

MIL-D-5549B

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SUPERSEDING

MIL-D-5549A

2 October 1950

## MILITARY SPECIFICATION

DOPE; CELLULOSE-ACETATE-BUTYRATE,  
CLEAR FOR AIRCRAFT USE

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

## 1. SCOPE

1.1 Scope. This specification covers the requirements for a clear cellulose-acetate-butyrate dope.

## 2. APPLICABLE DOCUMENTS

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

## SPECIFICATIONS

Federal

O-D-306	Diacetone Alcohol, Technical (Acetone-Free)
TT-B-838	Butyl Acetate, Normal (For Use in Organic Coatings)
TT-E-751	Ethyl Acetate, Technical
TT-M-261	Methyl-Ethyl-Ketone (For Use in Organic Coatings)
TT-P-143	Paint, Varnish, Lacquer, and Related Materials, Packaging, Packing, and Marking of
TT-T-662	Triphenyl Phosphate (For Use in Organic Coatings)

FSC 8010

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## SPECIFICATIONS

Military

MIL-C-5537	Cellulose-Acetate-Butyrate
MIL-D-5551	Dope, Cellulose-Acetate-Butyrate, Pigmented, Glossy
MIL-C-5646	Cloth, Airplane, Cotton
MIL-T-6096	Thinner, Cellulose-Acetate-Butyrate Dope
MIL-T-6097	Thinner, Cellulose-Acetate-Butyrate Dope, Blush Retarding
MIL-D-7850	Dope, Cellulose-Acetate-Butyrate, First Coat, Fungicidal

## STANDARDS

Federal

Fed. Test Method Std. No. 141	Paint, Varnish, Lacquer and Related Materials, Method of Inspection, Sampling and Testing
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Military

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

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

## 3. REQUIREMENTS

3.1 Material. The ingredients used in the manufacture of this product shall conform to the Government specifications specified herein and processed in a manner to meet the requirements of this specification.

3.2 Composition. The composition shall conform to the ingredients and percent by weight of each ingredient as specified in Table I.

TABLE I  
COMPOSITION

Ingredient	Percent by Weight +2 Percent of Weight of Each Ingredient	Ingredient Specification
<u>Non-volatile Content</u>		
Cellulose-Acetate- Butyrate	9.0	MIL-C-5537
Triphenyl Phosphate	1.0	TT-T-662
<u>Volatile Content</u>		
Diacetone Alcohol	9.0	O-D-306
Ethyl Acetate	36.0	TT-E-751
Methyl-Ethyl-Ketone	31.5	TT-M-261
Butyl Acetate, Normal	13.5	TT-B-838

### 3.3 Quantitative requirements.

3.3.1 Acidity. The acidity of the dope shall not exceed 0.06 percent calculated as acetic acid (see 4.4.2).

3.3.2 Nonvolatile content. The nonvolatile content of the package material shall be 10.0 +0.2 percent (see 4.4.2).

3.3.3 Refractive index. The refractive index of the dope shall be between 1.3900 and 1.3955 at 25°C (77°F) (see 4.4.2).

3.3.4 Viscosity. When three parts of the dope is reduced with one part of the thinner conforming to MIL-T-6096, the viscosity shall be between 46 to 94 seconds when determined by a No. 4 cup at a temperature of 25°C (77°F) (see 4.4.2).

3.3.5 Weight per gallon. The weight per gallon of the dope shall be between 7.3 and 7.6 pounds (see 4.4.2).

3.3.6 Appearance. The dope shall be a clear homogeneous product free from suspended matter and haze when examined by transmitted light (see 4.4.2).

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### 3.4 Qualitative requirements.

3.4.1 Drying time. The drying time of the dope shall be equivalent to or dry in less time than the laboratory control product when tested as specified in 4.4.3.

3.4.2 Surface appearance. The dope shall produce a smooth surfaced film which shall also be free from blushing, streaks, blisters, and coarse particles (see 4.4.4).

3.4.3 Weather resistance. Panels prepared as specified in 4.4.5.1 shall be subject to outdoor weathering. There shall be no premature checking or cracking failure, embrittlement, loss of adhesion or ring worming, when subjected to the Brittleness Test after a period of 6 months of Florida exposure (see 4.4.5.2).

3.4.4 Brush properties. Two coats of the dope under test shall show good brush properties and shall dry to a uniform smooth surface, free from runs, sags, bubbling, wrinkling or streaking (see 4.4.4).

3.4.5 Storage stability. The previously unopened packaged product shall meet all the requirements specified herein for a period of one year, except for weather resistance (3.4.3), provided that the daily mean temperature of the ambient air at the storage location falls within the range of 35 to 95 degrees Fahrenheit, and the ambient air temperature does not exceed 115 degrees.

3.4.6 Tautness of coated fabric. When tested as specified in 4.4.6, the panel coated with the dope under test shall have similar drum-like qualities as the control panel.

3.5 Workmanship. The component ingredients shall be combined and processed as required, in accordance with the best practice for a high quality dope.

## 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order, the supplier is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or order, the supplier may use his own or any other facilities suitable for the performance of the inspection requirements specified herein, unless disapproved by the Government. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to the prescribed requirements.

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4.2 Classification of inspection. The inspection requirements of the cellulose-acetate-butyrate dope shall be classified as quality conformance inspection.

4.3 Quality conformance inspection. Quality conformance inspection shall consist of the examination of product (4.3.3.4 and 4.3.3.5) and all the tests of this specification except as authorized in 4.3.3.3 and 4.3.3.3.1.

4.3.1 Lot formation. Unless otherwise specified, a lot shall consist of all the cellulose-acetate-butyrate dope manufactured at one time from one batch, forming part of one contract or order, and submitted for acceptance at the same time and place.

4.3.2 Sampling.

4.3.2.1 For tests and examinations. Samples consisting of two 1-quart containers of dope from each lot shall be selected in accordance with Method 1021 of Fed. Test Method Std. No. 141 and subjected to the tests and examinations of 4.3.3.1 and 4.3.3.4.

4.3.2.2 For preparation for delivery. A quantity of shipping containers prepared for delivery shall be selected in accordance with MIL-STD-105 and subjected to the examinations specified in 4.3.3.5.

4.3.3 Inspection procedure.

4.3.3.1 Quality conformance tests. Test specimens shall be prepared from the samples selected in accordance with 4.3.2.1 and subjected to the tests of 4.4 except as authorized in 4.3.3.3 and 4.3.3.3.1. In addition, the sample may be subjected to any other test specified herein, when considered necessary by the procuring activity, to insure conformance to the requirements of this specification. Non-conformance of test specimens to a single requirement shall be cause for rejection of the lot represented by the sample.

4.3.3.2 Batch data. Batch production data shall be furnished on a weight and volume basis in accordance with Method 1031 of Fed. Test Method Std. No. 141.

4.3.3.3 Report of tests. The manufacturer shall submit test reports for each lot, showing the results for all the acceptance tests except weather resistance and storage stability unless required by the procuring activity. In addition, the manufacturer shall submit a notarized certification signed by a responsible official of its management attesting that the dope will meet the weather resistance and storage stability requirements of this specification.

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4.3.3.3.1 In lieu of reporting analytical results on the breakdown of the nonvolatile and volatile composition of the dope, the manufacturer may report such results as "calculated" under the condition that he has carefully described by separate report, attached to manufacturer's test reports, the character and detail of his production methods which in his opinion guarantee that any suitable analysis made by the Government will yield acceptable results.

4.3.3.4 Examination of product. The dope shall be examined for conformance with the requirements of this specification with respect to material and workmanship.

4.3.3.5 Examination of preparation for delivery. The samples selected in accordance with 4.3.2.2 shall be examined for proper filling or weight, markings and leakage. Any package having one or more defects or under required fill shall be rejected. If the number of defective packages exceeds the Acceptable Quality Level (AQL) of 2.5 percent defective in accordance with Level I of MIL-STD-105, the lot represented by the sample shall be rejected.

4.3.4 The Government reserves the right to rerun any or all tests of this specification at any time within 1 year from the date of manufacture of the dope as attested by the data appearing on the container's label. Samples for retest shall be taken from previously unopened containers. Should the results of retest be unsatisfactory, the contracting officer will be so informed, and may require the supplier to remove the entire batch and supply conforming material to replace it.

4.3.5 Laboratory control product. The laboratory control product to be used as the standard of comparison for determining the performance of the manufactured product shall be formulated in strict conformance with Table I using ingredients which are known to be in conformance with all the requirements of the applicable specification and processed in the laboratory in a manner to meet the requirements of this specification.

#### 4.4 Test methods.

4.4.1 Test conditions. Test conditions shall be in accordance with Fed. Test Method Std. No. 141 and as specified herein.

4.4.2 The following tests shall be conducted in accordance with the specified methods as given in Fed. Test Method Std. No. 141 and as specified herein.

<u>Test</u>	<u>Method No.</u>
Acidity	5251
Nonvolatile Content	4044
Refractive Index	4371
Viscosity (see 3.3.4)	4282
Weight per Gallon	4184
Appearance <u>1/</u>	4261

1/ A separate sample of the control product (4.3.5) may be tested simultaneously for comparison purposes.

4.4.3 Drying time. The drying time of the dope shall be tested in accordance with Method 4061 of Fed. Test Std. No. 141, except that the dope shall be applied by brushing on fabric conforming to MIL-C-5646. Two fabric panels shall be prepared in accordance with Method 2041 of Fed. Test Method Std. No. 141. One panel shall be brush coated with the sample material of 4.3.2.1 using a flatstyle 2-1/2 inch wide brush of good quality. Concurrently, the other panel shall be given a brush coat with the laboratory control product specified in 4.3.5. The drying time of the two panels shall be checked for conformance to 3.4.1.

4.4.4 Surface appearance. The dried panel of 4.4.3 coated with the sample material of 4.3.2.1 shall be given a second brush coating with the same material and dried. The dried film shall be checked for surface appearance and brush properties for conformance to 3.4.2 and 3.4.4 respectively.

4.4.5 Weather resistance.

4.4.5.1 Preparation of weather exposure panels. Two panels to be subjected to weather exposure shall be prepared as specified in Method 2041 of Fed. Test Method Std. No. 141 using fabric conforming to MIL-C-5646 on both sides of the frame. The under side of the panels shall be coated with two brush coats of clear dope under test. The exposure side of each panel shall be brush coated with one coat of fungicidal dope conforming to MIL-D-7850, and one coat of the clear dope under test followed by two sprayed coats of the clear dope under test and two coats of aluminized dope conforming to MIL-D-5551, with a 45-minute drying interval between coats. Each finished coat shall be smoothed lightly with sandpaper before Top coating. Panels shall be dried at least 72 hours before weighing and before exposure. Place the panels on outdoor exposure for 6 months at an angle of 45° South in the vicinity of Miami, Florida. The total weight of the coating shall be between 2.25 and 2.50 ounces per square yard for clear dope and 2.00 to 2.25 ounces per square yard for pigmented dope.

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4.4.5.2 Brittleness test. Upon completion of the six month<sup>e</sup> exposure period, the panels shall be subjected to the brittleness test in accordance with Method 6162 of Fed. Test Method Std. No. 141 (see 3.4.3).

4.4.6 Tautness test. Prepare two panels, one as specified in 4.4.5.1 using the dope under test and the other panel in the same manner except using the control product of 4.3.5. A comparison shall be made for similar drum like qualities by tapping the panels with the fingers for conformance to 3.4.6.

## 5. PREPARATION FOR DELIVERY

5.1 Packaging and packing. The dope shall be packaged, packed and marked in accordance with TT-P-143 and as specified in 5.2. The unit container, and the level of packaging and packing shall be as specified (see 6.2).

5.2 Marking and labeling. Unless otherwise specified in the contract or order, marking shall be in accordance with MIL-STD-129, individual cans and containers shall bear a printed label (all printed labels shall be overcoated with a clear coating for weather proofing) showing the following information:

### "THINNING DIRECTIONS

If thinning is required, use thinner conforming to Specification MIL-T-6096.

When a blush retarder is required, use thinner conforming to Specification MIL-T-6097."

## 6. NOTES

6.1 Intended use. The clear cellulose-acetate-butyrate dope furnished under this specification is intended for use as a protective undercoat on airplane fabric surfaces and for making repairs to doped fabric surfaces.

6.2 Ordering data. Procurement documents should specify the following:

- (a) Title, number, and date of this specification
- (b) Selection of applicable level of packaging and packing required (see Section 5)
- (c) The unit of purchase to be the U.S. Gallon (see 3.3.5)

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- (d) Size of the containers in which the dope is to be furnished
- (e) Specify if the weather resistance test is required (see 4.3.3.3)

6.3 Marginal indicia. Asterisks are not used in this revision to identify changes with respect to the previous issue, due to the extensiveness of the changes.

Custodians:	Review activities:	Preparing activity
Army - MR	Army - MR	Navy - AS
Navy - AS	Navy - AS	Project No. 8010-0395
Air Force - 84	Air Force - 84	

NOTICE: Review/user information is current as of the date of this document. For future coordination of changes to this document, draft circulation should be based on the information in the current Federal Supply Classification Listing of DOD Standardization Documents.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL		OMB Approval No. 22-R255
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