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Standard Specification for Protectors for Rubber Insulating Gloves Meeting Specific Performance Requirements¹

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1. Scope

1.1 This specification establishes specifications and test requirements for protectors to be worn over electrical workers' rubber insulating gloves.

1.2 It is intended that the protectors specified herein fit snugly over rubber insulating gloves specified in Specification D120 without causing mechanical damage to the rubber insulating glove. Cinching at the wrist is allowed.

1.3 This specification covers the use of a material or combination of materials which do not compromise the integrity of the rubber insulating glove.

1.4 Specification F696 was used to establish minimums for this specification.

1.5 Protectors meeting this specification do not provide any electrical shock protection if used on their own.

1.6 This specification specifies the response of protectors to electric arc, puncture and cut under controlled conditions.

1.6.1 Field conditions will not directly correlate to testing methods.

1.7 The values stated in SI units are to be regarded as the standard except as noted. See IEEE/ASTM SI-10.

1.8 The following safety hazards caveat pertains only to the test method portion, Sections 6 and 7, of this specification. *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.9 *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.*

¹ This specification is under the jurisdiction of ASTM Committee F18 on Electrical Protective Equipment for Workers and is the direct responsibility of Subcommittee F18.15 on Worker Personal Equipment.

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2. Referenced Documents

2.1 ASTM Standards:²

D120 Specification for Rubber Insulating Gloves

D3389 Test Method for Coated Fabrics Abrasion Resistance (Rotary Platform Abrader)

D3884 Guide for Abrasion Resistance of Textile Fabrics (Rotary Platform Abrader Method)

D7138 Test Method to Determine Melting Temperature of Synthetic Fibers

F496 Specification for In-Service Care of Insulating Gloves and Sleeves

F696 Specification for Leather Protectors for Rubber Insulating Gloves and Mittens

F2675 Test Method for Determining Arc Ratings of Hand Protective Products Developed and Used for Electrical Arc Flash Protection

F2992 Test Method for Measuring Cut Resistance of Materials Used in Protective Clothing with Tomodynamometer Test Equipment

IEEE/ASTM SI-10 American National Standard for Metric Practice

2.2 ANSI Standard:³

ANSI/ISEA 105 American National Standard for Hand Protection Selection Criteria

2.3 NFPA Standard:⁴

NFPA 1971 Standard on Protective Ensembles for Structural Fire Fighting and Proximity Fire Fighting

3. Terminology

3.1 Definitions:

3.1.1 *glove, n*—a covering for the hand which has separate sections for the thumb and fingers or a mitten which has separate sections for the thumb and multiple fingers.

3.2 Definitions of Terms Specific to This Standard:

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 American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

⁴ Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

3.2.1 *attachments, n*—an additional material applied to a specific area of protective product to make the portion of the protective product more resistant to wear, to fit better, such as a cinch or elastic, or to add protection, such as impact protection.

3.2.2 *protector, n*—a glove designed to be worn over dielectric rubber insulating gloves.

3.2.2.1 *Discussion*—A protector is designed to provide mechanical and thermal protection for the dielectric rubber insulating glove.

4. Significance and Use

4.1 The protector provides resistance to mechanical hazards such as cut and puncture, for the rubber insulating gloves.

4.2 Protectors enhance protection from the thermal effects of an electric arc and shall not be used alone for electrical shock protection.

4.3 It is the responsibility of the user of this type of protective equipment to effectively train workers on the safe use of this equipment.

4.4 Testing is performed on new protective equipment; users are advised that product performance can be reduced due to routine use or contamination, or both.

4.5 Launder or recondition protectors according to the manufacturer’s instructions or employer’s procedure, or both.

5. Performance Requirements

5.1 Protectors shall conform to the requirements listed in **Table 1** as outlined in Section 7.

5.2 All tests in this standard are design tests and shall be performed on the production design and anytime the design of the protector changes, which could affect the testing results, including but not limited to material changes, coating changes, thread changes (if sewn) and any design change which could affect the testing results.

6. Test Methods

6.1 *Cut Resistance:*

6.1.1 Both the palm and the back of the protector (if the materials or construction are different) shall be tested for cut

resistance in accordance with ANSI 105, and the lowest cut level achieved shall be reported.

6.1.2 If the palm and the back of the protectors are of the same material and construction, only one side shall be tested.

6.1.3 When reinforcements are used on the protector design, they shall be removed to test only the base layer(s) of material.

6.2 *Arc Rating:*

6.2.1 *Arc Testing:*

6.2.1.1 Protectors shall be tested in accordance with Test Method **F2675** and the arc rating shall be reported in cal/cm².

6.2.1.2 Protectors shall have a minimum arc rating of 4 cal/cm². This has been determined by testing to prevent ignition of rubber insulated gloves.

6.2.1.3 Protectors shall be tested in their most basic layer model to determine the minimum arc rating (other areas of the glove may have greater protection but only the minimum protective area of the hand can receive an arc rating). When different areas have different base materials, all areas shall be evaluated. The protector shall be assigned the arc rating of the area having the lowest level of protection.

6.2.1.4 Where the front and back of a protector have distinctly different lay up constructions, both need to be tested in accordance with the requirement above. Where the front and back of a glove are different based on reinforcement layers, the lay up with the fewest layers will only be evaluated based on the requirement above.

(1) When attachments are used on the protector design, they shall be removed for the arc rating if the placement of these attachments can affect the arc rating.

(2) All protectors and attachments in a configuration as sold shall then be evaluated for ignition, melting and dripping by an arc test described in **6.2.2**. These could include but are not limited to cuffs, draw straps, elastics, reflective trim, impact protection or attached reinforcements.

(3) For example, a label on the back of the hand of a glove may raise the rating and would not be allowed in the arc rating test but must be evaluated by arc testing in accordance with this section to ensure it does not increase injury.

6.2.1.5 The average afterflame time of all exposures within 20 % of the arc rating shall be calculated. The average afterflame time shall not exceed 15 s.

TABLE 1 Requirements for Protectors

Characteristics	Test Standard	Requirement
Cut resistance	ANSI 105 Section 5.1.1 using Test Method F2992 and report the ANSI 105 level	Report Level(s)
Puncture resistance palm of hand	ANSI 105 Section 5.1.2	Report Level from ANSI 105
Arc Rating (AR)	Test Method F2675	AR is minimum 4 cal/cm ² Report AR in whole numbers, cal/cm ² (round down and to the nearest whole number)
Average afterflame time in arc test	Test Method F2675	Maximum 15 s average afterflame time for any component within 20 % of the AR
Arc ignition withstand	6.2.2	Shall not ignite, or melt and drip
Thread	Shall meet either Test Method D7138 and shall not melt at 260 °C or the thread shall meet the requirements of ASTM Specification F696 . Thread used when performing the arc testing shall not be changed for production as thread may affect arc rating level of some products.	
Other optional tests may be added in accordance with agreement with the end user from Appendix X1 .		Report Levels