

7. *Determination of Halon 1301/1211 Threshold Extinguishing Concentrations Using the Cup Burner Method*; Riley and Olson, Ansul Report AL-530-A.

H. §1910.163. *Fixed extinguishing systems—water spray and foam agents*:

1. *Standard for Foam Extinguisher Systems*, ANS/NFPA 11; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

2. *Standard for High Expansion Foam Systems*, ANS/NFPA 11A; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

3. *Standard for Water Spray Fixed Systems for Fire Protection*, ANS/NFPA 15; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

4. *Standard for the Installation of Foam-Water Sprinkler Systems and Foam-Water Spray Systems*, ANS/NFPA 16; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

I. §1910.164. *Fire Detection systems*:

1. *National Electrical Code*, ANS/NFPA 70; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

2. *Standard for Central Station Signaling Systems*, ANS/NFPA 71; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

3. *Standard on Automatic Fire Detectors*, ANS/NFPA 72E; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

J. §1910.165. *Employee alarm systems*:

1. *National Electrical Code*, ANS/NFPA 70; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

2. *Standard for Central Station Signaling Systems*, ANS/NFPA 71; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

3. *Standard for Local Protective Signaling Systems*, ANS/NFPA 72A; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

4. *Standard for Auxiliary Protective Signaling Systems*, ANS/NFPA 72B; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

5. *Standard for Remote Station Protective Signaling Systems*, ANS/NFPA 72C; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

6. *Standard for Proprietary Protective Signaling Systems*, ANS/NFPA 72D; National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.

7. *Vocal Emergency Alarms in Hospitals and Nursing Facilities: Practice and Potential*. National Bureau of Standards. Washington, D.C., July 1977.

8. *Fire Alarm and Communication Systems*. National Bureau of Standards. Washington, D.C., April 1978.

[45 FR 60715, Sept. 12, 1980, as amended at 58 FR 35309, June 30, 1993]

APPENDIX D TO SUBPART L OF PART 1910—AVAILABILITY OF PUBLICATIONS INCORPORATED BY REFERENCE IN SECTION 1910.156 FIRE BRIGADES

The final standard for fire brigades, section 1910.156, contains provisions which incorporate certain publications by reference. The publications provide criteria and test methods for protective clothing worn by those fire brigade members who are expected to perform interior structural fire fighting. The standard references the publications as the chief sources of information for determining if the protective clothing affords the required level of protection.

It is appropriate to note that the final standard does not require employers to purchase a copy of the referenced publications. Instead, employers can specify (in purchase orders to the manufacturers) that the protective clothing meet the criteria and test methods contained in the referenced publications and can rely on the manufacturers' assurances of compliance. Employers, however, may desire to obtain a copy of the referenced publications for their own information.

The paragraph designation of the standard where the referenced publications appear, the title of the publications, and the availability of the publications are as follows:

Paragraph designation	Referenced publication	Available from
1910.156(e)(3)(ii) .....	"Protective Clothing for Structural Fire Fighting," NFPA No. 1971 (1975).	National Fire Protection Association, Batterymarch Park, Quincy, MA 02269.
1910.156(e)(4)(i) .....	"Development of Criteria for Fire Fighter's Gloves; Vol. II, Part II: Test Methods" (1976).	U.S. Government Printing Office, Washington, D.C. 20402. Stock No. for Vol. II is: 071-033-0201-1.
1910.156(e)(5)(i) .....	"Model Performance Criteria for Structural Firefighter's Helmets" (1977).	U.S. Fire Administration, National Fire Safety and Research Office, Washington, D.C. 20230.

The referenced publications (or a microfiche of the publications) are available for review at many universities and public li-

braries throughout the country. These publications may also be examined at the OSHA Technical Data Center, Room N2439-Rear,

United States Department of Labor, 200 Constitution Ave., N.W., Washington, D.C. 20210 (202-219-7500), or at any OSHA Regional Office (see telephone directories under United States Government-Labor Department).

[45 FR 60715, Sept. 12, 1980, as amended at 58 FR 33509, June 30, 1993; 61 FR 9239, Mar. 7, 1996]

APPENDIX E TO SUBPART L OF PART 1910—TEST METHODS FOR PROTECTIVE CLOTHING

This appendix contains test methods which must be used to determine if protective clothing affords the required level of protection as specified in § 1910.156, fire brigades.

(1) *Puncture resistance test method for foot protection.*

A. *Apparatus.* The puncture resistance test shall be performed on a testing machine having a movable platform adjusted to travel at ¼-inch/min (0.1 cm/sec). Two blocks of hardwood, metal, or plastic shall be prepared as follows: the blocks shall be of such size and thickness as to insure a suitable rigid test ensemble and allow for at least one-inch of the pointed end of an 8D nail to be exposed for the penetration. One block shall have a hole drilled to hold an 8D common nail firmly at an angle of 98°. The second block shall have a maximum ½-inch (1.3 cm) diameter hole drilled through it so that the hole will allow free passage of the nail after it penetrates the insole during the test.

B. *Procedure.* The test ensemble consisting of the sample unit, the two prepared blocks, a piece of leather outsole 10 to 11 irons thick, and a new 8D nail, shall be placed as follows: the 8D nail in the hole, the sample of outsole stock superimposed above the nail, the area of the sole plate to be tested placed on the outsole, and the second block with hole so placed as to allow for free passage of the nail after it passes through the outsole stock and sole plate in that order. The machine shall be started and the pressure, in pounds required for the nail to completely penetrate the outsole and sole plate, recorded to the nearest five pounds. Two determinations shall be made on each sole plate and the results averaged. A new nail shall be used for each determination.

C. *Source.* These test requirements are contained in "Military Specification For Fireman's Boots," MIL-B-2885D (1973 and amendment dated 1975) and are reproduced for your convenience.

(2) *Test method for determining the strength of cloth by tearing: Trapezoid Method.*

A. *Test specimen.* The specimen shall be a rectangle of cloth 3-inches by 6-inches (7.6 cm by 15.2 cm). The long dimension shall be parallel to the warp for warp tests and parallel to the filling for filling tests. No two specimens for warp tests shall contain the

same warp yarns, nor shall any two specimens for filling tests contain the same filling yarns. The specimen shall be taken no nearer the selvage than ¼ the width of the cloth. An isosceles trapezoid having an altitude of 3-inches (7.6 cm) and bases of 1 inch (2.5cm) and 4 inches (10.2 cm) in length, respectively, shall be marked on each specimen, preferably with the aid of a template. A cut approximately ⅜-inch (1 cm) in length shall then be made in the center of a perpendicular to the 1-inch (2.5 cm) edge.

B. *Apparatus.* (i) Six-ounce (.17 kg) weight tension clamps shall be used so designed that the six ounces (.17 kg) of weight are distributed evenly across the complete width of the sample.

(ii) The machine shall consist of three main parts: Straining mechanism, clamps for holding specimen, and load and elongation recording mechanisms.

(iii) A machine wherein the specimen is held between two clamps and strained by a uniform movement of the pulling clamp shall be used.

(iv) The machine shall be adjusted so that the pulling clamp shall have a uniform speed of 12 ± 0.5 inches per minute (0.5 ± 0.02 cm/sec).

(v) The machine shall have two clamps with two jaws on each clamp. The design of the two clamps shall be such that one gripping surface or jaw may be an integral part of the rigid frame of the clamp or be fastened to allow a slight vertical movement, while the other gripping surface or jaw shall be completely moveable. The dimension of the immovable jaw of each clamp parallel to the application of the load shall measure one-inch, and the dimension of the jaw perpendicular to this direction shall measure three inches or more. The face of the movable jaw of each clamp shall measure one-inch by three inches.

Each jaw face shall have a flat smooth, gripping surface. All edges which might cause a cutting action shall be rounded to a radius of not over ¼-inch (.04 cm). In cases where a cloth tends to slip when being tested, the jaws may be faced with rubber or other material to prevent slippage. The distance between the jaws (gage length) shall be one-inch at the start of the test.

(vi) Calibrated dial; scale or chart shall be used to indicate applied load and elongation. The machine shall be adjusted or set, so that the maximum load required to break the specimen will remain indicated on the calibrated dial or scale after the test specimen has ruptured.

(vii) The machine shall be of such capacity that the maximum load required to break the specimen shall be not greater than 85 percent or less than 15 percent of the rated capacity.

(viii) The error of the machine shall not exceed 2 percent up to and including a 50-pound load (22.6 kg) and 1 percent over a 50-