

MIL-S-3794E
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SUPERSEDING
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MILITARY SPECIFICATION

SHOES, CONDUCTIVE

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

1. SCOPE

1.1 Scope. This specification covers the requirements for conductive shoes. Restrictions for use are as indicated in 6.1.

1.2 Classification. The shoes will be of one type only and in the following sizes and widths (see 6.2).

Sizes: 4 to 15 inclusive, in whole and half sizes
Widths: XN (Extra Narrow), N (Narrow), R (Regular), W (Wide) and
XW (Extra Wide)

2. APPLICABLE DOCUMENTS

2.1 Issues of documents. The following documents of the issue in effect on date of invitation for bids or request for proposal, form a part of this specification to the extent specified herein:

SPECIFICATIONS

FEDERAL

C-F-206	- Felt, Sheet: Cloth, Felt, Wool, Pressed
V-L-51	- Laces, Cotton
V-L-61	- Laces, Nylon
V-T-276	- Thread, Cotton
V-T-285	- Thread, Polyester
V-T-295	- Thread, Nylon
KK-I-570	- Insole, Footwear, Leather, Cattlehide
KK-W-231	- Welting, Leather, Shoe
ZZ-H-141	- Heels, Rubber

Beneficial comments (recommendations, additions, and deletions) and any pertinent data which may be of use in improving this document should be addressed to: Officer in Charge, Navy Clothing and Textile Research Facility, 21 Strathmore Road, Natick, MA 01760 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

FSC 8430

MIL-S-3794E

- CCC-C-443 - Cloth, Duck, Cotton (Single and Plied Filling Yarns, Flat)
- PPP-B-566 - Boxes, Folding, Paperboard
- PPP-B-676 - Boxes, Setup

MILITARY

- MIL-S-13192 - Shoe, Men's, Dress, Oxford
- MIL-S-40043 - Soles, Rubber, Shoe
- MIL-S-41814 - Counter, Footwear
- MIL-L-43585 - Lasts, Footwear, Shoe, Safety Toe, Men's, U.S. MIL-7

STANDARDS

FEDERAL

- FED-STD-151 - Metals Test Methods
- FED-STD-191 - Textile Test Methods
- FED-STD-311 - Leather, Methods of Sampling and Testing
- FED-STD-601 - Rubber, Sampling and Testing
- FED-STD-751 - Stitches, Seams, and Stitchings

MILITARY

- MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment and Storage

LAWS AND REGULATIONS

U. S. POSTAL SERVICE MANUAL

(Copies of the manual may be obtained from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

(Copies of specifications, standards, drawings, and publications required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless a specific issue is identified, the issue in effect on date of invitation for bids or request for proposal shall apply:

AMERICAN NATIONAL STANDARDS INSTITUTE

ANSI Z41.1 American National Standards for Men's Safety-Toe Footwear

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

AMERICAN SOCIETY FOR TESTING AND MATERIAL STANDARDS

- D-5 - Penetration of Bituminous Materials
- D-412 - Rubber Properties in Tension
- D-746 - Brittleness Temperature of Plastics and Elastomers by Impact
- D-2240 - Rubber Property - Durometer Hardness
- 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.)

NATIONAL MOTOR FREIGHT TRAFFIC ASSOCIATION, INC., AGENT

National Motor Freight Classification

(Application for copies should be addressed to American Trucking Associations, Attn: Traffic Department, 1616 P Street, N.W., Washington, DC 20036.)

UNIFORM CLASSIFICATION COMMITTEE, AGENT

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, Illinois 60606.)

3. REQUIREMENTS

3.1 Guide sample. Samples, when furnished, are solely for guidance and information to the contractor (see 6.3). Variations from this specification may appear in the sample, in which case this specification shall govern.

3.2 First article. When specified, (see 6.2), the contractor shall furnish shoes for first article inspection and approval (see 4.3).

3.3 Materials.

3.3.1 Upper leather. The uppers shall be cut from the best quality green salted, chrome-tanned sides. The tannery lot shall not exceed 25,000 square feet. The sides shall be full grain or partially corrected grain, 4 1/2 to 6 ounces in thickness. The area of a side shall not exceed 28 square feet. The break in leather for vamps shall not be more than a Break scale of 5 (see 4.4.4.2). Upper leather defects such as fat wrinkles, pits or insect damage shall not appear in the vamps or quarters forward of the breast of the heel. Cut parts with scratches, slaughter cuts, pronounced veins, cuts on grain surface of leather, brands or light flesh cuts that show through on the grain surface of the leather shall not be used. Flanky, pipey, loose, boney or rough or coarse grain leather shall not appear in the vamps or quarters; however, these defects may appear in the tongue or counter area back of the heel breast-line. Vamps shall be inspected as specified in 4.4.3.1.

3.3.1.1 Color and finish. The leather shall be dyed black (except tongue) and finished grain side out. A light application of finish containing only a sufficient amount of pigment to assist in obtaining a uniform color shall be applied to the grain side. Embossing or printing of the leather shall not be permitted. The flesh side of the leather shall be cleaned of coarse fibers. Paranitrophenol fungicide treatment shall not apply.

3.3.2 Tongue. Tongues shall be cut from leather specified in 3.3.1, except that the color shall be white for identification purposes.

3.3.3 Vamp and quarter lining. The vamp and quarter linings shall be cut from a soft, chrome-tanned, full grain or corrected grain cattlehide glove leather or pig skin. 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. The leather shall be a minimum of 2 ounces and a maximum of 3 1/2 ounces in thickness. Paranitrophenol fungicide treatment is not required.

3.3.4 Insoles. The insoles shall conform to type I, class 1, tannage (a) or (b) of KK-I-570, except that the thickness shall be 5 1/2 to 7 1/2 irons and fungicide paranitrophenol treatment is not required. As an alternate, the insole may be cut from Texorist material. The Texorist shall contain 0.26 to 1.00 percent copper-8-quinolinolate uniformly distributed throughout the insole. The insole shall be 0.116 ± 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 3.3.21).

3.3.5 Welting. Welting shall be as specified in 3.3.5.1 or 3.3.5.2.

3.3.5.1 Welting, leather. Leather welting shall conform to the requirements of KK-W-231, except that fungicide paranitrophenol treatment is not required.

3.3.5.2 Welting, synthetic. The welting shall be black, bright flat top, conforming to dimensions of Figure 2. The finished welting shall be smooth, uniform in texture and free from porosity, blemishes, cracks, blisters and other defects affecting serviceability and appearance. The synthetic welting shall conform to the requirements of Table I when tested as specified in 4.4.1. As an alternate, a storm welt with a 0.11 to 0.13 inch diameter head may be used (see 6.5).

Table I - Synthetic welting requirements

Property	Requirements
Initial	
Hardness	85-95
Specific gravity	1.32 maximum
Brittleness	-15°F or lower
Brittleness, after aging	5°F or lower
Tensile strength, pounds per sq. in.	2300 minimum
Elongation, percent	225 minimum
Water absorption, percent gain	3.00 maximum

3.3.6 Counters. Counters shall conform to the requirements of MIL-C-41814, except that fungicide paranitrophenol treatment is not required. Counters shall be molded to fit the last on which the shoes are made and the bottom flange of the counter shall be molded to accommodate a full welt construction.

3.3.7 Thread.

3.3.7.1 Thread, upper fitting. Upper fitting stitching operations shall be performed using cotton or nylon thread. The cotton thread shall conform to V-T-276. The needle thread shall be black, type IB3, 4 ply, ticket No. 30. The bobbin thread shall be natural, type IA1 or IA3, 4 ply, ticket No. 30. Colorfastness requirements shall not apply. The nylon thread shall conform to V-T-295, type I or II, class 1 or type III. Colorfastness requirements shall not apply. Thread size shall be E for the needle and bobbin on stitch type 301 and E for the needle, B or E for the looper with stitch type 401. The color shall be black.

3.3.7.2 Thread, inseaming. The polyester thread for inseaming shall conform to type I, class 1, subclass C of V-T-285. The color shall be natural.

3.3.7.3 Thread, sole stitching. Thread used for Goodyear stitching shall be cotton or polyester. The cotton thread shall conform to V-T-276. The running thread shall be black, type IVA or IVB, ticket No. 8/11, "Z" twist. The shuttle thread shall be type IVA or IVB, ticket No. 8/10, unbleached (natural). The polyester thread shall conform to type I, class 1, subclass C of V-T-285. The running thread shall be black, size 10, 3 ply. The shuttle thread shall be natural, size 10, 3 or 6 ply. Colorfastness requirements shall not apply.

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

3.3.8.1 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-g load for 60 seconds at 77°F when tested as specified in 4.4.1.

3.3.8.2 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 have a softening point of at least 150°F when tested as specified in 4.4.1. The binder shall be tested after evaporation to a constant weight level. As an alternate, a cold process bottom filler applied by semi-automatic equipment or method may be used. The alternate filler shall consist by weight of a mixture of one part ground cork to five parts suitable binder. Upon loss of solvent, the alternate 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.

3.3.9 Conductive heel filler. A conductive thermoplastic or cold-process cork bottom filler or a conductive rubber plug showing a maximum resistance of 250,000 ohms, when tested as specified in 4.4.1 and 4.5.3, may be used to fill the insole heel cavity.

3.3.10 Laces. Laces shall be cotton or nylon conforming to type I, class C of V-L-51 or type I or II, class 1 of V-L-61. The color shall be black. Laces shall be 26 inches for shoe sizes 4 to 12 and 27 1/2 inches for shoe sizes 12 1/2 to 15.

3.3.11 Toe cushion. The material used to cushion the steel box toe and mask the breastline shall be wool felt conforming to type III, classification 9A-2 of C-F-206. As an alternate, the materials listed below may be used. The cushion material shall be cut large enough to extend approximately 1/2 inch rearward of the steel box toe breastline.

- (a) Foamed polyvinyl material, 3/32 (\pm 1/32) inch in thickness, weighing 4 to 6 pounds per cubic foot.
- (b) Latex foam rubber, 1/8 (\pm 1/64) inch thick.

3.3.12 Copper nails. The nails used to provide a conductive path through the insole and heel (see Figure 1) shall be made of 98 percent copper and shall be flat head, commercial #12 type, a minimum of 3/4 inch long. The diameter of the flat head shall be 5/16 (\pm 1/16) inch and the thickness of the shank or wire shall be 7/64 (\pm 1/64) inch. Testing shall be as specified in 4.4.1.

3.3.13 Shank combination. The shank combination shall consist of a single rib or double rib steel shank (see 3.3.13.2), attached by four prongs or two rivets to a shank board (see 3.3.13.1).

3.3.13.1 Shank board. The shank board shall be a water-resistant type and shall have a finished thickness of 1/8 (\pm 1/32) inches. Shank board that has been hot waxed is considered as being water resistant. The shank boards shall be of proper length and width to fill the bottom cavity from ball line to slightly behind the heel breastline just forward of the copper contact nails (see 3.3.12). Shank boards shall conform to the shape of the last and have a graduated scarf at both ends. Testing shall be as specified in 4.4.1.

3.3.13.2 Steel shank. The steel shank shall be made from 19 gauge (0.0418 \pm 0.0030) inch, cold rolled carbon steel with a hardness ranging from 47 to 54 Rockwell C scale and shall be shaped to conform to the bottom of the MIL-7 (MIL-L-43585) last. The width of the shank shall be 5/8 (\pm 1/64) inch. The overall thickness of the shank with the rib shall be 0.080 to 0.125 inch. The rib of the shank shall level off at each end. Testing shall be as specified in 4.4.1.

3.3.14 Eyelets. The eyelets shall be invisible, plain type, made of aluminum 0.014 (\pm 0.0015) inch thick and shall conform to the finished requirements of Table II, when tested as specified in 4.4.1. After fabrication, the eyelets shall be anodized.

Table II - Requirements for finished eyelets

	Minimum (inch)	Maximum (inch)
Outside diameter of flange	0.290	0.305
Overall length before setting	0.135	0.150
Diameter of hole before setting	0.120	0.126

3.3.15 Steel box toe. The steel box toe shall be fabricated from cold-rolled carbon steel, and shall conform to the toe of the last. The steel box toes shall meet the requirements of Table IV after heat treatment, when tested as specified in 4.4.1. The steel box toes shall be thoroughly cleaned and completely coated with a zinc compound. As an alternate, the steel box toes may be coated with an suitable resin coating that will assure protection against corrosion and will not damage the component parts of the shoe.

Table IV - Physical requirements, steel box toe

Hardness (Rockwell C Scale)	Carbon content (percent)	Thickness (inches)	Trade Pattern No.
43 - 50	0.50 to 0.82	0.062 + .0025	400

3.3.15.1 Impact resistance. The steel box toes of the finished shoes shall have a minimum inside clearance of 1/2 inch when tested as specified in 4.5.2.

3.3.16 Outsoles, rubber. The outsoles shall be black and shall conform to type I, class 3 of MIL-S-40043, except that the bottom surface shall be smooth and have no raised tread design and the volume swell requirements shall not apply. The soles shall be a minimum of 10 irons in thickness and shall be conductive with a maximum resistance to 250,000 ohms, when tested as specified in 4.4.1 and 4.5.3. The finished soles shall contain no hollow spaces or metallic inclusions of any kind, including nails or fasteners, except as specified in 3.4. Non-marking requirements shall not apply.

3.3.17 Heels, rubber. The heels shall conform to type II, class 2, style 1 or 2, color number 1 of ZZ-H-141, except that the heels shall be 3/4 (+ 1/32) inch high with no metal washer or nail holes, and the non-marking requirements shall not apply. The bottom surface of the heel shall be smooth and have no raised tread design or hollow spaces. The heels shall be conductive with a maximum resistance of 250,000 ohms, when tested as specified in 4.4.1 and 4.5.3.

3.3.18 Sock lining. The sock lining shall be a conductive rubber-coated fabric having a maximum resistance of 250,000 ohms, when tested as specified in 4.4.1 and 4.5.3.

3.3.19 Cements.

3.3.19.1 Upper fitting. Cements or adhesive used in upper fitting operations may be any suitable adhesive.

3.3.19.2 Outsole-heel, sock lining fitting. The cements used for bonding the heel to the outsole and sock lining to the inside of the shoe shall be a conductive type having a maximum resistance of 250,000 ohms, when tested as specified in 4.4.1 and 4.5.3.

3.3.19.3 Self curing composition. The self curing composition used shall be conductive with a maximum resistance of 250,000 ohms, when tested as specified in 4.4.1 and 4.5.3. The Shore A hardness of the composition shall be 45 to 70.

3.3.20 Insole, stuck-on rib. The finished rib shall consist of a combination of coated fabric and fiberboard materials. The rib shall be 15/64 (+ 1/64) inch high with a minimum of 5/8 inch in width when measured from the inside vertical portion of the rib, and shall extend around the periphery of the insole from heel breastline to heel breastline. The fabric used for the stuck-on rib shall meet the requirements as listed below, when tested as specified in 4.4.1. A suitable cotton-synthetic fabric equal to the requirements listed below may be used as an alternate. The fabric shall be coated on one side with a suitable adhesive and bonded to the flesh side of the insole. The fiberboard and fabric shall cover 5/32 (+ 1/32) inch of the peripheral edge, and provide for the required edge extension of the finished shoe.

Fabric requirements

Weight, ounces per sq. yd. (min)	Yarns per inch (min.)		Breaking strength, lbs. (min.) warp and filling
	Warp	Filling	
8.0	52	30	105

3.3.20.1 Rib strength. The physical requirements for the stuck-on rib shall conform to the list below when tested as specified in 4.4.1.

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

1/ No single determination shall fall below the minimum value specified and the average of all determinations shall not be less than the average specified.

3.3.21 Assembly tacks and staples. Tacks and staples used for attaching the insole to the last and securing the uppers to the last during side lasting, shall be brass. Tacks and staples shall be of sufficient length to attach the parts through which they are driven and leave the insole smooth on the inside.

3.3.22 Wax. The wax used for the inseaming and sole stitching operations shall be white or golden in color and shall be a permanently plasticized resin that will thoroughly penetrate the thread used in the above stitching operations in a temperature range of normal machine use.

3.3.23 Ink, edge setting. When leather welting is used, the edge shall be stained in the finishing operations. The ink shall produce a hard, bright, uniform appearance after setting. The color of the ink shall be black.

3.3.24 Cleaner solution. A suitable cleaning solution shall be used to remove grease, adhesive or other soil marks of manufacturing operations from the uppers.

3.3.25 Repairers. Repairers may be a liquid spray, crayon or paste type. The color shall match the color of the uppers and shall have sufficient coverage to correct minor surface imperfections of the leather.

3.3.26 Renovators. Renovators used in lieu of or in addition to repairers shall match the color of the upper leather. The color shall be uniform throughout.

3.3.27 Fillers. When fillers are used, they shall be capable of providing foundation for the application of the top finish.

3.3.28 Top finish. The top finish used shall be compatible with and capable of binding to previously applied coatings and provide a flexible finish. The finish may be applied by sponge or spray method.

3.4 Design. The shoe shall be a plain toe, blucher oxford of full welt construction. The shoe shall have a leather vamp lining and leather quarter lining, steel safety box toe, smooth tread conductive rubber sole and heel, and a conductive sock lining. The shoes shall have no metal parts except for the steel box toe, steel shank, aluminum eyelets, copper contact nails and assembly tacks or staples. The shoes shall have a conductive path constructed between the conductive sock lining and the conductive sole and heel which shall provide a maximum resistance of 250,000 ohms (see 3.7.32).

3.5 Patterns and dies. Standard sets of component patterns and markers by width will be furnished by the Government as a basis from which the contractor's dies and patterns shall be made. They will consist of the component parts in accordance with the list below, which are designated as dress shoe patterns of MIL-S-13192. The Government patterns shall be followed except for lasting allowance, which shall be determined by the contractor. The insole patterns may be altered at the heel end to the extent necessary to remove excessive stock. The long side of the leather lining may be used with an inverted "V" removed in the shoe back center. The height of the cut for this inverted "V" may be as much as 1 1/4 inches from the bottom of the lasting allowance on a size 4 and grading upward to a maximum height of 1 1/2 inches on size 15. The contractor shall furnish wood insole rounding patterns or dies conforming to the paper patterns furnished by the Government.

Patterns and dies by width

<u>Component parts</u>	<u>Dies and patterns</u>
<u>Patterns:</u>	
Vamp	Whole and half sizes
Quarter inside	Whole and half sizes
Quarter outside	Whole and half sizes
Tongue <u>1/</u>	8 sizes
Vamp lining <u>1/</u>	8 sizes
Quarter lining inside	Whole and half sizes
Quarter lining outside	Whole and half sizes
Insole rounding	Whole and half sizes
<u>Markers:</u>	
Vamp <u>1/</u>	8 sizes

1/ XN has 7 sizes only.

3.6 Lasts. The shoes shall be made on standard U. S. MIL-7 (MIL-L-43585) lasts, all necessary sizes of which will be loaned to contractors by the Government.

3.7 Construction.

3.7.1 Cutting uppers. The uppers shall be cut from grain out leather specified in 3.3.1. Vamps shall be cut within the bend area of the side.

3.7.2 Quarter and vamp lining. The vamp and quarter linings shall be cut from leather specified in 3.3.3.

3.7.3 Skiving. Upper leather parts shall be skived as specified below. The scarf shall be of sufficient width and thickness in order to reduce bulk and assist in fitting operations.

Skiving requirements

<u>Part</u>	<u>Side</u>	<u>Location</u>
Quarters	Flesh	Top, front and backseam
Vamps	Flesh	Throat and wings
Tongue	Flesh	Bottom edge. Sides and top optional
Quarter lining	Flesh	Closing edge of long piece
Vamp lining	Flesh	Vamp and throat

3.7.4 Crimping. When necessary, vamps and vamp linings shall be crimped not more than one pair at a time.

3.7.5 Marking quarter lining. The contractor's name, number and date of contract, correct size and width shall be legibly stamped with marking ink on the outside quarter lining of each shoe.

3.7.6 Upper fitting. The upper fitting stitch types, thread sizes and stitches per inch shall be as specified in Table V. The stitch types shall conform to FED-STD-751. The backseam shall be closed with one row of stitching close to the edge of the quarters and rubbed down. The dog-ear of the outside quarter shall be lopped over the top of the inside quarter and stitched with one row. The skived top and front edges of the quarters shall be cemented with any suitable adhesive and folded to enable being caught by stitching.

Table V

	Stitch type	No. Stitches per inch	Thread size	
			Needle	Bobbin or Looper
Quarter lining closing	301	8-10	E or 30/4	E or 30/4
Quarter lining "V" notch when used	301	8-10	E or 30/4	E or 30/4
	401	8-10	E or 30/4	B or E or 30/4
Top stitching	301	8-10	E or 30/4	E or 30/4
Tongue stitching	301	8-10	E or 30/4	E or 30/4
Backseam closing	401	10 min.	E or 30/4	B or E or 30/4
Vamping	301	8-10	E or 30/4	E or 30/4

3.7.7 Quarter lining and top stitching. The quarter linings shall be lapped and closed with two rows of stitching $1/8 (+ 1/32)$ inch apart. When the quarter lining "V" notch is used, the seam shall be closed upwards from the lasting edge. The closing shall be done with one row of stitching and the seams shall be rubbed down. The assembled linings shall be top stitched to the quarters with a single row of stitching. The quarter lining shall be sufficiently undertrimmed to minimize exposure of the lining.

3.7.8 Tongue fitting. The tongue shall be placed between the vamp and vamp lining and stitched with two rows of stitching approximately $1/16$ inch from the edge of the leather and approximately $1/8$ inch between rows of stitching.

3.7.9 Eyeletting. On each quarter, five invisible eyelets specified in 3.3.15, shall be securely and smoothly clinched. The edge of the eyelets shall be $5/16 (+ 1/16)$ inch from the edge of the quarter and spaced evenly from the blucher nose to the top of the quarter.

3.7.10 Lacing for lasting. The machine lacing for lasting shall provide a $9/16 (+ 1/16)$ inch opening after lasting. A minimum of 3 pairs of eyelets shall be laced.

3.7.11 Vamping. The vamping shall be done with one row of stitching, single or double needle, close to the edge of the quarter and one row of stitching, single or double needle, spaced $1/4 (+ 1/64)$ inch inside the first row.

3.7.12 Insoles. Leather insoles shall be sorted for varying fibers and cased for even weight. The insoles shall be fleshed and rounded to patterns. Die cut insoles will be acceptable provided they conform to insole patterns loaned by the Government. A $\pm 1/64$ inch tolerance from Government loaned insole patterns will be allowed. Leather insoles and Texorist insoles (3.3.4) in the heel area shall have three (3) countersunk holes for the copper nails specified in 3.3.12 and as shown in Figure 1. Approximately 4 1/2 inches of the heel portion of the completed insoles (between the rib) shall be coated with the conductive material specified in 3.3.19.2

3.7.13 Lasting. The uppers may be conditioned by any suitable means except that they shall not be dipped in water. Insoles of the correct size and width shall be tacked to the last with not less than 5 tacks: one in the center of the heel seat, one at the shank, one at each side of the ball and one at the toe. Tacks shall not be larger than 2 1/2 ounces. Staples in lieu of tacks may be used for attaching the insole to the last. Edges of the insole shall be flush with the bottom of the last at all points. The heel seat of the insole shall be smooth and even with the heel seat of the last. Correct size and width of uppers and counters shall be assembled to the last. Counters shall be well cemented with a suitable adhesive on both sides. The correct size steel box toe shall be carefully inserted between the vamp lining and toe cushion. The uppers shall then be drawn down over the last with proper tension to assure blucher points and vamps are tight to the last and blucher noses are even. The sides of the shoes shall be spindled, drawing the uppers snugly to the last and then side lasted and stapled to hold uppers firmly to the last. Linings shall be pulled smooth and tight without any tears. The toe and heel seat areas shall be smoothly wiped-in and securely attached around the base of the insole rib. As an alternate, toe lasting side lasting and heel seat lasting may be performed by any suitable method or equipment.

3.7.14 Time allowance on lasts. The shoes shall remain on the lasts until thoroughly dry.

3.7.15 Inseaming. Inseaming shall be done by machine using thread specified in 3.3.7.2, thoroughly hot waxed, with tension on the thread, using a needle not larger than No. 41, with not less than 3 1/4 stitches per inch. The welting shall be inseam stitched to the bottom of the insole rib around the periphery of the shoe to provide a welted heel seat. As an alternate, the side lasting and inseaming operations may be performed simultaneously with any suitable equipment or method.

3.7.16 Tack and staple pulling, inseam trimming. All tacks, staples and toe or heel seat wires if used, shall be removed from the bottom of the insole and no broken tack or staple points shall remain. The inseam shall be carefully and closely trimmed around the periphery of the shoe without cutting or damaging the stitches. The welt shall be beaten out smoothly while in temper to lie flat around the entire shoe.

3.7.17 Shank fitting, bottom filling, self-curing conductive filling. Shank boards and shanks shall be selected for correct size. The shanks shall be inserted in position with the shank filling the cavity between the rib from ball line rearward to slightly behind the heel breastline in front of the copper nails (see 3.3.12). The forward end of the shank shall be flush with the insole and shall fit the contour of the shoe bottom back of the ball line and secured to the shoe bottom with a suitable adhesive. The bottom filler shall be firmly pressed into the insole channel around the toe extending to the heel breast area with a uniform and even surface. The bottom shall present a flat smooth surface for sole laying. Any excess cavities between the shank board and insole rib, except the heel area, shall be filled with bottom filler. The heel portion shall be filled with a conductive rubber heel plug or material specified in 3.3.9 or 3.3.19.3. The entire heel seat area shall be filled or coated.

3.7.18 Sole laying. The entire shoe bottom after bottom filling shall be coated with cement specified in 3.3.19.3 and the soles shall be laid on a sole laying machine with pressure to hold the sole to the welting at all points. The soles shall be laid evenly and shall be large enough to obtain the edge extension specified in 3.7.23.

3.7.19 Rough rounding. The soles shall be uniformly rounded on a rough rounding machine to provide for the edge extension of sole and welt specified in 3.7.23.

3.7.20 Sole stitching. The outsoles and welts shall be stitched together on a lockstitch machine using hot waxed thread specified in 3.3.7.3. A needle and awl not larger than No. 47 shall be used. The stitching shall be 5 to 7 stitches per inch, with the stitches laid on the surface of the welt and close to the outer edge of the welt on the finished shoe. The lock shall be placed just under the surface of the outsole.

3.7.21 Heel attaching. The heels shall be attached without the use of nails. The heels shall be attached by the use of heel attaching cement. The heel cup and sole heel seat area shall be properly roughed, cleaned and coated with a conductive cement specified in 3.3.19.2. The heels shall be spanked on, using a heeling machine, or any suitable equipment. Method of application and drying time of cements shall be determined by the contractor to assure a bond strength, measured in peel, a minimum of 25 pounds per inch, when tested as specified in 4.4.4.3 and 4.5.4.

3.7.22 Heel trimming, finishing. The heel seat area and heels shall be trimmed and smoothly scoured. When leather welting is used, the welting shall be stained to match the color of the uppers. When style 2 heels are used (see 3.3.17), the breastline shall not be scoured.

3.7.23 Edge trimming. Edges shall be trimmed square and smooth. The finished extension at the outside ball shall be $7/32 (+ 1/32)$ inch and toe and inside ball shall be $3/16 (+ 1/32)$ inch. When leather welting is used, the welting shall be stained to match the color of the uppers.

3.7.24 Bottom finishing. The bottoms shall be clean and smooth.

3.7.25 Insertion of copper nails. Three (3) copper nails specified in 3.3.12 shall be located in countersunk holes in the heel seat area of the insoles and as shown in Figure 1. The nails shall penetrate through the insole from the upper side and penetrate the conductive rubber heel. The nails shall be positioned as shown in Figure 1. The nail heads shall be countersunk to the level of the insole.

3.7.26 Application of conductive composition. After insertion of the copper nails specified in 3.7.25, the self-curing conductive composition specified in 3.3.19.3 shall be coated over the heel seat area and copper nail heads and be of sufficient amount to make firm contact with the conductive sock lining (see 3.3.18).

3.7.27 Insertion of sock lining. The conductive sock lining specified in 3.3.18 shall be inserted after application of the self-curing composition as specified in 3.7.26. The sock lining shall be attached to the insole with conductive cement specified in 3.3.19.3 and firmly and smoothly pressed in place to assure proper contact.

3.7.28 Lacing - mating. The shoes shall be properly mated and a lace shall be inserted through the lower eyelet of each shoe and tied in a loose knot.

3.7.29 Finish.

3.7.29.1 Preparation. The shoes shall be cleaned, removing accumulated dirt, wax, cement and all other foreign matter. All thread ends shall be trimmed.

3.7.29.2 Treeing. All wrinkles shall be removed from the shoes while on the last and no material shall be used that may injure the leather or thread.

3.7.29.3 Final finish. The shoes shall be repaired and filled using materials specified in 3.3.24 through 3.3.28. All raw edges shall be stained to match the upper leather.

3.7.29.4 Edge finishing. When leather welting is used, the edges shall be padded and brushed.

3.7.30 Tacks and staples. Tacks or staples that have been left protruding through the insole and cannot be pulled out, shall be cut close to the surface leaving no protruding stumps. A mechanical tack detector or other suitable method shall be used to indicate the presence of any protruding tacks or staples inside the shoe.

3.7.31 Instruction tag. An instruction tag shall be supplied by the contractor and shall be tied through an eyelet on one of each pair of shoes with not finer than 5-ply cotton string, doubled not less than 8 inches long. The instruction tag shall be made of cardboard not less than 0.020 inch thick. The color shall be white or light in shade to permit easy reading of printed markings. The ticket shall have a reinforced eyelet for attaching the tying cord.

3.7.31.1 Marking of instruction tag. The instruction tag shall be legibly marked with black water-insoluble marking ink as follows:

Instruction Tag for Testing Conductive Safety Shoes

READ AND REMEMBER

Conductive shoes shall be tested while worn for electrical resistance when issued and as often as necessary to assure that the resistance of the shoes and the wearer is within the required limits. However, the system shall be tested at least once every three (3) months. If the test shows excessive resistance, the shoes shall be cleaned and retested as above. The test shall be conducted on the B scale of the Vibrotester at 90 volts, or in accordance with other procedures, standards or regulations prescribed by the user activity.

3.7.31.2 Marking of tongue. A lightweight cotton fabric label shall be marked with the following instruction and cemented to the flesh side of the leather tongue:

WARNING: Test frequently for electrical resistance!

3.7.31.3 ANSI marking. The footwear shall be labeled that it complies with Class 75 of ANSI Z41.1 for safety footwear. A cloth label shall be stitched to the inside of each shoe in the tongue lining area. The label may be combined with the label specified in 3.7.31.2. The letters and numbers shall be in indelible ink and be a minimum of 3/16 inch in height. ANSI information shall be as follows:

ANSI
Z41.1 - 1967/75

3.7.32 Electrical resistance of finished shoe. The finished shoes shall have a maximum electrical resistance of 250,000 ohms when tested as specified in 4.4.4.3 and 4.5.3.

3.8 Workmanship. The finished shoes shall conform to the quality of product established by this specification. The occurrence of defects shall not exceed the applicable acceptable quality levels.

4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract, 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.1.1 Certificate of compliance. Where certificates of compliance are submitted, the Government reserves the right to check test such items to determine the validity of the certification.

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

1. First article inspection (see 4.3)
2. Quality conformance inspection (see 4.4)

4.3 First article inspection. When required, the first article submitted in accordance with 3.2 shall be inspected as specified in 4.4.4 for compliance with design, construction, workmanship and dimensional requirements, and tested for electrical resistance as specified in 4.4.4.3.

4.4 Quality conformance inspection. Sampling for inspection shall be performed in accordance with the provisions of MIL-STD-105, except where otherwise indicated herein.

4.4.1 Component and material inspection. In accordance with 4.1, components and materials shall be inspected and tested in accordance with all the requirements of referenced specifications, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document. In addition, testing shall be performed on components and materials listed in Table VI. When data in the "Number of determinations per sample unit" and "Results reported as" columns are not specified in Table VI, they shall be reported as required by the referenced test method. 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 or the composite fail to meet any requirements specified except where otherwise stated herein. The sample size shall be as follows, unless otherwise specified.

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

TABLE VI TESTING OF COMPONENTS

Component and unit of product	Characteristic	Specification reference		Requirement applicable to		No. of determinations per sample unit	Results reported as	Sample unit
		Requirement paragraph	Test method	Sample unit	Lot average			
Upper leather (1 side or skin)	Chrome tannage Color	3.3.1	1/ visual	X		1	Pass or fail	
		3.3.1						
Vamp and quarter lining leather (1 side or skin)	Chrome tannage Color	3.3.3	1/ visual	X		1	Pass or fail	
		3.3.3						
Textorist insole (1 pair)	Mat'l ident. Copper-8-quin Thickness	3.3.4	1/ visual					
		3.3.4	1/ visual					
		3.3.4	1/ visual					
Synthetic wetting (yard)	Mat'd ident. Hardness Specific gravity Brittleness (before and after aging) Tensile strength Elongation Water absorptior	3.3.5.2	1/ D-2240 3/ 4.5.1.1	X		3	number nearest .01	5 yards
		3.3.5.2	4.5.1.1	X		3	pass or fail	
		3.3.5.2	D-746 3/ and 4.5.1.3	X		10	nearest	
		3.3.5.2	D-412 3/	X		5	nearest 10 psi	
		3.3.5.2	D-412 3/ 4.5.1.2	X	X	5	nearest 5%	
Bottom filler (1 lb)	Percent of cork to binder Softening point of binder Penetration of binder	3.3.8	1/ E-28 3/ D-5 3/		X	2	nearest degree number	1 pound composite
		3.3.8			X	2		
		3.3.8						

TABLE VI TESTING OF COMPONENTS

Component and unit of product	Characteristic	Specification reference		Requirement applicable to		No. of determinations per sample unit	Results reported as	Sample unit
		Requirement paragraph	Test method	Sample unit	Lot average			
Bottom filler (1 lb) (cont'd)	Solubility of binder in water	3.3.8	1/					
	Flexibility of binder	3.3.8	1/					
Conductive filler (1 quart)	Mat'd ident.	3.3.9	1/					
	Electrical resistance	3.3.9	4.5.3	X		1	pass or fail	see 4.5.3.2
Toe cushion (poly vinyl and latex when applicable 1 yard)	Mat'd ident.	3.3.11	1/					
	Thickness	3.3.11	12031 4/					
	Weight, cubic foot	3.3.11(a)	5041 2/					
Copper nails (1 lb)	Copper content	3.3.12	1/					
	Length	3.3.12	1/					
	Dia. of head	3.3.12	1/					
	Thickness	3.3.12	1/					
Shank board (1 pair)	Mat'l ident.	3.3.13.1	1/					
	Thickness	3.3.13.1	Gauge		X	3	nearest 1/128 in	1 pair
Steel shank (1 shank)	Mat'd ident.	3.3.13.2	1/					
	Hardness (Rockwell C Scale)	3.3.13.2	243 5/					
	Thickness	3.3.13.2	gauge		X	1	nearest number	2 shanks
	Width	3.3.13.2	gauge		X	1	nearest 0.001 in	

TABLE VI TESTING OF COMPONENTS

Component and unit of product	Characteristic	Specification reference		Requirement applicable to		No. of determinations per sample unit	Results reported as	Sample unit
		Requirement paragraph	Test method	Sample unit	Lot average			
Eyelets (1 lb)	Mat'd ident. Thickness	3.3.14	1/				nearest 0.001 in.	
		3.3.14	1/					
	Finish	3.3.14	1/			2		2 eyelets
	Diameter of flange	3.3.14	gauge	X		2		
	Length	3.3.14	gauge	X		2		
	Dia. of hole	3.3.14	gauge	X		2		2 box toes
Steel box toe (1 pair)	Mat's ident.	3.3.15	1/					
	Harness (Rockwell C Scale)	3.3.15	243 5/	X		3	number	
	Carbon content	3.3.15	1/					
	Coating ident.	3.3.15	1/					
	Thickness	3.3.15	1/					
Rubber out-soles (1 pair)	Electrical resistance	3.3.16	4.5.3	X		1	pass or fail	1 sole
	Electrical resistance	3.3.17	4.5.3	X		1	pass or fail	1 heel
Sock lining (1 yard)	Mat'd ident. Electrical resistance	3.3.18	1/			1	pass or fail	9 in ²
		3.3.18	4.5.3	X				
Conductive cements (1 quart)	Mat'l ident. Electrical resistance	3.3.19.2	1/			1	pass or fail	see 4.5.3.2
		3.3.19.2	4.5.3	X				
Self-curing composition (1 quart)	Mat'd ident. Electrical resistance	3.3.19.3	1/			1	pass or fail	see 4.5.3.2
		3.3.19.3	4.5.3	X				

TABLE VI TESTING OF COMPONENTS

Component and unit of product	Characteristic	Specification reference		Requirement applicable to		No. of determinations per sample unit	Results reported as	Sample unit
		Requirement paragraph	Test method	Sample unit	Lot average			
Self-curing composition (1 quart)cont'd)	Hardness	3.3.19.3	D-2240 3/					Prepared as in 4.5.3.2
Insole ribbing fabric (1 yard - full width)	Mat'l ident.	3.3.20	1/					1 yard full width
	Weight	3.3.20	5041 1/ 2/					
	Yarns per inch Breaking strength	3.3.20	5050 1/ 2/					
Rib and insole (1 pair)	Shear strength	3.3.20.1	2061 6/ 7/	X	X	1	1b	2 ribbed soles 2 ribbed soles
	Stitch tear strength	3.3.20.1	2171 6/ 7/	X	X	1	1b	
Assembly tacks and staples (1 pound)	Mat'l ident.	3.3.21	1/					
Wax	Mat'd ident.	3.3.22	1/					
1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirement. 2/ Refers to FED-STD-191. 3/ Refers to ASTM Standards. 4/ Refers to FED-STD-601. 5/ Refers to FED-STD-151. 6/ Refers to FED-STD-311. 7/ Sample size shall be 5 units regardless of lot size								

4.4.1.1 Examination of components.

4.4.1.1.1 Examination of insoles. The leather insoles shall be examined for visual and dimensional requirements conforming to the provisions of the end item examination of KK-I-570. The Texorist insoles shall be examined for defects listed below. The inspection level shall be level II, and the AQL shall be 4.0 defects per hundred units.

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.

4.4.1.1.2 Examination of outsoles. The outsoles shall be examined for visual and dimensional requirements conforming to the provisions of the end item examination of MIL-S-40043.

4.4.1.1.3 Examination of heels. The heels shall be examined for visual and dimensional requirements conforming to the provisions of the end item examination of ZZ-H-141.

4.4.1.1.4 Examination of leather welting. The leather welting shall be examined for visual and dimensional requirements conforming to the provisions of the end item examination of KK-W-231.

4.4.1.1.5 Examination of synthetic welting. The synthetic welting shall be examined for visual defects referenced in 3.3.5.2 and for conformance with the dimensional requirements of Figure 2. The sample size and basis for lot rejection shall be as specified in 4.4.1 with the lot size expressed in yards of welting, and the sample size in units of one yard.

4.4.2 In-process examination. Inspection shall be made at any point or during any phase of the manufacturing process to determine whether operations or assemblies are accomplished as specified. The Government reserves the right to exclude from consideration for acceptance any material or service for which in-process inspection has indicated nonconformance.

4.4.3 Intermediate inspection.

4.4.3.1 Examination of vamps prior to fitting. A 100 percent examination of each cut vamp for the defects references in 3.3.1, shall be conducted prior to fitting operations. Any cut vamp containing one or more defects shall result in rejection of that vamp.

4.4.3.2 Visual examination. The defects found during intermediate examinations shall be classified in accordance with 4.4.3.2.1. and 4.4.3.2.2. The inspection level and acceptable quality level (AQL) shall be as indicated in 4.4.3.2.3.

NOTE: Defects designated by an asterisk (*) shall be scored as "Major" when seriously affecting serviceability and "Minor" when affecting serviceability but not seriously.

4.4.3.2.1 Examination of uppers after fitting. The upper assembly shall be examined for defects in cutting, fitting and other construction characteristics which cannot be seen in the end item. The sample unit shall be one completely fabricated upper assembly prepared for lasting. The lot size shall be expressed in units of one upper assembly.

Examine	Defect	Classification	
		Major	Minor
Construction and workmanship	Any component missing or not specified type	X	
	Any component misplaced, damaged or not affixed as specified		*
	Construction not as specified		*
	Backseam not rubbed down		X
	ANSI label missing <u>1/</u>		
Quality of leather	Thickness more than 1/2 ounce less than the minimum specified	X	
	Thickness more than the maximum or up to 1/2 ounce less than minimum specified		X
	Slaughter cut		*
Seams and stitching of upper (quarter lining V notch) (when used)	Off stretch cut	X	
	Quarter lining V notch has less than 8 stitches per inch		X

1/ The contractor shall perform 100% examination for this defect. Any defective unit found shall be repaired, replaced, or excluded from the in-process lot.

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

Examine	Defect	Classification	
		Major	Minor
Bottom of shoes	Any component missing or not specified type	X	
	Shank not properly positioned or not fitting contour of shoe bottom		*
	Shank wrong size or malformed		X
	Shank not securely attached		X
	Any tear in cotton duck in stitch area:		
	-more than 3/4 inch	X	
	-more than 1/2 but not more than 3/4 inch		X
	Insole tack, staple or anchor tack not removed	X	

Examine	Defect	Classification		
		Major	Minor	
Bottom of shoes (contd')	Upper damaged in lasting		*	
	Poor heel seat, side of toe lasting		*	
	Inseam not properly trimmed		*	
	Less than three stitches per inch on inseam	X		
	Inseam stitches broken, two or more consecutive skipped inseam stitches, or inseam stitches cut or damaged during trimming operation	X		
	Heel seat area not coated with conductive compound	X		
	Broken insole rib		*	
	Inseam stitching not at bottom of insole rib, i.e., 1/16 inch from bottom of rib for 6 or more stitches		X	
	Inseam stitching not at bottom of insole rib, i.e., 1/8 inch from bottom of rib for more than 4 stitches	X		
	Inseam stitching not in welt groove	X		
	Counter not caught in seam stitching		X	
	Welt not properly beat out, i.e., not flat		X	
	Holes for copper nails missing		X	
	Ends of welting not continuous		X	
	Upper part of shoe	Uppers not tightly pulled down to last		X
		Lace opening less than 1/2 inch or more than 5/8 inch	X	
		Quarter not laced in three pairs of eyelets		X

4.4.3.2.3 Inspection level and AQL. The inspection level and the AQL expressed in defects per 100 units shall be as follows:

	<u>Inspection level</u>	<u>AQL</u>	
		<u>Major</u>	<u>Total</u>
For 4.4.3.2.1 and 4.4.3.2.2	I	2.5	6.5

4.4.4 Examination of the end item. The defects found during the examination of the end item shall be classified in accordance with 4.4.4.1 and 4.4.4.2.

4.4.4.1 Critical defects. The contractor shall perform 100 percent inspection of the finished shoes prior to insertion of the sock lining for critical defects. Any shoe found with one or more of the following defects shall result in rejection of the entire lot.

- a. Other than copper nails used for conductive path.
- b. One or more copper nails missing in any shoe.
- c. Heel seat area not coated with conductive composition (see 3.3.20.3) as specified.
- d. Protruding point of tack or nail forward of heel breastline.

4.4.4.2 Major and minor defects. The finished shoes, after insertion of the sock lining, shall be examined for defects in pairing, design, material, construction, workmanship, finish and marking. The lot size shall be expressed in units of one shoe and selection shall be by pairs. Defects of pairing shall be classified as a single defect. Classification of defects shall be as shown below. The inspection level shall be II and acceptable quality levels (AQL's) shall be 2.5 Major and 6.5 total defects per hundred units (DHU). The vamp shall be examined for break of leather in accordance with the procedure below:

Vamp: To examine the vamp, the shoe shall be held in an upright position with both hands. The toe of the shoe shall face away from the examiner. Position thumbs on top of vamp approximately half way between box toe line and blucher noses and 1 inch to 1 1/2 inches apart. Press downward with thumbs so as to form grain surface into a concave surface. The break in the leather between the thumbs and running across the vamp shall be observed and compared with the break patterns of the Satra scale (see 6.4). Any vamp exhibiting a break pattern greater than No. 5 on the Satra scale shall be scored as a defect.

NOTE: Asterisk defects listed below shall be scored "Major" when affecting serviceability or appearance seriously and "Minor" when affecting serviceability or appearance but not seriously.

Examine	Defect	Classification	
		Major	Minor
Pairing	Not properly mated, i.e., not right and left of same size	X	
	Variation in color		*
Cleanliness	Any spot, stain or foreign matter clearly noticeable		X
Color and finish	Not specified color	X	
	Color not uniform		X
	Any raw edges not stained to match upper leather		X
	Finish streaky, chipped or flaky on uppers		X

Examine	Defect	Classification	
		Major	Minor
Design, type and size	Not as specified	X	
Material (general)	Any component not fabricated of the material specified	X	
Upper leather	Stretchy vamp	X	
	Leather damaged in process	X	
	Break of vamps and quarters not as specified (see 4.4.4.2)	X	
	Any defects in leather referenced in 3.3.1		*
Lining leather	Wrinkled, torn or excessively full lining	X	
	Not material specified	X	
	Flanky - off stretch	X	
Construction and workmanship (general)	Any cut, tear, hole, rip, repair abrasion		*
	Any component or assembly misplaced, operation omitted or not properly performed, e.g., blucher noses crooked to a degree where it is readily noticeable		*
	Wrinkled or bunched area at the back seam		*
	Any component or assembly misplaced or operation omitted or not properly performed, unless otherwise classified herein		*
Seams and stitching (upper)	Two broken stitches, continuous skipped stitches or run-off stitches on a single or multiple row or stitching		X
	Three or more broken stitches, continuous skipped stitches or run-off stitches on a single or multiple row of stitching	X	
	Loose tension resulting in a loosely secured seam		*
	Tight tension resulting in puckering or cutting of leather		*
	Wrong stitch type or seam type	X	
	One or two stitches less than the minimum specified		X

Examine	Defect	Classification	
		Major	Minor
Seams and stitching (upper) (cont'd)	More than two stitches less than the minimum specified	X	
	More than the specified maximum number of stitches:		
	-resulting in damage to leather	X	
	-but does not damage leather		X
	Gauge of stitching not as specified or irregular		X
	Any row of stitching omitted	*	
	Thread ends not trimmed throughout shoe		X
	Needle holes or needle chews		X
Outsoles stitching	Lock not just under surface of outsole	X	
	Lock on surface of outsole	X	
	Less than 5 stitches per inch	X	
	More than 7 stitches per inch, except ball and toe sole stitching		X
NOTE: More than 3 1/2 stitches per any one half 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.			
	Skipped or broken stitch	X	
	Goodyear stitching too tight, cutting into sole substance, or too loose	X	
	Gauge of Goodyear stitching not as specified or irregular		X
	Checked sole, or separation of any bottom component	X	
	Any stitching not visible on surface of sole	X	
Counters	Rolled or curled counter		*
Edge making	Edge trimmed into Goodyear stitching	X	
	Edge not trimmed square or trimming is irregular		X
	Sole extension less than the specified minimum by more than 3/32 inch	X	

Examine	Defect	Classification	
		Major	Minor
Edge making (cont'd)	Sole extension less than the specified minimum but not more than 3/32 inch, or more than the specified maximum		X
Heel finishing and attaching	Heel not finished square, i.e., flared or tapered more than 1/8 inch		X
	Heel not finished smooth		X
	Checked heel, i.e., separation of heel and outsole		X
	Wrong size or type heel		X
	Open heel seat	X	
Laces	Heel crooked		X
	Wrong type	X	
Eyelets	Length not as specified		X
	Number of eyelets not as specified	X	
	Eyelets not properly spaced within the row or misalignment between the rows to an extent interfering with proper lacing	X	
	Edge of any eyelet less than 3/16 inch or more than 5/16 inch from edge of quarter		X
	Eyelet not securely clinched		X
Inseaming	Grinning seam, i.e., thread exposed	X	
	Strained seam, i.e., needle holes visible but thread not exposed		X
Insoles	Any protruding point of tack, staple or nail on insole in heel area	X	
	Any protruding point of nail, staple or tack on insole forward of the heel breastline <u>1/</u>		
	Insoles short or long		*
Steel box toe	Missing <u>1/</u>		
Sock lining	Not firmly and completely adhered to heel seat	X	
Marking	Missing, incomplete, incorrect, not applied in the specified manner, misplaced, illegible or not specified size		X
ANSI label	Missing <u>2/</u>	X	
	Illegible, incorrect, not affixed as specified, incomplete	X	

1/ This defect found in the sample shall be cause for rejection of the lot represented.

2/ When this defect is found the defect shall be scored and the item shall be repaired, replaced, or excluded from the lot.

4.4.4.3 Testing of the end item. The finished shoes shall be tested for the characteristics listed in Table VII. Each of the finished shoes in the end item lot shall be tested for electrical resistance. The sample unit for the bond strength and impact tests shall be one shoe. The inspection level shall be S-1. The same shoes may be used for the bond strength and impact tests. Any sample unit that fails to meet requirements specified shall result in rejection of the end item lot.

Table VII - Testing of finished shoes

Characteristic	Requirement paragraph	Test method	Determinations per sample unit
Impact resistance	3.3.15.1	4.5.2	1
Bond strength/outsole to heel	3.3.21	4.5.4	1
Electrical resistance	3.7.32	4.5.3	1

4.4.5 Examination of packaging requirements. An examination shall be made to determine that packaging, packing and marking comply with Section 5 requirements of this specification. Defects shall be scored in accordance with the list below. The sample unit shall be one shipping container fully prepared for delivery with the exception that it need not be sealed. Defects of closure listed below shall be examined on shipping containers fully prepared for delivery. The lot size shall be the number of containers in the end item inspection lot. The inspection level shall be S-2 and the AQL shall be 2.5 defects per one hundred units.

<u>Examine</u>	<u>Defect</u>
Marking (interior and exterior)	Omitted, incorrect, illegible, of improper size, location, sequence, or method of application. Size marked on shoes or intermediate package not in conformance with size shown on exterior container. <u>1/</u>
Materials	Any component missing, damaged or not as specified.
Workmanship	Inadequate application of components such as: Incomplete closure of container flaps, loose strapping, inadequate stapling. Bulging or distortion of containers.
Content	Number of pairs of shoes per container is more or less than specified.

1/ For this defect, one pair from each container shall be examined.

4.5 Tests.

4.5.1 Test for synthetic welting. The testing of the synthetic welting shall be carried out as specified in Table VI and as follows for conformance with the requirements of 3.3.5.2:

4.5.1.1 Specific gravity. The specific gravity of the synthetic wetting shall be determined by a Fisher Young Gravitometer, or any other suitable method, using a specimen from 2 to 3 inches in length.

4.5.1.2 Water absorption. A specimen of synthetic wetting shall be cut to a length of 4 (+ 0.05) inches, weighed to the nearest 0.001 gram (W1), immersed in a beaker of distilled water and maintained for seven days in an oven at a temperature of 70° (+ 2°C). The beaker shall then be removed from the oven, cooled to a room temperature. The test specimen shall then be washed in methanol, dried for one minute and reweighed (W2). The top of the beaker shall be sealed during the test to prevent evaporation of the distilled water. The percentage of water absorbed shall be calculated from the following formula:

$$\text{Water absorption percent} = \frac{W2-W1}{W1} \times 100$$

4.5.1.3 Brittleness. A sample of synthetic wetting shall be placed in an oven and aged at a temperature of 212° (+ 4°F) for seven days. The sample shall then be removed and allowed to remain at room temperature for 24 hours prior to testing. Both the aged and the unaged samples shall be tested for brittleness following the general procedure of the method specified. The unaged specimens shall be immersed in a -15°F bath, and the aged specimens in a 5°F bath in accordance with the referenced test method. After the specified impact blow is delivered, each specimen shall be examined to determine whether or not it has failed. Failure occurs in a specimen which breaks or exhibits a readily apparent crack. A sample unit fails if more than half of the specimens in it fail.

4.5.2 Test of steel box toe. The impact test shall be performed on a finished toe section of the shoe as specified in 4.4.4.3 for conformance with the requirements of 3.3.15.1.

4.5.2.1 Impact. The general procedure for impact testing of class 75 foot-wear contained in American National Standard-ANSI Z41.1 shall be followed. The test specimen shall be one shoe (see 4.4.4.3) of any size, tested at any time after completion of manufacture. The toe section is not required to be separated from the rest of the shoe as long as it can be secured in place with any suitable guides or clamps. The use of the plunger as specified is not required as long as the striking surface of the falling weight conforms to the configuration of the striking surface specified for the plunger. A weight less than that specified falling from a height greater than that specified may be used if the combination results in the required impact of 75 foot pounds. For example, a weight of 25 (+ 1/4) lb may be dropped from a height of 36 inches to obtain the required impact.

4.5.3 Tests for electrical resistance of shoes and components. Tests for electrical resistance shall be performed as specified in 4.4.1 and 4.4.4.3 for conformance with the requirements of 3.3.9, 3.3.16, 3.3.17, 3.3.18, 3.3.19, and 3.7.32.

4.5.3.1 Procedure. The test instrument shall be a Vibrotester Med-check Model 2269 of Associated Research Inc., 8221 North Kimball Ave., Skokie, IL 60076. The instrument shall be operated on the "A" scale. It shall be short circuited and adjusted for zero resistance prior to the testing of components. The base electrode shall be a metal plate whose area shall be able to accommodate the entire heel and sole of the finished shoe; the **weighted** electrode shall be 5 pounds (+ 1/2 ounce), contact area 2 1/2 (+ 0.1) inches square. The contact area shall be shod with rubber and a sheet of aluminum foil as specified in Flammable Anesthetics Code 1962-56 Section 2522(b), page 24, by National Fire Protection Association. The shoe or the sample of the component or material to be tested shall be placed on the metal plate. The cylindrical contact shall then be placed inside the shoe at the heel section for shoe testing; and on the heel, the sole, the sock lining and the conductive filler and conductive cement or self-curing composition films (see 4.5.3.2) for component testing. The resistance reading shall be made after depressing the pushbutton and holding it not longer than 30 seconds. As an alternate, an instrument capable of furnishing 500 volts, including a d.c. voltmeter, 1000 ohms/volt sensitivity or greater, and a suitable milliammeter with a range suited to the test requirements, may be used with electrodes described above.

4.5.3.2 Conductive filler, conductive cement and self-curing composition. The conductive filler, cement and self-curing composition shall be prepared for testing in 4.5.3.1 as follows: a sufficient quantity of each material shall be placed in a dish and the solvent evaporated to produce a fairly uniform film approximately 1/8 inch thick and slightly larger in area than that of the upper electrode foot. When evaporation is complete, the film shall be removed from the dish and tested.

4.5.4 Bond strength of outsole to heel. Bond strength tests shall be performed as specified in 4.4.4.3 for conformance with the requirements of 3.7.21.

4.5.4.1 Specimen. The specimen shall be a complete shoe which as aged at least three days at room temperature. Starting at the back of the shoe, separate the heel from the outsole for a distance of approximately one inch.

4.5.4.2 Apparatus. A power driven pendulum type strength tester, or an approved testing device of equal performance shall be used. The rate of travel of the power actuated grip shall be 2 inches per minute. If the machine is equipped with a ratchet for maintaining the maximum load on the indicating scale, it should be disengaged to permit readings of variable force.

4.5.4.3 Procedure. The separate ends of the specimen shall be secured in the jaws of the machine using "C" clamps or other suitable rigid clamps. The machine shall be started, and the outsole and heel shall be pulled apart for a distance of one inch. At that instant, the load indicated on the machine shall be read and recorded. The load shall be divided by the width of the specimen at the corresponding line of separation, and reported as pounds per inch of width.

5. PACKAGING

5.1 Preservation packaging. Packaging shall be level A or C (commercial) as specified (see 6.2).

5.1.1 Level A. Each pair of mated shoes shall be inserted in a close-fitting clear polyethylene film bag having a thickness of 0.002 inch (+ 20 percent tolerance). The bag shall be formed with heat sealed seams that are straight, continuous and parallel to each other and the formed edges of the bag. The final closure of the bag shall be heat sealed with the heat seal made as close as possible to the open end. The bag may be fabricated from polyethylene film tubing or sheeting. Alternately, the final closure of the polyethylene bag may be accomplished by means of a mechanical tie (paper or plastic covered soft steel wire, aluminum band, etc.). Each bagged pair of shoes shall then be placed in a two-piece partial telescope style folding or setup paperboard box as hereinafter specified. The depth of the lid of the box shall be 1 inch.

5.1.1.1 Folding boxes. Folding boxes shall be fabricated from a kraft-lined chipboard not less than 0.032 inch thick conforming to variety 1, style III, type G, class j. subclass 2 of PPP-B-566.

5.1.1.2 Setup boxes. Setup boxes shall be fabricated from paperboard not less than 0.040 inch thick conforming to type II, variety 1, class A or D, style 4 of PPP-B-676.

5.1.2 Level C (commercial). Each pair of shoes shall be packaged to afford adequate protection against physical damage during shipment from the contractor to the first receiving activity. The package and the quantity per package shall be the same as that normally used by the contractor for retail distribution.

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

5.2.1 Level A. Twelve pairs of shoes of one size and width only, packaged 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. Each fiberboard 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. Toward the end of the contract or when there are less than the required amount per container of the same size, mixed sizes may be packed within the same container.

5.2.2 Level B. Twelve pair of shoes of one size and width only, packaged as specified in 5.1, shall be packed in a snug-fitting fiberboard shipping container conforming to style RSC, type CF (Variety SW) or SF, class domestic, grade 275 of PPP-B-636. Each fiberboard container shall be closed in accordance with method II as specified in the appendix of PPP-B-636. Toward the end of the contract or when there are less than the required amount per container of the same size, mixed sizes may be packed within the same container.

5.2.2.1 Weather-resistant fiberboard containers. When specified (see 6.2), the fiberboard shipping container shall be a grade V3c, W5c, or W6c fiberboard box fabricated in accordance with PPP-B-636 and closed in accordance with method III as specified in the appendix of the container specification.

5.2.3 Level C (commercial). Shoes, packaged as specified in 5.1, shall be packed in a manner to insure carrier acceptance and safe delivery at destination at the lowest transportation rate for such supplies. The quantity per shipping container shall be the same as that normally used by the contractor for retail distribution. Containers shall comply with U.S. Postal Service Manual, Uniform Freight Classification Rules or National Motor Freight Classification Rules, as applicable.

5.3 Marking. In addition to any special marking required by the contract or order, interior packages and shipping containers shall be marked in accordance with MIL-STD-129.

5.3.1 Width marking. Following the nomenclature and size designation, in the same size lettering, the width shall be spelled out, i.e., "EXTRA NARROW", "NARROW", "REGULAR", "WIDE", or "EXTRA WIDE".

5.3.2 Labels, mixed sizes. Each shipping container packed with mixed sizes, shall have securely attached to the end and side, directly under the printing or stenciling, a white paper label 5 by 4 inches with the words "MIXED SIZES" plainly stamped or printed thereon, and under these words shall be legibly stamped or printed the correct quantity of pairs and sizes contained therein.

6. NOTES

6.1 Intended use. Conductive shoes are intended to be worn by personnel in ordnance or ammunition plants, or other places where accumulation of static electricity in the body of the wearer constitutes a hazard because of the possibility of its sudden discharge in the form of a spark which might ignite sensitive explosives, gas mixtures or flammable vapors. The effectiveness of conductive shoes is dependent on a low resistance conductive path, sufficiently conductive floors, and on the use of cotton socks or stockings which are sufficiently conductive when in contact with the foot of the wearer.

6.2 Ordering data. Procurement documents should specify the following:

- a. Title, number and date of this specification.
- b. Size and width required (see 1.2).
- c. Whether first article is required (see 3.2).
- d. Selection of applicable levels of packaging and packing (see 5.1 and 5.2).
- e. When weather-resistant grade fiberboard shipping containers are required for level B packing (see 5.2.2.1.).

6.3 Guide sample. For access to guide sample, address the procuring activity issuing the invitation for bids.

6.4 The Satra scale may be obtained from the British Shoe and Allied Trade Research Association, Satra House, Kettering, England, or may be obtained from Bata Engineering, Batawa, Ontario, Canada.

6.5 Storm Welting. Storm weltings manufactured by Barbour Welting Co., Inc., 932 North Montecello Street, Brockton, MA 02402 (Style #221-P), by Wind Specialties Co., 7 Sylvan Street, Brockton, MA 02402 (Style #438) and by Rextrude Company, 230 Elliot Street, Brockton, MA (Style #411-WH8) have been found acceptable for configuration, dimensions and physical requirements (see 3.3.5.2).

Custodians:

Navy - NU
Air Force - 99

Preparing activity:
Navy - NU

Project No. 8430-0244

Review activities:

Navy - OS
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DLA - CT

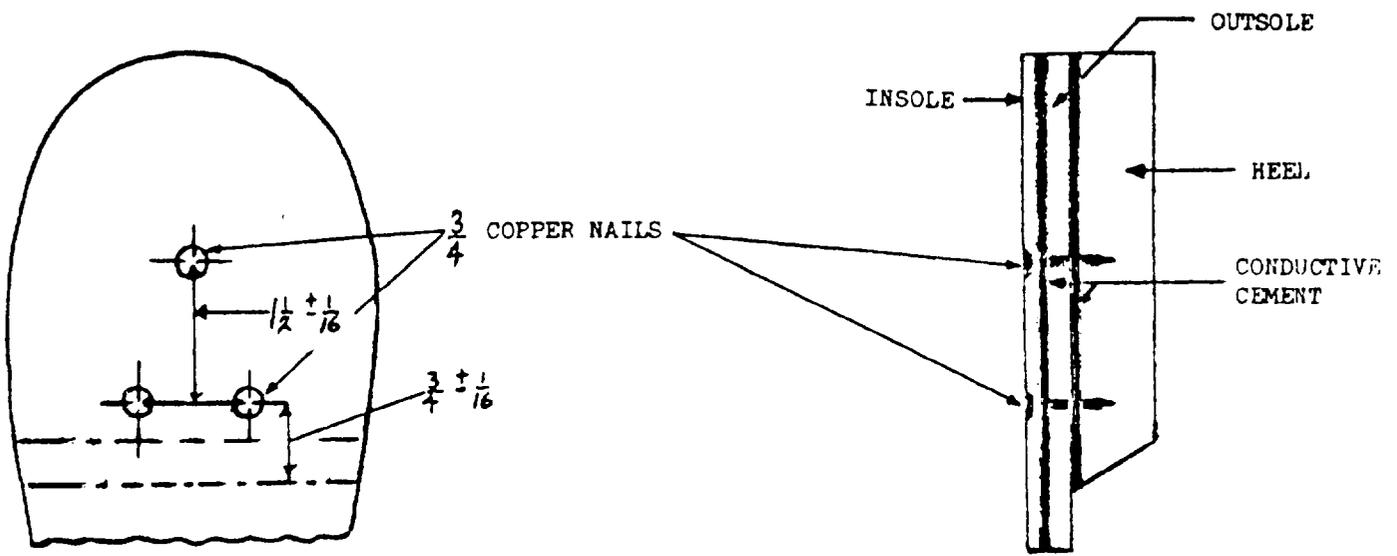
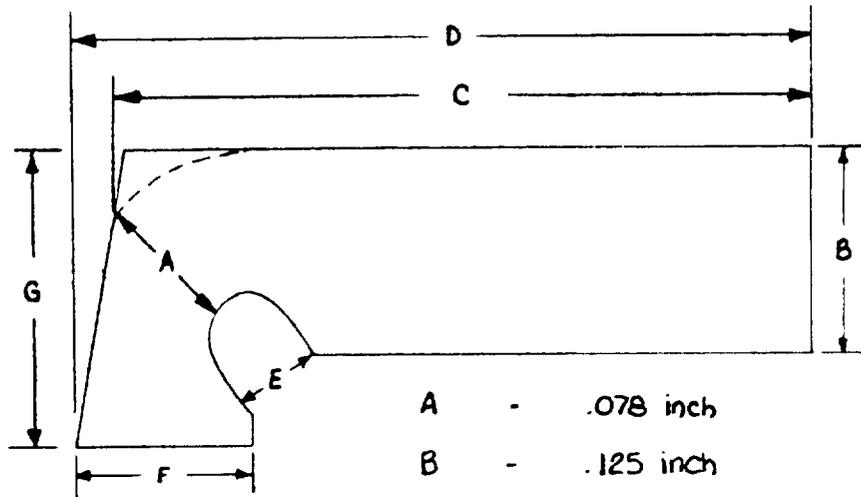


FIGURE 1 - SHOES, CONDUCTIVE

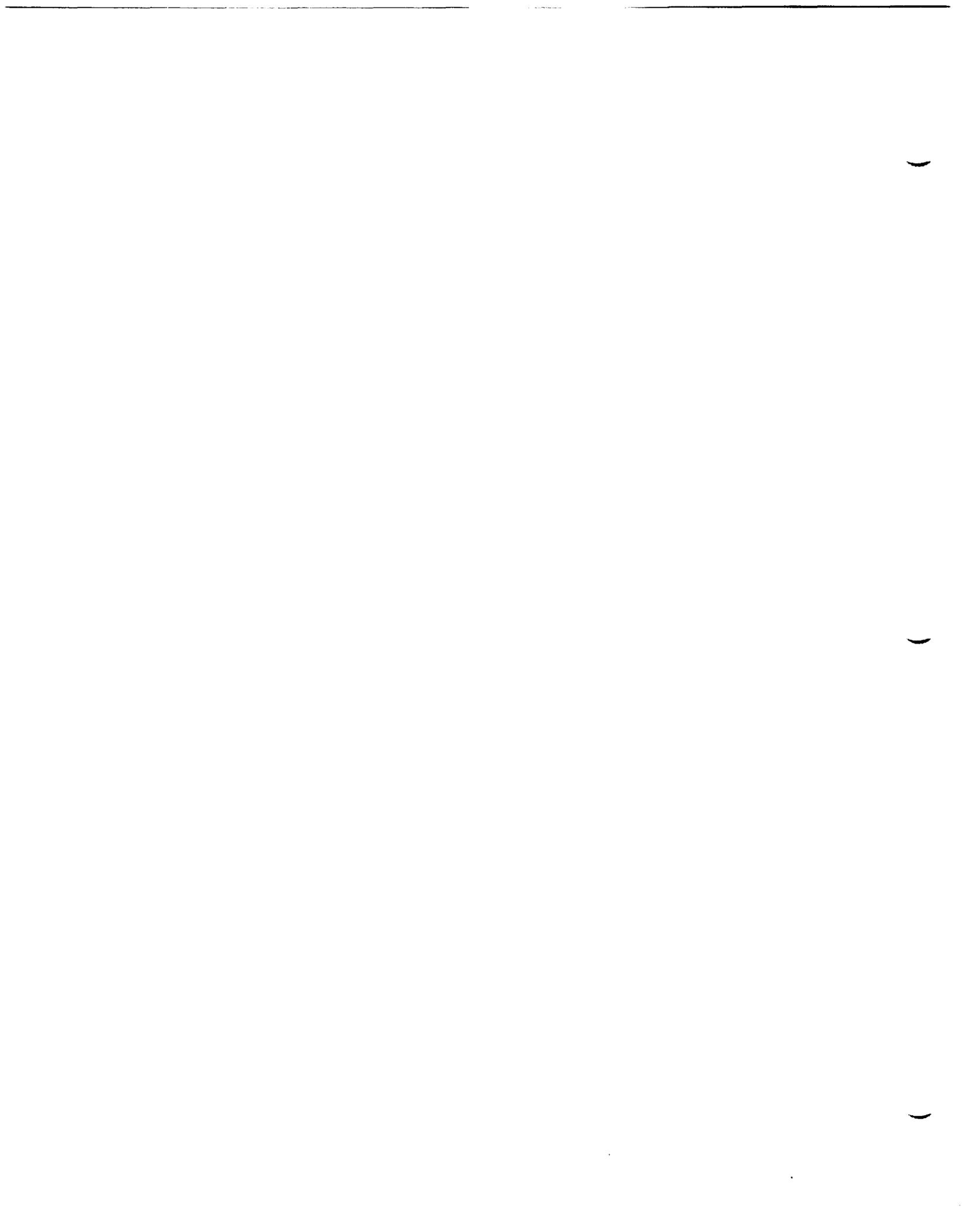


- A - .078 inch
- B - .125 inch
- C - .437 inch
- D - .456 inch
- E - .060 inch
- F - .109 inch
- G - .188 inch

ALL DIMENSIONS $\pm 1/128$ INCH

BROKEN LINE INDICATES
OPTIONAL CONFIGURATION

FIGURE 2 - SHOES, CONDUCTIVE
SYNTHETIC WELTING



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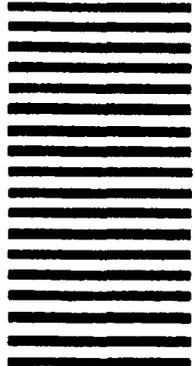
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