



Designation: **F3325 – 19 F3325 – 20**

Standard Specification for Leg-Protective Devices for Chainsaw Users¹

This standard is issued under the fixed designation F3325; 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 (ϵ) 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 chainsaws.²

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 chainsaw 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 chainsaw operators may be exposed.

1.5 Mandatory requirements are indicated by the use of “shall”; recommendations and advisory information are indicated by the use of “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. Terminology

2.1 Definitions:

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

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

2.1.2.1 *Discussion*—

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

2.1.3 *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.

2.1.4 *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.

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

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

2.1.7 *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.

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

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² This was developed as a replacement for the archived CAN/BNQ 1923-450.

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

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

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

2.1.11 *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.

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

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

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

2.1.14.1 *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.

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

2.1.16 *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.

2.1.16.1 *Discussion*—

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

2.1.17 *protective device*, *n*—*for chainsaw 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.

2.1.17.1 *Discussion*—

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

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

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

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

2.1.21 *threshold stopping speed*, *n*—chain speed that results in a 5-mm (1/4-in.) cut in the bottom layer of the protective pad liner in a chainsaw leg-protective device.

2.1.21.1 *Discussion*—

This value establishes the relationship between the probability of cutting through the 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. Materials and Manufacture

3.1 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.

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

3.3 Protective garments or protective devices shall be constructed of materials that offer protection as stipulated in Section 4 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.

3.4 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.

3.5 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.

4. Areas of Protection

4.1 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.

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

4.2.1 *Pants/Trousers Classes:*

4.2.1.1 *Class A*—The protective pad shall have a minimum length of 686 mm (27 in.) and extend from the crotch to a point no more than 75 mm (3 in.) above the bottom of the pant leg, as well as rear coverage of the leg as shown in Fig. 1. The front pad covers from side seam to inner seam on the front, and the calf coverage shall be a minimum of 305 mm (12 in.) on the rear.

NOTE 1—Should the inseam length be less than 686 mm (27 in.), then the pad may extend above the crotch.

4.2.1.2 *Class B*—The front protective pad shall have a minimum length of 686 mm (27 in.) and extend from the crotch to a point no more than 75 mm (3 in.) above the bottom of the pant leg, as shown in Fig. 2.

NOTE 2—Should the inseam length be less than 686 mm (27 in.), then the pad may extend above the crotch.

4.2.1.3 *Class C*—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 not to exceed 0.785 rad (45°) downward 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 shall overlap the boot top by at least 50 mm (2 in.) as worn on the user. See Fig. 3.

NOTE 3—Should the inseam length be less than 686 mm (27 in.), then the pad may extend above the crotch.

4.2.1.4 *Class D*—The protective pad shall cover, at a minimum, the areas specified in Fig. 4. 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 not to exceed 0.785 rad (45°) downward 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 shall overlap the boot top by at least 50 mm (2 in.) as worn on the user. The pad coverage shall also extend to cover the calf area of the pant beyond the extra 100 mm (4 in.) to the left of each leg and shall also cover a minimum 306 mm (12 in.) vertically in the calf area of the rear pant as per Fig. 4.

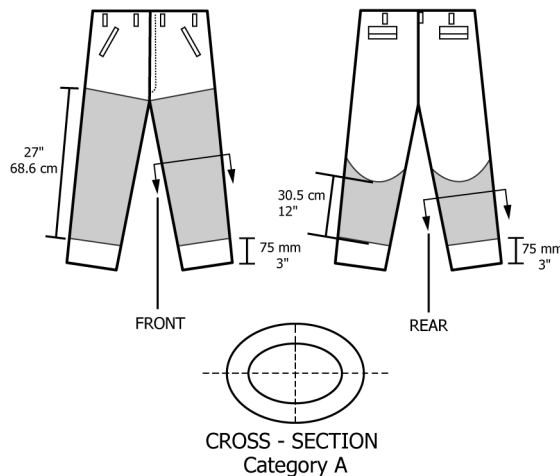


FIG. 1 Class A Protective Pad

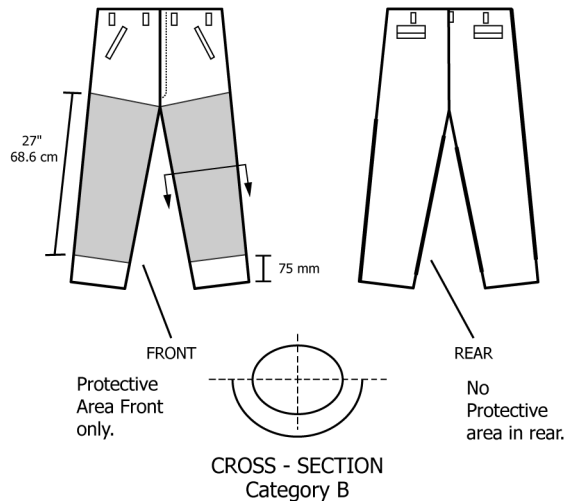


FIG. 2 Class B Protective Pad

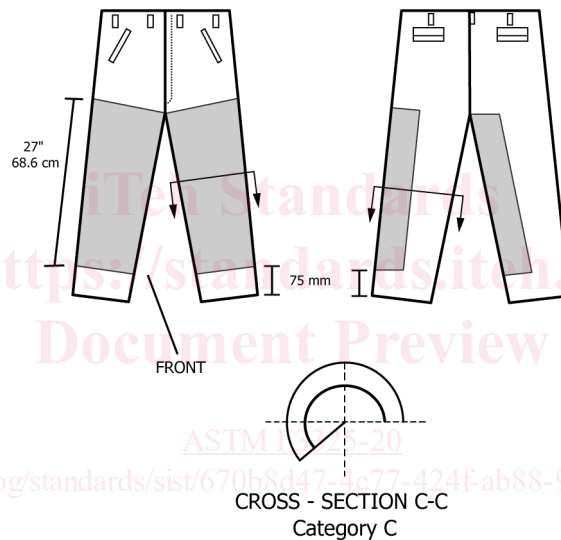


FIG. 3 Class C Protective Pad

NOTE 4—Should the inseam length be less than 686 mm (27 in.), then the pad may extend above the crotch.

4.3 Chaps and Leggings:

4.3.1 Chaps and leggings shall be at least 686 mm (27 in.) in length and be of a Class A, B, C, or D pad type. The minimum protective pad dimensions and locations shall comply with Fig. 5, Fig. 6, Fig. 7, or Fig. 8.

4.3.2 Chaps and leggings shall be provided with permanently attached means to fasten them around the waist and legs as shown in Figs. 9 and 10.

5. Inspection and Performance Testing

5.1 Inspection:

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

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

5.1.3 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.

5.2 Performance Testing:

5.2.1 *Performance Requirement*—The threshold stopping speed of the test specimens shall not be less than 15 m/s (3000 fpm), or the cut-through time shall not be less than 1.5 s at 90°.

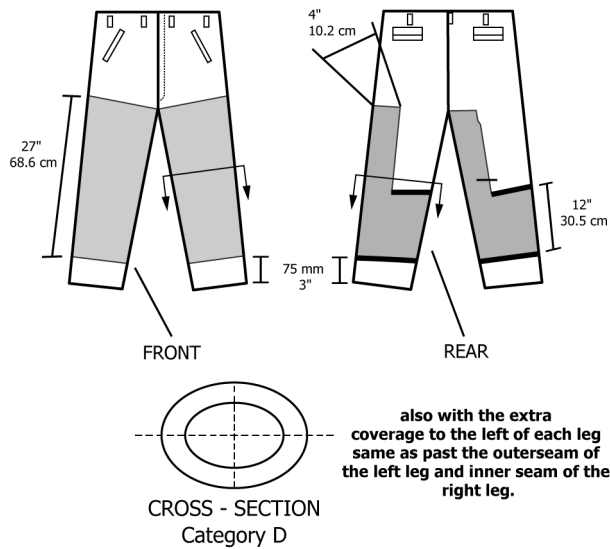


FIG. 4 Class D Protective Pad

6. Certification

6.1 General:

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

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

6.1.3 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 meet the requirements specified in Section 8.

6.2 Certification Program:

6.2.1 The certification organization shall not be owned or controlled by manufacturers or vendors of the product being certified. The certification organization shall be primarily engaged in certification work and shall not have a monetary interest in the product's ultimate profitability.

6.2.1.1 The certification organization should have sufficient breadth of interest and activity so that the loss or award of a specific business contract would not be a determining factor in the financial well-being of the organization.

6.2.2 The certification organization shall refuse to certify products to this specification that do not comply with all applicable requirements of this specification.

6.2.3 The contractual provisions between the certification organization and the manufacturer shall specify that certification is contingent upon compliance with all applicable requirements of this specification. There shall be no conditional, temporary, or partial certifications. Manufacturers shall not be authorized to use any label or reference to the certification organization on products that are not manufactured in compliance with all applicable requirements of this specification.

6.2.3.1 The contractual provisions covering certification programs should contain clauses advising the manufacturer that if requirements change, the product should be brought into compliance with the new requirements by a stated effective date through a compliance review program involving all currently listed products. Without these clauses, certifiers would not be able to move quickly to protect their names, marks, or reputations. A product safety certification program would be deficient without these contractual provisions and the administrative means to back them up.

6.2.4 A certification organization shall have, or contract with, laboratory facilities and equipment for conducting proper tests, a program for calibration of all instruments, and procedures to ensure proper control of all testing. These procedures shall include the use of laboratory manuals, data sheets, documented calibration and calibration routines, performance verification, proficiency testing, and staff qualification and training programs.

6.2.4.1 Investigative procedures are important elements of an effective and meaningful product safety certification program. A preliminary review should be carried out on products submitted to the agency before any major testing is undertaken.

6.2.5 Manufacturers shall be required to establish and maintain a program of production, inspection, and testing.

6.2.6 The manufacturer and the certification organization shall evaluate any changes affecting the form, fit, or function of the certified product to determine its continual certification to this specification.

6.2.7 Product certifications shall include a follow-up inspection program, with at least two random and unannounced visits in each twelve-month period.

6.2.7.1 Such factory inspections shall include, in most instances, witnessing of production tests. With certain products, the certification organization inspectors should select samples from the production line and submit them to the main laboratory for counter-check testing. With other products, it may be necessary to purchase samples on the open market for test purposes.

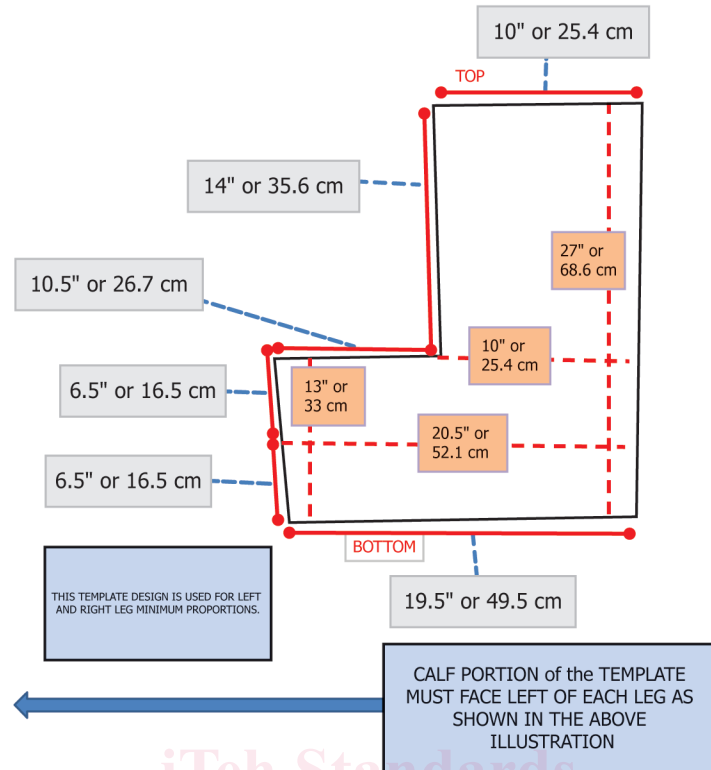


FIG. 5 Class A Template Minimum for Chaps and Leggings

6.2.8 The certification organization shall have a program for investigating field reports alleging malperformance or failure of listed products.

6.2.9 The operating procedures of the certification organization shall provide a mechanism for the manufacturer to appeal decisions. The procedures shall include the presentation of information from both sides of a controversy to a designated appeals panel.

6.2.10 The certification organization shall be in a position to use legal means to protect the integrity of its name and label. The name and label shall be registered and legally defended.

7. Care and Maintenance

7.1 Protective clothing and protective devices shall be maintained according to the manufacturer's instructions.

7.2 If the protective clothing or protective device is damaged, check with the manufacturer's instructions for replacement criteria. It may no longer provide the minimum protection required by this specification.

7.3 The protective pad that covers the area outlined in Section 4 shall not be modified.

7.4 Failure to follow manufacturer's instructions may result in the protective clothing or protective device no longer meeting the minimum protection required by this specification.

7.5 Manufacturer shall also provide some guidance relative to retirement of protective clothing or protective devices.

8. Identification

8.1 Each protective garment or protective device meeting this specification shall be provided with:

8.1.1 The certification organization's label and means to identify the manufacturer.

8.1.2 A label that states:

8.1.2.1 "This product has been certified to comply with Specification F3325."

8.1.3 Instructions for use, care, repair, replacement, cleaning, and drying.

8.1.4 Any necessary informational and advisory material that includes at least the following or similar statement:

8.1.4.1 **Warning**—No one can guarantee that an injury will not occur or will be less severe because an operator wears this protective clothing or protective device. This protective clothing or protective device is intended, under limited conditions, to assist the wearer in reducing the severity of injury from a running power saw chain that accidentally contacts the saw operator's leg. Failure to follow the manufacturer's instructions may result in the protective clothing or protective device no longer providing the minimum protection required by this specification.