

INCH-POUND

MIL-S-43860D

31 May 1990

SUPERSEDING

MIL-S-43860C

30 September 1986

## MILITARY SPECIFICATION

## SHOES, ELECTRICAL HAZARDS PROTECTIVE, HIGH, MEN'S

This specification is approved for use by all Departments and Agencies of the Department of Defense.

## 1. SCOPE

1.1 Scope. This specification covers men's high black safety electrical hazard protective shoes with traction tread soles and heels, and steel box-toes.

1.2 Classification. The shoes shall be of one type in the following sizes and widths as specified in table I (see 6.2).

TABLE I. Schedule of Sizes

| Width | 4 | 4½ | 5 | 5½ | 6 | 6½ | 7 | 7½ | 8 | 8½ | 9 | 9½ | 10 | 10½ | 11 | 11½ | 12 | 12½ | 13 | 13½ | 14 | 14½ |
|-------|---|----|---|----|---|----|---|----|---|----|---|----|----|-----|----|-----|----|-----|----|-----|----|-----|
| XN    | - | -  | X | X  | X | X  | X | X  | X | X  | X | X  | X  | X   | X  | X   | X  | X   | X  | X   | X  | X   |
| N     | X | X  | X | X  | X | X  | X | X  | X | X  | X | X  | X  | X   | X  | X   | X  | X   | X  | X   | X  | X   |
| R     | X | X  | X | X  | X | X  | X | X  | X | X  | X | X  | X  | X   | X  | X   | X  | X   | X  | X   | X  | X   |
| W     | X | X  | X | X  | X | X  | X | X  | X | X  | X | X  | X  | X   | X  | X   | X  | X   | X  | X   | X  | X   |
| XW    | X | X  | X | X  | X | X  | X | X  | X | X  | X | X  | X  | X   | X  | X   | X  | X   | X  | X   | X  | X   |

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5014 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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## 2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2).

## SPECIFICATIONS

## FEDERAL

- C-F-206 - Felt Sheet: Cloth, Felt, Wool, Pressed
- V-L-61 - Laces, Nylon
- V-T-285 - Thread, Polyester
- V-T-295 - Thread, Nylon
- KK-I-570 - Insole, Footwear, Leather, Cattlehide
- TT-C-490 - Cleaning Methods for Ferrous Surfaces and Pretreatments for Organic Coatings
- CCC-C-443 - Cloth, Duck, Cotton (Single and Plied Filling Yarns, Flat)
- PPP-B-566 - Boxes, Folding, Paperboard
- PPP-B-636 - Boxes, Shipping, Fiberboard
- PPP-B-676 - Boxes Setup

## MILITARY

- MIL-L-3122 - Leather, Cattlehide, for Footwear Uppers, Chrome Tanned, Fatliquored
- MIL-L-10867 - Leather, Cattlehide, Gusset, Chrome Tanned, Fatliquored
- MIL-S-22777 - Soles and Heels, Rubber, Traction Tread, Shoe
- MIL-L-35078 - Loads, Unit: Preparation of Semiperishable Subsistence Items; Clothing, Personnel Equipment and Equipage; General Specification For.
- MIL-C-41814 - Counter, Footwear
- MIL-L-43585 - Lasts, Footware, Shoe, Safety Toe, U.S. MIL-7

## STANDARDS

## FEDERAL

- FED-STD-191 - Textile Test Methods
- FED-STD-311 - Leather, Methods of Sampling and Testing
- FED-STD-406 - Plastics: Methods of Testing
- FED-STD-751 - Stitches, Seams and Stitchings

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- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage
- MIL-STD-147 - Palletized Unit Loads
- MIL-STD-731 - Quality of Wood Members for Containers and Pallets

(Unless otherwise indicated, copies of military and federal specifications, standards, and handbooks are available from the Standardization Documents Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issues of the documents cited in the solicitation (See 6.2).

## AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

- D 5 - Penetration of Bituminous Materials
- D 412 - Rubber Properties in Tension
- D 573 - Rubber-Deterioration in an Air Oven
- D 746 - Brittleness Temperature of Plastics and Elastomers by Impact
- D 1052 - Measuring Rubber Deterioration-Cut Growth Using Ross Flexing Apparatus
- D 1238 - Flow Rates of Thermoplastics by Extrusion Plastometer
- D 2240 - Rubber Property - Durometer Hardness
- D 3951 - Standard Practice for Commercial Packaging
- E 18 - Rockwell Hardness and Rockwell Superficial Hardness of Metallic Materials
- E 28 - Softening Point by Ring-and-Ball Apparatus

(Application for copies should be addressed to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19103-1187.)

## AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

- ANSI Z41 - Personnel Protection - Protective Footwear

(Application for copies should be addressed to the American National Standards Institute, Inc., 1430 Broadway, New York, NY 10018.)

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

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2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

## 3. REQUIREMENTS

3.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection (see 6.3) in accordance with 4.3.

3.2 Samples. The samples, when furnished, are solely for guidance and information to the contractor (see 6.4). Variation from this specification may appear in the sample, in which case this specification shall govern.

3.3 Material. It is encouraged that recycled material be used when practical as long as it meets the requirements of this specification.

3.3.1 Leather. All leather components shall contain not less than 0.18 percent nor more than 0.70 percent paranitrophenol fungicide.

3.3.1.1 Upper leather vamps, quarters, and counterpockets. The leather for the vamps, quarters, and counterpockets shall be smooth plated, full grain, or corrected grain side leather conforming to treatment B of MIL-L-3122, except that the leather shall be treated with an approved water-resistant compound and the maximum amount of chloroform soluble material permitted in this leather shall be 18.0 percent. The thickness shall be as specified for the cut parts in 3.7.1. The break for vamps and quarters shall be not more than a break pattern of 4 when examined as specified in 4.4.3. The color shall be black. All finishes applied by the shoe manufacturer and tanner shall be compatible with each other to ensure a long lasting lustrous finish.

3.3.1.1.1 Upper leather tongues. Tongues shall be gusset leather conforming to treatment A of MIL-L-10867, except that the leather shall be treated with an approved water-resistant compound. The thickness shall be as specified for cut parts in 3.7.1. The color shall be black.

3.3.1.2 Insoles. The insoles shall be cut from leather conforming to type I, class 1, tannage a or b of KK-I-570. The insoles shall have either a channeled or stuck-on rib (see 3.3.5.3). The thickness of the channeled insoles shall be 6-1/2 irons, and the thickness of the stuck-on rib insoles shall be 5-1/2 irons. As an alternative, the insole may be cut from Texorist material. The Texorist shall contain 0.25 to 1.00 percent copper-8-quinolinolate uniformly distributed throughout the insole (see 4.4.1.1). The insole shall be 0.116  $\pm$  0.010 inch thick. The insole shall be cut with the heel-to-toe direction across the machine direction of the Texorist. The Texorist insole shall have a stuck-on rib applied to the printed side of the material (see 3.3.5.3).

3.3.1.3 Vamp lining. The vamp linings shall be cut from soft pliable calf, kip, or side leather 3 ounces  $\pm$  1/2 ounce in thickness when tested as specified in 4.4.1.1. The tannage of the leather shall be either chrome or vegetable

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tanned or a combination thereof. The leather shall be a full grain or partially corrected grain. The color of the leather shall be as produced by the tanning agents. As an alternative, the lining material may be vegetable tanned, chrome tanned, or vegetable chrome retanned split pigskin. The pigskin shall be the first split from the grain side after the grain has been removed. The thickness shall be 2 to 3 ounces. The pigskin shall be drum dyed, and the color shall be light russet. The surface of the split that was nearest the grain shall be sealed with a clear lacquer sufficient to coat the surface fibers but not decrease porosity, then smooth plated. The sealed plated surface shall be next to the foot. All the lining leather shall contain not less than 0.18 percent nor more than 0.70 percent paranitrophenol when tested as specified in 4.4.1.1. A light application of dye may be used to level the color of the grain surface. Slaughter cuts and flanky or pipey leather that may affect serviceability will not be permitted.

3.3.1.4 Heel pads. The heel pads shall be cut from either chrome tanned or a combination of chrome and vegetable tanned, full grain, or partially corrected lining leather, sheepskin, kip, calf, or cattlehide. The heel pads shall have a minimum thickness of 2 ounces and a maximum thickness of 3-1/2 ounces when tested as specified in 4.4.1.1. The color of the leather shall be as produced by the tanning agents. A light application of dye may be used to level the color of the grain surface. Heel pads cut from vamp leather specified in 3.3.1.3 may be used. The heel pad shall contain not less than 0.18 percent nor more than 0.70 percent paranitrophenol fungicide when tested as specified in 4.4.1.1.

3.3.2 Counters. The counters shall be leather, leatherboard, shoeboard, or polyethylene.

3.3.2.1 Leather, leatherboard, or shoeboard counters. The leather, leatherboard, or shoeboard counters shall conform to the requirements of MIL-C-41814 for shoes, electrical hazard, high. The counters shall be full molded conforming to the MIL-7 (MIL-L-43585) last, and the bottom flange shall be molded to provide for welt construction completely around the heel seat periphery of the shoe.

3.3.2.2 Polyethylene counters. The counters shall be molded and the bottom flanged as specified in 3.3.2.1 from an unfilled polyethylene resin of natural color. The molded pieces shall be uniform in texture and finish and shall be free from porosity, cracks, and blisters. The polyethylene resin shall conform to the requirements of table II when tested as specified in 4.4.1.1.

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TABLE II. Polyethylene resin requirements

| Characteristic             | Requirement                      |
|----------------------------|----------------------------------|
| Density                    | 0.91 to 0.93 gram per milliliter |
| Melt index                 | 1.0 to 5.0 grams per 10 minutes  |
| Tensile strength, ultimate | 1400 psi minimum                 |
| Elongation, ultimate       | 400 percent minimum              |

3.3.3 Rubber compounds.

3.3.3.1 Outsole. The outsole shall conform to type I, grade B of MIL-S-22777, except that, as an alternative, the color may be mahogany brown.

3.3.3.2 Heel, rubber. The rubber heel shall conform to type II, grade B, class 2 of MIL-S-22777, except that, as an alternative, the color may be mahogany brown. The heel may have a weight relief cavity with a minimum 3/8 inch diameter center support plug symmetrically located about the center of the heel. The depth of the weight relief cavity shall be not greater than 3/8 inch. The lateral distance from the edge of the weight relief cavity to the outside edge of the heel shall be not less than 7/8 inch.

3.3.3.3 Midsole. The midsole shall be of nonmarking rubber. The hardness of the midsole shall be not less than 88 nor more than 95 before and after aging when determined by the Shore A Durometer. The cut growth after aging shall not exceed 500 percent after being subjected to 25,000 flexes when tested as specified in 4.4.1.1. The color shall approximately match the color of the outsole. The thickness of the midsole shall be not less than 5 irons nor more than 6 irons.

3.3.3.4 Welting, vinyl. The welting shall be vinyl, bright flat top with the construction providing for a storm welt of medium bead number 438 or any other bead number of equal performance. The welting shall be of sufficient width to ensure that the required extensions on the finished shoes are met (see 3.7.16). The thickness of the welting shall be 0.12 to 0.13 inch. The base compound shall be virgin polyvinyl chloride, compound with suitable nonbleeding plasticizers. The finished welting shall be smooth, uniform in texture, and free from porosity, blemishes, cracks, blisters, and other defects affecting serviceability and appearance. The vinyl welting shall conform to the requirements of table III when tested as specified in 4.4.1.1.

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TABLE III. Vinyl welting requirements

| Characteristic                 | Requirement                                      |
|--------------------------------|--|
| Hardness                       | 85-95  |
| Specific gravity               | 1.32 maximum                                     |
| Brittle point                  | -15°F or less                                    |
| Brittle point, after aging     | +20°F maximum change from standard brittle point |
| Tensile strength, psi          | 2,300 minimum                                    |
| Elongation, percent            | 225 minimum                                      |
| Water absorption, percent gain | 3.0 maximum                                      |

3.3.4 Metals.

3.3.4.1 Steel box toe. The steel box toe shall be fabricated from cold-rolled carbon steel and shall conform, after heat treatment, to the requirements of table IV when tested as specified in 4.4.1.1.

TABLE IV. Physical requirements, steel box toe

| Hardness<br>(Rockwell<br>C scale) | Carbon<br>content<br>(percent) | Thickness<br>(inch) | Size | Shape                        | Trade<br>pattern | Plating<br>and<br>coating   |
|-----------------------------------|--------------------------------|---------------------|------|------------------------------|------------------|---|
| 43 to 50                          | 0.50 to<br>0.82                | .062 $\pm$ 0.0025   | 8    | Conform<br>to toe<br>of last | 400              | Zinc<br>electro-<br>plate or<br>zinc<br>compound<br>coating <u>1/</u> |

- 1/ The steel box toes shall be thoroughly cleaned by any method of TT-C-490 prior to coating. The steel toes shall be coated with a suitable coating that will assure protection against corrosion and will not damage component parts of the shoe. The coating shall be completely and uniformly applied to the base material.



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3.3.4.1.1 Impact resistance. The steel box toe of the finished shoe shall have a minimum inside clearance of 1/2 inch when tested for impact resistance as specified in 4.4.4.1.

### 3.3.5 Fabrics.

3.3.5.1 Channeled insole reinforcement. The insole reinforcement shall be a cotton duck cloth conforming to type I of CCC-C-443.

#### 3.3.5.2. Felt strip, masking tape, and toe cushion assembly.

3.3.5.2.1 Felt strips. The felt strips for masking the steel toe breast line shall be a minimum of 1/2 inch in width and shall conform to type III, classification 9A2 of C-F-206. As an alternate, Volara type A or equal foam masking material may be used. The masking material shall be a closed cell polyethylene foam. The density shall be 2 pounds per cubic foot and the thickness range shall be 3/32 to 5/8 inch for roll form or 1/2 to 1-1/2 inch for sheet form (see 6.7).

3.3.5.2.2 Masking tape. The masking tape for holding the felt strip against the breast line of the steel box toe shall be pressure-sensitive adhesive coated cloth tape that is 1-1/2 inches wide.

3.3.5.2.3 Toe cushion. The toe cushion to cover the steel box toe and to cover the masking tape area shall be cut from a 1/8-inch thick polyurethane pad.

3.3.5.2.4 Understructure (optional). A virgin ionomer resin (surlyn) laminated on both sides may be used. The lamination shall consist of flannel fabric or nonwoven fabric on either or both sides, or a flannel or nonwoven fabric on one side with a sheeting fabric on the other side. Thickness of the surlyn shall be  $0.015 \pm 0.001$  inch except that, when nonwoven fabric is used on both sides, the surlyn thickness shall be  $0.020 \pm 0.001$  inch. Total thickness shall be  $0.033 \pm 0.005$  inch.

3.3.5.3 Stuck-on rib (when used, see 3.3.1.2). The finished rib shall be 7/32 to 8/32 inch high, shall be not less than 5/8 inch wide measured from the inside vertical portion of the rib, and shall extend around the periphery of the insole to provide for a welted heel seat. The rib shall be made from coated fabric or a combination of coated fabric and fiberboard. The fabric shall conform to requirements specified in 3.3.5.3.1. The upstanding portion of the rib shall be one of the following: not less than three plies of coated fabric folded over on itself; two layers of coated fabric with a fiberboard filler not less than 0.050 inch thick; or fiberboard and coated fabric.

3.3.5.3.1 Rib construction. The ribbing fabric used in the construction of the rib shall be unbleached cotton or cotton synthetic fabric conforming to the requirements of table V when tested as specified in 4.4.1.1. The fabric shall be coated on one side with a rubber-based adhesive specified in 3.3.10 and bonded to the flesh side of the insole. The fabric or fiberboard shall cover



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5/32 inch, -2/32 and +1/32 inch, of the peripheral edge and extend over the top of the vertical rib, or the fabric may extend from the inside top of the vertical rib and cover the area between the ribs for a distance not less than 5/8 inch from the inside rib edge. The preformed rib shall be firmly and smoothly fitted and bonded to the flesh side of the insole, as specified above, to provide for a welted heel seat with the required edge extension on the finished shoe. As an alternative, the fabric bonded to the flesh side of the insole between the ribs is permitted to have a pinked edge.

TABLE V. Ribbing fabric requirements

| Weight (ounces)<br>per sq yd, minimum | <u>Yarns per inch, minimum</u> |         | Breaking strength (pounds),<br>minimum, warp and filling |
|---------------------------------------|--------------------------------|---------|--|
|                                       | Warp                           | Filling |  |
| 8.0                                   | 52                             | 30      | 105  |

3.3.5.3.2 Rib strength. The physical requirements for the rib strength shall conform to table VI when tested as specified in 4.4.2.2.1.

TABLE VI. Rib strength requirements

| Characteristic       | Minimum (pounds) <u>1/</u> | Average (pounds) |
|----------------------|----------------------------|------------------|
| Shear strength       | 70                         | 75               |
| Stitch tear strength | 20                         | 30               |

1/ No single determination (sample unit) shall fall below the minimum value specified, and the average of all sample units shall be not less than the average specified.

3.3.6 Thread.

3.3.6.1 Thread, upper fitting. All upper fitting operations shall be stitched with nylon thread conforming to type I, II, or III of V-T-295, except that requirements for colorfastness shall not apply. The thread size on stitch type 301 shall be E for needle and bobbin and E for the needle, and shall be B or E for the looper with stitch type 401. The color of the thread shall be black.

3.3.6.2 Thread, sole stitching. The thread for sole stitching shall be polyester and shall conform to type I, class 1, subclass C of V-T-285. The color of the running thread shall be black, and the color of the shuttle thread

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shall be natural. The requirements for colorfastness shall not apply. The running thread shall be size 10, 3 ply. The shuttle thread shall be size 10, 3 ply or size 10, 6 ply.

3.3.6.3 Thread, inseaming. The inseaming thread shall be polyester, size 10, 3 or 6 ply conforming to type I, class 1, subclass C of V-T-285. The color shall be natural.

3.3.7 Bottom filler. The bottom filler shall be either thermoplastic or cold process type.

3.3.7.1 Thermoplastic bottom filler. The thermoplastic type shall consist of a mixture of ground cork and a suitable thermoplastic binder in proportion of a minimum of 2-3/4 parts by volume of cork to each one part of binder. The cork granules shall be free from bark. The ground cork and the binder shall be thoroughly and evenly mixed. The binder shall be water insoluble. The binder shall have a softening point of at least 125°F and a maximum penetration of 85 mm with a 200 gram load for 60 seconds at 77°F when tested as specified in 4.4.1.1.

3.3.7.2 Cold process bottom filler. The cold process type shall be spreadable without the use of heat. It shall consist of a mixture of ground cork and a suitable binder in the proportion of two parts cork to one part binder by volume. The cork granules shall be free from bark. When spread filler is dry and set, it shall consist of four parts cork to one part binder. The binder shall be water insoluble and shall have a softening point of at least 150°F when tested as specified in 4.4.1.1. The binder shall be tested after evaporation to a constant weight level. As an alternative, a cold process bottom filler applied by semiautomatic equipment or method may be used. The alternative filler shall consist by weight of a mixture of one part ground cork to five parts suitable binder. Upon loss of solvent, the alternative filler shall consist by weight of one part cork to 3-3/4 parts binder. The binder shall be water insoluble and have a softening point of at least 125°F when tested as specified in 4.4.1.1.

3.3.8 Wood shank. The shank shall be made from a straight grain birch wood or from equivalent straight grain hardwood. The width of the shank shall be 1-1/16 inches  $\pm$  1/16 inch. The thickness of the shank shall be 0.125 to 0.156 inch. The edges of the shank shall be bevelled.

3.3.8.1 Wood shank (alternate). As an alternate, MS plastic shanks or equal (see 6.6), made of high density polyethylene, virgin compound may be used. Also, Tru-fit or equal (see 6.6) fiberglass shanks may be used. The fiberglass shank shall consist of glass fibers impregnated with vinyl ester resins encased in a plastic sleeve or tube.

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3.3.8.2 Shank fitting sizes. The shanks shall be carefully selected for correct size in accordance with commercial practice. The shanks shall be inserted in position, filling the cavity from the ball line rearward to slightly behind the heel breast line. The forward end of the shank shall be flush with the insole, fit the contour of the shoe bottom back of the ball line, and be attached with tar or an adhesive specified in 3.3.10.

3.3.9 Laces. The laces shall conform to type II, class 1 or 4 of V-L-61. The color of the laces shall be black. The length of the laces shall be 33 inches for shoe sizes 4 to 9, and 35 inches for shoe sizes 9-1/2 to 14.

3.3.10 Adhesive. The adhesive used for bonding the various parts of shoes shall be of the following types:

- a. Natural rubber latex
- b. Synthetic rubber latex (including chloroprene)
- c. Natural rubber solvent cement
- d. Synthetic resin cements
- e. Synthetic rubber solvent cement
- f. Synthetic cement for sole stock fitting

3.3.11 Wax, inseam sewing and sole stitching. The wax shall be white or golden and shall be a permanently plasticized resin. The wax, in the temperature range of normal machine use, shall thoroughly wax the threads described in 3.3.6.2 and 3.3.6.3.

3.3.12 Repairers. Repairers shall be liquid spray, crayon, or paste-type applied by hand. The color shall match the upper leather and shall have sufficient coverage to correct minor surface imperfections of the leather.

3.3.13 Renovators. Renovators, used in lieu of or in addition to repairers, shall match the color of the upper leather. Application may be by sponge or by spray method.

3.3.14 Fillers. Fillers, when used, shall be capable of providing a foundation for the application of top finish and shall be applied by sponge or by spray method.

3.3.15 Top finish. The top finish shall be applied by sponge or by spray method and shall be a material compatible with, and capable of wetting into and binding, the previously applied coats. The finish shall match the dyed leather and shall provide luster.

3.4 Design. The design shall be for a full welt around the heel construction high blucher shoe cut from grain-out leather. The shoe shall have a full plain toe vamp, whole blucher quarter, counterpocket, one piece half bellows tongue with extended eyelet facings, and leather vamp lining. The shoe shall have no metal parts except for the safety steel box toe and side lasting staples. The shoe shall have an insole, rubber midsole, and a traction tread sole and heel with chevron design.

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3.4.1 Safety toe performance requirements. The finished shoes shall conform to the class 75 impact and compression resistance requirements of ANSI Z41. Prior to the first shipment or delivery, the contractor shall submit to the contracting officer or his authorized representative satisfactory evidence that the shoes he proposes to furnish under this document meet the applicable requirements of ANSI Z41 (see 4.4.1.1). The label requirements shall be in accordance with 3.7.4.3.

3.5 Patterns and dies. A standard set of paper patterns and their markers will be furnished by the Government as a basis from which the contractor's dies or patterns shall be made. The upper pattern shall have a slight slant at top of high roll in accordance with Government furnished patterns. The contractor shall furnish the wood insole rounding patterns conforming to paper patterns furnished by the contracting activity. The patterns, markers, and contractor's cutting dies and patterns shall consist of the component parts specified in table VII. The Government patterns and markers shall not be altered and shall be followed except that up to 1/8 inch may be added to the vamp wings, and the lasting allowance shall be determined by the contractor. An outside counterpocket may be used with an inverted "V" removed in the center of the back of the counterpocket. The height of the cut for this inverted "V" shall be a maximum of 1-1/4 inches from the bottom of the lasting allowance on a size 4 and grade upward to a maximum height of 1-1/2 inches on a size 14. The point of this inverted "V" shall be in the center back of the counterpocket. All outer lines of this counterpocket must conform to Government patterns except for this inverted "V". This "V" shall be removed in a curved line to conform after closing to the back part of the MIL-7 (MIL-L-43585) safety toe last. As an alternate, the counterpocket may be modified to fit flush with the top edge of the quarters and springing of the counterpocket wings to accommodate adequate counter room is acceptable.

TABLE VII. Contractor's dies and patterns

| Patterns and dies      | Sizes                            |
|------------------------|----------------------------------|
| <u>Component parts</u> |                                  |
| Vamp                   | Whole and half sizes, all widths |
| Quarter                | Whole and half sizes, all widths |
| Counterpocket          | Whole and half sizes, all widths |
| Tongue                 | Whole sizes, all widths          |
| Vamp lining            | Whole and half sizes, all widths |
| Insole rounding        | Whole and half sizes, all widths |
| <u>Markers</u>         |                                  |
| Vamp                   | Whole and half sizes, all widths |
| Quarter                | Whole and half sizes, all widths |

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3.6 Lasts. The shoe shall be made on standard U.S. MIL-7 (MIL-L-43585) men's safety toe lasts, all sizes and widths of which will be loaned to the contractor by the Government.

3.7 Construction.

3.7.1 Cutting uppers. The uppers shall be cut from grain-out leather. The leather shall conform to the thickness specified in table VIII. Vamps shall be cut from the bend area of the side leather.

TABLE VIII. Thickness of upper leather

| Part <u>1/</u>        | Minimum<br>(ounces) | Maximum<br>(ounces) |
|-----------------------|---------------------|---------------------|
| Vamp                  | 5                   | 6                   |
| Quarter               | 4-1/2               | 6                   |
| Outside counterpocket | 4                   | 6                   |
| Tongue                | 2-3/4               | 3-1/2               |

1/ None of these parts shall be split or shaved. No parts cut off stretch shall be accepted.

3.7.2 Skiving. The skiving of upper leather parts shall conform to the requirements specified in table IX.

TABLE IX. Skiving requirements 1/

| Part    | Side  | Location                       | Scarf width (inches)<br>6 ounce<br>leather | Scarf edge<br>thickness<br>(millimeters<br>$\pm 0.3$ mm) |
|---------|-------|--------------------------------|--|--|
| Quarter | Flesh | Back edge                      | $3/16 \pm 1/32$                            | 1.5  |
| Quarter | Flesh | Lasting<br>edge                | $5/8 \pm 1/8$                              | 1.5  |
| Quarter | Flesh | Top edge<br>eyelet<br>row edge | $3/16 \pm 1/32$                            | 1.5 <u>2/</u>  |

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TABLE IX. Skiving requirements 1/ (cont'd)

| Part           | Side  | Location         | Scarf width (inches) | Scarf edge thickness<br>(millimeters<br>$\pm 0.3$ mm) |
|----------------|-------|------------------|----------------------|---|
|                |       |                  | 6 ounce<br>leather   |   |
| Counter-pocket | Flesh | Lasting edge 3/  | $5/8 \pm 1/8$        | 1.5   |
| Vamp           | Flesh | Throat and wings | $3/16 \pm 1/32$      | 1.2   |

1/ Skiving of the flesh surface of the tongue in the fold area between the vamp and quarter is optional, provided the scarf edge thickness is maintained at 1.0 mm.

2/ The tolerance for this measurement only shall be +0 and -0.5 mm.

3/ Skiving of the lasting edge of the counterpocket is optional.

3.7.3 Crimping. The vamps may be crimped, if necessary, to ensure tight lasting.

3.7.4 Marking, identification. The inside quarter of each shoe shall be marked on the grain side with the correct size and width, the contractor's identification symbol, and the month and year (expressed numerically) of the date of contract. This marking shall be placed approximately in the center of the inside quarter,  $1/2 \pm 1/8$  inch below the top. The outside quarter of each shoe shall be marked on the grain side with the letters EH (electrical hazard). The markings shall be impressed into the grain side of the leather in such a manner as to be permanently visible without cutting through at any point. Figures shall be Arabic and letters shall be Gothic. The figures and letters shall be a minimum of  $9/32$  inch and maximum of  $3/8$  inch in height, except that the letters EH shall be a minimum of  $1/2$  inch and a maximum of  $9/16$  inch in height. The contractor's symbol shall be in a block as shown by the following example: 10 W /AB/ 3-81.

3.7.4.1 Description marking. Each heel pad shall contain a description marking imprinted with an electrical embossing machine using indelible ink. The letters shall be Gothic and shall be a minimum  $3/16$  inch in height. The legend shall read as follows:

THESE SHOES ARE ELECTRICAL HAZARD PROTECTIVE WITH STEEL TOES

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3.7.4.2 Caution tag. A caution tag shall be furnished by the contractor and shall be attached to each pair of shoes. The tag shall be of cardboard and shall be white or light in shade to permit easy reading of the printed marking. The printed marking shall be as follows:

CAUTION

These electrical hazard shoes are not recommended for use while working in the vicinity of live circuits exceeding 600 volts (ac or dc). The shoes should be tested periodically to ensure that current leakage does not exceed 14 milliamperes when 14,000 ac volts (rms value) 60 Hz (cycles) are applied for 1 minute. For use on circuits exceeding 600 volts, consult your safety officer. The shoes should not be worn in flooded areas where water might saturate the shoe above the welt line.

3.7.4.3 ANSI labeling. The shoes shall be labeled to indicate that they conform to class 75 safety toe requirements specified in ANSI Z41. Each shoe shall have an indelible cloth label sewn to the inside of the tongue. The numbers and letters shall be a minimum of 3/16 inch in height. The label inscription shall be as follows:

ANSI Z41 PT 1/  
M I/75 C/75  
EH

1/ Two additional digits designating the year of the standard to which the shoe complies shall be used to fill in this blank.

3.7.5 Upper leather fitting. Line marking patterns shall be used for all upper fitting. No die stab marking will be allowed. Quarters shall be closed at the back using a stitch type 401 of FED-STD-751. The backseam shall be closed with stitching closely positioned to the edge of quarters on the grain side and shall be rubbed down. A nominal 1/2 inch cotton tape may be used to cover the back seam stitching, if desired. All other upper stitching shall be done using stitch type 301. All upper stitching shall be 8 to 10 stitches per inch.

3.7.5.1 Counterpocket fitting. The outside counterpockets shall be stitched to the quarters with three or four rows of stitching, with a single or double needle machine, spaced  $1/16 + 1/32$  inch between rows. If an inverted "V" seam counterpocket is used, the "V" seam shall be closed by sewing upward from the lasting edge. The closing shall be done with one row of stitching using stitch type 401 and 8 to 10 stitches per inch. This seam shall extend approximately 1/16 inch on the flesh side and shall be rubbed down. The butt side of this seam shall be on the flesh side of the leather.



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3.7.5.2 Tongue fitting. The tongues shall be stitched to the vamp, grain side out with two rows of stitching, with one row not more than  $3/32$  inch from the edge of the tongue and a second row placed not more than  $3/32$  inch from the edge of the vamp lining, both of these rows to include stitching through the vamp lining. The tongue, including the portion of the extended eyelet facings, shall be stitched to the quarters with edge and lace hole rows trimmed flush to  $1/8$  inch undertrim. The top skived edge of the quarters shall not be stitched. Tongues and quarters shall be pounded at the throats before vamping.

3.7.5.3 Lace holes. On each quarter for lacing the shoe, there shall be four punched holes on sizes 4 through 9 and five punched holes on sizes 9-1/2 through 14. Eyelets shall not be permitted. The holes shall be of a diameter to adequately accommodate a round shoe lace not greater than  $1/8$  inch diameter. The holes shall be approximately centered between the lace hole rows of stitching and not less than  $1/4$  inch nor more than  $5/16$  inch from the edge of the quarter. The holes shall be spaced evenly from blucher nose to top of quarter. The holes shall be punched cleanly and neatly.

3.7.5.3.1 Lacing for lasting. The machine lacing for lasting shall provide for a  $3/4 \pm 1/8$  inch opening after lasting. The quarters shall be laced in either the two lower pairs of lacing holes or in the second and third pairs of lacing holes from the blucher point.

3.7.5.4 Vamping, barring. Vamping shall be done with two rows of stitching close on the edge of the quarter, plus two rows, single or double machine stitched, spaced  $3/16$  inch,  $+1/16$  and  $-1/32$  inch, between inside rows. The vamp lap shall extend beyond the second two space rows, but not more than  $3/16$  inch. The bar row shall be uniformly spaced between and parallel to the two rows of vamping. The vamp bar shall consist of one or two rows and shall be  $5/8 \pm 1/16$  inch in length on each blucher ear. The barring shall be done by single needle or by the automatic method with tying or locking ends. As an alternative, the barring may be located (centered) between the inside double row of vamping and the inside (back) single row of lace row stitching.

3.7.6 Rubber midsole and outsole. The inner surfaces of the rubber outsole and rubber midsole shall be roughed their full length with a coarse abrasive paper prior to cementing. The entire roughed surfaces of the midsole and outsole shall be coated with a cement specified in 3.3.10 that is compatible with rubber compounds. The combined midsole-outsole shall have an average minimum bond strength of 12 pounds per linear inch of width with no individual value below 10 pounds when tested as specified in 4.5.2.

3.7.7 Leather insoles. The leather insoles shall be sorted for varying fibers to get uniform channeling and shall be cased for even weight. The insoles shall be fleshed. The insoles shall be rounded to pattern. Die cut insoles will be accepted provided they conform to insole patterns loaned by the Government. A  $\pm 1/64$ -inch tolerance from the Government loaned insole patterns will be allowed.

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3.7.7.1 Insole channeling. The insole, except the stuck-on rib insole, shall be channeled, including heel seat, to provide for a welted heel seat. The insoles may be chamfered. The channel leaf and outside lip shall be not less than one-third the thickness of the insole, and the channel leaf shall be slightly thicker than the lip. The in-between substance shall be  $1/64$  to  $1/32$  inch greater than the combined thickness of the leaf and lip. The channel margin shall be a minimum of  $5/32$  inch, and the maximum shall not exceed the required extension on the finished shoe (see 3.7.16). The lips shall be cemented with a latex adhesive specified in 3.3.10 (a) or (b) and pressed together at lip setting to include inward and to be a minimum of  $1/8$  inch in height.

3.7.7.1.1 Assembly of stuck-on rib. When assembled, the stuck-on rib insoles shall meet the requirements of 3.3.5.3.

3.7.7.2 Insole backing. All insoles except stuck-on rib insoles (see 3.3.5.3.1) shall be reinforced by the application of cotton duck as specified in 3.3.5.1. The duck shall be coated on one side with any adhesive compound as specified in 3.3.10 and shall be bonded to the flesh side of the insole. The duck shall cover the entire area between the ribs, extend to the top of the upstanding rib, be firmly and smoothly fitted and bonded to the base and the lip, and be trimmed to the required rib height. The insole shall be cemented with any adhesive as specified in 3.3.10 on the flesh side prior to attaching the coated duck.

3.7.8 Lasting. Uppers may be conditioned by any suitable means except dipping in water. The correct size and width of uppers, lasts, and insoles shall be assembled. Insoles shall be tacked to the last with not less than five tacks: one of the five tacks in the center of the heel seat, one at shank, one at each side of the ball, and one at the toe. Staples in lieu of tacks may be used for attaching the insole to the last. Edges of the insole shall be flush with the last bottom at all points. The heel seat of the insole shall be smooth and even with the heel seat of the last. Counters shall be assembled in accordance with sizing schedule so that they will fill the counterpockets. The counters shall be molded to ensure that they are caught by the inseam stitching around the periphery of the heel seat. Counters shall be cemented on both sides, except that cementing of polyethylene counters is optional. Uppers, of the correct size and width, and counters shall be assembled to the lasts. Uppers shall be drawn over the lasts with tension on the pulling-over machine to ensure that the quarters at the blucher points and the vamps are down to the last and that the blucher noses are even. Sides of shoes shall be spindled, drawing the upper snugly to the last, and then side-lasted so that, when stapled, the upper will be held securely to the last. Side-lasting and inseaming operations may be performed simultaneously (see 3.7.9). The heel seat shall be wiped-in and secured to provide for a welt around the heel seat. As an alternative, heel seat lasting may be done by any suitable method or equipment to ensure a secure welt around the heel seat. When the alternative methods are used for forepart and heel seat lasting, excess upper material shall be trimmed so as not to interfere with the cementing of the lasting operation.

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3.7.8.1 Steel toe lasting. The vamp shall be laid back sufficiently to accommodate the steel toe. The correct size steel box toe shall be inserted. The felt strip described in 3.3.5.2.1 shall be superimposed on the vamp lining directly to the rear and abutting the edge of the steel box toe. The masking tape described in 3.3.5.2.2 shall be placed to completely cover the curved felt and to mask the joint of the felt strip and the steel box toe edge. The polyurethane cushion pad described in 3.3.5.2.3 shall be placed so as to cover the steel box toe, felt strip, and masking tape. The vamp shall be lasted back in place, the toe shall be firmly and smoothly wiped in, and the toe wire or nylon filament shall be attached securely around the toe at the base or the insole rib providing a shoulder for subsequent inseaming. As an alternative, any suitable equipment or method may be used to smoothly and securely attach the toe around the base of the insole rib.

3.7.8.2 Time allowance on lasts. The shoes shall remain on the lasts a sufficient length of time to thoroughly dry the counters, uppers, and insoles.

3.7.9 Inseaming. Inseaming shall be done by machine, with the thread waxed and with tension on the thread, using not larger than a number 41 needle and not less than 3-1/4 stitches to the inch. The welting shall be inseam stitched to the bottom of the insole rib completely around the periphery of the shoe to provide for a welted heel seat. As an alternative, the operation for side-lasting and inseaming may be performed simultaneously with any suitable equipment or method. Prior to heel seat lasting and inseaming, each shoe shall be spindled, the forward edge of the counter pulled into position, and the upper with its lining drafted snugly down to the last on both sides of the shoe.

3.7.10 Tack and staple pulling, inseam trimming. All tacks, staples, and toe wire shall be removed from the insole bottom, and no broken tack or staple points shall remain. The inseam shall be closely trimmed without cutting or damaging stitches. The welt shall be laid out smoothly to lie flat around the periphery of the shoe.

3.7.11 Shank fitting, bottom filling. The shanks shall be selected for correct size as specified in 3.3.8.1. The bottom filler shall be firmly pressed into the insole channel from the toe to the forward end of the shank with a uniform and even surface. The bottom shall present a flat, smooth surface for sole laying. The shank and heel cavities shall be filled with bottom filler flush with the welting.

3.7.12 Sole laying. The shoe bottoms shall be thoroughly cemented with any adhesive specified in 3.3.10. After the combined rubber midsole and rubber outsole have been cemented as specified in 3.7.6, the midsole shall be cemented over the entire inner surface and shall be laid on a sole-laying machine with pressure. The soles shall be of adequate size and shall be laid evenly in order to prevent the sole stitching from running into the plaque area and to allow for the specified edge extension.

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3.7.13 Rough rounding. Soles shall be uniformly rounded on a rough-rounding machine for the specified edge extension of sole and welt as specified (see 3.7.16).

3.7.14 Sole stitching. Soles and welts shall be stitched together on a lockstitch machine using a waxed polyester thread size 10, 3 ply for the running thread and size 10, 3 ply or size 10, 6 ply for the shuttle thread with a No. 45 round blade chisel point awl and not larger than a No. 45 needle, using 4-1/2 to 7 stitches per inch except that there shall be no more than 3-1/2 stitches per any 1/2-inch length in the ball and toe sole stitching. The stitching shall be laid on the surface of the welt and close to the outer edge of the welt on the finished shoe. The stitching shall be with the lock (peg) just under the surface of the outsole.

3.7.15 Heeling. Heels as specified in 3.3.3.2 shall be of correct size and shall be attached without the use of heel nails. The heel cup and sole heel seat shall be roughed with a wire brush. One coat of any adhesive specified in 3.3.10 that is compatible with rubber compounds shall be applied to the roughed area of the heel cup and sole heel seat, allowing sufficient drying time to ensure the required bond. As an alternative, the drying time may be accelerated by the use of a portable dryer. The heels shall then be spanked on using a heeling machine or any other suitable equipment. The bond strength, measured in peel, shall be a minimum of 25 pounds per inch when tested as specified in 4.4.4.1.

3.7.16 Edge trimming. Edges shall be trimmed square. The finished minimum extension of outside ball shall be 3/16 inch and of toe and inside ball shall be 1/8 inch, when measured at right angles from the upper.

3.7.17 Heel finishing. The heel shall be trimmed and smoothly scoured. The beveled breastline shall not be scoured.

### 3.7.18 Finishing.

3.7.18.1 Preparation. The shoes shall be cleaned by removing accumulated dirt, such as wax or cement, and the surface of the leather shall be conditioned to receive further application of the finish. All thread ends shall be trimmed.

3.7.18.2 Treeing. The shoes shall be treed whole on the lasts or on a testing machine, using right and left tree feet conforming to the MIL-7 safety toe last. All wrinkles shall be removed. No material shall be used that may injure the leather or thread.

3.7.18.3 Final finish. Shoes shall be repaired and filled. All raw edges including vamping line, counterpocket, and top and front edges shall be stained to match the upper leather. Materials and methods shall be as specified in 3.3.12 through 3.3.15.

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3.7.19 Tacks and staples. Tacks and staples that have been left protruding through or around the insole shall be pulled out. A mechanical tack detector or other suitable method may be used to indicate the presence of any protruding tacks or staples inside the shoe.

3.7.20 Heel pads. The flesh side of the leather heel pad shall be coated with any adhesive as specified in 3.3.10. Heel pads shall be pressed firmly and completely into the heel seat. Heel pads shall be fitted in accordance with size schedule.

3.7.21 Lacing. The shoes shall be mated. A lace shall be inserted through the top lacing hole of the outside quarter of each shoe, and the two laces shall be tied firmly together.

3.7.22 Repairs of stitching.

3.7.22.1 Type 301 and 401 upper fitting stitches. Repairs of type 301 and 401 stitches shall be as follows:

a. When thread breaks or bobbin run-outs occur during stitching, the stitching shall be repaired by restarting the stitching one stitch in back of the end of stitching.

b. Thread breaks or two or more consecutive skipped stitches noted during inspection of the item (in-process or end item) shall be repaired by overstitching. The stitching shall start one stitch in back of the defective area and continue one stitch beyond the defective area onto the existing stitching.

3.7.22.2 Inseaming and sole stitching. Repairs of inseaming and outsole stitches shall be in accordance with 3.7.22.1(a) and (b).

3.8 Replacement of defective components. During the cutting and manufacturing process, components having the material defects or damages that are classified as defects in 4.4.2.1, 4.4.2.2, and 4.4.3 shall be removed from production and replaced with nondefective and properly matched components.

3.9 Electrical test of finished shoe. Each finished shoe shall be capable of withstanding a proof test of an alternating current potential of 10,000 volts (rms) 60 Hz (cycles) for 3 minutes without a leakage current of more than 10 milliamperes when tested as specified in 4.4.4.2. In addition, each finished shoe shall be capable of withstanding the application of 14,000 volts (rms) 60 Hz (cycles) break-down voltage test for 1 minute without showing a leakage current in excess of 14 milliamperes when tested as specified in 4.4.4.2.

3.10 Workmanship. The end item shall conform to the quality of product established by this specification and the occurrence of defects shall not exceed the applicable acceptable quality levels.



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## 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the contractor is responsible for the performance of all inspection requirements (examinations and tests) as specified herein. Except as otherwise specified in the contract or purchase order, the contractor may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in this specification where such inspections are deemed necessary to ensure supplies and services conform to prescribed requirements.

4.1.1 Responsibility for compliance. All items shall meet all requirements of sections 3 and 5. The inspection set forth in this specification shall become a part of the contractor's overall inspection system or quality program. The absence of any inspection requirements in the specification shall not relieve the contractor of the responsibility of ensuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling inspection, as part of manufacturing operations, is an acceptable practice to ascertain conformance to requirements, however, this does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to accept defective material.

4.1.2 Responsibility for dimensional requirements. Unless otherwise specified in the contract or purchase order, the contractor is responsible for ensuring that all specified dimensions have been met. When dimensions cannot be examined on the end item, inspection shall be made at any point, or at all points in the manufacturing process necessary to ensure compliance with all dimensional requirements.

4.1.3 Certificates of compliance. When certificates of compliance are submitted, the Government reserves the right to inspect such items to determine the validity of the certification.

4.2 Classification of inspections. The inspection requirements specified herein are classified as follows:

- a. First article inspection (see 4.3).
- b. Quality conformance inspection (see 4.4).

4.3 First article inspection. When a first article is required (see 3.1 and 6.2), it shall be examined for the defects specified in 4.4.3 and tested for the characteristics specified in 4.4.4.

4.4 Quality conformance inspection. Unless otherwise specified, sampling for inspection shall be performed in accordance with MIL-STD-105.

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4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected in accordance with all the requirements of referenced documents unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.4.1.1 Component testing. In addition to the quality assurance provisions of the subsidiary documents, testing shall be performed on components and materials listed in table X. When the data in the "Number of determinations per sample unit" and "Results reported as" columns are not specified in table X, they shall be as required by the referenced test methods. The vamp lining leather sampling procedures shall be in accordance with FED-STD-311. All test reports shall contain the individual values utilized in expressing the final result. The lot shall be unacceptable if one or more sample units, the lot average, or the composite sample fails to meet any requirement specified. The sample size shall be as follows:

| <u>Lot size (pairs of shoes)</u> | <u>Sample size (sample units)</u> |
|----------------------------------|-----------------------------------|
| 800 or less                      | 2                                 |
| 801 up to and including 22,000   | 3                                 |
| 22,001 and over                  | 5                                 |



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TABLE X. Component tests

| Component and lot expressed in terms of | Characteristic                    | Require-<br>ment para. | Test method  | Requirement applicable to Sample unit average | No. determinations per sample unit | Results reported as |                        | Sample unit |
|---|-----------------------------------|------------------------|--------------|---|------------------------------------|---------------------|------------------------|-------------|
|   |                                   |                        |              |   |                                    | Pass or fail        | Numerically to nearest |             |
| Insole (Texorist)                       | Copper-8-quinolinolate            | 3.3.1.2                | 1/           | -   | -                                  | -                   | -                      | -           |
| Vamp lining (pairs)                     | Paranitrophenol                   | 3.3.1.3                | 6711 2/      | -   | -                                  | -                   | -                      | -           |
|   | Thickness                         | 3.3.1.3                | 1011 2/      | X   | -                                  | -                   | -                      | -           |
|   | Material identification           | 3.3.1.3                | 1/           | -   | -                                  | -                   | -                      | See 4.4.1.1 |
|   | Tannage                           | 3.3.1.3                | 1/           | -   | -                                  | -                   | -                      | -           |
| Heel pads (pads)                        | Paranitrophenol                   | 3.3.1.4                | 6711 2/      | -   | -                                  | -                   | -                      | -           |
|   | Material identification           | 3.3.1.4                | 1/           | -   | -                                  | -                   | -                      | -           |
|   | Thickness                         | 3.3.1.4                | 1011 2/      | X   | -                                  | -                   | -                      | 5 heel pads |
|   | Tannage                           | 3.3.1.4                | 1/           | -   | -                                  | -                   | -                      | -           |
| Counters, polyethylene (pairs)          | Density                           | 3.3.2.2                | 5011 4/      | X   | -                                  | -                   | -                      | -           |
|   | Melt index                        | 3.3.2.2                | D 1238 5/    | -   | -                                  | -                   | -                      | -           |
|   | Tensile strength                  | 3.3.2.2                | 1/           | -   | -                                  | -                   | -                      | -           |
|   | Elongation                        | 3.3.2.2                | 1/           | -   | -                                  | -                   | -                      | -           |
| Midsoles (pairs)                        | Nonmarking                        | 3.3.3.3                | 4.5.1.1      | X   | -                                  | X                   | -                      | -           |
|   | Hardness (before and after aging) | 3.3.3.3                | D 2240 5/ 6/ | X   | -                                  | X                   | -                      | 2 pairs     |

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TABLE X. Component tests - continued

| Component and lot expressed in terms of | Characteristic                         | Require-<br>ment para. | Test method                      | Requirement applicable to Sample unit | No. determinations per sample unit | Results reported as |                        | Sample unit |
|---|--|------------------------|----------------------------------|---------------------------------------|------------------------------------|---------------------|------------------------|-------------|
|   |  |                        |                                  |                                       |                                    | Pass or fail        | Numerically to nearest |             |
| Midsoles (pairs) - continued            | Cut growth                             | 3.3.3.3                | 4.5.1.2                          | X                                     | 2                                  | -                   | Percent                | 2 pairs     |
|   | Thickness                              | 3.3.3.3                | 1/                               | -                                     | -                                  | -                   | -                      | -           |
| Vinyl wetting (yards)                   | Material identification                | 3.3.3.4                | 1/                               | -                                     | -                                  | -                   | -                      | -           |
|   | Hardness (Shore A durometer)           | 3.3.3.4                | D 2240 1/ 5/                     | -                                     | -                                  | -                   | -                      | -           |
|   | Specific gravity                       | 3.3.3.4                | 1/                               | -                                     | -                                  | -                   | -                      | -           |
|   | Brittle point (before and after aging) | 3.3.3.4                | D 746 1/ 5/                      | -                                     | -                                  | -                   | -                      | -           |
|   | Tensile strength                       | 3.3.3.4                | D 412 (Method A) 1/ 5/ (Die "E") | -                                     | -                                  | -                   | -                      | -           |
|   | Elongation                             | 3.3.3.4                | D 412 (Method A) 1/ 5/ (Die "E") | -                                     | -                                  | -                   | -                      | -           |
| Water absorption                        | Water absorption                       | 3.3.3.4                | 1/                               | -                                     | -                                  | -                   | -                      | -           |

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TABLE X. Component tests - continued

| Component and lot expressed in terms of | Characteristic                    | Require-<br>ment para. | Test method | Requirement applicable to Sample unit | No. determinations per sample unit | Results reported as |                        | Sample unit |
|---|-----------------------------------|------------------------|-------------|---------------------------------------|------------------------------------|---------------------|------------------------|-------------|
|   |                                   |                        |             |                                       |                                    | Pass or fail        | Numerically to nearest |             |
| Steel box toe (pairs)                   | Material identification           | 3.3.4.1                | 1/          | -                                     | -                                  | -                   | -                      | -           |
|   | Hardness                          | 3.3.4.1                | E 18 5/     | X                                     | 3                                  | -                   | Hardness number        | 3 box toes  |
|   | Carbon content                    | 3.3.4.1                | 1/          | -                                     | -                                  | -                   | -                      | -           |
|   | Thickness                         | 3.3.4.1                | 1/          | -                                     | -                                  | -                   | -                      | -           |
| Masking tape                            | Coating or plating identification | 3.3.4.1                | 1/          | -                                     | -                                  | -                   | -                      | -           |
|   | Material identification           | 3.3.5.2.2              | 1/          | -                                     | -                                  | -                   | -                      | -           |
|   | Material identification           | 3.3.5.2.3              | 1/          | -                                     | -                                  | -                   | -                      | -           |
|   | Material identification           | 3.3.5.2.3              | 1/          | -                                     | -                                  | -                   | -                      | -           |
| Toe cushion (polyurethane)              | Material identification           | 3.3.5.3.1              | 1/          | -                                     | -                                  | -                   | -                      | -           |
|   | Weight                            | 3.3.5.3.1              | 5041 1/7/   | -                                     | -                                  | -                   | -                      | -           |
|   | Yarns per inch                    | 3.3.5.3.1              | 5050 1/7/   | -                                     | -                                  | -                   | -                      | -           |
|   | Breaking strength                 | 3.3.5.3.1              | 5100 1/7/   | -                                     | -                                  | -                   | -                      | -           |

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TABLE X. Component tests - continued

| Component and lot expressed in terms of | Characteristic                | Requirement para.   | Test method | Requirement applicable to Sample unit average | No. determinations per sample unit | Results reported as |   | Sample unit       |
|---|-------------------------------|---------------------|-------------|---|------------------------------------|---------------------|---|-------------------|
|   |                               |                     |             |   |                                    | Pass or fail        | Numerically to nearest                  |                   |
| Bottom filler (1 pound)                 | Material identification       | 3.3.7               | 1/          | -   | -                                  | -                   | -                                       | -                 |
|   | Solubility of binder in water | 3.3.7.1 and 3.3.7.2 | 1/          | -   | -                                  | -                   | -                                       | -                 |
|   | Softening point of binder     | 3.3.7.1 and 3.3.7.2 | E 28 5/     | -   | 2                                  | -                   | Avg. of 2 determinations to nearest 10F | 1 pound composite |
|   | Penetration of binder         | 3.3.7.1             | D 5 5/      | -   | 3                                  | -                   | Avg. of 3 determinations to nearest mm  | -                 |
|   | Proportion of cork to binder  | 3.3.7.1 and 3.3.7.2 | 1/          | -   | -                                  | -                   | -                                       | -                 |
| Wood shank                              | Material identification       | 3.3.8               | 1/          | -   | -                                  | -                   | -                                       | -                 |
|   | Width and thickness           | 3.3.8               | 1/          | -   | -                                  | -                   | -                                       | -                 |

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TABLE X. Component tests - continued

| Component and lot expressed in terms of  | Characteristic          | Requirement para. | Test method | Requirement applicable to Sample unit average | No. determinations per sample unit | Results reported as |                             |
|--|-------------------------|-------------------|-------------|---|------------------------------------|---------------------|-----------------------------|
|  |                         |                   |             |   |                                    | Pass or fail        | Numerically to nearest unit |
| Adhesive   | Material identification | 3.3.10            | 1/          | -   | -                                  | -                   | -                           |
| Wax  | Material identification | 3.3.11            | 1/          | -   | -                                  | -                   | -                           |
| <p>1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirement.</p> <p>2/ Refers to FED-STD-311.</p> <p>3/ Requirement applicable to composite.</p> <p>4/ Refers to FED-STD-406.</p> <p>5/ Refers to ASTM standard.</p> <p>6/ Aging shall be at a temperature of <math>158 \pm 10^\circ\text{F}</math> for <math>166 \pm 1</math> hours in accordance with the ASTM D 573 procedures for accelerated aging.</p> <p>7/ Refers to FED-STD-191.</p> |                         |                   |             |   |                                    |                     |                             |

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4.4.1.2 Examination of insoles. The Texorist insoles, when used, shall be examined for the following defects:

- Any hole, cut, tear or gouge.
- Any brittle area or evidence of delamination.
- Thickness not as specified.
- Sole outline not conforming to required pattern.
- Sole not cut in specified direction.

The lot size shall be expressed in units of insoles. The sample unit shall be one insole. The inspection level shall be II and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

4.4.2 In-process examination. The defects found during in-process examination shall be classified in accordance with 4.4.2.1 and 4.4.2.2. The inspection level shall be II and the AQL, expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total major and minor defects combined.

4.4.2.1 Examination of uppers after all fitting. The upper assembly shall be examined for defects listed in table XI, which cannot be seen in the end item. The lot size shall be expressed in units of uppers. The sample unit shall be one completely fabricated upper assembly prepared for lasting.

TABLE XI. Upper defects

| Examine                      | Defect   | Classification |              |
|------------------------------|--|----------------|--------------|
|                              |  | <u>Major</u>   | <u>Minor</u> |
| Construction and workmanship | Any component missing or not specified type                                  | 101            |              |
|                              | Any component misplaced or not affixed as specified <u>1/</u>                | 102            | 201          |
|                              | Vamp stitched more than 5/32 inch from edge at throat                        | 103            |              |
|                              | Vamp stitched more than 3/32 inch from edge at throat but not over 5/32 inch |                | 202          |
|                              | Vamp throat or wings not skived  | 104            |              |
|                              | Quarter not skived as specified  | 105            |              |
|                              | Backseam not rubbed down   |                | 203          |
| Quality of leather           | Thickness more than 1/2 ounce less than the minimum specified                | 106            |              |

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TABLE XI. Upper defects - continued

| Examine                     | Defect   | Classification |              |
|-----------------------------|--|----------------|--------------|
|                             |  | <u>Major</u>   | <u>Minor</u> |
| Quality of leather (cont'd) | Thickness less than the specified minimum but not exceeding 1/2 ounce less |                | 204          |
|                             | Thickness more than maximum specified                                      |                | 205          |
|                             | Rough fiber on flesh side of quarters <u>1/</u>                            | 107            | 206          |
|                             | Off-stretch cut  | 108            |              |
|                             | Slaughter cut <u>1/</u>  | 109            | 207          |
| Lining leather (vamp)       | Not soft and pliable   | 110            |              |
|                             | Pipey or flanky <u>1/</u>  | 111            | 208          |

1/ This defect shall be scored as major when seriously affecting serviceability, and as minor when affecting serviceability but not seriously.

4.4.2.2 Examination of shoe before bottom filling. The partially fabricated shoe shall be examined for defects listed in table XII, which cannot be seen in the end item. The lot size shall be expressed in units of shoes. The sample unit shall be one partially constructed shoe at a point after lasting and attachment of shank but before the application of the bottom filler.

TABLE XII. Shoe (before bottom filling) defects

| Examine        | Defect  | Classification |              |
|----------------|---|----------------|--------------|
|                |   | <u>Major</u>   | <u>Minor</u> |
| Bottom of shoe | Any component missing or not specified type                                   | 101            |              |
|                | Shank not properly positioned or not fitting contour of shoe bottom <u>1/</u> | 102            | 201          |
|                | Shank wrong size, malformed, or not securely attached                         |                | 202          |
|                | Any tear in cotton duck in stitch area:                                       |                |              |
|                | - more than 3/4 inch  | 103            |              |
|                | - more than 1/2 inch but not more than 3/4 inch                               |                | 203          |
|                | Any insole tack, staple, or anchor tack not removed                           | 104            |              |



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TABLE XII. Shoe (before bottom filling) defects - continued

| Examine                       | Defect   | Classification |       |
|-------------------------------|--|----------------|-------|
|                               |  | Major          | Minor |
| Bottom of shoe -<br>continued | Upper damaged <u>1/</u>  | 105            | 204   |
|                               | Poor heel seat, side, or toe lasting <u>1/</u>   | 106            | 205   |
|                               | Spacing of staples not as specified  |                | 206   |
|                               | Inseam not properly trimmed <u>1/</u>  | 107            | 207   |
|                               | Less than 3 stitches per inch on<br>inseam   | 108            |       |
|                               | Less than 3-1/4 but not less than<br>3 stitches per inch on inseam   |                | 208   |
|                               | Inseam stitches broken, two or more<br>consecutive skipped inseam stitches,<br>or inseam stitches cut or damaged<br>during trimming operation: |                |       |
|                               | - not repaired   | 109            |       |
|                               | - not repaired as specified  |                | 209   |
|                               | Inseam stitches not at bottom of insole<br>rib or not in welt groove <u>1/</u>   | 110            | 210   |
|                               | Broken insole rib  | 111            |       |
|                               | Counter not caught in inseam stitching   | 112            |       |
|                               | Welt not properly laid out (i.e., not<br>flat)   |                | 211   |
| Upper part of<br>shoe         | Upper not tightly pulled down to last  |                | 212   |
|                               | Lace opening less than 5/8 inch or<br>more than 7/8 inch   |                | 213   |
|                               | Quarter not laced as specified   |                | 214   |
|                               | Steel box toe out of alignment or<br>crooked <u>1/</u>   | 113            | 215   |

1/ This defect shall be scored as major when seriously affecting serviceability and as minor when affecting serviceability but not seriously.

#### 4.4.2.3 In-process testing.

4.4.2.3.1 Stuck-on rib insole. When used, the stuck-on rib shall be tested for compliance with the requirements of 3.3.5.3.2. Method 2061 of FED-STD-311 shall be used for the shear strength test. Method 2171 of FED-STD-311 shall be used for the stitch tear strength test. The sample unit shall be two ribbed insoles, one for each test, and the sample size shall be 5, regardless of the lot quantity. The lot shall be unacceptable if one or more sample units or the lot average of all units fails to meet the requirement specified.

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4.4.2.3.2 Outsole and rubber midsole assembly. The rubber outsole and midsole assembly shall be tested to determine compliance with the bond strength requirement of 3.7.6. The test method shall be as specified in 4.5.2. The sample unit shall be one cemented midsole and outsole unit. The lot shall be unacceptable if one or more sample units or the sample unit average fails to meet the requirement specified. The sample size shall be as follows:

| <u>Lot size</u>                | <u>Sample size (sample unit)</u> |
|--------------------------------|----------------------------------|
| 800 or less                    | 2                                |
| 801 up to and including 22,000 | 3                                |
| 22,001 and over                | 5                                |

4.4.3 End item visual examination. The shoes shall be examined for the defects listed in table XIII. The lot size shall be expressed in units of one shoe. The sample unit shall be one completely fabricated shoe, and the selection shall be by pairs. Defects of pairing shall be classified as a single defect. The inspection level shall be II and the (AQL), expressed in terms of defects per hundred units, shall be 2.5 for major defects and 6.5 for total (major and minor combined) defects. Heel pads removed by the Government during verification examination shall be recemented and replaced by the manufacturer's personnel. The vamp and the inside and outside quarters of each shoe shall be examined for break of leather in accordance with the following procedure:

a. To examine the vamp, hold the shoe in an upright position with both hands. The toe of the shoe shall face away from the examiner. Position thumbs on top of the vamp approximately halfway between box toe line and blucher noses and 1 inch to 1-1/2 inches apart. Press downward with thumbs so as to form the grain surface into a concave surface and observe the break pattern. Any vamp exhibiting a break pattern at any location comparable to a break pattern represented by numbers 5 through 8 on the Satra scale (see 6.6) shall be scored as a defect. The defect shall be scored regardless of the direction in which the break pattern appears.

b. To examine the quarters, place the index finger and the second finger held in a "V" position against the inside of the quarter in the midsection area. Place the thumb on the outside of the quarter directly above the slotted fingers. Apply pressure to the quarter with the thumb and fingers so as to impart a break pattern to the leather. Observe the break pattern of the quarter and compare it with the break patterns of the Satra scale. Any quarter exhibiting a break pattern comparable to a break pattern represented by numbers 5 through 8 on the Satra scale shall be scored as a defect. The following note regarding defects visible at a distance of 3 feet is not applicable to examination of the break pattern.

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TABLE XIII. End item visual defects

| Examine                             | Defect  | Classification |              |
|-------------------------------------|---|----------------|--------------|
|                                     |   | <u>Major</u>   | <u>Minor</u> |
| Pairing                             | Not properly mated (i.e., not right and left of same size)  | 101            |              |
|                                     | Variation in color or appearance <u>1</u> /   | 102            | 201          |
| Cleanness                           | Any nonremovable spot, stain, or foreign matter affecting appearance                              |                | 202          |
| Color and finish                    | Not specified color   | 103            |              |
|                                     | Finish streaky, chipped, or flaky on upper  |                | 203          |
|                                     | Any raw edges not stained to match upper leather  |                | 204          |
| Design, type, and size              | Not as specified  | 104            |              |
| Upper leather                       | Leather deeply snuffed (i.e., fiber structure damaged)  | 105            |              |
|                                     | Any grub or tick damage, scratch, brand, or boney leather <u>1</u> /                              | 106            | 205          |
|                                     | Fat wrinkles or veins <u>1</u> /  | 107            | 206          |
|                                     | Stretchy vamp   | 108            |              |
|                                     | Leather embossed or printed   | 109            |              |
| Break pattern of vamps and quarters | Break pattern comparable to break pattern represented by numbers 5 through 8 on Satra break scale | 110            |              |

NOTE: Leather exhibiting a break pattern comparable to the numbers indicated above is considered to be loose, pipey, or flanky. The break shall be determined in accordance with 4.4.3.

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TABLE XIII. End item visual defects - continued

| Examine                      | Defect  | Classification |              |
|------------------------------|---|----------------|--------------|
|                              |   | <u>Major</u>   | <u>Minor</u> |
| Construction and workmanship | Any cut, tear, hole, repair, or factory damage <u>1/</u>  | 111            | 207          |
|                              | Any component or assembly omitted or misplaced, operation omitted or not properly performed (unless otherwise specified herein) <u>1/</u>   | 112            | 208          |
|                              | Wrinkled or bunched area at the back seam <u>1/</u>   | 113            | 209          |
|                              | Loose leather fibers exposed along cut edge of quarter vamp line or cut edge of counterpocket   |                | 210          |
|                              |   |                |              |
| Seams and stitching (upper)  | Open seam not repaired  | 114            |              |
|                              | Repair of open seam not as specified  |                | 211          |
|                              | NOTE: A seam shall be classified as open when one or more stitches joining a seam are broken or when two or more consecutive skipped or run-off stitches occur. On multiple stitched seams, a seam is considered open when either one or both sides of the seam are open. When any of the above conditions occur on the inside of the shoe, it shall be scored as an asterisk (*) defect. |                |              |
|                              | Loose tension resulting in a loosely secured seam <u>1/</u>   | 115            | 212          |
|                              | Tight tension resulting in puckering or cutting of leather <u>1/</u>  | 116            | 213          |
|                              | Wrong stitch or seam type   | 117            |              |
|                              | Any row of stitching with less than 8 stitches per inch but not less than 6 stitches per inch   |                | 214          |
|                              | Any row of stitching with less than 6 stitches per inch   | 118            |              |
|                              | More than the specified maximum number of stitches <u>1/</u>  | 119            | 215          |
|                              |   |                |              |

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TABLE XIII. End item visual defects - continued

| Examine                                 | Defect   | Classification |              |
|---|--|----------------|--------------|
|   |  | <u>Major</u>   | <u>Minor</u> |
| Seams and stitching (upper) - continued | NOTE: A plus tolerance of 3 stitches per inch will be allowed when stitching over heavy places or turning sharp corners.   |                |              |
|   | Gage of stitching not as specified or irregular <u>1</u> /   | 120            | 216          |
|   | Stitching omitted where required <u>1</u> /  | 121            | 217          |
|   | Needle holes or needle chew <u>1</u> /   | 122            | 218          |
|   | Thread ends not trimmed throughout shoe  |                | 219          |
|   | Sand hole (i.e., tongue not properly caught in at throat)  |                | 220          |
|   | Less than 3-1/2 stitches per inch  | 123            |              |
|   | Less than 4-1/2 stitches per inch but not less than 3-1/2 stitches per inch  |                | 221          |
|   | More than 7 stitches per inch except in ball and toe sole stitching  |                | 222          |
|   | NOTE: More than 3-1/2 stitches per any 1/2-inch length in the ball and toe sole stitching shall be classified as a minor defect. The ball and toe sole stitching shall be defined as that portion of the sole stitching that runs from the inside ball and around the toe to the outside ball. |                |              |
| Outsole stitching                       | Broken stitch or two or more consecutive skipped stitches:   |                |              |
|   | - not repaired   | 124            |              |
|   | - not repaired as specified  |                | 223          |
|   | Sole stitching not properly gaged <u>1</u> /   | 125            | 224          |
|   | Any stitching not visible on surface or outsole <u>1</u> /   | 126            | 225          |
|   | Stitch locks laying on surface <u>1</u> /  | 127            | 226          |

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TABLE XIII. End item visual defects - continued

| Examine                          | Defect  | Classification |       |
|----------------------------------|---|----------------|-------|
|                                  |   | Major          | Minor |
| Outsole stitching -<br>continued | Stitches running into traction tread plaque <u>1</u> /  | 128            | 227   |
|                                  | Outsole or welt damaged by stitches   | 129            |       |
| Counters                         | Roll or curled counter <u>1</u> /   | 130            | 228   |
|                                  | Soft counter  |                | 229   |
| Edge making                      | Edge trimmed into sole stitching <u>1</u> /   | 131            | 230   |
|                                  | Edge not trimmed or irregular affecting appearance  |                | 231   |
|                                  | Sole extension less than the specified minimum <u>1</u> /   | 132            | 232   |
|                                  | Checked sole (i.e., separation between outsole and midsole) <u>1</u> /  | 133            | 233   |
|                                  |   |                |       |
| Heel finishing                   | Heel not finished square (i.e., has pronounced flare or taper)  |                | 234   |
|                                  | Heel not finished smooth affecting appearance   |                | 235   |
|                                  | Checked heel (i.e., separation at heel and outsole) <u>1</u> /  | 134            |       |
|                                  | Crooked or wrong size heel  |                | 236   |
|                                  |   |                |       |
| Lacing holes                     | Number of lacing holes not as specified but each row has the same number  |                | 237   |
|                                  | Not the same number of lacing holes in each row   | 135            |       |
|                                  | Lacing holes not properly spaced within row or misalignment between the rows to an extent interfering with proper lacing <u>1</u> / | 136            | 238   |
|                                  | Edge of any lacing hole less than 3/16 inch from the edge of the quarter  | 137            |       |
|                                  | Edge of any lacing hole less than 1/4 inch but not less than 3/16 inch or more than 5/16 inch from the edge of the quarter          |                | 239   |
|                                  |   |                |       |
|                                  |   |                |       |

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TABLE XIII. End item visual defects - continued

| Examine    | Defect   | Classification |       |
|------------|--|----------------|-------|
|            |  | Major          | Minor |
| Inseaming  | Grinning seam (i.e., thread exposed)   | 138            |       |
|            | Strained seam (i.e., needle holes visible but thread not exposed)  |                | 240   |
|            | Dropped welting, skipped stitches, or cut inseam   | 139            |       |
| Steel toe  | Missing  | <u>2/</u>      |       |
| Lining     | Vamp lining having excessive fullness, loose, or wrinkled <u>1/</u>  | 140            | 241   |
| Insole     | Short or long <u>1/</u>  | 141            | 242   |
|            | Any protruding point of lasting staple or tack in heel area  | 142            |       |
|            | Any protruding point of lasting staple or tack forward of heel breast line                                       | <u>2/</u>      |       |
| Heel pad   | Not firmly and adequately adhered to heel seat   |                | 243   |
| Marking    | Missing, incomplete, incorrect, not applied in the specified manner, misplaced, illegible, or not specified size |                | 244   |
| ANSI label | Missing, illegible, not as specified, or improperly attached   |                | 245   |

NOTE: Appearance defects shall be scored only when the condition is plainly visible at a distance of 3 feet or more.

- 1/ This defect shall be scored as major when seriously affecting serviceability or appearance, and as minor when affecting serviceability or appearance but not seriously.
- 2/ Any steel toe missing or any protruding point of lasting staple or point of tack found in the sample shall cause rejection of the lot represented. The AQL does not apply to nail, tack, or staple forward of heel breast line (see 6.5).



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4.4.4 End item testing.

4.4.4.1 Impact and bond strength testing. The finished shoe shall be tested for the characteristics listed in table XIV. The sample unit for the impact test and bond strength test shall be one shoe. Requirements are applicable to the sample unit. The lot shall be unacceptable if one or more sample units fail to meet any requirement specified in table XIV. The sample size shall be as follows:

| <u>Lot size (pairs)</u>            | <u>Sample size (sample unit)</u> |
|------------------------------------|----------------------------------|
| 800 or less                        | 2                                |
| 801 and up to and including 22,000 | 3                                |
| 22,001 and over                    | 5                                |

TABLE XIV. End item tests

| <u>Characteristic</u>                      | <u>Requirement paragraph</u> | <u>Test method</u> | <u>Number of determinations per sample unit</u> |
|--|------------------------------|--------------------|---|
| Impact resistance                          | 3.3.4.1.1                    | 4.5.3              | 1   |
| Bond strength of outsole to heel           | 3.7.15                       | 4.5.4              | 1   |
| Class 75 impact and compression resistance | 3.4.1                        | ANSI Z41 1/        |   |

1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirement.

4.4.4.2 Electrical testing. Each shoe in every lot shall be tested in accordance with the procedure specified in 4.5.5 for conformance to the requirements specified in 3.9. Any shoe failing one or more of the electrical tests shall be rejected. The contractor shall furnish a certificate of compliance with each lot stating that every shoe has been tested and complies with the electrical requirements.

4.4.5 Packaging examination. The fully packaged end items shall be examined for the defects listed below. The lot size shall be expressed in units of shipping containers. The sample unit shall be one shipping container fully packaged. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 2.5.

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| <u>Examine</u>                  | <u>Defect</u>   |
|---------------------------------|---|
| Marking (exterior and interior) | Omitted; incorrect; illegible; of improper size, location, sequence, or method of application   |
| Materials                       | Any component missing, damaged, or not as specified   |
| Workmanship                     | Inadequate application of components, such as:<br>incomplete sealing or closure of flap, improper taping, loose strapping or inadequate stapling<br>Open and noncontinuous heat sealed seams and closure of polyethylene bag; incorrectly fabricated bag<br>Bulged or distorted container |
| Content                         | Number of pairs of shoes per container is more or less than required<br>Size indicated on shoes is not the same as specified on unit pack or shipping containers <u>1/</u>  |

1/ For this defect, one unit pack from each container in the sample shall be examined.

4.4.6 Palletization examination. The fully packaged and palletized end items shall be examined for the defects listed below. The lot size shall be expressed in units of palletized unit loads. The sample unit shall be one palletized unit load, fully packaged. The inspection level shall be S-1 and the AQL, expressed in terms of defects per hundred units, shall be 6.5.

| <u>Examine</u>      | <u>Defect</u>   |
|---------------------|---|
| Finished dimensions | Length, width, or height exceeds specified maximum requirement  |
| Palletization       | Pallet pattern not as specified<br>Interlocking of loads not as specified<br>Load not bonded as specified |
| Weight              | Exceeds maximum load limits   |
| Marking             | Omitted; incorrect; illegible; of improper size, location, sequence, or method of application             |

#### 4.5 Methods of inspection.

##### 4.5.1 Midsole tests.

4.5.1.1 Nonmarking test. One corner of the specimen shall be drawn firmly across a sheet of white bond paper. Any resulting marking that cannot be easily removed by rubbing with fingers shall be considered a test failure.

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4.5.1.2 Cut growth after aging test. Cut growth after aging shall be determined in accordance with ASTM D 1052, except that the results shall be reported as percent cut growth after 25,000 cycles and a reading after each 10 percent cut growth shall not be reported. Aging shall be conducted in accordance with ASTM D 573. Specimens shall be aged 24 hours at  $100 \pm 1^{\circ}\text{C}$ .

4.5.2 Bond strength test (outsole and midsole).

4.5.2.1 Specimen (outsole and midsole). The specimen shall be a combined midsole-outsole unit that has aged at least 2 days. The outsole shall be separated from the midsole for a distance of approximately 2-1/2 inches from the toe end of the specimen.

4.5.2.2 Apparatus (outsole and midsole). A power-driven portable gage tong adhesion machine, or an approved portable testing device of equal performance, shall be used. The rate of travel of the power actuated grip shall be 2 inches per minute. The machine shall be operated without any device for maintaining maximum load indication.

4.5.2.3 Procedure (outsole and midsole). Clamp the separated toe ends of the specimen in the jaws of the machine, with the jaws 2 inches apart. The specimen shall extend outward at right angles to the direction of the application of the load. Start the machine, and pull apart the outsole and midsole for a distance of 1 inch. At that instant, read and record the load indicated on the machine. Divide the lot by the width of the specimen at the corresponding line of separation.

4.5.3 Impact test of steel box-toe. The impact test shall be made on a finished shoe or on the toe section of shoe obtained by sawing through the short dimension of the shoe not less than 1/2 inch back of the box-toe. Use a falling weight of steel or other suitable material, weighing not less than 49-1/2 pounds nor more than 50-1/2 pounds, of  $1 \pm 0.2$  inch in diameter and with a striking face made hemispherical in shape by rounding on a 1-inch radius, equipped to drop freely in a tube or other suitable guide. Drop the weight from a distance of 18 inches  $\pm 1/4$  inch above the top of the box toe. As an alternative, drop a falling weight of 25 pounds  $\pm 1/4$  pound from a distance of 36 inches  $\pm 1/2$  inch. Assemble the equipment so that the center of the striking face of the falling weight will strike the shoe at midwidth 1/2 inch in front of the back edge of the box toe. Mount the shoe (or toe-sections) on an anvil (or rigidly mounted bed-plate) of steel or other suitable material weighing not less than 500 pounds, equipped with suitable guides (or clamps) to hold the shoe specimen in place. In performing the test, the instantaneous clearance may be determined by placing lumps of plastic material such as wax or modeling clay, inside the shoe directly below the point of impact. The plastic material should be compressed with the fingers so that it contacts both upper and lower inside surfaces of the shoe, before the test is made. When in place, the greatest horizontal dimension of the lumps should not exceed 1 inch. An alternative method for impact testing is specified in ANSI Z41.

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4.5.4 Bond strength test of outsole to heel.

4.5.4.1 Specimen (outsole and heel). The specimen shall be a complete shoe that has aged at least 3 days. Starting at the back of the heel, separate the heel from the outsole for a distance of 1 inch.

4.5.4.2 Apparatus (outsole and heel). A power-driven, pendulum-type machine or an approved portable testing device of equal performance shall be used. The rate of travel of the power actuated grip shall be 2 inches per minute. The machine shall be operated without any device for maintaining maximum load indication.

4.5.4.3 Procedure (outsole and heel). Clamp the separated ends of the heel and sole in the jaws of the machine. "C" clamps or other rigid clamps may be used to fasten the specimen to the jaws of the testing machine. Start the machine and pull apart the outsole and heel for a distance of 1 inch. At that instant, read and record the load indicated on the machine. Divide the load by the width of the specimen at the corresponding line of separation and report as pounds per inch of width.

4.5.5. Electrical tests: proof test voltage, proof test current, and breakdown voltage test.

4.5.5.1 Test equipment. The test equipment shall have a rating of not less than 0.5 kVA per shoe being tested, and the impedance value of the measuring system shall not exceed 280,000 ohms. The electrodes shall consist of a plate electrode and a suitable block shod with sponge rubber on which is placed a layer of metal foil.

4.5.5.2 Procedure. The proof test voltage, proof test current, and breakdown voltage shall be performed on each shoe of each lot by mounting the specimen so that the sole and heel are in contact with the plate electrode (external electrode). The internal electrode shall be made of sponge rubber cut to the shape of an insole and wrapped with metal foil and shall be placed in the shoe with the foil in contact with the insole of the test specimen. A conductor from this electrode is to be brought out of the shoe so that the electrode can be connected to the test circuit. Place a special block (modified shoe last or similar) in the shoe on the internal electrode and a minimum load of 75 pounds applied to the block.

4.5.5.3 Application of proof test voltage. The proof test voltage shall be applied starting at 0 volts and gradually and steadily raised at a rate of approximately 1,000 volts per second until 10,000 volts (rms) proof test voltage is reached (or failure occurs). The 3-minute test period shall be counted from the instant the prescribed testing voltage is reached.

4.5.5.4 Proof test current measurement. The proof test current shall be measured directly, by inserting a milliammeter in series with each individual shoe. The measurement reading preferably shall be taken near the end of the

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proof voltage test period. It is customary to make high-voltage tests of this character with one end of the test circuit grounded. The milliammeter is connected in the grounded end of the test circuit with a short-circuiting device shunting the meter. This will keep the circuit closed except at the time the current measurements are being made, thus maintaining an uninterrupted ground. If the milliammeter and short circuiting device are adequately insulated, they may be used in the high voltage circuit.

4.5.5.5 Application of breakdown test voltage. The breakdown test voltage of 14,000 volts (rms) shall be applied to the specimen by raising the test voltage from 10,000 to 14,000 volts (rms) at a rate of approximately 1,000 volts per second. The 1-minute testing period shall be counted from the instant the prescribed testing voltage is reached. Leakage current under the condition shall not exceed 14 milliamperes.

## 5. PACKAGING

5.1 Preservation. Preservation shall be level A or Commercial, as specified (see 6.2).

5.1.1 Level A preservation. Each pair of shoes shall be placed into a snug-fitting polyethylene bag. The polyethylene bag shall be made from 0.002-inch thick film (+ 20 percent tolerance). The polyethylene bag shall be formed with heat sealed seams that are straight, continuous, and parallel to each other and to the formed edges of the bag. Closure of the bag shall be by heat sealing or by mechanical means (twist tie closure). Each pair of shoes shall then be unit packed into a container. The container shall be a box fabricated from nonbending grades of boxboard, having a caliper not less than 0.040 inch, and shall conform to type II, variety 1, class A or D, style 4 of PPP-B-676. Alternatively, a box may be fabricated from blank style setup bending grades of boxboard having a caliper not less than 0.032 inch and shall conform to variety 1, style III, type G, class j, subclass 2 of PPP-B-566. The outside dimensions of the box (lid included) shall be 14-7/8 inches in length, 7-3/4 inches in width, and 5 inches in depth, with the lid 1 inch in depth.

5.1.2 Commercial preservation. Shoes shall be preserved in accordance with ASTM D 3951.

5.2 Packing. Packing shall be level A, B, or Commercial, as specified (see 6.2).

5.2.1 Level A packing. Nine pairs of shoes of one size and width only, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, grade V2s of PPP-B-636. Level A unit packs shall be packed on end, three in length, three in width, and one in depth within a shipping container. Inside dimensions of each shipping container shall be approximately 23-1/2 inches in length, 15 inches in width, and 15 inches in depth. Approximate dimensions are furnished as a guide only.

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Each shipping container shall be closed in accordance with method III, waterproofed in accordance with method V, and reinforced as specified in the appendix of PPP-B-636, except that the inspection shall be in accordance with 4.4.5. Shipping containers shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of load specified (see 6.2). Strapping shall be limited to nonmetallic strapping, except for type II, class F loads.

**5.2.2 Level B packing.** Nine pairs of shoes of one size and width only, preserved as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to type RSC, type CF (variety SW) or SF, class domestic, grade 275 of PPP-B-636. Level A unit packs shall be packed on end, three in length, three in width, and one in depth within a shipping container. Inside dimensions of each shipping container shall be approximately 23-1/2 inches in length, 15 inches in width, and 15 inches in depth. Approximate dimensions are furnished as a guide only. Each shipping container shall be closed in accordance with method II as specified in the appendix of PP-B-636, except that the inspection shall be in accordance with 4.4.5.

**5.2.2.1 Weather-resistant fiberboard containers.** When specified (see 6.2), the shipping container shall be grade V3c, V3s, or V4s fiberboard box fabricated in accordance with PPP-B-636 and closed in accordance with method III as specified in the appendix of PPP-B-636 except that the inspection shall be in accordance with 4.4.5.

**5.2.3 Commercial packing.** Shoes, preserved as specified in 5.1, shall be packed in accordance with ASTM D 3951.

**5.3 Palletization.** When specified (see 6.2), shoes, packed as specified in 5.2.2 and 5.2.3, shall be palletized on a 4-way entry pallet in accordance with load type Ia of MIL-STD-147. Pallet type shall be type I (4-way entry), type IV or type V in accordance with MIL-STD-147. Pallets shall be fabricated from wood groups I, II, III, or IV of MIL-STD-731. Each prepared load shall be bonded with primary and secondary straps in accordance with bonding means C and D or film bonding means F or G. Pallet pattern shall be number 3 in accordance with appendix of MIL-STD-147.

**5.4 Marking.** In addition to any special marking required by the contract or purchase order, unit packs, shipping containers, and palletized unit loads shall be marked in accordance with MIL-STD-129 or ASTM D 3951, as applicable.

## 6. NOTES

(This section contains information of a general or explanatory nature that may be helpful, but is not mandatory.)

**6.1 Intended use.** The shoes are intended for use by personnel where assigned duties require work on energized circuits not exceeding 600 volts. The bottom of the shoe will afford the wearer protection against electrical hazards; however, the upper part will not, since lethal currents can readily leak through the leather. The shoes should not be worn in flooded areas where water might saturate the shoe above the welt line.



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6.2 Acquisition requirements. Acquisition documents must specify the following:

- a. Title, number, and date of this specification.
- b. Size and width required (see 1.2).
- c. Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.1.1 and 2.2).
- d. When a first article is required (see 3.1, 4.3, and 6.3).
- e. Levels of preservation and packing (see 5.1 and 5.2).
- f. Type and class of unit load required (see 5.2.1).
- g. When weather-resistant grade fiberboard shipping containers are required for level B packing (see 5.2.2.1).
- h. When palletization is required (see 5.3).

6.3 First article. When a first article is required, it shall be inspected and approved under the appropriate provisions of FAR 52.209. The first article should be a preproduction sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article.

6.4 Sample. For access to samples, address the contracting activity issuing the invitation for bids or request for proposal.

6.5 Satra scale. The Satra scale may be obtained from the British Shoe and Allied Trade Research Associates, Satra House, Kettering, Northants, England, or may be obtained from Satra House's North American agent: Bata Engineering, Batawa, Ontario, Canada.

6.6 Alternate wood shank. The alternate wood shank described in 3.3.8.1 may be obtained from the following sources. There may be equivalent items available from other suppliers.

MS plastic shank

Brockton Sole & Plastics Inc.  
53 Spark Street  
Brockton, MA 02403

Tru-Fit fiberglass shank

American Shoe Machinery Co.  
199 Newbury Street  
Danvers, MA 01923



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6.7 Foam masking material. A foam masking material manufactured by Voltek, Division of Sekisue America Corp., 17 Allen Avenue, Coldwater, MI 49036 under the designation "VOLARA" has been found to meet the requirements of 3.3.5.2.1 for foam masking material.

6.8 Subject term (key word) listing.

Black  
Footwear  
Safety  
Steel box toe  
Traction tread soles and heels

6.9 Changes from previous issue. Marginal notations are not used in this revision to identify changes with respect to the previous issue due to the extensiveness of the changes.

Custodians:

Army - GL  
Navy - NU  
Air Force - 99

Preparing activity:

Army - GL  
(Project 8430-0389)

Review activities:

Army - MD  
Air Force - 11, 82  
DLA - CT

User activity:

Air Force - 45