

INCH-POUND

MIL-DTL-32089

August 24, 2001

SUPERSEDING

KK-L-201F

May 31, 1968

**MILITARY DETAILED SPECIFICATION
LEATHER, CATTLEHIDE, LACE, AND CUT LACES**

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

1. SCOPE This Military Detailed Specification covers cut laces primarily intended for shoe laces, name tags, slings for parachutes, and splicing purposes.

- 1.2 CLASSIFICATION. The leather will be in the following types:

Type I - Alum tanned rawhide

Type II - Alum and vegetable tanned, Indian tanned

Type III - Alum and vegetable tanned, latigo

Type IV - Chrome tanned

Class 1 - Sides

Class 2 - Cut laces

Class 3 - Backs

Treatment A - Mildew resistant treated.

Treatment B - Not mildew treated.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Defense Supply Center Philadelphia, Clothing and Textiles Directorate, Attn: DSCP-COC, bld 6-1-D, 700 Robbins Ave, Philadelphia, PA 19111-5096.

AMSC N/A

FSC 8330 and 8335

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2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are specified in sections 3 and 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 documents cited in sections 3 and 4 of this specification, whether or not they are listed.

2.2 Non-Government publications. The following document(s) 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

- D- 6075 Cracking Resistance of Leather
- D- 2209 Tensile Strength of Leather
- D- 3495 Hexane Extraction of Leather
- D- 2617 Total Ash in Leather
- D- 6076 Shrinkage temperature of leather
- D- 2807 Chromic Oxide Content by Perchloric Acid Oxidation Test
- D- 2810 pH of Leather

(Applications for copies should be addressed to American Society For Testing and Materials, 100 Barr Harbor Drive, West Conshohocken, PA 19428.)

ANSI/ASQC Z1.4

(Applications for copies should be addressed to ANSI/ASQC American Society for Quality Control 611 East Wisconsin Ave. , Milwaukee WI 53202)

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

2.3 Order of Precedence. In the event of a conflict between the text of this document and the references cited herein (except for related associated specifications or specification sheets), the text of this document takes precedence. Nothing in this document however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

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3. REQUIREMENTS

3.1 Materials. The lace leather and cut laces shall be full grain cattlehide. The flesh side of the leather shall be smooth and free of coarse loose flesh.

3.1.1 Class 1. Class 1 leather shall be furnished in the form of sides.

3.1.2 Class 2. Class 2 shall be furnished in the form of cut laces. The laces shall be cut from class 1 or class 3 leather.

3.1.3 Class 3. Class 3 leather shall be furnished in the form of backs.

3.2 Tannage.

3.2.1 Type I. Type I leather shall be tanned with aluminum salts.

3.2.2 Type II and III. Type II and III leather shall be tanned with aluminum salts and vegetable tanning materials.

3.2.3 Type IV. Type IV leather shall be chrome tanned.

3.3 Physical requirements.

3.3.1 Classes 1 and 3

3.3.1.1 Trim (form and area). The leather shall be furnished in the form of sides or backs as required for the type specified. Class 1 leather shall be not less than 16 square feet in total area. Class 3 leather shall be not less than 12 square feet in total area. The area in terms of square feet shall be legibly marked in the butt area on the flesh side of the leather.

3.3.1.2 Thickness. The thickness of class 1 and class 3 leather shall be furnished in the following thicknesses as specified (see 6.2 and 6.3): 4, 5, 6, 7 and 8 ounces. A minus thickness tolerance of 50 percent shall be permitted. The thickness shall be expressed in terms of ounces.

NOTE: 1 ounce = 1/64 inch

3.3.1.3 Color. The color of the class 1 and class 3 leather shall be as specified (see 6.2).

3.3.1.4 Cracking. The leather shall not crack when tested as specified in 4.3.

3.3.1.5 Shrinkage temperature (type IV). The type IV shall not shrink at or below 97°C when tested as specified in 4.3.

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3.3.1.6 Elongation. Not less than 80 percent of the specimens tested shall have elongation values no greater than 20 percent at the loads indicated below for the specified thicknesses when tested as specified in 4.3.

<u>Thickness</u>	<u>Loads (pounds)</u>
4	45.0
5	60.0
6	70.0
7	80.0
8	95.0

3.3.1.7 Breaking force. Not less than 80 percent of the specimens tested shall have minimum breaking force values as indicated below for the specified thickness.

<u>Thickness</u>	<u>Loads (pounds)</u>
4	95.0
5	115.0
6	140.0
7	165.0
8	190.0

3.3.2 class 2.

3.3.2.1 Cutting. The cut laces shall be cut in the lengthwise direction of the side or back.. The cut laces shall be free of cuts, holes, scars, and grain damage which adversely affects serviceability or appearance. The laces shall have clean cut square edges.

3.3.2.2 Color. The color of the laces shall be as specified (6.2).

3.3.2.3 Width, length and thickness. The laces shall be furnished in the width indicated below and as specified (see 6.2). the length and the thickness of the laces shall be as specified below and as required for the width specified.

<u>Width, inch</u> (± 1/64 inch)	<u>Length, feet</u> (± 1 inch)	<u>Thickness, ounces</u> (+0.0 – 50 percent)
1/8 <u>1/</u>	4	8
1/4	4	6
5/16	4	6
3/8	5	7
7/16	5	7
1/2	6	8
5/8	6	8
3/4	6	8
7/8	6	8
1	6	8

1/ Tolerance of plus 1/64 inch only.

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3.4. Fungicide. Unless otherwise specified (paragraph 6.2), one of the following leather fungicides is required.

3.4.1 2- (thiocyanomethylthio) Benzothiazole. The leather shall contain not less than 100ppm and not more than 400ppm of active ingredient 2- (thiocyanomethylthio) benzothiazole (TCMTB), (see paragraph 4.4.1).

3.4.2 Ortho- Phenyl Phenol. The leather shall not contain less than 540 ppm and not more than 2580 ppm. (see paragraph 4.4.2)

3.4.3 Diiodomethyl para Tolysulfone . The leather shall contain not less than 300 ppm and not more than 2000 ppm. (see paragraph 4.4.3)

3.5 Chemical requirements

3.5.1 The leather shall conform to the chemical requirements of table I when tested as specified in 4.5.

TABLE I Chemical requirements

Characteristic	Minimum	Maximum
Aluminum oxide, percent <u>1/</u>		
Type I	2.0	-
Type II and III	1.0	-
Total ash, percent <u>1/</u>		
Type I, II, III	-	15.0
Type IV	-	8.0
Chloroform-soluble material, percent <u>1/</u>		
Type I, II, IV	20.0	30.0
Type III	12.0	22.0
Acidity (pH)		
Type I, II, III, IV	3.5	-

1/ Moisture free basis.

3.6 Workmanship. The finished leather shall conform to the quality established by this specification. The occurrence of defect shall not exceed the applicable acceptable levels.

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4.0 VERIFICATION.

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

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

4.2 Conformance inspection. Sampling for inspection shall be in accordance with the provisions of ANSI/ASQC Z1.4, except where otherwise indicated hereinafter.

4.2.1 Component and material inspection. In accordance with 4.1 above, components and material shall be tested in accordance with all the requirements of referenced specification, drawings, and standards unless otherwise excluded, amended, modified, or qualified in this specification or applicable purchase document.

4.2.2 Examination of the end item. The classification of defects found during the examination shall be in accordance with the lists shown in 4.2.2.1 and 4.2.2.2. The sample unit for these examinations shall be one side or back. The lot size shall be expressed in terms of one side or back. A sample size of 15 and a rejection number of 2 shall be applicable for thickness determinations on lots consisting of 51 or more units of product. Separate examinations shall be performed for visual and dimensional characteristics, but the same sample may be used for each examination.

4.2.2.1 Examination for visual characteristics.

<u>Examine</u>	<u>Defect</u>
Material	Not full grain cattlehide
Trim	Not sides or backs as required
Color	Unless otherwise specified, color not natural
Quality of leather	Burn mark on flesh side Flesh side not smooth or has areas of loose Flesh in excess of four square inches in total area. Any hole, deep cut, scratch, damaged grain hipmark, Rough shoulder, Stain, or other defects which individually or collectively impair the cutting value of more than 10 % of the total area of the back or sided. Raw streak

NOTE: Light, well healed scratches and grub holes, light fat wrinkles, and slight stains shall not be classified as defects.

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4.2.2.2 Examination for dimensional characteristics.

<u>Examine</u>	<u>Defect</u>
Area (expressed in Terms of square feet)	Not as marked on leather
Marking	Omitted
Thickness <u>1/</u>	Not as specified

1/ Thickness shall be measured in accordance with ASTM-D-1814

4.3 End item testing. The methods of testing specified in ASTM wherever applicable and as listed in table IV, shall be followed. Sampling procedure and location from which the sample unit is to be obtained shall be in accordance with ANSI/ASQC Z1.4. All test reports shall contain the individual values utilized in expressing the final result . The lot shall be rejected if any one of the following conditions exists:

- a. More than three test failures occur for breaking force or elongation.
- b. More than one test failure occurs for the remaining requirements applicable to the sample unit.
- c. Any composite fails to meet the specified requirement.

TABLE V Tests

Characteristic	Requirement paragraph	Test method	Requirement <u>Applicable to</u>	
			Sample unit	Composite sample
Material	3.1	<u>1/</u>		—
Tannage	3.2	<u>1/</u>		—
Breaking force	3.3.4	ASTM-D-2209	X	
Elongation	3.3.5	ASTM-D-2209	X	
Cracking	3.3.6	ASTM-D-6075	X	
Shrinkage temperature	3.3.1.5	ASTM-D-6076	X	
Chloroform-soluble material	3.4.1	ASTM-D-3495	—	X
Water-soluble material	3.4.1	ASTM-D-3495	—	X

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TABLE V Tests (Con't)

Characteristic	Requirement paragraph	Test method	Sample unit	Requirement <u>Applicable to</u> Composite sample
Total ash	3.4.1	ASTM-D-2617	—	X
PH value	3.4.1	ASTM-D-2810	—	X
Fungicide	3.4.	para 4.4	-	X

1/ Unless otherwise specified, a certificate of compliance is required and will be acceptable for the stated requirement.

4.3.2 Cracking. The leather shall be tested for cracking in accordance with ASTM-D-6075. The diameters of the mandrels shall be 1/8 inch.

4.4 Fungicide

4.4.1 TCMTB. Testing to determine the concentration of Busan 30 L in the leather shall be conducted by using Buckman Laboratories standard test method for 2- (Thiocyanomethylthio) Benzothiazole Analysis of Leather by HPLC. This method may be obtained by contacting Buckman Laboratories at 1256 North McLean Blvd., Memphis, TN 38108 (800) 282-5625.

4.4.2 Ortho-phenyl phenol. Testing to determine chemical concentration in leather shall be conducted in accordance with Test I, Type I of the MIL-L-8067 specification.

4.4.3 Diiodomethyl para Tolysulfone. The chemical concentration in the leather shall be conducted using the High Pressure Liquid Chromatography (HPLC) test method as follows:

4.4.3.1 Grinding. Grind the leather according to paragraph 6.3.7 of ASTM Method D2813 Standard Practice for Sampling Leather for Physical and Chemical Tests.

4.4.3.2 Stock Standard Preparation. Weigh accurately approximately 100mg of Diiodomethyl-para-tolylsulfone Internal Reference Standard (IRS), into a 100ml volumetric flask. Add approximately 50ml of acetonitrile, stopper and sonicate to aid dissolution (about 1 minute). Dilute to volume with acetonitrile.

4.4.3.3 Working Standards Preparation. Transfer 3ml aliquots of the Stock Standard Preparation into 25, 50, 100, and 250ml volumetric flasks. Dilute to volume with acetonitrile. These standards contain approximately 12, 30, 60 and 120ppm of Diiodomethyl-para-tolylsulfone.

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Note: (1) A lower standard may be required for samples containing very low levels of Diiodomethyl para tolylsulfone

(2) Solutions must be stored in darkness to prevent degradation. Minimize exposure to light during preparation and use. The Standard Preparations may be retained one month.

(3) Internal Reference Sample (IRS) is available from Chemtan Company, Inc., P.O. Box C, Exeter, NH 03833 Tel.: 603-772-3741

4.4.3.4 Sample preparation. Accurately weigh approximately 3 to 5g of sample into a 150ml beaker. Add 75-100ml of acetonitrile. Cover samples with parafilm; mix 16 to 24 hours on magnetic stir plate. The following day, allow samples to settle; remove necessary amount of acetonitrile and inject Note: Samples may have to be diluted further to fall within standard curve.

4.4.3.5 Testing equipment:

- a. HPLC System with variable UV detector and integrating computer. Suitable syringe and glassware.
- b. A micro-Bondapak C18 column (Waters Associates P/N 2734) or equivalent.
- c. 0.45-micron polycarbonate filters (Nuclepore Corporation, Catalog No. 111107) or equivalent.
- d. Calculator capable of doing linear regression.
- e. Reagents: Acetonitrile (Chromatographic grade).

4.4.3.5.1 Typical mobile phase. Mix 550ml of distilled water and 450ml of acetonitrile. Filter and degas the solution. The concentration may be varied to meet system suitability requirements within range 50% to 40% acetonitrile.

4.4.3.5.2 Typical chromatographic conditions:

Injection Volume	20 Microliters
Flow	2.5 ml/minute
Detector	235 nm

4.4.3.6 System suitability. Inject the highest working standard until 2 percent agreement is reached between two successive injections. Chromatograph for approximately 15 minutes.

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Determine that, after the solvent front, one impurity peak elutes before the major peak. Elution for monoiodomethyl-para-tolylsulfone is about 6 minutes and for Diiodomethyl-para-tolylsulfone is about 8.5 minutes.

4.4.3.7 Procedure. Inject each standard and sample preparation in duplicate allowing each injection to run for at least 15 minutes. Measure the peak response for the Diiodomethyl-para-tolylsulfone.

Note: The run time may have to be increased for samples with late eluting peaks. Perform a linear regression of peak response (area) versus concentration for each of the components.

For each component:

Concentration (ppm) in leather =

$$\frac{\text{Concentration (ppm) from linear regression.}}{\text{Sample wt(g)}} \times 75$$

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 materiel is to be performed by DoD 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 activity within the Military Department or Defense Agency, or within the Military Department's System Command. 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

6.1 Intended use. The cattlehide lace leather and cut laces are primarily intended for shoe laces, Name tags, slings for parachutes and splicing purposes.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, and date of this specification
- b. Type and class required (see 2.0)
- c. Thickness required (see 3.3.1.2 or 3.3.2.3)).
- d. Color when other than natural color is required (see 3.3.2)
- e. Packaging requirements (see 5.1)

6.3 Strength and elongation characteristics are known to be adversely affected when thick layers of leather are removed from the flesh side by splitting.

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6.3 Subject term (key word) listings.

Sides
Backs
Mildew resistant
Fungicide

MILITARY INTERESTS:

Custodians

Army - GL
Navy - NU
Air Force 11

Review Activities

ARMY - MD
Air Force 82

PREPARING ACTIVITY:
DLA - CT

Project 8330-0206

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, and send to preparing activity.
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.

I RECOMMEND A CHANGE:		1. DOCUMENT NUMBER MIL-DTL-32089	2. DOCUMENT DATE (MMDD) 20010824
3. DOCUMENT TITLE		LEATHER, CATTLEHIDE, LACE, AND CUT LACES	
5. REASON FOR RECOMMENDATION			
6. SUBMITTER			
a. NAME (Last, First, Middle Initial)		b. ORGANIZATION	
c. ADDRESS (Include Zip Code)		d. TELEPHONE (Include Area Code) (1) Commercial (2) AUTOVON (if applicable)	DATE SUBMITTED (YYYYMMDD)
8. PREPARING ACTIVITY			
NAME Defense Supply Center Philadelphia DSCP-COCT		b. TELEPHONE (Include Area Code) (1) Commercial (215) 737-8035 (2) AUTOVON 444-8035	
c. ADDRESS (Include Zip Code) 700 Robbins Avenue (BLDG 6, C & T) Philadelphia, PA 19111-5092		IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT: Defense Standardization Program Office (DLSC-LM) 8725 John J. Kingman road, Suite 2533, Ft. Belvoir, VA 22060-2533 Telephone (703) 767-6888 AUTOVON 427-6888	