

INCH-POUND

MIL-S-40043D

15 March 1991

SUPERSEDING

MIL-S-40043C

4 February 1977

MILITARY SPECIFICATION

SOLES, RUBBER, SHOE

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

1. SCOPE

1.1 Scope. This specification covers full and half soles of black rubber composition for shoes and boots.

1.2 Classification. The soles shall be of the following types and classes as specified (see 6.2).

- Type I - Full sole, whole sizes 5 through 16
- Type II - Half sole, whole sizes 5 through 16
- Type III - MIL-5 full sole, whole sizes 6 through 14
- Class 1 - Nonmarking composition
- Class 3 - Nonmarking and oil-resistant composition

2. APPLICABLE DOCUMENTS

2.1 Government documents.

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

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be used in improving this document should be addressed to: U.S. Army Natick Research, Development, and Engineering Center, Natick, MA 01760-5019, by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 8335

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

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SPECIFICATIONS

FEDERAL

- TT-S-735 - Standard Test Fluids; Hydrocarbon
- PPP-B-636 - Boxes, Shipping, Fiberboard

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- MIL-L-35078 - Loads, Unit: Preparation of Semiperishable Subsistence Items; Clothing, Personal Equipment and Equipage; General Specification For

STANDARDS

FEDERAL

- FED-STD-311 - Leather, Methods of Sampling and Testing
- FED-STD-601 - Rubber: Sampling and Testing

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

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

2.1.2 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.

DRAWINGS

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

- 2-1-22 - Soles, Rubber, Shoe; Half Sole, Tap
- 2-1-310 - Soles, Rubber, Shoe; Full Sole
- 2-1-721 - Soles, Rubber, Shoe; Type III, MIL-5, Full Sole

(Copies of drawings are available from the U.S. Army Natick Research, Development, and Engineering Center, ATTN: STRNC-UX, Natick, MA 01760-5017.)

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

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM)

ASTM D 573	- Accelerated Aging of Vulcanized Rubber by the Oven Method
D 624	- Tear Resistance of Vulcanized Rubber
D 1052	- Measurement of Cut Growth of Rubber by the use of the Ross Flexing Machine
D 1630	- Abrasion Resistance of Rubber Compounds for Soles and Heels
D 2240	- Indentation Hardness of Rubber and Plastics by Means of a Durometer
D 3183	- Preparation of Pieces from Rubber Vulcanizates Other Than Standard Test Sheets
D 3951	- Standard Practice for Commercial Packaging

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

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

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

3. REQUIREMENTS

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

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

3.2.1 Class 1 soles. The soles shall be made of natural rubber, synthetic rubber, or a mixture of natural and synthetic rubber.

3.2.2 Class 3 soles. The soles shall be made of synthetic rubber.

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3.3 Physical requirements. The finished soles shall conform to the applicable requirements specified in table I when tested as specified in 4.4.4.

TABLE I. Physical requirements

Characteristic	Requirement	
	Class 1	Class 3
Abrasive index before aging:		
Lot average, minimum	60	60
Test specimen, minimum	50	50
Abrasive index after aging:		
Lot average, minimum	60	60
Test specimen, minimum	50	50
Hardness before aging:		
Minimum	72	72
Maximum	85	85
Hardness after aging:		
Minimum	72	72
Maximum	90	90
Cut growth after aging (25,000 cycles), maximum, percent	500	500
Volume swell, maximum, percent	-	60
Stitch tear, before and after aging, pounds per inch of thickness, minimum	225	225
Tear strength, pounds per inch of thickness, minimum	150	150

3.4 Nonmarking soles. Nonmarking soles shall produce only a slight, easily erasible mark on white paper when tested as specified in 4.4.4. The contractor shall furnish a certificate of compliance to the contracting officer stating that the soles do not contain over three parts of carbon black per hundred parts of rubber.

3.5 Design and dimensions. The design and dimensions of type I and III soles shall be as specified in Drawings 2-1-310 and 2-1-721 respectively.

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For type II soles, the contractor's equivalent size may be substituted provided that contour, area, and tread design closely approximate Drawing 2-1-22 and adequately fulfill fitting and use requirements for that size.

3.6 Color. The color of the soles shall be black.

3.7 Molds. The manufacturer's own mold equipment shall be used.

3.8 Identification.

3.8.1 Trademark. The manufacturer's name or trademark shall appear on the tread surface in the shank of type I and type III soles, and above the shank bevel line of type II soles. The trademark shall not be more than 1-1/2 inches in diameter.

3.8.2 Size. Each sole shall be marked in the heel area with the size in figures not less than 1/4 inch high.

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

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

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

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

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

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

4.3 First article inspection. When a first article is required (see 3.1 and 6.2), it shall be examined for the defects specified in 4.4.2 and 4.4.3 and tested for the characteristics specified in 4.4.4.

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

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

4.4.2 End item visual examination. The end items shall be examined for the defects listed in table II. The lot size shall be expressed in terms of pairs of soles. The sample unit shall be one pair of soles. The inspection level shall be II and the acceptable quality level (AQL), expressed in terms of defects per hundred units, shall be 4.0.

TABLE II. End item visual defects

Examine	Defect
Pairing	Not properly mated, i.e., not right and left of same size, wide variation in color or appearance
Color	Not black
Design	Any characteristic not in accordance with the specified requirements

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TABLE II. End item visual defects (cont'd)

Examine	Defect
Type and class	Not as specified
Construction and workmanship	Any tackiness Any area of porosity or sponginess resulting in loss in density of the rubber stock More than one air check over 1/32 inch deep but not exceeding one-third of the thickness dimension of the sole Any air check more than one-third the thickness dimension of the sole in depth Any press cut, tear, check, loss of tread detail, or imbedded foreign matter; or otherwise defective Not cleanly trimmed
Identification and size marking	Missing, incomplete, incorrect, misplaced, illegible, or not specified size

4.4.3 End item dimensional examination. The end items shall be examined for conformance to the dimensions specified on the drawings. Only those dimensions that can be evaluated without damaging the end items shall be examined. Any dimension not within the specified tolerance shall be classified as a defect. The lot size shall be expressed in units of soles. The sample unit shall be one sole. The inspection level shall be S-2 and the AQL, expressed in terms of defects per hundred units, shall be 4.0.

4.4.4 End item testing. The end items shall be tested for the characteristics listed in table III. The lot size shall be expressed in units of pairs of soles. The sample unit shall be eight soles of each type and class. The inspection level shall be S-1. Any test failure shall be cause for rejection of the lot.

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TABLE III. End item tests

Characteristic	Requirement paragraph	Test method	Requirements applicable to		No. determinations per sample unit	Results reported as
			Sample unit	Lot average		
Composition	3.2.1 and 3.2.2	1/	-	-	-	-
Abrasive index before aging	3.3	D 1630 2/	X	X	3	Nearest index number
Abrasive index after aging 4/	3.3	D 1630 2/	X	X	3	Nearest index number
Hardness before aging 4/	3.3	D 2240 2/	-	X	5	Nearest hardness number
Hardness after aging 4/	3.3	D 2240 2/	-	X	5	Nearest hardness number
Cut growth after aging 4/ (classes 1 and 3)	3.3	D 1052 2/ 5/	-	X	2	Nearest percent
Volume swell (class 3)	3.3	FED-SID-601 Method 6211 6/7/	X	-	3	Nearest percent
Stitch tear: Before aging	3.3	Method 2141 8/	-	X	3	Nearest pound/inch
After aging 4/	3.3	Method 2141 8/	-	X	3	Nearest pound/inch
Tear strength	3.3	D 624-73 2/ 2/	-	X	3	Nearest pound/inch
Normmarking	3.4	4.5.1	X	-	1	Pass or fail

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- 1/ A certificate of compliance shall be submitted and will be acceptable for the stated requirement.
- 2/ ASTM Standard.
- 3/ Aging shall be accomplished in accordance with ASTM D 573. The soles shall be aged 24 hours at $212^{\circ} \pm 1.8^{\circ}\text{F}$.
- 4/ Except that test results shall be reported as percent cut growth after 25,000 cycles, and reading after each 100 percent cut growth shall not be reported.
- 5/ The immersion medium shall be type III of TT-S-735 and the thickness of the test specimen shall be 0.075 ± 0.005 inch.
- 6/ Refers to test method of FED-STD-311.
- 7/ Buffing and preparation of samples shall be in accordance with ASTM 3183 and thickness shall be in accordance with ASTM D 624. Die C shall be used.

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

<u>Examine</u>	<u>Defect</u>
Marking (exterior and interior)	Omitted; incorrect; illegible; of improper size, location, sequence, or method of application
Materials	Any component missing, damaged, or not as specified
Workmanship	Inadequate application of components, such as: incomplete sealing or closure of flap, improper taping, loose strapping, or inadequate stapling Bulged or distorted container
Content	Number per container is more or less than required

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

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

4.5 Methods of inspection.

4.5.1 Nonmarking test. The corner edge of the sole shall be drawn across a sheet of white paper using moderate pressure. If only a light mark is made which is easily erased by rubbing with the fingers, the soles shall be classified as nonmarking.

5. PACKAGING

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

5.1.1 Level A preservation. Six pair of full soles of one type, class, and size only, shall be placed together with soles face to face in pairs so that all edges are even and securely tied with cotton tape or twine. Half sizes require no preservation.

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

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

5.2.1 Level A packing. Twelve bundles (72 pair) of full soles, or 80 pair of half soles, preserved as specified in 5.1, shall be packed in a shipping container conforming to style RSC-L, grade V2s of PPP-B-636. Inside dimensions of the box shall be in accordance with table IV. Half soles shall be arranged 20 pairs in a row, two rows per layer. Each box shall be closed, waterproofed, and reinforced in accordance with the appendix of PPP-B-636. Boxes shall be arranged in unit loads in accordance with MIL-L-35078 for the type and class of load specified (see 6.2). Strapping shall be limited to nonmetallic strapping, except for type II, class F loads.

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TABLE IV. Shipping container dimensions and pallet patterns

Size	Dimensions of shipping container (L X W X D in inches)	Pallet pattern
Full sole		
5 - 8	16-1/4 X 12 X 11	9
9 - 11	17-1/4 X 13-1/4 X 11	7
12 - 16	18-1/2 X 14-1/4 X 11	95
Half Sole		
5 - 8	13-1/2 X 12-3/4 X 9	103
9 - 16	16 X 12-1/2 X 9	9

1/ Dimensions are approximate and are furnished as a guide only.

5.2.2 Level B packing. Twenty bundles (72 pair) of full soles, or 80 pair of half soles, preserved as specified in 5.1, shall be packed in a shipping container conforming to style RSC-L, type CF (variety SW) or SF, class domestic, grade 275 of PPP-B-636. Inside dimensions of the box shall be in accordance with table IV. Half soles shall be arranged 20 pairs in a row, two rows per layer. Each box shall be closed in accordance with method II as specified in the appendix of PPP-B-636.

5.2.2.1 Weather-resistant shipping container. When specified (see 6.2), the shipping container shall be grade V3c, V3s, or V4s fiberboard shipping container fabricated in accordance with PPP-B-636 and closed in accordance with the appendix of PPP-B-636.

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

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

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

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6. NOTES

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

6.1 Intended use. Type I full soles are intended for use as a component in new shoes, type II half soles are for use in repair of shoes, and type III MIL-5 full soles are for use as a component in MIL-B-41818. Class 3 resists deterioration caused by oil and should be used where frequent contact with petroleum products may be expected.

6.2 Acquisition requirements. Acquisition documents must specify the following:

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

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

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

6.5 Subject term (key word) listing.

Boot
 Full sole
 Half sole
 MIL-5
 Natural rubber
 Nonmarking
 Oil resistant composition
 Shoe
 Synthetic rubber

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

Custodians:

Army - GL
Navy - SA
Air Force - 99

Preparing activity:

Army - GL
(Project 8335-0170)

Review activities:

Army - MD
Air Force - 82
DLA - CT

User activities:

Navy - MS, MC, CG

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

1. The preparing activity must complete blocks 1, 2, 3, and 8. In block 1, both the document number and revision letter should be given.
2. The submitter of this form must complete blocks 4, 5, 6, and 7.
3. The preparing activity must provide a reply within 30 days from receipt of the form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

1. RECOMMEND A CHANGE:	1. DOCUMENT NUMBER MIL-S-40043D	2. DOCUMENT DATE (YYMMDD) 1991 March 15
3. DOCUMENT TITLE SOLES, RUBBER, SHOE		
4. NATURE OF CHANGE <i>(Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)</i>		
5. REASON FOR RECOMMENDATION		
6. SUBMITTER		
a. NAME <i>(Last, First, Middle Initial)</i>	b. ORGANIZATION	
c. ADDRESS <i>(include Zip Code)</i>	d. TELEPHONE <i>(include Area Code)</i> (1) Commercial (2) AUTOVON <i>(if applicable)</i>	7. DATE SUBMITTED (YYMMDD)
	8. PREPARING ACTIVITY	
AME U.S. Army Natick RD&E Center	b. TELEPHONE <i>(include Area Code)</i> (1) Commercial 508-651-4532	(2) AUTOVON 256-4532
c. ADDRESS <i>(include Zip Code)</i> Commander, U.S. Army Natick RD&E Center ATTN: STRNC-IRT Natick, MA 01760-5019	IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Quality and Standardization Office 5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466 Telephone (703) 756-2340 AUTOVON 289-2340	