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## Standard Specification for Leg Protection for Chain Saw Users<sup>1</sup>

This standard is issued under the fixed designation F1897; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 1. Scope

1.1 This specification specifies minimum requirements for the design, performance, testing, and certification of protective clothing and protective devices designed to provide cut resistance protection to the legs of operators of power chain saws.

1.2 The objective of this specification is to prescribe fit, function, and performance criteria for protective clothing and protective devices that, when worn by chain saw operators, are intended to reduce the severity of leg injuries caused by contact with a running power saw chain.

1.3 This standard 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 standard 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 ~~shall~~; “shall”; recommendations and advisory information is indicated by use of ~~should~~; “should.”

1.6 *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*:<sup>2</sup>

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

### 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 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.

<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.

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<sup>2</sup> 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.

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

3.1.6 *chain speed*, *n*—the speed of synchronized movement of linked cutters around a guide bar and sprocket. **F1414**

3.1.7 *chainspeed 50 (CS50)*, *n*—for chain saw protection, the mean chain speed at which ~~cut through~~ cut-through occurs. **F1414**

3.1.7.1 *Discussion*—

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

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

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

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

3.1.12 *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.

3.1.13 *jamming*, *n*—for chain saw cut resistance, the clogging action manifested by a protective garment that can produce a chain stop.

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

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

3.1.15.1 *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.

3.1.16 *protective chaps*, *n*—for chain saw cut protection, a protective device normally worn outside the trousers that is secured around the legs and waist.

3.1.17 *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.

3.1.17.1 *Discussion*—

For chain saw cut-resistant protective clothing, the potential hazard is exposure to a running power saw chain.

3.1.18 *protective device*, *n*—for chain saw cut resistance, an article of personal protective equipment that augments other equipment and is worn for the purpose of providing limited protection from injury due to contact with a moving power saw chain.

3.1.18.1 *Discussion*—

Examples of protective devices for leg protection include protective chaps, protective leggings, and protective pants.

3.1.19 *protective legging*, *n*—for chain saw cut resistance, a protective garment with independent legs normally worn outside the trousers.

3.1.20 *protective pant*, *n*—for chain saw cut resistance, a trouser-style protective garment in which the protective material is permanently attached to the garment.

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

## 4. Materials and Manufacture

4.1 Protective clothing and protective devices shall be constructed of materials that are sufficiently flexible to adapt to the shape of the leg. Protective garments or protective devices should remain functional and effective throughout seasonal climatic variations.

4.2 Protective clothing and protective devices shall be constructed to be lightweight and flexible enough so as not to severely restrict movement of the leg.

4.3 Protective garments or protective devices shall be constructed of materials that offer protection as stipulated in Section 5 and that do not impede normal maneuverability or capability to perform the intended task. Protective garments or protective devices should retain their shape and function when wet.

4.4 The workmanship in the production and assembly of the protective clothing or protective device, and any associated clothing or restraining material, shall be such that the protective pad is permanently attached to the protective clothing.

4.5 Protective clothing or protective devices shall be free of defects or imperfections that could detract from their function or performance. All hardware on protective clothing or protective devices should be free of rough spots, burrs, or sharp edges.

## 5. Areas of Protection

5.1 The means of maintaining the protective clothing or protective device in the intended position is considered part of the protective clothing. Protective garments or protective devices shall have an adequate means to keep them securely fastened around the waist and legs.

5.2 Protective garments and protective devices shall protect a minimum area as described below:

### 5.2.1 *Pants/Trousers:*

5.2.1.1 The protective pad shall have a minimum length of 700 mm (28 in.) and extend from the crotch to a point no more than 75 mm (3 in.) above the bottom of the pant leg.

NOTE 1—Should the inseam length be less than 700 mm (28 in.), then the pad may extend above the crotch.

5.2.1.2 The protective pad shall cover at least 3.142 rad (180°) across the frontal arc of each leg plus an additional 0.524 rad (30°) or 100 mm (4 in.) on the left side of both legs. The top of the extended coverage area, adjacent to the crotch, may be trimmed to an ~~angle~~ angle not to exceed 0.785 rad (45°) downwards in the back of the left leg, and at an angle not to exceed 1.134 rad (65°) in the back of the right leg. The protective pad should overlap the boot top by at least 50 mm (~~2 in.~~) (2 in.) as worn on the user (see Fig. 1a, 1b, and 1c).

### 5.2.2 *Chaps or Leggings:*

5.2.2.1 The protective pad shall have a minimum length of 700 mm (28 in.) and extend from the crotch to a point 25 mm (1 in.) above the bottom of the carrier garment.

5.2.2.2 The protective pad shall have a minimum width of 350 mm (14 in.) at the midpoint of the pad and a minimum width of 250 mm (10 in.) at the bottom of the pad. The top of the extended coverage area, adjacent to the crotch, may be trimmed to an angle of 0.785 rad (45°) downward in the rear of the left leg and up to 1.134 rad (65°) downward on the rear of the right leg (see Fig. 2).

## 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 assure ensure to a reasonable and acceptable confidence level that products certified to standard are compliant.

6.1.2 Inspection for determining compliance with any design requirements specified in the standard shall be performed on a completed garment.

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

### 6.2 *Performance Testing:*

6.2.1 *Performance Requirement*—The CS50 of test specimens shall not be less than 14 m/s (2750 f/m) or the cut-through ~~cut-through~~ time shall not be less than 1.5 s at both ~~45°~~45° and ~~90°~~90°.

## 7. Certification

### 7.1 *General:*

7.1.1 Protective clothing or protective devices that are labeled as complying with this standard shall meet or exceed all applicable requirements specified in the standard and shall be certified.

7.1.2 All certifications shall be performed by an approved certification organization.

7.1.3 Compliance protective clothing or protective devices shall be labeled and listed. Such protective garments or protective devices shall also have a label and identification that ~~meets~~ meet the requirements specified in Section 9.