

INCH-POUND
GL-PD-08-75
Dated 24 July 2007

BOOT, COMBAT, HOT WEATHER ARMY
DIRECT ATTACH SOLING SYSTEMS:
RUBBER AND POLYETHER POLYURETHANE OUTSOLES

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 a Desert Sand-colored Hot Weather Combat Boot for use in both hot weather wet and dry environments.

1.2 Classification. This specification covers the following sizes and widths see 6.2.

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

Comments, suggestions, or questions on this document should be addressed to: Michael Holthe, US Army Natick Soldier Research Development and Engineering Center, AMSRD-NSC-WP-WC, 15 Kansas St, Natick, MA 01760.

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3, 4, or 5 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, 4, or 5 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.

FEDERAL SPECIFICATIONS

V-T-295 - Thread, Nylon

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)

DEPARTMENT OF DEFENSE SPECIFICATIONS

MIL-C-41814 - Counter, Footwear
 MIL-DTL-43734 - Cloth, Duck, Textured Nylon
 MIL-DTL-32075 - Label: For Clothing, Equipage, and Tentage, (General Use)
 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 <http://assist.daps.dla.mil/quicksearch/> or <http://assist.daps.dla.mil/> or from the Standardization Document Order Desk, 700 Robbins Avenue, Building 4D, 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 shall be those cited in the solicitation or contract.

DRAWINGS

U.S. ARMY RESEARCH, DEVELOPMENT, AND ENGINEERING COMMAND

2-1-1635 - Speed Lace Assembly

(Copies of drawings are available through <http://warfighter.dla.mil> under tab “Vendor Info” then “Specifications/Pattern Request”.)

FEDERAL ACQUISITION REGULATIONS (FAR)

52.209-4 – First Article Approval – Government Testing

(Copies are available online at <http://acquisition.gov/far/index.html> or by contacting the Superintendent of Documents at 202-512-1800.)

FEDERAL TRADE COMMISSION

Rules and Regulations Under the Textile Fiber Products Identification Act

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

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 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 D 412 - Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers -Tension
- ASTM D 471 - Standard Test Method for Rubber Property-Effect of Liquids
- ASTM D 624 - Standard Test Method for Tear Strength of Conventional Vulcanized Rubber and Thermoplastic Elastomers
- ASTM D 792 - Standard Test Methods for Density and Specific Gravity (Relative Density) of Plastics by Displacement
- ASTM D 816 - Standard Test Methods for Rubber Cements
- ASTM D 1052 - Standard Test Method for Measuring Rubber Deterioration-Cut Growth Using Ross Flexing Apparatus
- ASTM D 1055 - Standard Specifications for Flexible Cellular Materials-Latex Foam
- ASTM D 1630 - Standard Test Method for Rubber Property-Abrasion Resistance (Footwear Abrader)
- ASTM D 1777 - Standard Test Method for Thickness of Textile Materials
- ASTM D 2208 - Standard Test Method for Breaking Strength of Leather by the Grab Method
- ASTM D 2240 - Standard Test Method for Rubber Property-Durometer Hardness
- ASTM D 3273 - Standard Test Method for Resistance to Growth of Mold on the Surface of Interior Coatings in an Environmental Chamber
- ASTM D 3574 - Standard Test Methods for Flexible Cellular Materials- Slab, Bonded, and Molded Urethane Foams
- ASTM D 3575 - Standard Test Methods for Flexible Cellular Material Made from Olefin Polymers.
- ASTM D 3767 - Standard Practice for Rubber – Measurement and Dimensions
- ASTM D 3787 - Test Method for Bursting Strength of Textiles Constant-Rate-of- Traverse (CRT) Ball Burst Test
- ASTM D 3886 - Standard Test Method for Abrasion Resistance of Textile Fabrics (Inflated Diaphragm Method)
- ASTM D 4786 - Standard Test Method for Stitch Tear Strength, Single Hole
- ASTM D 4966 - Standard Test Method for Abrasion Resistance of Textile Fabrics (Martindale Abrasion Tester Method)

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

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION

ISO 4915- Textiles – Stitch Types – Classification and Terminology

(Copies of this document are available online at <http://www.iso.org> or from International Organization for Standardization (ISO) 1, rue de Varembre, Case Postale 58, CH 1211 Geneva 20, Switzerland.)

SATRA GLOBAL TEST METHODS

FOOTWEAR TEST METHODS

- SATRA MTM 2 - Tensile properties of insole materials
- SATRA MTM 3 - Flexing index
- SATRA MTM 14 - Resistance to scuffing by mild circular abrasion
- SATRA MTM 31 - Abrasion resistance - Martindale method - to be used with STM 105/STM604 Inc.
Amendment no. 1 - to be used with new test equipment STM 650
- SATRA MTM 33 - Strength perpendicular to needle perforations
- SATRA MTM 64 - Compression set - constant stress method
- SATRA MTM 80 - Transverse tensile strength of sheet materials
- SATRA MTM 83 - Measurement of the area shape retention and collapsing load of formed toes 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 marking by solings or top pieces
- SATRA MTM 404 - Rapid Sole Adhesion Test for Complete Footwear

(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. 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 Color. The color of the boot and all associated components visible on the exterior of the boot shall be Desert Sand.

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

3.2.1 Visual shade matching (All components). The color and appearance of the components shall match the standard shade and appearance in 3.3 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.

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 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 eyelet stays shall conform to MIL-PRF-3122, Type I, Treatment A and B. The leather for the front edge eyelet stays shall conform to MIL-PRF-3122, Type II, Treatment A. The inside counter pocket shall not be leather. 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 front edge stays and eyelet stays shall not apply.
- e. The thickness shall be as specified for the cut parts in Table VIII.
- f. As an option, the 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.

TABLE I. Insole Performance Requirements

Characteristics	Physical Requirements
Thickness (all constructions)	0.090 in (min.)
Fungal resistance	Level 10
Wet Tensile	70 kgf/cm ² min.
Flexing Index	3.7 (5000 cycles) min.
Abrasion Resistance	
Cellulose board	50 mm ³ max.
Non-Woven board	25,600 revs dry/6400 wet (min.)
Transverse Tensile-Dry	8 kgf/cm ² min.
Dimensional Stability	0.7% max.
Peel Strength	5 kgf/cm ² min.

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 copalmer 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 II.

Table II. Thermoplastic Performance Requirements

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

1/ Resilience is percentage retention of initial collapsing load after ten collapses.

2/ Moisture resistance is percentage retention of initial dry collapsing load after 1 hour immersion.

3.4.4 Fabrics and Other Materials.

3.4.4.1 Upper fabric.

3.4.4.1.1 Nylon duck. The cloth for the quarters and gussets shall be nylon duck conforming to class 1 of MIL-C-43734, except that the color shall be Desert Sand matching that of the standard sample (see 3.3), 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.

3.4.4.1.2 Fabric liner for cushioned insert and inside counter pocket. The cloth for both the fabric top cover on the cushioned inserts and the inside counter pocket shall conform to the requirements in Table III.

TABLE III. Cloth Performance Requirements

Characteristics	Requirement
Martindale Abrasion	
Fabric Only, Dry	153,600 revs/9,600 cycles (min)
Bursting Strength	
Fabric Only	125 (min)

3.4.4.1.3 Back seam tape. The tape shall conform to A-A-52071, type I, class 3, 1/2 or 17/32 inch wide. As an alternate, the tape shall conform to MIL-PRF-5038, type III, class 1, 1/2 inch wide. The color shall be Desert Sand matching that of the standard sample.

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.

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 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. Testing shall be as specified in 4.4.2. A Thermoplastic box toe may be used and shall conform to the performance requirements of Table II.

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 matching that of the standard sample.

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 matching that of the standard sample.

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 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 $5/8 \pm 1/16$ inch in width. The steel shank shall be constructed from 19 gauge, cold rolled carbon steel with a hardness ranging from 47 to 54 Rockwell C scale. The width of the steel shank shall be $5/8 \pm 1/32$ 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 $1 \pm 1/32$ inch. The shank shall be made with two ribs for the 5/8 inch width and three 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 and sizes 11.5 through 16 shall be six. The color of the speed lace assembly shall be Desert Sand matching that of the standard sample. The speed lace assembly shall be in accordance with drawing 2-1-1635.

3.4.11 Eyelets. The two bottom eyelets shall be brass, Size AA, with a coated Desert Sand finish.

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 shade flesh-out leather. Placement of the eyelets shall be in the inner arch of the boot, at a location that shall allow the greatest possible drainage of water from the boot. Internal components of the boot shall not interfere with the proper drainage from the eyelets. Drainage eyelets shall be placed at the same location relative to the solid midsole on all boots (with variation according to boot size).

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.

3.4.13 Shock Attenuation and Kinematic Parameters. Shock Attenuation and Kinematic Parameters. Whole boot shock attenuation (as measured IAW ASTM F1614-99) shall be optimized for user comfort and injury reduction, and shall be between 16.0 and 20.0 in the Forefoot and

between 12.0 and 16.0 in the Rearfoot. Shock attenuation shall be achieved through the choice of standard materials and construction techniques used in commercial industry and found in this Purchase Description. Human biomechanical gait parameters while wearing combat boots shall not be compromised to achieve increased shock attenuation. Testing shall be performed on the boot without the removable cushion insert or removable bootie. The Shock Attenuation requirements listed in this section (3.4.13) shall apply to both the Direct Attach Soling System with a Rubber Outsole (described in Section 3.4.14) and the Direct Attach Soling System with a Polyether Polyurethane Outsole (described in section 3.4.15).

3.4.14 Direct Attach (with Rubber Outsole) Soling System Requirements

3.4.14.1 Cushion 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 midsole design shall be as shown in Figures 3. The cushion midsole shall be pure polyether polyurethane, desert sand color and have an exterior texture pattern that is a good match to the government standard sample. The cushion midsole shall meet the dimensions specified in Table IV.

TABLE IV. External Cushion Midsole Dimensions

Characteristics	Inches
Overall thickness at back of heel	1.00 1/
Overall thickness at one inch forward from back of heel	1.31 1/
Overall thickness at toe	0.62 1/
Overall thickness at ball	0.50 1/
Radius of transition from bottom of heel to radius of heel breast	0.19 1/
Radius of heel breast	3.11 1/

1/ Tolerance for all measurements is ± 0.06 inches.

3.4.14.2 Cushioned 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.

Table V. Cushion Midsole Physical Requirements

Characteristics	Minimum	Maximum	Test Method
Density (g/c ²)		0.60	ASTM D792
Hardness (shore A)	50	75	ASTM D2240 1/
Tensile strength (kg·f/cm ²)	25	-	ASTM D3574 2/
Elongation (%)	250	-	ASTM D3574 2/
Tear strength			
Die T (kg/cm)	3.7	-	ASTM D3574 2/
Volume swell (%)			
w/ ASTM Oil #3 (at 24 hrs)	-	10	ASTM D471 2/ 3/
Compression Set (%)	-	20	SATRA MTM-64 4/
Ross flex (1x6 in) at 5°C	900% @ 150,000 cycles	-	ASTM D1052 5/ 6/

1/ Thickness of test sample used shall equal 12.7mm (0.5 in) from test slabs.

2/ 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.

However, all test reports used for conformance purposes and submitted to the Government shall use test slabs.

3/ Test conducted after 24 hours at Room Temperature with ASTM test slabs.

4/ 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.

5/ Test method modified to include 2mm insole board glued onto the specimen and conducted at -5 degrees C. Samples are to be pre-conditioned for 2 hours at -5C.

6/ 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.

3.4.14.3 Rubber Outersole.

3.4.14.3.1 Rubber Outsole Design Requirements. The outersole design shall be the Quabaug Vibram Sierra 1276 model. The outsole shall be a minimum of 18-iron (9.5mm) in thickness of solid rubber at each of the lugs. The color of any identification plug shall be Desert Sand in color.

3.4.14.3.2 Rubber Outsole compound requirements. The requirements for the rubber outsoles are based on the testing performed on 0.250 or 0.070 gauge inch test slabs (in accordance with ASTM procedures) and are not actual soles. The requirements shall be as specified in Table VI.

TABLE VI. Rubber Outsole Compound Requirements.

Characteristics	Outsole
NBS abrasion	150 min.
Hardness (shore A)	70-80 A
Stitch Tear (dry)	180 lb. min
Stitch Tear (Fuel B)	50 lb min
Die C tear strength	300 lb. min.
Ross flex, Oil #3	250% max. @ 50,000 flexes
Volume swell, Fuel B(@ 46 hrs) <u>2/</u>	30% max.
Non-marking	Pass
Tensile	2,100 lb. Min
Elongation	400% min.

1/ indicates that requirement is not applicable

2/ Test conducted at Room Temperature with ASTM test slabs.

3.4.15 Direct Attach (with Polyether Polyurethane Outsole) Soling System Requirements

3.4.15.1 Midsole/Outsole Construction and Design. The midsole/outsole shall be a dual density pure polyether polyurethane construction that is formed by injecting or open pouring the midsole polyurethane directly between the polyurethane outsole and boot upper. The design shall be the Meramec Battalion (see Figure 3) or equal based on Government approval. The midsole/outsole shall be desert sand color and meet the dimensions specified in Table VII. The surface texture shall be a good match to the Government sample. The outsole shall match the tread design shown in Figure 3 or equal based on Government approval. The bottom of the outsole may indicate the boot manufacturer and brand name of outsole or outsole compound. The thickness of the outsole polyurethane at the lugs shall be a minimum of .315 inches except in the shank area. The thickness of the outsole polyurethane at non lug areas shall be a minimum of .09 inches.

TABLE VII. Midsole/Outsole Combined Dimensions

Characteristics	Inches <u>1/</u>
Overall thickness at back of heel	1.575
Overall thickness at one inch forward from back of heel	1.850
Overall thickness at toe	1.280
Overall thickness at ball	1.024
Lug height (except shank area)	0.236

1/ Tolerance for all measurements is ± 0.02 inches.

3.4.15.2 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 VIII.

TABLE VIII. Midsole Polyether Polyurethane Requirements

Characteristic	Minimum	Maximum
Density (gm/cc)	0.45	0.55
Hardness (shore A)	55	65
Tensile strength (kgf/cm sq)	30	-
Tensile strength (kgf/cm sq) (after 7 day hydrolysis)	25	-
Elongation (%)	300	-
Elongation (%) (after 7 day hydrolysis)	300	-
Tear Strength		-
Die T (kg/cm)	5	-
Volume Swell (%) w/ASTM Oil #3 (at 24 hrs)	-	10
Compression Set (%)	-	20
Ross Flex (1X6 inch) at -5 ⁰ C		900% @ 150,000 cycles

(“ – “ indicates that requirement as not applicable)

3.4.15.3 Outersole Compound Requirements. The requirements for the polyether polyurethane 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 IX.

TABLE IX. Outsole Compound Requirements

Characteristics	Outsole
NBS abrasion	400 min.
Hardness (shore A)	55-70 A
Stitch Tear (dry)	150 lb. min
Stitch Tear (Fuel B) <u>1/</u>	50 lb min
Die C tear strength	150 lb. min.
Ross flex, Oil #3	50% max. @ 50,000 flexes
Volume swell, Fuel B (@ 46 hrs) <u>2/</u>	60% max.
Non-marking	Pass
Tensile	1,100 lb. Min
Elongation	500% min.
Cold Flex (@ -23 degrees C)	<500% @ 7,500 flexes
Transitional Hardness (2 hrs @ -23 degrees C)	Max change +15 point shore hardness
Slip Index (cold/ice)	0.20 min. (rough ice method)

1/ Test conducted after 46 hours in Fuel B at Room Temperature.

2/ Test conducted at Room Temperature with ASTM test slabs.

3.4.16 Bond Strength. The bond achieved between any of the bottoming layers (midsole, cushion midsole, and outsole) to include the boot upper shall be permanently resistant to any delamination. Any bond failures between any of the components will be explicitly covered under warranty, and those failed items will be replaced on a one-for-one basis, no questions asked (as is done in commercial practices).

3.4.17 Thread, nylon. The thread shall be nylon, conforming to type I, II or III, class A or B, size E of V-T-295. The color of the thread shall be Desert Sand in color. Colorfastness requirements shall not apply. The maximum thread elongation for all thread shall be 32 percent.

3.4.18 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 X. 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 a minimum of 0.100 inch forward of the instep, and a minimum of 0.220 inch elsewhere.

TABLE X. Removable Cushion Insert Requirements

Characteristics	Requirement
Polyether Polyurethane	
Density	17 (+2, -1) lb/cu. ft.
Tensile strength	82 lb./sq. in. (min)
Compression set @ 77 degrees F	25% @ 10.6 psi 50% @ 21.6 psi
Fabric Top Cover:	
Martindale Abrasion Fabric Only; Dry	153,600 revs/9,600 cycles (min)
Bursting Strength Fabric Only	125 min.

3.4.19 Laces. The laces shall conform to Type III, class 1 of A-A-55093. The color of the laces shall be Desert Sand matching that of the standard sample (see 3.3). The length of the laces shall be 66 inches for all sizes.

3.5 Design. The color of the boot shall be Desert Sand in color and have a padded collar covered with a nylon cloth. The boot shall contain a partial speedlace closure system consisting of two 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 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 (see Figures 1, 2a and 2b for upper pattern design requirements). The boot shall have a direct attach soling system consisting of either a polyether polyurethane cushioned midsole with a rubber outsole or a polyether polyurethane cushioned midsole with a polyether polyurethane outsole.

3.5.1 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 2a and 2b)

3.5.2 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 $10 \pm 1/4$ inch on size 10R and shall graduate up and down between sizes and widths as indicated by the patterns.

3.5.3 Boot weight. The weight of a finished boot (size 10R) shall be less than or equal to 2 pounds per boot.

3.6 Lasts. The boots shall be made on commercial last model "FMT U3813-1 Military" or equal based on government approval. An electronic table of last dimensions as well as last bottom files for each size and 3-dimensional data file for sizes 10N (B), 10R (D), 10W (EE) and 10XW (EEEE) for the Direct Attach lasts are available from U.S. Army Natick Soldier Research Development and Engineering Center, AMSRD-NSC-WP-WC (Attn: Michael Holthe), Kansas Street, Natick, MA 01760-5011. 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 58 molds.

3.7 Construction.

3.7.1 Uppers.

3.7.1.1 Cutting leather uppers. The leather parts shall conform to the thickness requirements specified in Table XI. All leather for boot components, with the exception of the eyelet stays shall be cut so as to be used flesh side out. Front edge stays shall not be split. The inside counter pocket shall not be leather (see Section 3.4.4.1.2).

TABLE XI. Thickness of leather uppers (ounces).

<u>Characteristics</u>	<u>If not split</u>		<u>For split parts</u>	
	<u>Min</u>	<u>Max</u>	<u>Min</u>	<u>Max</u>
Vamp	5	6	-	-
Outside counterpocket	4	6	4	6
Front edge stays	3	4	-	-
Eyelet stays	3	4	3-1/2	4

3.7.1.2 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.

3.7.2 Skiving. The vamp shall be skived at the throat and wings. The outside counterpocket shall be skived at the stitch edge and top. Additional upper leather skiving shall be permitted.

3.7.3 Finishing leather parts. The leather shall be flesh out drum dyed Desert Sand matching that of the standard sample with the color penetrating throughout the thickness of the hide so that the chrome tannage shall not be visible.

3.7.4 Backstay seam strength. The seam strength of the backstay shall be not less than 250 pounds per inch.

3.8 Assembly.

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

3.8.2 Pairing, lacing. 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 laces for each pair shall be tied firmly together.

3.9 Instruction and Hangtags.

3.9.1 Instruction tags. The Use and Care Information must be included on the instruction tags. Component and boot feature hangtags may be attached to the boots.

3.9.2 Labels. Each boot shall have a label, adhered securely so as to remain in place and be clearly legible for the life of the item. The label shall be printed and include information related

to (but not limited to) sizing, commercial model number, and contractor name.

3.10 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. REGULATORY REQUIREMENTS. The offeror/contractor is encouraged to use recovered materials to the maximum extent practicable, in accordance with paragraph 23.403 of the Federal Acquisition Regulation (FAR).

5. PRODUCT CONFORMANCE PROVISIONS.

5.1 Product Conformance. The products provided shall meet the salient characteristics of this Purchase Description, conform to the producer's own drawings, specifications, standards, and quality assurance practices, and be the same product offered for sale in the commercial marketplace. The government reserves the right to require proof of such conformance.

6. PACKAGING.

6.1 Packaging. Preservation, packing, and marking shall be specified in the contract or order.

7. NOTES.

7.1 Sources of documents.

7.11 ASTM Standards are available online at www.astm.org or from ASTM INTERNATIONAL, 100 Barr harbor Drive, West Conshohocken, PA 19428-2959.

7.12 SATRA Standards are available from SATRA Technology Center, SATRA House; Rockingham Road, Kettering, Northamptonshire; NN 16 9 JH, England.

7.12 Federal Acquisition Regulations are available online at <http://acquisition.gov/far/index.html> or by contacting the Superintendent of Documents at 202-512-1800.

7.2 Key words.

Boot
Tactical
Assault
Urban



Figure 1. Army Combat Boot (Hot Weather)
[PHOTO FOR DESCRIBING UPPER CONSTRUCTION AND OUTSOLE TREAD
PATTERN ONLY. SOLING SYSTEM SHALL BE DIRECT ATTACH.



Figure 2a. Close up view of Vamp/Gusset seam (front view).



Figure 2b. Close up view of Vamp/Gusset seam (lateral view).



Figure 3. Direct Attach with Rubber Outsole – Soling System Design Requirements
[PHOTO FOR DESCRIBING SOLING CONSTRUCTION ONLY. SOLING SYSTEM
BOOT UPPER PATTERN SHOWN IS NOT ACCEPTABLE FOR THIS PURCHASE
DESCRIPTION]



Figure 4. Polyether Polyurethane Ousole design required for Direct Attach Soling System with Polyether Polyurethane Outsole