INCH-POUND
MIL-DTL-32237C
5 May 2016
SUPERSEDING
MIL-DTL-32237B
11 July 2011

DETAIL SPECIFICATION

BOOT, COMBAT, HOT WEATHER ARMY

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

1. SCOPE

1.1 Scope. This specification covers the requirements for a Type I Desert Sand and Type II Coyote 498 Hot Weather Combat Boot for use in both hot weather wet and dry environments as specified in the contract or solicitation.

1.2 Classification. This specification covers the following types, sizes and widths.

1.2.1 Types.

Type I – Desert Sand
Type II – Coyote 498

1.2.2 Sizes.

Size:	2 through 15 (whole and half sizes), 16 (whole size only)			
Widths:	Narrow	(B)	Wide	(EE)
	Regular	(D)	X-Wide	(EEEE)

2. APPLICABLE DOCUMENTS

Comments, suggestions, or questions on this document should be addressed to: Attn: DLA Troop Support Standardization Team, 700 Robbins Avenue, Philadelphia, PA 19111-5096. Since contact information can change, you may want to verify the currency of the address information using Acquisition Streamlining and Standardization Information System (ASSIST) online database https://assist.dla.mil.

AMSC N/A FSC 8430

2.1 General. The documents listed in this section are specified in sections 3 or 4 of this specification. This section does not include documents cited in other sections of this specification or recommended for additional information or as examples. While every effort has been made to ensure the completeness of this list, document users are cautioned that they must meet all specified requirements of documents cited in sections 3 or 4 of this specification, whether or not they are listed.

2.2 Government documents.

2.2.1 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 cited in the solicitation or contract (see 6.2).

COMMERCIAL ITEM DESCRIPTIONS

A-A-52071 - Tape, Textile, Cotton, General Purpose
A-A-55093 - Laces, Nylon
A-A-55296 - Cloth, Twill, Cotton, 10.0 Ounces (339g)
A-A-59826 - Thread, Nylon

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-C-41814 - Counter, Footwear
MIL-DTL-32075 - Label: For Clothing, Equipage, and Tentage, (General Use)
MIL-DTL-32439 - Cloth, Duck Textured Nylon
MIL-PRF-3122 - Leather, Cattlehide, for Footwear Uppers, Gusset, Chrome Tanned, Fatliquored
MIL-PRF-5038 - Tape, Textile and Webbing, Textile, Reinforcing, Nylon
MIL-W-17337 - Webbing, Textile, Woven Nylon

(Copies of these documents are available online at https://assist.dla.mil or from the Standardization Document Order Desk, 700 Robbins Avenue, Philadelphia, PA 19111-5094).

2.2.2 Other Government documents, drawings and publications. The following other Government documents drawings and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation or contract.

DRAWINGS

U.S. ARMY NATICK SOLDIER RESEARCH, DEVELOPMENT, AND ENGINEERING CENTER

2-1-1635 - Speed Lace Assembly

(Copies of drawings are available from the U.S. Army Natick Soldier Research Development and Engineering Center, ATTN: RDNS-SEW-EWC, 10 General Greene Avenue, Natick, MA 01760-5019).

FEDERAL TRADE COMMISSION

Rules and Regulations Under the Textile Fiber Products Identification Act

(Copies are available online at http://www.ftc.gov or from the Federal Trade Commission, 600 Pennsylvania Avenue, N.W., Washington, DC 20580-0001.)

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

2.3 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 are those cited in the solicitation or contract (see 6.2).

AMERICAN ASSOCIATION OF TEXTILE CHEMISTS AND COLORISTS (AATCC)

AATCC Evaluation Procedure 9, Visual Assessment of Color Difference of Textiles

(Copies are available on line at http://www.aatcc.org or from the American Association of Textile Chemists and Colorists, P.O. Box 12215, Research Triangle Park, NC 27709-2215.)

AMERICAN SOCIETY FOR QUALITY

ANSI/ASQ Z1.4 - Sampling Procedures and Tables for Inspection of Attributes

(Copies are available online at http://www.asq.org or from the American Society for Quality, 600 North Plankinton Avenue, Milwaukee, WI 53203).

ASTM INTERNATIONAL

ASTM D297 - Standard Test Methods for Rubber Products – Chemical Analysis
ASTM D412 - Standard Test Method for Vulcanized Rubber and Thermoplastic Elastomers – Tension
ASTM D471 - Standard Test method for Rubber Property-Effect of Liquids
ASTM D624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
ASTM D1052 - Standard Test Method for Measuring Rubber Deterioration-Cut Growth Using Ross Flexing Apparatus
ASTM D1630 - Standard Test Method for Rubber Property-Abrasion Resistance (Footwear Abrader)
ASTM D1777 - Standard Test Method for Thickness of Textile Materials
ASTM D2208 - Standard Test Method for Breaking Strength of Leather by the Grab Method

ASTM D2240 - Standard Test Method for Rubber Property-Durometer Hardness
ASTM D3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
ASTM D3574 - Standard Test Method for Flexible Cellular Materials-slab, Bonded, and Molded Urethane Foams
ASTM D3787 - Standard Test Method for Bursting Strength of Textiles Constant-Rate-of-Traverse (CRT) Ball Burst Test
ASTM D4786 - Standard Test Method for Stitch Tear Strength, Single Hole
ASTM D4966 - Standard Test method for Abrasion Resistance of Textile Fabrics (Martindale Abrasion Tester Method)

(Copies of documents are available on line at http://www.astm.org or from the ASTM INTERNATIONAL, 100 Barr Harbor Drive, P.O. Box C700 West Conshohocken, PA 19426-2959.)

SATRA GLOBAL TEST METHODS

SATRA MTM 2 - Tensile properties of insole materials
SATRA MTM 3 - Flexing index
SATRA MTM 31 - Abrasion resistance-Martindale method
SATRA MTM 64 - Compression set –constant stress method
SATRA MTM 80 - Traverse Tensile strength of sheet materials
SATRA MTM 83 - Measurement of the area shape retention and collapsing load of formed toe puff and stiffener materials
SATRA MTM 98 - Dimensional stability with changes in atmospheric humidity
SATRA MTM 101 - Surface peel strength of insole materials
SATRA MTM 223 - Floor markings by solings or top pieces

(Copies of this document are SATRA Technology Center, SATRA House, Rockingham Road, Kettering, Northants, NN 16 9 JH, United Kingdom.)

(Copies of documents required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting activity.)

2.4 Order of precedence. Unless otherwise noted herein or in the contract, 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 Inspections.

3.1.1 First article. When specified (see 6.2), a sample shall be subjected to first article inspection in accordance with 4.2.

3.1.2 Conformance inspection. When specified (see 6.2), a sample shall be subjected to conformance inspection in accordance with 4.3.

3.2 Standard sample. The finished leather shall match a swatch of cattlehide leather for shade and sueded flesh appearance. Unless otherwise indicated, shall be equal to or better than the standard sample with respect to all characteristics for which the standard is referenced when tested as specified in 4.4.2 and 4.4.4.

3.3 Recycled, recovered, or environmentally preferable materials**.** Recycled recovered or environmentally preferable materials should be used to the maximum extent possible provided that the material meets or exceeds the requirements of this document and promotes economically advantageous life cycle costs.

3.4 Materials.

3.4.1 Upper leather. The leather shall be flesh out drum dyed Desert Sand (Type I) or Coyote 498 (Type II) with color penetrating throughout the thickness of the hide. The chrome tannage shall not be visible. The leather for the vamps, outside counter pockets and inside eyelet stays shall conform to MIL-PRF-3122, Type I, Treatment A and B. The leather for the outside eyelet stays shall conform to MIL-PRF-3122, Type II, Treatment A. The following exceptions to MIL- PRF-3122 shall be applicable for the upper leathers:

a. The flesh surface shall be suede to produce a fine uniform nap.
b. The grain surface shall be lightly buffed to remove the surface of the grain only.
c. The finish requirements for the leather shall not apply.
d. The tear strength requirements for the inside and outside eyelet stays shall not apply.
e. The thickness shall be as specified for the cut parts in Table VIII.
f. As an option, the outside eyelet stays may conform to MIL-PRF-3122, Type I, Treatment A and Treatment B.

3.4.2 Insoles The insole shall meet the requirements specified in Table I when tested as specified in 4.4.2.

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TABLE I. Insole performance requirements

Characteristics	Physical Requirements
Thickness, inches (min.)	0.09
Fungal resistance, Level	10
Wet Tensile, kgf/cm^2 (min.)	70
Flexing Index, (5000 cycles) (min.)	3.7
Abrasion Resistance, Cellulose board mm^3 (max.) Non-Woven board revs dry/ wet (min.)	 50 25,600 /6400
Transverse Tensile-Dry, kgf/cm^2 (min.)	8
Dimensional Stability, percent (max.)	0.7
Peel Strength, kgf/cm^2 (min.)	0.5

3.4.2.1 Insole foam. Microcellular polyurethane foam, 0.125 (± 0.01) inch thick, shall be permanently attached to the top of the insole board. The top of the foam shall be permanently covered with a fabric top cover which meets the requirements of paragraph 3.4.4.1.2. The foam shall meet the requirements of Table II when tested as specified in 4.4.2.

TABLE II. Insole foam requirements.

Characteristics	Physical Requirements
Density, lb/cu.ft.	19-23
Tensile Strength, lbs/sq.in. (min.)	60
Compression set, percent (max.) At 50% compression, 70°C	 5
Resilience/Ball Rebound (min.)	8

3.4.3 Counters. Counters shall conform to the requirements of MIL-C-41814. The counter shall conform to fit the last used and shall fill the counter pocket area. The physical requirement for single hole tear strength shall not apply.

3.4.3.1 Counters (alternate). As an alternate, counters manufactured from leather board need not meet the chemical requirements of MIL-C-41814 but shall meet the fungicide requirements of MIL-PRF-3122. An extruded thermoplastic film sandwiched between fusion bonded non-woven fabric made from a blend of synthetic fibers and impregnated with a styrene co-polymer and coated on each side with a thermoplastic adhesive may be used. A Thermoplastic counter may be used and shall conform to the performance requirements of Table III when tested as specified in 4.4.2.

TABLE III. Thermoplastic performance requirements.

Characteristics	Physical Requirements
Initial Collapsing Load (N)	>130
Resilience, percent (min.)	25
Moisture Resistance, percent (min.)	80
Area Shape Retention, percent (min.) Initial 10th collapse	 85 60

3.4.4 Fabrics and other materials.

3.4.4.1 Upper fabric.

3.4.4.1.1 Cloth . The cloth for the quarters and gussets shall conform to MIL-DTL-32439, Type I, Class 1, Style A, except that the color shall be Desert Sand (Type I) or Coyote 498 (Type II) matching that of the standard sample (see 3.2), and the air permeability requirement shall not apply. The nylon duck cloth for the quarters and gussets may be treated with a non-fray finish to facilitate cutting and handling. The nylon duck cloth for the collar cover may be flame-combined to a 0.05 (± 0.008) -inch thick layer of polyester foam having a density of 1.70 (± 0.05) pounds per cubic foot. Testing shall be as specified in 4.4.2.

3.4.4.1.2 Fabric liner for cushioned insert and inside counter pocket. The cloth for the fabric top cover on the cushioned inserts and the inside counter pocket shall conform to the requirements in Table IV. Testing shall be as specified in 4.4.2.

TABLE IV. Fabric cloth performance requirements.

Characteristics	Physical Requirements
Martindale Abrasion (Fabric only) Dry (153,600 revs), cycles (min.)	 9,600
Bursting Strength, lbs. (min.) Fabric Only	 125

3.4.4.1.3 Back seam tape. The tape shall conform to A-A-52071, Type I, Class 3, 1/2-inch or 17/32-inch wide. As an alternate, the tape shall conform to MIL-PRF-5038, Type III, Class 1, 1/2-inch wide. Testing shall be as specified in 4.4.2.

3.4.4.1.4 Vamp lining. The cloth for the vamp lining shall be cotton twill conforming to Class 2 of A-A-55296. Testing shall be as specified in 4.4.2

3.4.5 Box toe. The material for the box toe shall be a laminate of 0.020 (± 0.002) inch virgin ionomer resin (surlyn) sandwiched between two (2) layers of non-woven polyester saturated with polystyrene. The total thickness shall be 0.056 (± 0.005) inches. The box toes shall be skived 3/8 (± 1/8) inch wide at the breast. A Thermoplastic box toe may be used and shall conform to the performance requirements of Table III.

3.4.6 Binding tape. The tape for binding the top edge of the gusset shall be nylon conforming to MIL-PRF-5038 Type III, Class 1 or 2, 3/4-inch. The color shall be Desert Sand (Type I) or Coyote 498 (Type II) matching that of the standard sample (see 3.2).

3.4.7 Backstay and ankle reinforcement tape. The backstay tape shall be cut from 1-inch wide nylon webbing and the ankle reinforcing tape shall be cut from 3-inch wide nylon webbing. The webbing shall conform to MIL-W-17337, Class 1 or 2. The color shall be Desert Sand (Type I) or Coyote 498 (Type II) matching the standard sample (see 3.2).

3.4.8 Collar foam. The foam rubber for the padded collar shall be 1/4-inch thick latex foam having a density of 6.7 (±2) pounds per cubic foot. One (1) side only shall be covered with a cotton scrim cloth.

3.4.9 Shanks. The steel or fiberglass shanks shall be bonded to the insole and shall conform to the shape of the last. The fiberglass shank (glass and resin area), when cured, shall be 5/8 (± 1/16) inch in width. The width of the steel shank shall be 5/8 (± 1/32) inch for boot sizes 2 through 6-1/2 (all widths), 7 through 8-1/2 N, and R widths. For all other sizes and widths, the steel shank width shall be 1 (± 1/32) inch. The shank shall be made with two (2) ribs for the 5/8-inch width and three (3) ribs for the 1-inch width.

3.4.10 Speed lace assembly. The number of speed lace loops for sizes 2 through 11 shall be five (5) and sizes 11.5 through 16 shall be six (6). The speed lace assembly shall be brass with a nylon coated Desert Sand (Type I) or Coyote 498 (Type II) finish matching the standard sample (see 3.2). The speed lace assembly shall be in accordance with drawing 2-1-1635 (see 2.2.2).

3.4.11 Eyelets. The two (2) bottom eyelets shall be brass, Size AA, with a nylon coated finish in Desert Sand (Type I) or Coyote 498 (Type II).

3.4.12 Drainage eyelets and washers

3.4.12.1 Drainage eyelets. The eyelets and boot construction shall allow water out, but shall not allow sand to get into the boot. Eyelets shall be permanently fixed to the boots for the life of the item, and shall have a subdued finish to blend with the color of the Desert Sand (Type I) or Coyote 498 (Type II) shade flesh-out leather. Placement of the two (2) eyelets shall be in the inner arch of the boot, with the top edge of the eyelets not more than 1-inch up from the midsole, at a location that shall allow the greatest possible drainage of water from the boot. Drainage eyelets shall be placed at the same location relative to the solid midsole on all boots (with variation according to boot size). (See Figure 2B).

3.4.12.2 Washers. The washers shall be brass. The washers shall have an outside diameter of 0.463 (± 0.005) inch, and an inside diameter of 0.220 (± 0.005) inch, and a thickness of 0.009 (± 0.003) inch.

3.5 Soling system requirements.

3.5.1 Midsole construction and design. The cushion midsole shall be directly attached to the upper and shall be achieved either through an injection molding or open pouring method. The

design shall be as shown in Figures 2a and 2b. The cushion midsole shall be pure polyether polyurethane, Desert Sand (Type I) or Coyote 498 (Type II) color and have an exterior texture pattern that is a good match to the Government standard sample (see 6.4). The dimensions of the cushion midsole shall be sufficient to meet all of the salient characteristics listed within this document or specification.

3.5.2 Midsole compound requirements. The requirements for the pure polyether polyurethane cushioned midsole are based on testing done on slabs (according to ASTM procedures) and are not actual soles. The requirements shall be as specified in Table V when tested in accordance with 4.4.2.

TABLE V. Midsole polyether polyurethane requirements.

Characteristics	**Minimum**	**Maximum**
Density (gm/cc)	0.40	0.60
Hardness (shore A)	50	75
Tensile strength, kgf./cm sq	25	N/A
Elongation, percent	250	N/A
Tear Strength Die T, kg/cm	3.7	N/A
Volume Swell, percent w/ASTM Oil #3 (at 24 hrs)	N/A	10
Compression Set, percent	N/A	20
Ross Flex (1-inch X 6-inch) at -5 °C, percent 150,000 cycles	N/A	900

3.5.3 Outersole. The outersole design shall be the Quabaug Vibram Sierra 1276. The outsole shall be a minimum of 18-iron, 9.5 millimeters (mm) in thickness of solid rubber at each of the lugs. The color of any identification plug shall be Desert Sand (Type I) or Coyote 498 (Type II) in color unless otherwise specified in the contract or solicitation.

3.5.3.1 Rubber outersole compound requirements. The requirements for the rubber outsole are based on testing done on slabs (according to ASTM procedures) and are not actual soles. The requirements shall be as specified in Table VI when tested in accordance with 4.4.2.

TABLE VI. Rubber outsole compound requirements.

Characteristics	**Physical Requirements**
NBS abrasion (min.)	150
Hardness (Shore A)	70-80
Stitch Tear, pounds (min.) Dry Fuel B	 180 50

TABLE VI. Rubber outsole compound requirements - Continued

Characteristics	Physical Requirements
Die C tear strength, pounds (min.)	300
Ross flex, Oil #3, percent (max.) 50,000 flexes	250
Volume swell, percent (max.) Fuel B (46 hrs)	30
Non-marking	Pass
Tensile, pounds (min.)	2,100
Elongation, percent (Min.)	400

3.5.4 Bond strength. The bond achieved between the boot upper, cushion midsole, and outsole shall be resistant to any delamination for the life of the item.

3.5.4.1 Entire sole to upper. The bond strength shall not be less than 130 pounds. Testing shall be as specified in 4.4.4.

3.5.4.1.1 Outersole to cushion midsole bond strength. The outersole to cushion midsole bond strength shall not be less than 100 pounds. Testing shall be as specified in 4.4.4.

NOTE: The components of the sole shall be layered in such a manner that the specified bond strengths will be achieved. If test results find values to be less than specified due to material failure, in regards to the bond between the layers, the test shall be classified as a failure.

3.6 Thread, nylon. The thread shall be nylon, conforming to Type I Tex size 68-70 (Government size E), Type II Tex size 70-76 (Government size E) or Type III Tex size 70-75 (Government size E), Class A or B, of A-A-59826. The color of the thread shall be Desert Sand (Type I) or Coyote 498 (Type II). Colorfastness requirements shall not apply. Testing shall be as specified in 4.4.2.

3.7 Removable cushion insert. The removable cushion insert shall be a low-density heel cup support made of a polyether polyurethane system, medium black in color, and molded to a fabric top cover meeting the requirements listed in Table VII. The fabric shall be black in color and conform to the requirements of the liner for cushioned insert in 3.4.4.1.2. The total thickness of the insert shall be 0.180 (± 0.025) inch forward of the instep, and 0.250 (± 0.030) inch elsewhere. Testing shall be as specified in 4.4.2.

TABLE VII. Removable cushion insert requirements.

Characteristics	Requirement
Density, lb./cu. ft.	16-19
Tensile strength, lb./sq. in. (Min.)	82
Compression set, percent at 25% at 50%	 5 5
Foam Hardness	50-65

3.8 Laces. The laces shall conform to Type III, Class 1 of A-A-55093. The color of the laces shall be Desert Sand (Type I) or Coyote 498 (Type II) matching that of the standard sample (see 3.2). The length of the laces shall be a minimum of 66-inches for all sizes. Testing shall be as specified in 4.4.2.

3.9 Design. The color of the boot shall be Desert Sand (Type I) or Coyote 498 (Type II) in color and have a padded collar covered with a nylon cloth. The boot shall contain a partial speedlace closure system consisting of two (2) eyelets with the remainder of the closures being speed loops. The boot shall contain a removable cushion insert. The outside leather areas shall be flesh-side out with two (2) drainage eyelets located in the inner arch area of each boot. The quarter shall be nylon duck, the backstay, and ankle reinforcements shall be nylon webbing.

3.9.1 Vamp design. The vamp design shall be such as to allow for the leather Vamp to extend up the gusset to approximately the second eyelet of the boot (see Figures 3a and 3b).

3.9.2 Boot height. The height of the finished boot, measured upward on the outside from tread area at the breast of heel to the top of the boot, shall be 10 (± 1/4) inch on size 10R and shall graduate up and down between sizes and widths as indicated by the patterns. Testing shall be as specified in 4.4.4.

3.9.3 Boot weight. The weight of a finished boot (size 10R) shall be less than or equal to 2-pounds per boot when tested as specified in 4.4.4.

3.10 Lasts and molds.

3.10.1 Direct attach soling construction lasts and molds. The boots shall be made on commercial last model “FMT U3813-1 Military” or equal based on Government approval. The numerical size of the boot shall correspond with the numerical size of the last used to produce the boot (i.e. a size 10R boot shall be produced on a size 10R last). The Direct Attach last has a common last bottom shared by N and R lasts and a common last bottom shared by W and XW lasts for each whole and half size. The Direct Attach (either Injection Molding or Open Pouring) process shall utilize a separate cushion midsole mold to produce N and R widths for each whole and half size. The Direct Attach process shall use a separate cushion midsole mold to produce W

and XW widths for each whole and half size. The total number of molds required to produce the full size tariff shall be fifty-eight (58) molds.

3.11 Construction.

3.11.1 Uppers.

3.11.1.1 Cutting leather uppers. The leather parts shall conform to the thickness requirements specified in Table VIII. All leather for boot components, with the exception of the inside eyelet stays, shall be cut so as to be used flesh side out. Vamps shall be examined as specified in 4.4.2. Outside eyelet stays shall not be split down parts.

TABLE VIII. Thickness of leather uppers (ounces).

	If not split down		**For split down parts**	
Characteristics	**Min**	**Max**	**Min**	**Max**
Vamp	5	6	-	-
Outside counterpocket	4	6	-	-
Outside eyelet stays	3	4	-	-
Inside eyelet stays	3	4	3-1/2	4

3.11.1.2 Cutting fabric upper parts. The quarters shall be cut in the bias direction on a 15 (± 1) degree bias from the warp direction. The collar cover shall be cut in the bias direction.

3.11.1.3 Marking, permanent identification. With the exception of Product Demonstration Models (PDMs), the Contractor shall permanently mark the correct American and Mondopoint sizes and widths, the contract number (Example: 04-D-1234), and the company or brand name on the inside of the boot in the shaft or gusset area. The marking may be in the form of a label and shall be done in accordance with acceptable commercial practices, and it shall not reduce footwear functionality. The boot shall contain a manufacturing tracking lot number and a born date. Embossing of a company or brand name on the exterior of the boot shall not be permitted. Unit packs will include NSN and UPC bar codes as specified in the contract. Each symbol must be Human and scanner readable. As an alternate, a sewn in label may be utilized.

3.11.2 Skiving. Skiving of upper leather parts is permitted.

3.11.3 Finishing leather parts. The leather shall be flesh out drum dyed Desert Sand (Type I) or Coyote 498 (Type II) matching that of the standard sample (see 3.2) with the color penetrating throughout the thickness of the hide so that the chrome tannage shall not be visible.

3.12 Assembly.

3.12.1 Insole. The insole shall be as specified in 3.4.2 of the appropriate thickness (see Table I).

3.12.2 Boot finishing. No top finish or treatment shall be applied.

3.12.3 Pairing, lacing, and instruction tag. The boots shall be paired. A lace shall be inserted through the top speed lace loop of the outside quarter of each boot, and the two (2) laces for each pair shall be tied firmly together. One (1) instruction tag (see 3.9) shall be attached to each pair of boots by inserting a lace through the hole in the instruction tag.

3.13 Instruction and hangtags.

3.13.1 Instruction tag. The instruction label/tag is to be attached to the finished boots, and the print size shall be 1/8 (± 1/32) inch. The instruction label/tag shall be printed using the data specified in Figure 1. Each item shall be individually bar-coded with a label/tag conforming to Type VIII, Class 17, of MIL-DTL-32075. The bar-coding element shall be a 13 digit national stock number (NSN). The bar-code type shall be a medium to high code density. It shall be located so that it is completely visible on the item when it is folded and/or packaged as specified in the contract and in a manner that causes no damage to the item. As an option, a hang tag identifying the features of the boot is permitted.

3.14 Workmanship. The finished boots shall conform to the quality of product established by this document. The occurrence of defects shall not exceed the contractor's own quality assurance standards and the quality assurance standards defined by the technical data in the bid package.

4. VERIFICATION

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

a. First article inspection (see paragraph 4.2).
b. Conformance inspection (see paragraph 4. 3).

4.2 First article inspection. First article inspection when required (see 3.1.1) shall be examined for the defects specified in 4.4.3 and tested for the characteristics in 4.4.4.

4.3 Conformance inspection. Conformance inspection (see 3.1.2) shall include the examinations of 4.4.1 through 4.4.1.3 and 4.4.3 and the testing in 4.4.2 and 4.4.4. Unless otherwise specified sampling for inspection shall be performed in accordance with ANSI/ASQ Z1.4.

4.4 Component and material inspection.

4.4.1 In-process inspection. Inspection shall be made at any point or during any phase of manufacturing to determine whether the components are as specified or operations and/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.

4.4.1.1 In-process examination. Examination shall be made for the component defects listed in 4.4.1.1 through 4.4.1.3 and classified as specified. The lot size shall be expressed in units of upper assemblies prepared for lasting. The sample unit shall be one (1) completely fabricated upper assembly prepared for lasting.

4.4.1.2 Examination uppers after all fitting. The upper assemblies shall be examined for the defects listed in Table IX. The lot size shall be expressed in units of upper assemblies prepared for lasting. The sample unit shall be one (1) completely fabricated upper assembly prepared for lasting.

TABLE IX. Examination of upper after all fitting.

Examine	Defect	Classification	
		Major	Minor
Construction and workmanship (general) affixed	Any component missing or not specified type	101	
	Any component misplaced or not as specified 1/	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 more than 5/32-inch		202
	Vamp throat or wings not skived	104	
Quality of Leather	Thickness more than 1/2 ounce less than minimum specified	105	
	Thickness less than specified minimum, but not exceeding 1/2 ounce less		203
	Thickness more than maximum specified		204
	Off-stretch cut 1/	106	205
	Slaughter cut 1/	107	206

1/ This defect shall be scored as major when seriously affecting serviceability, and as a minor when not seriously affecting serviceability, as determined by the Government

4.4.1.3 Examination of boot before last pulling. The partially fabricated boots shall be examined for the defects listed in Table X. The lot size shall be expressed in units of partially fabricated boots. The sample unit shall be one (1) partially constructed boot assembled to the point just prior to pulling off the last.

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TABLE X. Examination of boot before last pulling.

Examine	Defect	Classification	
		Major	**Minor**
Bottom of boot	Any component missing, sized wrong, malformed or not specified type	108	
	Upper damaged 1/	109	207
	Poor heel seat, side, or toe lasting 1/	110	208
	Insole tack not removed	111	
Upper part of boot	Uppers not firmly pulled down to last 1/	112	209

1/ This defect shall be scored as major when seriously affecting serviceability, and as a minor when not seriously affecting serviceability as determined by the Government.

4.4.2 Component testing. The components shall be tested for the characteristics listed in Table XI. The methods of testing specified where applicable shall be used. The sampling plan shall be as follows: (Unless otherwise noted in the contract or solicitation).

Lot size (yards or units)	Sample size
Under 800	2
801 – 22,000	5
22,001 and above	8

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TABLE XI. Component tests.

Component	Characteristic	Requirement Paragraph	Test Method
Upper leather	Physical Characteristics	3.4.1	MIL-PRF-3122
	Shade Evaluation	3.4.1	1/
Insole	Thickness	3.4.2	ASTM D1777 2/
	Fungal resistance	3.4.2	ASTM D3273
	Wet Tensile	3.4.2	SATRA MTM-2
	Flexing Index	3.4.2	SATRA MTM-3
	Abrasion resistance Non-Woven board	3.4.2	SATRA MTM-31
	Transverse Tensile-Dry	3.4.2	SATRA MTM-80
	Dimensional Stability	3.4.2	SATRA MTM-98
	Peel Strength	3.4.2	SATRA MTM-101
Insole Foam	Thickness	3.4.2.1	ASTM D1777 2/
	Density	3.4.2.1	ASTM D3574A
	Tensile	3.4.2.1	ASTM D3574E
	Compression set At 50%	3.4.2.1	ASTM D3574D
	Resilience/Ball Rebound	3.4.2.1	ASTM D3574H
Box Toe & Heel Counters (alternate -Thermoplastic)	Initial Collapsing Load (N)	3.4.3 & 3.4.5	SATRA MTM-83
	Resilience (%)	3.4.3 & 3.4.5	SATRA MTM-83 3/
	Moisture Resistance (%)	3.4.3 & 3.4.5	SATRA MTM-83 4/
	Area Shape Retention (%)	3.4.3 & 3.4.5	SATRA MTM-83
Fabrics: Nylon duck fabric	Shade Evaluation	3.4.4.1.1	1/
Laminated cloth	Martindale Abrasion Fabric Only	3.4.4.1.2	ASTM D4966 5/
	Dry Bursting Strength Fabric Only	3.4.4.1.2	ASTM D3787

TABLE XI. Component tests - Continued

Component	Characteristic	Requirement Paragraph	Test Method
Binding Tape	Width	3.4.6	Visual 6/
	Shade Evaluation	3.4.6	1/
Backstay and ankle reinforcement tape	Width	3.4.7	Visual 6/
	Shade Evaluation	3.4.7	1/
Collar Foam	Thickness	3.4.8	ASTM D1777 2/
	Density	3.4.8	ASTM D3574A
Shanks	Width	3.4.9	Visual 6/
	Number of ribs per size	3.4.9	Visual 6/
Speed Lace Assembly	Shade Evaluation	3.4.10	1/
Eyelets	Shade Evaluation	3.4.11	1/
Drainage Eyelets	Shade Evaluation	3.4.12.1	1/
Washers	Width	3.4.12.2	Visual 6/
	Thickness	3.4.12.2	Visual 6/
Polyether Polyurethane Cushion Midsole	Shade Evaluation	3.5.1	1/
	Density (gm/cc)	3.5.1	ASTM D297
	Hardness (shore A)	3.5.1	ASTM D2240 7/
	Tensile strength (kgf/cm sq)	3.5.1	ASTM D3574E 8/
Elongation (%)	Tear strength Die T (kg/cm)	3.5.1	ASTM D3574F 8/
	Volume swell (%) w/ ASTM Oil #3 (at 24 hrs)	3.5.1	ASTM D471 2/, 8/
	Compression Set %	3.5.1	SATRA MTM-64 9/
	Ross flex (1-inch x 6-inch) at 5°C	3.5.1	ASTM D1052 10/, 11/
Outersole	Thickness	3.5.3	2/
	Shade Evaluation	3.5.3	1/
Rubber Compound	NBS abrasion	3.5.3.1	ASTM D1630
	Hardness (shore A)	3.5.3.1	ASTM D2240
	Stitch Tear (dry)	3.5.3.1	ASTM D4786
	Stitch Tear (Fuel B)	3.5.3.1	ASTM D4786 12/
	Die C tear strength	3.5.3.1	ASTM D624
	Ross flex, Oil #3	3.5.3.1	ASTM D1052

TABLE XI. Component tests – Continued

Component	Characteristic	Requirement Paragraph	Test Method
Rubber Compound - Continued	Volume swell, Fuel B @ 46 hrs	3.5.3.1	ASTM D471
	Non-marking	3.5.3.1	SATRA MTM 223
	Tensile	3.5.3.1	ASTM D412
	Elongation	3.5.3.1	ASTM D412
Thread, nylon	Shade Evaluation	3.6	1/
Removable cushion Inserts	Density	3.7	ASTM D3574A
	Foam hardness	3.7	ASTM D2240
	Tensile strength	3.7	ASTM D3574E
	Compression set @ 25%	3.7	ASTM D3574D
	Compression set @ 50%	3.7	ASTM D3574D
Laces	Shade Evaluation	3.8	1/
	Length	3.8	Visual 6/

1/ The color of the component shall be Desert Sand (Type I) or Coyote 498 (Type II) matching that of the standard sample (see 3.2) when tested in accordance with AATCC Evaluation Procedure 9 Option A as described in Section 4.6 of this specification.
2/ A thickness gauge of the dead-weight type equipped with a dial graduated to read directly to 0.001-inches shall be used. The presser foot shall be circular, with a diameter of 1.129 (± 0.001) inches and with moving parts weighted to apply a total load of 0.60 (±0.03) pounds per square inch (psi) to the specimen. The anvil shall be not less than 1.129-inches in diameter. The presser foot and anvil surface shall be paned to within 0.001-inches and shall be parallel to each other to within 0.001-inches.
3/ Resilience is percentage retention of initial collapsing load after ten collapses.
4/ Moisture resistance is percentage retention of initial dry collapsing load after 1-hour immersion.
5/ Martindale Tester; Pressure applied: 12 kPa; visually examine specimens after each 3200 cycles; abradant changed after each 3200 cycles.
6/ Measured with a calibrated ruler/caliper
7/ Thickness of test slab shall be as stated in the respective ASTM method.
8/ Thickness of test sample used shall equal 12.7mm (0.5 in) from test slabs or 6.0mm from actual cushioned midsoles. Actual cushioned midsoles shall be used for verification testing only.
9/ Thickness of test sample used shall equal 12.7mm (0.5 in) from test slabs or 19.0mm from actual cushioned midsoles. Actual cushioned midsoles shall be used for verification testing only. However, all test reports used for conformance purposes and submitted to the Government shall use test slabs.
10/ Method modified to include 2mm insole board glued onto the specimens and conducted at -5 ºC.

11/ Thickness of test sample used shall equal 6.4mm (0.25 in) from test slabs or 6.0mm from actual cushioned midsoles. Actual cushioned midsoles shall be used for verification testing only. However, all test reports used for conformance purposes and submitted to the Government shall use test slabs.
12/ Test conducted after 46 hours in Fuel B at Room Temperature. However, all test reports used for conformance purposes and submitted to the Government shall use test slabs.

4.4.3 End item visual examination. The end items shall be examined for the defects listed in Table XII below. The lot size shall be expressed in units of boots. The inspector shall check to see that removable cushion inserts are inserted in the boots. For the pairing examination, and when determining possible differences in outersole thickness, the pair shall be examined together. During the inspection for the defects listed within the "End item visual examination." Defect Table, the minor defects or departures from specification requirements listed in the table shall be observed and recorded. resence of these departures shall not result in the rejection of the lot, but the plant quality assurance and the Government personnel reserve the right to establish and impose lot rejection criteria when either the frequency or severity of the presence of these departures warrant. These additional rejection criteria may be invoked at any time during the life of the contract when the Government judges this action to be in their best interest. Defects of pairing shall be classified as a single defect. Note: Appearance defects shall be scored only when the condition is plainly visible at a distance of 3 feet or more and it appreciably affects item appearance.

TABLE XII. End item visual examination

Examination	**Defect**	**Classification**	
		Major	**Minor**
Pairing	Not properly mated; i.e, not right and left of same size	113	
	Variation in color, or appearance 1/	114	210
	Variation of more than 1/4–inch in height of pair	115	
	Difference in outersole thickness between left/right boot 1/	116	211
	- More than 3/32-inch	117	
	- More than 1/16-inch but less than 3/32-inch		212
Nylon quarter and Gusset	Mend or week spot	118	
	Two (2) or more yarns missing	119	
	Quarter not cut on the bias	120	
	Abrasion, spot, stain or discoloration 1/	121	213
Construction & Workmanship (general)	Cut, tear, hole, repair, or factory damage 1/	122	214
	Wrinkled or bunched area at the back seam 1/	123	215
	Component or assembly omitted or misplaced, operation omitted or not properly performed (unless otherwise classified herein) 1/	124	216
Webbing	Not firmly and tightly woven, edges frayed or scalloped	125	

TABLE XII. End item visual examination - Continued

Examination	Defect	Classification Major	Classification Minor
Seams & stitching (upper)	Open seam not repaired 2/	126	
	Quarter panel and gusset fabric not caught in second row of inside eyelet stay stitching		217
	One (1) or more run-off stitches	127	
	Loose tension resulting in a loosely secured seam 1/	128	218
	Tight tension resulting in puckering or cutting of Leather 1/	129	219
	Wrong stitch type	130	
	Row of stitching with less than eight (8) stitches per inch, but not less than six (6) stitches per inch 3/		220
	Any row of stitching with less than six (6) stitches per inch 3/	131	
	More than the specified maximum number of stitches 1/, 3/	132	221
	Gage of stitching not as specified or irregular 1/	133	222
	Stitching omitted where required 1/	134	223
	Thread ends not trimmed throughout boot 4/		224
	Needle holes or needle chew 1/	135	225
	Sand hole (i.e., tongue not properly caught in at throat)		226
Vamp or counter Pocket stitching at outersole junction	One (1) or more rows of defective stitching not repaired	136	
	Repaired, but first stitch more than 1/4-inch from outersole junction	137	
	Repaired with one (1) stitch in lieu of two (2) or more stitches		227
Outersole & Soling System	Thickness not as specified	138	
	Flash edges not removed by scouring affecting appearance		228
	Edge scouring irregular affecting appearance		229
	Other defects in tread or edge area 1/	139	230
	Incomplete or incorrect bonding of outersole to cushion midsole (i.e., not securely attached) 1/	140	231
Counters	Rolled or curled counter 1/	141	232
	Soft counter		233

TABLE XII. End item visual examination – Continued

Examination	Defect	Classification Major	Classification Minor
Speed laces	Number of speed lace loops not as specified, but each row has the same number		234
	Not the same number of loops in each row	142	
	Loops not properly spaced within the row or misaligned between the rows to an extent interfering with proper lacing 1/	143	235
	Loops not perpendicular to edge of quarters or parallel to each other		236
	Loops not securely riveted	144	
	Distance from center of rivet to edge of quarter less than 7/32-inch or more than 9/32-inch 1/	145	237
Gusset	Binding omitted	146	
Marking, instruction tag and bar code	Missing, incomplete, incorrect, not applied in the specified manner, misplaced, illegible, or not specified size or not readable by scanner not visible		238
	Causes damage to end item	147	
Insole	Short or long 1/	148	239
	Any protruding lasting staple or prong	149	
	Any protruding shank prong on insole	150	
	Any protruding point of lasting staple or point of tack forward of heel breast line found in the sample, shall cause rejection of the lot represented	151	
Removable Cushion Inserts	Missing, wrong size		240
Heel finishing	Heel not finished square and smooth, affecting appearance		241
Eyelets, quarter	Number of eyelets, not as specified; but each row has the same number		242
	Not the same number of eyelets in each row	1542	
	Eyelets not properly spaced within the row or misalignment between the rows to an extent interfering with proper lacing 1/	153	243
	Edge of any eyelet more than 5/16-inch from the edge of the quarter		244
	Eyelet not securely clinched		245
Drainage Eyelets and Washers	Components omitted	154	
	Not securely clinched, or not inserted as specified 1/	155	246

1/ This defect shall be scored as major when seriously affecting serviceability as determined by the Government or appearance, and as minor when not seriously affecting serviceability.

2/ A seam shall be classified as open when one (1) or more stitches joining a seam are broken or when two (2) or more consecutive skipped or run-off stitches occur. On multiple stitched seams, a seam is considered open when either one (1) or both sides of the seam are open. When the above conditions occur on the inside of the boot, it shall be scored as a footnote (1/) defect
3/ A plus tolerance of three (3) stitches per inch will be allowed when stitching over heavy places or turning sharp corners.
4/ Upon occasion when some insignificant thread ends are noted during inspection (audit) they will not be cause for lot/shipment rejection. In-plant corrective action shall be made on current and future production.

4.4.4 End item testing. The finished boot shall be tested for the characteristics listed in Table XIII. The sample unit for all tests shall be one (1) boot. All test results shall contain the individual values utilized in expressing the final result. For all tests, the sample size shall be five (5) boots regardless of lot size and the lot shall be unacceptable if one (1) or more sample units fail to meet any requirement specified.

TABLE XIII. End item tests.

Characteristic	Requirement Paragraph	Test Method
Bond strength	3.5.4	
Entire sole to upper	3.5.4.1	4.5.2
Outersole to cushion midsole	3.5.4.1.1	4.5.1
Height	3.9.2	Visual 1/
Weight	3.9.3	2/

1/ Measured with a calibrated ruler/caliper
2/ Weighed on a calibrated scale

4.5 Methods of test.

4.5.1 Bond strength test of outersole to cushion midsole.

4.5.1.1 Specimen. The specimen shall be a completed boot which has aged at least two (2) days. The outersole shall be separated from the cushion-midsole, for a distance of approximately 2-1/2-inches each from the toe end of the specimen.

4.5.1.2 Apparatus. A power-driven adhesion machine, 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. The machine shall be operated with a device for maintaining maximum load indication.

4.5.1.3 Procedure. The separate toe ends of the specimen shall be clamped in the jaws of the machine. The specimen shall extend outward at right angles to the direction of the application load. The machine shall be started, and the surface being tested shall be pulled apart to a distance of not more than 4-1/2-inches from the toe. Upon attaining that degree of separation, the

load indicated on the machine shall be read and recorded. If the required load is achieved (at any time during the pull test) the test is deemed as passing.

4.5.2 Bond strength test of entire soling system to boot upper,

4.5.2.1 Specimen. The test specimen shall be legibly marked on each side at two (2) points (2-inches and 4-inches) from the tip of the toe. The entire soling system shall then be separated from the upper to the 2-inch mark. The separation may be aided by any suitable device or machine capable of withstanding the amount of force necessary to accomplish separation. After separation to the 2-inch mark is achieved, the toe cap of the boot shall be crushed to facilitate mounting of the specimen in the tester. In event that the point of separation at the 2-inch mark is not between the upper and the soling system, that portion of the soling system remaining adhered to the upper shall be separated manually (with the aid of a knife or other instrument), so as to show separation between leather and soling system. Care should be taken in order to be sure that the leather is not cut.

4.5.2.2 Apparatus and procedure. The apparatus for measuring soling system/upper separation shall be as described in test method ASTM D2208. The separated and crushed toe portion of the boot shall be gripped by one (1) clamp in a manner such that the minimum effective jaw surface area applied shall be 1-inch by 1-inch. The jaw surface shall be centered approximately 1/2-inch to 1-inch from the tip of the toe. The other jaw surface shall hold the entire sole system, i.e., midsole and outer sole, and it shall not be less than 1-inch by 2-inches, with the long dimensions perpendicular to the pull of the machine. The machine shall be set in operation and the separation continued at a speed of 10-inches per minute until the outsole is separated from the upper to a point past the mark 4-inches from the tip. The maximum value attained during separation shall be taken as the bond strength.

4.6 Visual shade matching (All components). The color and appearance of the components shall match the standard shade and appearance in 3.2 when viewed using AATCC Evaluation Procedure 9, Option A, with sources simulating artificial daylight D75 illuminant with a color temperature of 7500 (± 200)K, illumination of 100 (± 20) foot candles and shall be a good match to the standard sample under incandescent lamplight at 2856 (± 200)K.

5. PACKAGING.

5.1 Packaging. For acquisition purposes, the packaging requirements shall be as specified in the contract or order (see 6.2). When actual packaging of material is to be performed by DoD or in-house contractor personnel, these personnel need to contact the responsible packaging activity to ascertain requisite packaging requirements. Packaging requirements are maintained by the Inventory Control Point's packaging activities within the Military Department or Defense Agency, or within the military service's system commands. Packaging data retrieval is available from the managing Military Department's or Defense Agency's automated packaging files, CD-ROM products, or by contacting the responsible packaging activity.

6. NOTES

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

6.1 Intended use. The boots are intended for wear by military personnel of the Department of Defense in Hot Weather Wet Environments, Hot Weather Dry Environments, Garrison Environment and during combat. As the combat environment is more severe than that seen during commercial wear and use, it is expected that the items procured by the US Government will be superior to those found commercially. Any item not meeting the performance(s) specified herein, or which does not meet commercial standards for retail production and purchasing will not be accepted by the US Government for use by its Military personnel.

6.2 Acquisition requirements. Acquisition documents must specify the following:

a. Title, number and date of this specification
b. Types, sizes and widths required (see 1.2)
c. The specific issue of individual document referenced (see 2.2)
d. When first article is required, (see 3.1.1, 4.2 and 6.3)
e. Conformance inspection acceptance quality limits (AQL) (see 3.1.2 and 4.3)
f. Inclusion of specific instructions regarding arrangement for examinations, quantity, testing and approval (see 4.3)
g. Packaging requirements (see 5.1)

6.3 First article. When a first article is required, it will be inspected and approved under the appropriate provisions of Federal Acquisition Regulation (FAR) 52.209-4. The first article should be a pre-production sample. The contracting officer should specify the appropriate type of first article and the number of units to be furnished. The contracting officer should also include specific instructions in acquisition documents regarding arrangements for selection, inspection, and approval of the first article (see 3.1.1 and 4.2).

6.4 Standard sample. For access to samples and pattern drawings, address the contracting activity issuing the invitation for bids or request for proposal.

6.5. Subject term (key word) listing.

Desert
Footwear Inserts
Rubber outsole
Leather

FIGURE 1. Use and care instruction tag.

Use and Care Instructions
Army Combat Boot (Hot Weather)

1. Wear with: 1 pair of cushioned sole socks depending on safety/uniform requirements; 1 pair of insole inserts if desired.

2. Sizes. These boots are supplied in whole and half sizes 2 through 15 and 16 whole size, widths N (B), R (D), W (EE), and XW (EEEE). In some instances, it may be necessary to select a slightly larger size than normally worn in order to allow for normal swelling of the feet and the use of inserts or cushioned socks.

3. Pull on boot seating heel firmly into place, then lace. Boots should fit snugly but not tightly. There should be at least a 3/4-inch minimum additional length at toe.

4. Trousers should be bloused over the outside and below the comfort collar of the boot.

5. Break-in: DO NOT soak boots in water or bake in an oven to break-in. Boots should be worn-in gradually at first with ever-increasing walking or marching distances while remaining comfortable. If blistering occurs, check to make sure that boots are fitted properly and that you are wearing recommended socks.

6. Your Combat Boots are designed for maximum performance in a field environment. Do not apply polish to your Combat Boots.

7. Your Combat Boots are designed to be easy to care for. The nylon quarter side panels of your boots are as strong as leather and will last if cared for properly. To clean your Combat Boots, brush with stiff nylon bristle brush to clean and then use warm water. Do not use soap to clean your boots. If additional, more stringent cleaning is necessary, only water-soluble cleaning products should be used as oil- or alcohol-based cleaning products may damage your boots.

8. Your Combat Boots come with a replaceable rubber outsole. Do not wear sole past rubber outsole into the softer midsole material or permanent damage to your boots will occur. The midsole is the soft cushioned material between the rubber lug outsole and the boot upper.

9. (Must include information on how/where the boots can get resoled or who to contact to receive information on resoling.)

10. This item is not authorized for flight or combat vehicle use.

FIGURE 2A. Army combat boot, hot weather (lateral view)

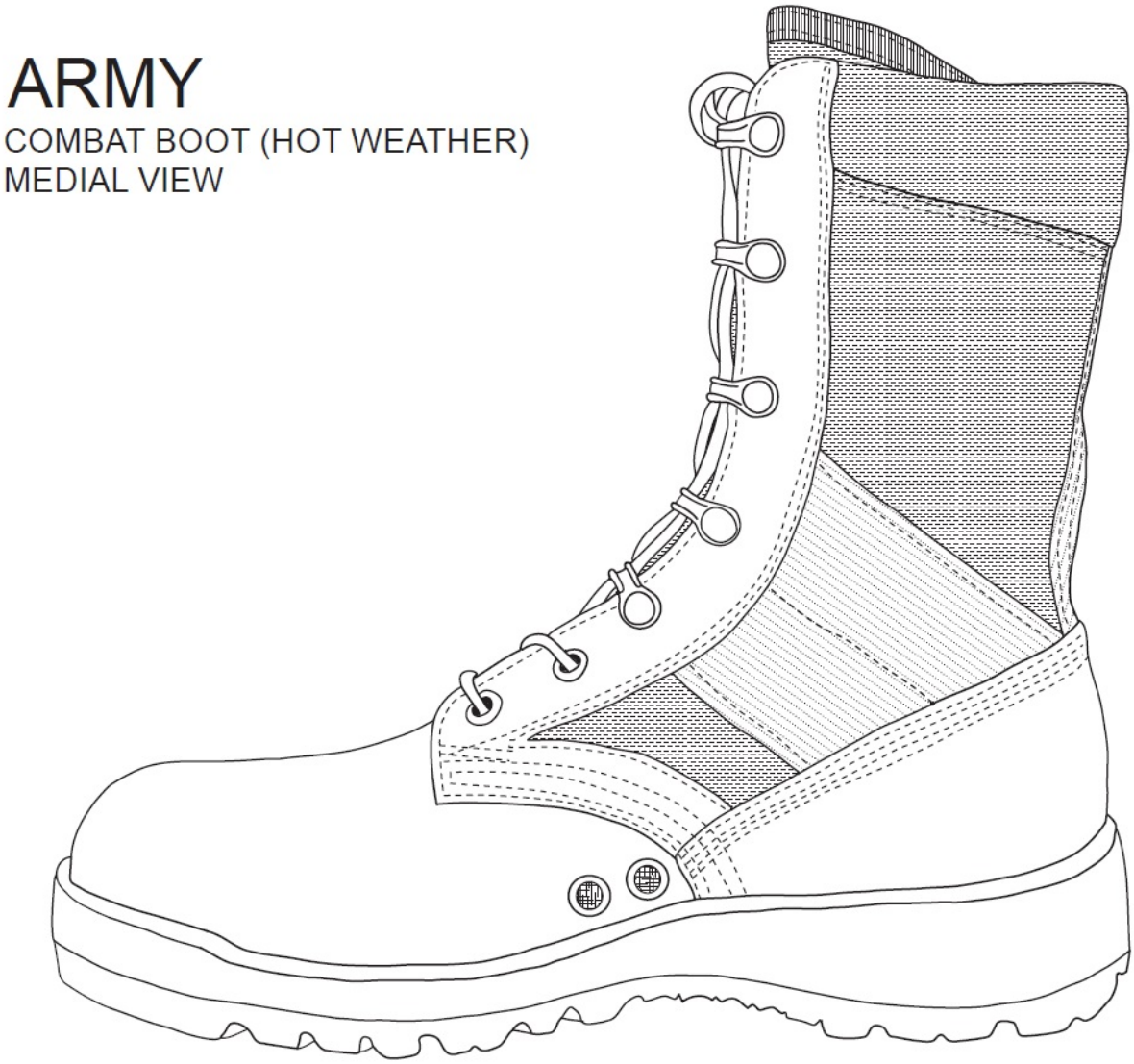

FIGURE 2B. Army combat boot, hot weather (medial view).

FIGURE 3A. Close up view of vamp/gusset seam (front view).

FIGURE 3B. Close up view of vamp/gusset seam (lateral view).

Custodians:

Army – GL

Preparing Activity

DLA - CT

Project Number: 8430-2016-002

NOTE: The activities listed above were interested in this document as of the date of this document. Since organizations and responsibilities can change, you should verify the currency of the information above using ASSIST Online database at https://assist.dla.mil.