

TT-N-350B
September 19, 1973
SUPERSEDING
TT-N-350A
September 6, 1962

FEDERAL SPECIFICATION
NITROCELLULOSE, TECHNICAL
(FOR USE IN ORGANIC COATINGS)

This specification was approved by the Commissioner Federal Supply Services, General Services Administration, for use of all Federal Agencies.

1. SCOPE AND CLASSIFICATION

1.1 Scope. This specification covers soluble nitrocellulose (see 6.3) for use in protective coatings.

1.2 Classification. Nitrocellulose shall be of the following types as specified (see 6.2):

Type I - 1/4 sec.
Type II - 1/2 sec.
Type III - 5-6.5 sec.
Type IV - 15-20 sec.
Type V - 20-30 sec.
Type VI - 30-40 sec.

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:

Federal Specifications

O-E-760

- Ethyl Alcohol (Ethanol); Denatured Alcohol; and Proprietary Solvent.

FSC 6810

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TT-B-846	- Butyl Alcohol, Normal (Butanol) (For Use in Organic Coatings).
TT-E-751	- Ethyl Acetate, Technical.
TT-I-735	- Isopropyl Alcohol.
TT-T-548	- Toluene; Technical.

Federal Standards

FED. TEST METHOD STD. No. 141	- Paint, Varnish, Lacquer and Related Materials: Methods of Inspection, Sampling, and Testing.
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(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U. S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification and other Federal Specifications required by activities outside the Federal Government for bidding purposes are available without charge from Business Service Centers at the General Services Administration Regional Offices in Boston, New York, Washington, DC, Atlanta, Chicago, Kansas City, MO, Fort Worth, Denver, San Francisco, Los Angeles, and Seattle, WA.

(Federal Government activities may obtain copies of Federal Specifications, Standards, and Handbooks and the Index of Federal Specifications and Standards from established distribution points in their agencies.)

2.2 Other publications. The following documents form a part of this specification to the extent specified herein. Unless otherwise indicated, the issue in effect on date of invitation for bids or request for proposal shall apply.

AMERICAN SOCIETY FOR TESTING AND MATERIALS

ASTM D 301	- Specification and Tests for Soluble Cellulose Nitrate.
ASTM D 1343	- Viscosity of Cellulose Deriva- tives by Ball-Drop Method.

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

DEPARTMENT OF TRANSPORTATION

49 CFR, substitute B, chapter 1, - Hazardous Materials Regulations.
parts 172 and 173.

(Application for copies should be addressed to the Secretary, Hazardous Materials Regulation Board, 400 Sixth Street SW, Washington, DC 20590.)

DEPARTMENT OF TRANSPORTATION

46 CFR, 146.01-1 - Navigation Regulations Relating
to Shipping (chapter 1).

(Application for copies should be addressed to the Superintendent of Documents, Government Printing Office, Washington, DC 20402.)

3. REQUIREMENTS

3.1 Material. Nitrocellulose shall be of one grade (12 percent nitrogen) and shall be the product of nitration from newly prepared prime quality cellulose. No reworked material from other processes shall be employed.

3.2 Alcohol content. The nitrocellulose shall be furnished wetted with 30 plus or minus 1/2 percent (by weight) of alcohol or with water when specified (see 3.2.1). The type of alcohol shall be one of the following as specified (see 6.2):

- (a) Ethyl alcohol conforming to O-E-760, grade III, denatured alcohol.
- (b) Isopropyl alcohol conforming to TT-I-735.
- (c) Normal butyl alcohol conforming to TT-B-846.

3.2.1 Wetted nitrocellulose. When specified (see 6.2), the nitrocellulose may be furnished wetted with water not less than 20 percent nor more than 30 percent based upon net weight.

3.3 Nitrogen content. The nitrogen content of the nitrocellulose based upon dry weight shall be between 11.8 and 12.2 percent (see 4.4.5).

3.4 Acidity. When tested as specified in 4.4.6, the mineral acid content shall not exceed 0.2 percent expressed as H_2SO_4 based on dry weight.

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3.5 Ethyl acetate solubility. Insoluble matter shall not exceed 0.2 percent based on dry weight (see 4.4.2).

3.6 Appearance. The appearance of the nitrocellulose when dissolved as specified in table I shall be clear and free from abnormal amounts of insoluble matter and shall have no more than slight granularity when dissolved as specified in table I. No haze shall be permitted (see 4.4.1).

3.7 Viscosity. The viscosity of the nitrocellulose solutions based upon standard formulas shown in table I when determined as specified in 4.4.1 shall be as specified in table I.

3.8 Ash content. The ash content when determined as specified in 4.4.1 shall not exceed 0.1 percent based on dry weight.

3.9 Film properties. The nitrocellulose solution prepared, as specified in table I, and tested as specified in 4.4.7 shall be free from blushing and the flow-out film shall be uniformly smooth and free from abnormal amounts of foreign matter, impurities and undissolved particles.

3.10 Stability. The stability of the nitrocellulose, when determined as specified in 4.4.3, shall be not less than 25 minutes.

TABLE I. Standard viscosity solution formulas

Ingredients ^{1/}	Solvent	Composition, percent by weight \pm .05				
		Type I 1/4 sec. NC		Type II 1/2 sec. NC		All other Types - Viscosity as shown in 1.2
		NC solution	Viscosity in seconds	NC solution	Viscosity in seconds	NC solution
Nitrocellulose (dry weight)	-	25.0	4-5	20.0	3-4	12.2
Ethyl alcohol (O-E-760 grade III)	25	18.75		20.0		22.0
Toluene (TT-T-548)	55	41.25		44.0		48.3
Ethyl acetate (85-88% grade) (TT-E-751)	20	15.0		16.0		17.5

^{1/} First add the alcohol and toluene to the dry nitrocellulose and after it is thoroughly wet, add the ethyl acetate. Agitate in a closed container until a uniform, smooth solution is formed. Allow up to 7 hours for this step; adequate for the viscosity types covered in 1.2. Transfer to a 25° plus or minus 1° C. bath for a minimum of 1 hour. Determine viscosity 8 hours after initial solvent blend addition. Nitrocellulose solutions drop slightly in viscosity after mixing and standing. A time interval of 8 hours after addition of solvents before determining viscosity, has been established for obtaining reproducible results.

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

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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 prescribed requirements.

4.2 Classification of inspection. Inspection shall be classified as follows:

(a) Quality conformance inspection (see 4.3).

4.3 Quality conformance inspection.

4.3.1 Sampling. Sampling for testing shall be in accordance with FED. TEST METHOD STD. No. 141, methods 1011 and 1021.

4.3.2 Lot. A lot shall consist of 500 pounds of nitrocellulose or fraction thereof, made from one production run.

4.3.3 Tests. Samples selected in accordance with 4.3.1 shall be tested as specified in 4.4.1 through 4.4.7 inclusive. Failure of any test shall be cause for rejection of the lot from which the sample was taken.

4.4 Test procedures.

4.4.1 Qualitative. The following tests shall be conducted in accordance with FED. TEST METHOD STD. No. 141, methods as specified in table II. Failure of any test result to fall within the ranges specified in the applicable requirement paragraph specified in table II shall constitute failure of the applicable test.

TABLE II. Tests and methods

Tests	Method No.	Requirement Para.
Appearance	4261	3.6
Viscosity	4272.1*	3.7
Ash	5264	3.8

*Alternate equivalent method ASTM D 1343 may be used.

4.4.2 Ethyl acetate solubility. One gram of the wet sample shall be digested in sufficient ethyl acetate to filter the solution. Filter, using a Gooch crucible having a mat consisting of a thin layer of asbestos fiber. Dry the residue to constant weight in an oven at 100° C. (212° F.), weigh and report as percent insoluble matter based on dry weight of sample. Nonconformance to 3.5 shall constitute failure of this test.

4.4.3 Stability. Test for stability in accordance with ASTM Method D 301. Nonconformance to 3.10 shall constitute failure of this test.

4.4.4 Alcohol or water content. The nitrocellulose shall be dried at a temperature of 60° to 65° C. (100° to 140° F.) and an air pressure of 35 to 40 psi for about 30 to 40 minutes (about 40 minutes are necessary to dry 40 to 50 grams of wet nitrocellulose (see 6.4)). Calculate the percentage loss in weight and report as alcohol content. Preserve the dry nitrocellulose for the nitrogen content, ash content, stability and viscosity. The acidity (see 4.4.6) shall be run on a duplicate sample of material used for alcohol content. Nonconformance to 3.2 shall constitute failure of this test.

4.4.5 Nitrogen content. Test for nitrogen content in accordance with ASTM Method D 301. Nonconformance to 3.3 shall constitute failure of this test.

4.4.6 Acidity. Thoroughly wash a 250-ml Erlenmeyer flask or other suitable container with distilled water. Weigh 1.5 plus or minus 0.1 g of the wet nitrocellulose (see 4.4.4). Add 10 ml of recently boiled distilled water. Shake well and add 100 ml of acetone. Stopper and shake until the nitrocellulose is completely dissolved. Add 3 drops of 0.1 methyl red indicator solution and 25 ml of distilled water slowly with vigorous swirling. Titrate immediately with 0.01 N standard NaOH. Make a blank titration on a mixture of 35 ml of distilled water and 100 ml of acetone.

$$\frac{(S - B) N (0.049) 100}{\text{Weight of sample on dry basis}}$$

Percent acidity as H₂SO₄

Where:

S = ml NaOH titre for sample.

B = ml NaOH titre for blank.

N = normality of NaOH titrant.

Nonconformance to 3.4 shall constitute failure of this test.

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4.4.7 Film properties. Dilute a portion of solution prepared in accordance with table I with an equal volume of normal butyl acetate. Pour the solution onto a clean glass panel. Allow to dry in a nearly vertical position in a dust-free atmosphere overnight. The atmosphere shall be maintained at a temperature of 23.9° plus or minus 1.1° C. (75° plus or minus 2° F.) and a relative humidity of 55 plus or minus 5 percent. Nonconformance to 3.9 shall constitute failure of this test.

5. PREPARATION FOR DELIVERY

5.1 Packaging, packing, and marking. Packaging, packing, and marking of nitrocellulose shall be in accordance with Code of Federal Regulations, Title 49, substitute B, chapter 1, parts 172 and 173. When nitrocellulose is to be shipped by water 46 CFR 146.01-1 shall also apply.

6. NOTES

6.1 Intended use. Nitrocellulose covered by this specification is intended for use in the manufacture of organic protective coatings.

6.2 Ordering data. Purchasers should exercise any desired options offered herein and procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Type of alcohol required (see 3.2).
- (c) When nitrocellulose may be wetted with water (see 3.2.1).

6.3 Soluble nitrocellulose is clearly differentiated from guncotton or smokeless nitrocellulose. Guncotton, according to the Federal Explosives Act (see revised form issued 6-22-42, pages 1 and 2), is nitrocellulose having a nitrogen content greater than 12.2 percent. In practice, guncotton usually contains 13.15 percent or more nitrogen, and is an entirely different commodity from soluble nitrocellulose with nitrogen content between 10.7 and 12.2 percent, depending upon the type.

6.4 Apparatus for drying nitrocellulose. Drying of nitrocellulose may be accomplished by use of hot-air blowers. Detailed description of drying equipment and procedures may be obtained from companies such as Hercules Inc., Wilmington, DE 19899.

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MILITARY INTEREST

CIVIL AGENCY COORDINATING ACTIVITY:
GSA-FSS

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Army - ME
Navy - YD
Air Force - 68

Project No. 6810-0917

User activities:

Navy - AS, SH

Preparing activity:

Army - ME

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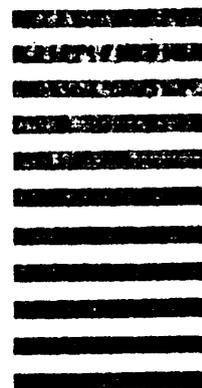
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