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Standard Specification for Foot Protection for Chain Saw Users¹

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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.

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 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 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:

- D 1776 Practice for Conditioning Textiles for Testing²
- F 1414 Test Method for Measurement of Cut Resistance to Chain Saws in Lower Body (Legs) Protective Clothing³
- F 1458 Test Method for Measurement of Cut Resistance to Chain Saw of Foot Protective Devices³

2.2 AATCC Standards:⁴

- AATCC Test Method 96—(1988) Dimensional Changes in Laundering of Woven and Knitted Fabrics, except Wool

¹ This specification is under the jurisdiction of ASTM Committee F23 on Protective Clothing and is under the direct responsibility of Subcommittee F23.20 on Physical Properties.

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² Annual Book of ASTM Standards, Vol 07.01.

³ Annual Book of ASTM Standards, Vol 11.03.

⁴ Available from American Association of Textile Chemists and Colorists (AATCC), One Davis Dr., P.O. Box 12215, Research Triangle Park, NC 27709-2215.

AATCC Test Method 158—(1985) Dimensional Changes on Dry Cleaning in Perchloroethylene: Machine Method

2.3 OSHA Standard:⁵

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.

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, 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 of synchronized movement of linked cutters around a guide bar and sprocket.

3.1.7 *chain stop, n*—for *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 (see *threshold stopping speed*).

3.1.8 *cut resistance, n*—in *textile testing for chain saws*, the ability of a material, while in contact with the linked cutters, to resist penetration of the cutters of a moving saw chain, independent of either jamming or chain stop.

⁵ Available from the Supt. of Documents, U. S. Government Printing Office, Washington, DC 20402.

3.1.9 *cut-through time, n*—for chain saw cut resistance, the time required for a running saw chain to affect complete breakthrough of a protective garment or protective device.

3.1.9.1 *Discussion*—When a cut through is effected, speed of the saw chain, and time required must be measured.

3.1.10 *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.

3.1.11 *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 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 cut resistance, a boot or shoe of any construction.

3.1.14 *gaiter, n*—for chain saw cut resistance, a foot protective device worn outside the footwear.

3.1.15 *jamming, n*—for chain saw 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 *liner, n*—for chain saw cut resistance, foot protective device worn inside the footwear.

3.1.18 *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.

3.1.18.1 *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.

3.1.19 *protective clothing, n*—any material or combination of materials used in an item clothing for the purpose of isolating parts of the body from a potential hazard.

3.1.19.1 *Discussion*—In this specification, the potential hazard is contact with a running chain saw.

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

3.1.21 *threshold stopping speed (TSS), n*—for chain saw cut protection, the maximum saw chain speed measured in metres per second (m/s) (feet per minute (f/m)) that does not produce a cut through when the chain saw is dropped onto the test specimen.

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

3.1.22.1 *Discussion*—In the absence of a toe box, the toe area cut zone extends to a vertical plane 65 mm \pm .25 mm (2.60 in. \pm 0.01 in.) from the front of the footwear.

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

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

3.1.25 *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 The means of securing the footwear or foot protective device in position on the foot is considered part of its structure. A means of securing footwear includes laces, buckles, snaps, hooks, and any other items which may be considered as a means of holding the footwear or protective device securely in place. These means of securing the footwear or foot protective device shall not be removed for testing and care is to be taken so that the means of securing the footwear or foot protective device are not lodged between the forms and mounting brackets in such a way that they interfere with the integrity of the testing procedure.

5.2 Footwear and foot protective devices shall have a minimum area of protection as described in 5.2.1-5.2.3.

5.2.1 *Height of Protection*—The chain saw cut resistance area of the upper test cut zone shall extend downward from a minimum height of 178 mm (7 in.). (See Fig. 1.)⁶

5.2.2 *Width of Protection:*

5.2.2.1 *Slip On or Non-Frontal Closure Device*—The chain saw 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.

5.2.2.2 *Front Closure Device*—The chain saw 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.

5.2.3 *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 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.