designed to provide protection. The identification shall be enclosed in an oval border and be placed on the inside or outside surface of either the tongue, gusset, shaft or quarter lining in one half pair.

6.1.2 Print size on labels shall be clearly visual to the eye and shall measure 3.175 mm (0.125 in.) or larger. For example:

TABLE 1 Examples of Marking and Identification

Identification		Description
Example A		
Line 1	ASTM F2892	Soft Toe Protective footwear which complies to the performance requirements of F2892 issued in 2011.
Line 2	EH	The outsole and heel of this footwear is made with non-conductive materials to be electrical hazard resistant
Example B		
Line 1	ASTM F2892	Soft Toe Protective footwear which complies to the performance requirements of F2892 issued in 2011.
Line 2	Cd	Footwear is conductive



6.1.3 *Line 1*—Identifies that the footwear is protective footwear that complies to an ASTM standard with a specific year of issuance.

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6.1.4 *Line 2*—of label shall identify the appropriate performance ratings in this standard.

EH Electrical Hazard	EH, PR	PR Puncture Resistant Footwear
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6.1.4.1 (*Cd*)—Identifies protection against conductive hazards as discussed in 5.1.

6.1.4.2 (*EH*)—Identifies footwear constructed with and manufactured to have electrical insulation properties; electrical hazard resistant as discussed in 5.2.

6.1.4.3 (*SD*)—Identifies footwear designed to reduce the accumulation of excess static electricity as discussed in 5.3.

6.1.4.4 (*PR*)—Identifies footwear designed to be puncture resistant as discussed in 5.4.

7. Marking and Compliance Requirements

7.1 The marking as defined in this specification indicates that the soft toe protective footwear bearing this label meets the

minimum requirements for the product category as defined within this specification.

7.2 *Responsibility of the Manufacturer or Supplier*—The manufacturer or supplier, or both, of the soft toe protective footwear bearing the marking shall maintain documentation to identify the product category sampled for testing, a report of tests performed, test results, date of testing and identity of the independent testing facility used.

7.2.1 *Responsibility of testing facility*—the independent testing facility of record shall maintain verifiable documentation to identify the product category of soft toe protective footwear sampled for testing, a report of test performed, test results, date tested and the manufacturer or supplier, or both, of the product category tested.

7.3 *Compliance Requirements*—The manufacturer or supplier, or both, of soft toe protective footwear bearing the marking label that is found to be in non-compliance with the requirements of this specification is liable for immediate disqualification from using the ASTM label for that product category.

8. Keywords

8.1 conductive footwear (*Cd*); ESD; electric hazard resistance (*EH*); foot protection; puncture resistance (*PR*); static dissipative (*SD*); soft toe protective footwear; safety footwear

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