



Designation: ~~F1818–13~~ F1818 – 15

## Standard Specification for Foot Protection for ~~Chain Saw~~ Chainsaw Users<sup>1</sup>

This standard is issued under the fixed designation F1818; 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 minimum requirements for the design, performance, testing, and certification of footwear and foot protective devices designed to provide cut resistance protection to the feet of operators of power ~~chain saws~~ chainsaws.

1.2 The objective of this specification is to prescribe fit, function, and performance criteria for footwear and foot protective devices, worn by ~~chain saw~~ chainsaw operators, which are intended to reduce foot injuries caused by contact with a running power saw chain.

1.3 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.

1.4 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 ~~chain saw~~ chainsaw operators may be exposed.

1.5 Mandatory requirements are indicated by the use of the word shall; recommendations and advisory information is indicated by the use of the word should.

### 2. Referenced Documents

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

F1414 Test Method for Measurement of Cut Resistance to Chainsaw in Lower Body (Legs) Protective Clothing

F1458 Test Method for Measurement of Cut Resistance to Chainsaw of Foot Protective Devices

F1897 Specification for Leg Protection for Chain Saw Users

F2413 Specification for Performance Requirements for Protective (Safety) Toe Cap Footwear

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

29 CFR 1910.266

### 3. Terminology

#### 3.1 Definitions:

3.1.1 *approve, v*—to be acceptable to the authority having jurisdiction.

3.1.2 *authority having jurisdiction, n*— the organization, office, or individual responsible for approving any equipment, installation, or procedure.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee F23 on Personal Protective Clothing and Equipment and is under the direct responsibility of Subcommittee F23.20 on Physical.

Current edition approved Jan. 1, 2013; Nov. 1, 2015. Published January 2013; May 2016. Originally approved in 1997. Last previous edition approved in 2004 as F1818 - 04. DOI: 10.1520/F1818-13.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto: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 U.S. Government Printing Office Superintendent of Documents, 732 N. Capitol St., NW, Mail Stop: SDE, Washington, DC 20401; Occupational Safety and Health Administration (OSHA), 200 Constitution Ave., Washington, DC 20210, <http://www.osha.gov>.

#### 3.1.2.1 Discussion—

The term *authority having jurisdiction* is used in this document in a broad manner since jurisdictions and the responsibilities of approval agencies vary.

3.1.3 *certification*, *n*—a system whereby an organization determines that a manufacturer has demonstrated the ability to make a product that complies with the requirements of the specification, authorizes the manufacturer to use a label on products that comply with the requirements of the specification, and conducts a follow-up program to verify the methods the manufacturer uses to determine compliance with the requirements of this specification.

3.1.4 *certification organization*, *n*—an independent, third-party organization that determines product compliance with the requirements of the specification with a labeling and listing follow-up program.

3.1.5 ~~*chain saw*~~, *chainsaw*, *n*—a portable power-operated tool used for cutting wood which has cutters linked in a chain.

3.1.6 *chain speed*, *n*—the ~~velocity~~speed of synchronized movement of linked cutters around a guide bar and sprocket.

3.1.7 *chainspeed 50 (CS50)*, *n*—for ~~chain saw~~ *chainsaw* protection, the mean ~~velocity~~speed at which cut through occurs.

#### 3.1.7.1 *Discussion*—

This value establishes the relationship between the probability of cutting through the ~~chain saw~~ *chainsaw* leg protective clothing (or foot protective device) and the speed of the saw chain. For lower chain speeds, the probability of cut through approaches zero, while for higher chain speeds, the probability of cut through approaches one.

3.1.8 *chain stop*, *n*—for ~~chain saw~~ *chainsaw* cut resistance, the resulting action when a material clogs (jams) the drive sprocket or slows the speed sufficiently to prevent advancement of the saw chain.

3.1.9 *cut resistance*, *n*—in ~~chain saw~~ *chainsaw* testing, the ability of a material, while in contact with the linked cutters, to resist cut through of the cutters of a moving saw chain, independent of either jamming or chain stop.

3.1.10 *cut-through*, *n*—for ~~chain saw~~ *chainsaw* cut resistance, the action of a running ~~chain saw~~ *chainsaw* after complete breakthrough of either protective garment or protective device.

3.1.11 *follow-up program*, *n*—the sampling, inspection, tests, or other measures conducted by the certification organization on a periodic basis to determine the continued compliance of products that are being made by the manufacturer to the requirements of the standard specification.

3.1.12 *foot*, *n*—the terminal part of the vertebrate leg, including the ankle, upon which an individual stands.

3.1.12 *foot protective device*, *n*—for ~~chain saw~~ *chainsaw* cut resistance, an article of personal equipment which covers the foot and ankle for the purpose of providing limited protection from injury due to contact with a moving saw chain.

3.1.13 *footwear*, *n*—for ~~chain saw~~ *chainsaw* cut resistance, a boot or shoe of any construction.

3.1.14 *gaiter*, *n*—for ~~chain saw~~ *chainsaw* cut resistance, a foot protective device permanently attached to the outside of the footwear.

3.1.15 *jamming*, *n*—for ~~chain saw~~ *chainsaw* cut resistance, the clogging action manifested by a protective garment which can produce a chain stop.

3.1.16 *label*, *v*—for *protective clothing*, to attach a symbol or other identifying mark, the use of which has been authorized by a certification organization.

3.1.17 *list*, *v*—for *protective clothing*, to publish a register of equipment or materials which has been verified by a certification organization as being acceptable and meeting the requirements of standard specifications.

#### 3.1.17.1 *Discussion*—

The means for identifying listed equipment may vary for each organization concerned with product evaluation, some of which do not recognize equipment as listed unless it is also labeled. The authority having jurisdiction should utilize the system employed by the certification organization to identify a listed product.

3.1.18 *protective clothing*, *n*—an item of clothing that is specifically designed and constructed for the intended purpose of isolating all or part of the body from a potential hazard or isolating the external environment from contamination by the wearer of the clothing.

#### 3.1.18.1 *Discussion*—

For ~~chain saw~~ *chainsaw* cut resistant protective clothing the potential hazard is exposure to a running power saw chain.

3.1.19 *saw chain*, *n*—a closed loop of cutters linked together for use in a portable power-operated tool.

3.1.20 *toe area cut zone*—in the testing of foot protective devices, that area, excluding the sole, that extends from the frontmost part of the footwear, to a vertical plane 15 mm ± 0.25 mm (0.60 in. ± 0.01 in.) behind the toe box.

### 3.1.20.1 Discussion—

In the absence of a toe box, the toe area cut zone extends to a vertical plane 65 mm ± .25 mm (2.60 in. ± 0.01 in.) from the front of the footwear.

3.1.21 *toe box, n*—in the testing of foot protective devices, a component inserted into the toe area of footwear.

3.1.22 *upper, n*—in footwear, that area of the footwear above the sole.

3.1.23 *upper cut zone, n*— in the testing of foot protective devices, that area which starts near the top of the footwear and extends downward, but excludes the toe area cut zone.

## 4. Materials and Workmanship

4.1 Footwear and foot protective devices shall be constructed of materials which should remain functional and effective throughout seasonal climatic variations.

4.2 Footwear and foot protective devices shall not impede normal movement or the capability to perform the intended tasks.

4.3 The workmanship in the production and assembly of the footwear or foot protective device shall be such that the protective material is securely attached.

4.4 Footwear and foot protective devices shall be free of defects or imperfections which could detract from their function or performance. All hardware should be free of rough spots, burrs, or sharp edges.

## 5. Areas of Protection

5.1 Footwear and foot protective devices shall have a minimum area of protection as described in 5.1.1 – 5.1.3.

5.1.1 *Height of Protection*—The ~~chain saw~~ chainsaw cut resistance area of the upper test cut zone shall extend downward from a minimum height of 178 mm (7 in.). (See Fig. 1.)

NOTE 1—This height can be measured by using a dowel having 64-mm (2½ in.) diameter and 178 mm (7 in.) length placed at the inside back of the heel of the footwear.

5.1.2 *Width of Protection:*

5.1.2.1 *Slip On or Non-Frontal Closure Device*—The ~~chain saw~~ chainsaw cut resistance area shall extend from Point A, at the front centerline to vertical lines on both sides of the footwear or the foot protective device. The top of the vertical lines are 70 mm (2.75 in.) from Point A when measured circumferentially along the top of the minimum protective area as shown in Fig. 1.

5.1.2.2 *Front Closure Device*—The ~~chain saw~~ chainsaw cut resistance area shall extend from Point A, at the front centerline to vertical lines on both sides of the footwear or foot protective device. The top of the vertical lines are 75 mm (3.0 in.) from Point B when measured circumferentially along the top of the minimum protective area as shown in Fig. 2.

5.1.3 *Toe Area Protection*—Toe boxes at least 1.6 mm (0.60 in.) thickness steel shall be considered to be part of the protective area.

## 6. Inspection and Performance Testing

6.1 *Inspection:*

6.1.1 Sampling levels for testing and inspection shall be established by the certification organization and the manufacturer to ensure a reasonable and acceptable confidence level that products certified to standard are compliant.

6.1.2 Inspection for determining compliance with any design requirements established in the specification shall be performed on footwear or foot protective devices.

6.1.3 Testing for determining material and component compliance with the requirements detailed in this specification shall be performed on samples which are no better than components used in the actual construction of the protective clothing. The certification organization shall be permitted to also use sample materials cut from representative footwear or foot protective devices as defined by this specification.

6.2 *Performance Testing:*

6.2.1 *Performance Requirement CS50:*

6.2.1.1 The footwear shall demonstrate a minimum CS50 of 13.9 m/s (2750 fpm) or there shall be no cut through at 1.5 seconds when tested in accordance with Test Method F1458-year.

6.2.1.2 Six specimens, three left and three right, shall be tested at the approximate midpoint of the upper cut zone. Using the dowel noted in Test Method F1458, a horizontal line will be extended from the midpoint of the dowel to where it intersects the centerline of the front of the footwear or foot protective device. The bracket on which the footwear or protective device rests is at an angle such that the tangent of the centerline at the cut point is horizontal and perpendicular to the guide bar.

6.2.1.3 Six specimens shall be tested in the toe area cut zone, three left outside and three right inside, at a point approximately 12 ± 2 mm (0.5 ± 0.1 in.) behind the edge of the toe box. The footwear shall be positioned so that the centerline of the guide bar is at an angle of 0° to the plane of the baseplate when mounted on the test bracket. The plane of the guide bar is vertical and is perpendicular to the area of the centerline of the footwear.