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INCH-POUND
MIL-DTL-244B
12 November 1996
SUPERSEDING
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DETAIL SPECIFICATION

NITROCELLULOSE

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, examinations and tests for five grades, four types, and two classes of nitrocellulose for use in propellant.

1.2 Classification. Nitrocellulose is classified into the following grades, types, and classes.

Grade A - Pyrocellulose

Type I Nitrogen Content 12.6 ± 0.10%

Type II Nitrogen Content 12.6 ± 0.15%

Grade B - Guncotton Nitrogen Content 13.35% minimum

Grade C - Blend of Pyrocellulose and Guncotton

Type I - Nitrogen Content 13.15 ± 0.05%
Type II - Nitrogen Content 13.25 ± 0.05%

Grade D - Nitrogen Content 12.20 ± 0.10%

Grade E - Nitrogen Content 12.00 ± 0.10%

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document, should be addressed to: Commander, U.S. Army ARDEC, ATTN: AMSTA-AR-EDE-S, Picatinny Arsenal, NJ 07806-5000 by using the Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

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Classes 1 and 2 - Each of these grades and types of nitrocellulose will be produced as either Class 1 or Class 2 depending on its specific applications (see 3.2 and 6.1).

2. APPLICABLE DOCUMENTS

2.1 General. The documents listed in this section are needed to meet the requirements specified in sections 3, 4, and 5 of this specification. This section does not include documents 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 requirements documents cited in sections 3, 4, and 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 listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplemented thereto, cited in the solicitation. (see 6.2)

SPECIFICATIONS (see 6.2)

RR-S-366 - Sieve, Test

DEPARTMENT OF DEFENSE

MIL-C-206 - Cellulose (Cotton)

MIL-C-216 - Cellulose, Woodpulp, Sulfite

MIL-E-463 - Ethyl Alcohol (For Ordnance Use)

MIL-C-20330 - Cellulose, Woodpulp (Sulfate)

STANDARDS

DEPARTMENT OF DEFENSE

MIL-STD-129 - Marking for Shipment and Storage.

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MIL-STD-286 - Propellants: Sampling, Inspection and Testing.

(Unless otherwise indicated, copies of above specifications, standards, and handbooks are available from the DOD Single Stockage Point (DODSSP), Standardization Document Order Desk, 700 Robbins Avenue, BLDG 4D, Philadelphia, PA 19111-5094.)

2.3 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 QUALITY CONTROL

ANSI/ISO/ASQC A8402-1994 Quality Management and Quality Assurance Vocabulary

(Application for copies should be addressed to American Society for Quality Control, 611 East Wisconsin Ave, Milwaukee, Wisconsin)

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. (See contract provisions for additional precedence criteria).

3. REQUIREMENTS

3.1 First article. When specified in the contract or purchase order (see 6.2), a sample shall be subjected to first article inspection in accordance with the technical provisions herein (see 4.3).

3.2 Material. The material requirements and test methods for specific classes (applications) of nitrocellulose shall be in accordance with Table I below:

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Table I
Requirements and test methods for classes 1 and 2 applications

Classes	Applications	Requirements Paragraphs	Applicable Test Method Paragraphs
1	For combustible cartridge applications	3.1 to 3.11 inclusive	4.5.1 to 4.5.12 inclusive
2	For all other applications	3.1, 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8, 3.9 3.11	4.5.1 to 4.5.9 inclusive

3.2.1 Water. The water used at all stages in the manufacturing process shall be clean and free from suspended matter or sediment.

3.2.2 Alcohol. The alcohol used in the manufacture of nitrocellulose shall conform to the requirements for Grade 2 of Specification MIL-E-463.

3.2.3 Cellulose. The cellulose used shall be derived from cotton cellulose, woodpulp cellulose obtained by the sulfate process or woodpulp cellulose obtained by the sulfite process, fabricated in sheeted or baled form, conforming to the chemical and physical requirements of Specifications MIL-C-206, MIL-C-20330, or MIL-C-216 respectively except that sheeted or baled material is acceptable.

3.3 Chemical properties. The chemical properties shall be as specified in Table II for all classes of nitrocellulose when determined in accordance with the applicable subparagraphs of 4.4 and 4.5. Blending may be used to achieve the applicable requirements for each particular grade as specified in Table II.

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Table II Chemical properties

Grade/Type		Nitrogen content	Ether alcohol solubility %, (Min.)	Acetone insoluble maximum %, (Max.)	Ash Max	See Foot note
A	I	12.6 ± 0.10	99	0.4	0.4	1
	II	12.6 ± 0.15	99	0.4	0.4	1
B		13.35 min.		0.4	0.4	
C	I	13.15 ± 0.05		0.4	0.4	2
	II	13.25 ± 0.05		0.4	0.4	2
D		12.20 ± 0.10	99	0.4	0.4	3
E		12.00 ± 0.10	99	0.4	0.4	4

Footnotes:

1- The required nitrogen content may be obtained by blending nitrocellulose containing from 12.45 to 12.75 percent nitrogen.

2. - The limits for solubility of Grade C nitrocellulose in ether-alcohol shall be left to the discretion of the manufacturer using the nitrocellulose in the production of propellants. However, when nitrocellulose is purchased and used by a different plant from that producing it, detailed requirements for solubility shall be as specified in the contract or order (see 6.2g).

3.- The required nitrogen content may be obtained by blending nitrocellulose containing from 12.05 to 12.35 percent nitrogen.

4. - The required nitrogen content may be obtained by blending nitrocellulose containing from 11.90 to 12.20 percent nitrogen.

3.4 Viscosity. Detailed requirements for viscosity shall be as specified in the contract or order (see 6.2h), when tested as specified in 4.5.5.

3.5 Deterioration in storage. Nitrocellulose of Grade A (Types I and II), Grade B, Grade C (Types I and II), Grade D, or Grade E for all Classes which has been stored prior to its use in the manufacture of propellant shall, within a period of 2 weeks prior to its use, conform to the requirements specified in 3.8.

3.6 Fineness. Detailed requirements for fineness shall be as specified in the contract or order (see 6.2i), when tested as

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specified in 4.5.6.

3.7 134.5 degree Centigrade (C.)heat test. Nitrocellulose shall meet a minimum heat test period of 30 minutes, when tested as specified in 4.5.7.

3.8 65.5 degree Centigrade (C.) heat test. When specified by the procuring officer, heat test shall be conducted with potassium iodine (KI) starch paper. Nitrocellulose shall meet a minimum KI test period of 35 minutes, when tested as specified in 4.5.8.

3.9 Manufacturing procedure. The following procedures shall be used for the manufacture of nitrocellulose:

3.9.1 Drying. Cotton cellulose conforming to the requirements of Specification MIL-C-206 may be dried before nitration when producing Grades A, B, and C nitrocellulose, and when producing Grades D and E nitrocellulose in a continuous process. Cotton cellulose conforming to the requirements of Specification MIL-C-206 shall be dried before nitration when producing Grades D and E nitrocellulose in a batch nitration process. The drying temperature at no time shall exceed 110 degrees C. Wood sulfate cellulose conforming to the requirements of Specification MIL-C-20330 and wood sulfite cellulose conforming to the requirements of Specification MIL-C-216 may be subjected to rapid drying in a continuous sheet at a temperature preferably not higher than 165 degrees C., and shall not be higher than 175 degree C. The time of exposure to temperature above 165 degree C. shall in no event exceed 15 minutes.

3.9.2 Preliminary boiling. The nitrocellulose shall be boiled in tubs so constructed that the nitrocellulose shall not come into direct contact with the heating coils or with the live steam from the coils. The nitrocellulose shall be entirely covered with boiling water. During the process, the temperature shall at all times be kept as close to 100 degrees C as possible. Where barometric conditions reduce the boiling temperature, the temperature required is the highest that can be attained. Irrespective of the boiling points of water in the particular locality, the temperature at no point in the tub shall be less than 95 degrees C. No alkali shall be used in this preliminary boiling. The treatment shall be so arranged with regard to the type of water used, that the first boil shall be with a distinctly acid water, not less than 0.05 percent acidity and preferably within the limits of 0.05 to 0.50 percent acidity calculated as sulfuric acid and tested for acidity at approximately 2 hours after commencement of boiling treatments and at intervals during the first boil.

3.9.2.1 For Grades A, D and E nitrocellulose. For Grade A nitrocellulose, the preliminary boiling treatment shall be not less than 20 hours, followed by two 5-hour boils with a change of water after each boil. For Grades D and E nitrocellulose, the

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preliminary boiling treatment shall be not less than 15 hours, followed by two 5-hour boils with a change of water after each boil.

3.9.2.2 For Grade B nitrocellulose. For Grade B nitrocellulose, the first boil of the preliminary boiling treatment shall be not less than 40 hours, followed by two 5-hour boils with a change of water after each boil.

3.9.3 Pulping. The nitrocellulose shall then be pulped in water to which may be added just enough sodium carbonate solution to preserve a slight alkaline reaction to phenolphthalein. The addition of sodium carbonate in dry form instead of solution is allowed. The pulping process shall be continued until the nitrocellulose is thoroughly and evenly pulped to a satisfactory degree of fineness. During this process, the water shall be changed to the extent which may be necessary to remove impurities.

3.9.4 Poaching. After pulping, the nitrocellulose shall be run to the poachers, settled, decanted, and washed if necessary. The nitrocellulose shall then be boiled for 4 hours in fresh water, and during this time a total of not more than 10 gallons of sodium carbonate solution for each 2,000 pounds of dry nitrocellulose may be added at intervals. The solution shall contain one pound of sodium carbonate per gallon. The addition of sodium carbonate in dry form instead of solution form is allowed. During this and all other boiling treatments in the poachers, the pulp shall be thoroughly agitated by mechanical stirrers with sufficient water added to mix thoroughly all pulp in the poacher. The water shall be boiled by injecting live steam into it in such a manner that the temperature at no point in the tub will be less than 95 degrees C. (without correction for boiling water). After each boiling treatment, sufficient water shall be added to replace that lost by evaporation and the contents of the tub agitated. The nitrocellulose shall be allowed to settle and the clear water decanted as completely as possible so that at least 30 percent of the contents of the tub shall be drawn off. The tub shall then be filled with fresh water, boiled 2 hours, settled, decanted and refilled with fresh water. The boiling shall then be continued for 1 hour and this process repeated, making a total boiling treatment in the poacher as follows:

4 hours boiling, with or without sodium carbonate

2 hours boiling, without sodium carbonate

1 hour boiling, without sodium carbonate

1 hour boiling, without sodium carbonate

Each boiling shall be followed by settling and change of water. However the settling and change of water after the final 1 hour boiling, without sodium carbonate, may be omitted in plants using

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a filter method of washing as described in 3.9.5, when approved by the contracting agency.

3.9.5 Washing. After poaching, the nitrocellulose shall have a sufficient number of cold water washings (not less than 2) to insure its conformance with the requirements of this specification. Each washing shall consist of agitation by mechanical means for 1/2 hour in a sufficient amount of fresh water, with thorough settling and decantation of the clear water. In decanting, at least 30 percent of the total contents of the tub shall be drawn off. Any other practical method of washing which removes an equivalent amount of impurities, such as displacement washing by means of a filter, may be employed, provided that the details of the process are submitted to and approved by the contracting agency.

3.9.6 Screening. Nitrocellulose shall be screened to remove fibers not properly pulped. The width of the slots shall not be greater than 0.022 inch. Only the material which passes through the screen shall be offered in the finished lot.

3.9.7 Complete process. Written details of the complete manufacturing process (including the boiling schedules for individual products), and the equipment used by the contractor shall be submitted to the contracting agency. Written approval shall be received from the contracting agency prior to commencement of manufacture. Any deviation from the approved manufacturing process must be submitted in writing to the contracting agency and written approval received prior to use. The contractor shall inform the inspector of all major and minor changes in manufacture.

3.10 (Nitrocellulose for use in Class 1 applications see 6.1). Nitrocellulose for use in combustible cartridge case and combustible paper applications shall meet the requirements of 3.10.1 and 3.10.2.

3.10.1 Product purity. During packaging visually examine nitrocellulose in accordance with 4.4.4 and 4.5.10. Any drum which contains multiple non-nitrocellulose material (more than three particles) shall be sampled and tested in accordance with 4.5.11. Any drum sampled shall be reprocessed. The testing information shall be provided to the technical agency (see 6.13) for information only.

3.10.2 Oil and grease content. The nitrocellulose shall be tested for oil and grease content in accordance with 4.5.12. If the nitrocellulose oil and grease content exceeds 0.1 percent then the lot shall not be submitted for use in combustible paper product type components.

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3.11 Workmanship. Examination for workmanship shall be conducted on each sample selected for testing in accordance with 4.4 and 4.5. If any sample fails to meet any test requirement, the lot represented by the sample shall be rejected. The nitrocellulose lot shall maintain a uniform composition, texture, and color while meeting all requirements for the applicable class and grade.

4. VERIFICATION

4.1 General provisions. 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 the specification where such inspections are deemed necessary to ensure supplies and services conform to the prescribed requirements. Reference shall be made to ANSI/ISO/ASQC A8402-1994 in order to define the terms used herein. All items must 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in conformance inspection does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.1.1 Submission of product. At the time each completed lot of items deliverable under the contract is submitted to the Government for acceptance, the contractor shall supply the following information accompanied by a certificate which attests that the information provided is correct and applicable to the product being submitted:

a. A statement that the lot complies with all of the conformance inspection provisions specified in this specification.

b. Drawing, specification number and date, together with identification and date of changes thereto.

c. Certificates of analysis on all materials used directly by the contractor when materials are controlled by Government specifications shall be made available upon request by the Contracting Officer.

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d. Results for all inspections performed.

e. Quantity of product in the lot.

f. Date submitted

certificate shall be signed by a responsible agent of the certifying organization. The initial certificate submitted shall be substantiated by evidence of the agent's authority to bind his principal. Substantiation of the agent's authority will not be required with subsequent certificates unless, during the course of the contract, this authority is vested in another agent of the certifying organization.

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

a. First article inspection (see 4.3).

b. Conformance inspection (see 4.4).

4.2.1 Inspection condition. Unless otherwise specified, all inspections shall be performed in accordance with the test conditions specified in 4.4 and 4.5.

4.3 First article inspection.

4.3.1 Submission. Prior to initiation of regular production, the contractor shall submit a first article sample consisting of 50 lbs of nitrocellulose for each specific class, Grade, and Type of nitrocellulose pertaining to the contract in accordance with instruction issued by the contracting officer for evaluation in accordance with 4.3.2. The sample shall be composed of three equal portions each taken from one of the three nitrocellulose drums, representative of the beginning, the middle and the end of the first article lot respectively, utilizing standard sampling procedures. All samples submitted shall have been produced by the contractor using the same production process, procedures, and equipment as will be used in regular production, and shall be accompanied by certificates of analysis. Supplemental first article samples, or portion thereof, as directed by the contracting officer, shall also be submitted in accordance with the contract provision: Instruction Regarding Submission of First Article.

4.3.2 Inspection to be performed. The sample will be subjected by the Government to any or all of the examinations of tests specified in 4.5.1 through 4.5.12 of this specification.

4.3.3 Rejection of first article samples. If any sample fails to comply with any of the applicable requirements, the first article quantity shall be rejected. The Government reserves the right to terminate its inspection upon any failure of a sample to comply with any of the stated requirements.

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4.4 Conformance inspection.

4.4.1 Inspection lot formation. The term "inspection lot" is defined as a homogeneous collection of units of product from which a representative sample is drawn or which is inspected 100 percent to determine conformance with applicable requirements. Units of product selected for inspection shall represent only the inspection lot from which they are drawn and shall not be construed to represent any prior or subsequent quantities presented for inspection. Homogeneity shall be considered to exist provided the inspection lot has been produced by one manufacturer, in one unchanged process, using the same materials and methods, in accordance with the same drawings, same drawing revisions, same specifications, and same specification revisions. All material submitted for inspection in accordance with this specification shall comply with the homogeneity criteria specified herein, regardless of the type of inspection procedure which is being applied to determine conformance requirements.

4.4.2 Examination and tests.

a. Classification of characteristics. Conformance examinations and tests are specified in the following Classification of Characteristics paragraphs. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing and specification requirements utilizing as a minimum the conformance criteria specified. When cited herein, attributes sampling inspection shall be conducted in accordance with Table III, using the inspection levels stated in the Classification of Characteristics paragraphs. For the classification of characteristics, the following definitions apply:

Critical - A critical defect is a defect that is likely to result in hazardous or unsafe conditions for individuals using, maintaining, or depending upon the product, or a defect that analysis indicates is likely to prevent performance of the tactical function of a major end item such as a tank, land vehicle, missile, aircraft, artillery, or other major weapon system.

Major - A major defect is a defect, other than critical, that is likely to result in failure, or to reduce materially the usability of the unit of product for its intended purpose.

Minor - A minor defect is a defect that is not likely to reduce materially the usability of the unit of product for its intended purpose, or is a departure from established standards having little bearing on the effective use or operation of the unit.

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Table III
Attributes sample inspection

Lot size (# of containers)	Inspection levels I	II
2 to 8	*	5
9 to 15	*	5
16 to 25	*	5
26 to 50	32	5
51 to 90	32	13
91 to 150	32	13
151 to 280	32	20
281 to 500	32	20
501 to 1200	80	20
1201 to 3200	80	32
3201 to 10000	125	32
10001 to 35000	125	50
35001 to 150000	125	50
150001 to 500000	200	50
500001 and over	200	50

Numbers under inspection levels indicate sample sizes; asterisks (*) indicate one hundred percent inspection. If sample size exceeds lot size, perform one hundred percent inspection. Accept on zero and reject on one or more for all inspection levels.

b. Alternative conformance provisions. Unless otherwise specified herein or provided for in the contract, alternative conformance procedures, methods, or equipment, such as statistical process control, tool control, other types of sampling procedures, etc. may be used by the contractor when they provide as a minimum the level of verification required by the provisions herein. Prior to applying such alternative procedures, methods, or equipment, the contractor shall describe them in a written proposal submitted to the Government for evaluation (see 6.11). When required, the contractor shall demonstrate that the effectiveness of each proposed alternative is equal to or better than the specified quality conformance provision(s) herein. In case of dispute as to whether the contractor's proposed alternative(s) provides equivalent assurance, the provisions of this specification shall apply. All approved alternative provisions shall be specifically incorporated into the contractor's quality program or inspection system, as applicable.

c. Contractor conformance system. If the contractor desires to utilize a conformance system, which is at variance

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with the conformance inspection and testing provisions of 4.4, 4.5, and other documents referenced herein, he shall submit a written description of production. It shall include a description covering controls for lot formation and identification, inspections to be performed, inspection stations, sampling procedures, methods of inspection, (measuring and testing equipment), and provisions for control and disposition of non-conforming material. The written description will be considered acceptable when, as a minimum, it provides the verifications required by the provisions of 4.4, 4.5, and other documents referenced herein. The contractor shall not be restricted to the inspection station or the method of inspection listed in this specification provided that an equivalent control is included in the approved conformance procedure. In cases of dispute as to whether certain procedures of the contractor's system provide equal assurance, the comparable procedure of this specification shall apply. The contractor shall notify the Government of, and obtain approval for, any changes to the written procedure that affects the degree of assurance required by this specification or other documents reference herein.

4.4.2.1 Classification of characteristics - drums prior to filling with nitrocellulose.

Classification	Examination/test	Conformance criteria	Requirement paragraph	Inspection method ref.
Critical	None defined			
Major				
101	Foreign material	Level I	5.1, 6.4.2.1	Visual
102	Holes in container	Level I	5.1, 6.4.4	Visual
103	Holes in bag	Level I	5.1, 6.4.2	Visual
Minor	None defined			

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4.4.2.2 Classification of characteristics - drums prior to closing.

Classification	Examination/test	Conformance criteria	Requirement paragraph	Inspection method ref.
Critical	None defined			
Major				
101	Nitrocellulose not uniformly wet with water	Note a.	5.1, 6.4.1.1	Visual & 4.5.9
102	Nitrocellulose inadequately treated with alcohol	Note a.	5.1, 6.4.1.2	Visual & 4.5.9
103	Product purity (for NC used in Class 1 applications)	4.4.4	3.10.1, 3.11	4.5.10 4.5.11
104	Oil and grease content (for NC used Class 1 applications)	4.5.12	3.10.2, 3.11	4.5.12
Minor				
201	Failure of drums to meet Department of Transportation Regulations	Level II	5.1, 6.4.2	Visual

Note a. - The first drum of each nitrocellulose blend.

4.4.2.3 Classification of characteristics - drums after closing.

Classification	Examination/test	Conformance criteria	Requirement paragraph	Inspection method ref.
Critical	None defined			
Major				
101	Heads of drums incorrectly sealed.	Level I	5.1, 6.4.2	Visual
102	Marking incorrect, misleading or unidentifiable	Level I	5.2, 6.4.3	Visual
Minor	None defined			

4.4.3 Sampling for tests and treatment results [except for product purity (3.10.1) and oil and grease (3.10.2) requirements for Class 1 applications]. Three samples each consisting of 8 ounces, shall be selected from each lot and subjected to all the

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tests specified herein. Each test shall be evaluated independently of any other test. If the three sample results from each test comply with the applicable requirements, further testing is not required. If two or three of the sample results for any test(s) fail to comply with the requirement for that test, the lot shall be rejected. If only one of the sample results fails to comply with the applicable requirements, that result which fails to comply shall be tested for possible classification as an "extreme observation" (see 6.7) as follows:

(a) If the result failing to comply with the requirement is the highest value observed. The following test shall be made:

If (H-M)/(H-L) > .941, the highest value shall be considered an "extreme observation".

(b) If the result failing to comply with the requirement is the lowest value observed, the following test shall be made:

If (M-L)/(H-L) > .941, the lowest value shall be considered an "extreme observation".

where H = highest value
M = middle value
L = lowest value

4.4.3.1 "Extreme observation". (see 6.7) If classified by the above criteria as an extreme observation, the suspected result shall not be further considered. The drum from which the extreme observation sample was obtained shall be excluded from acceptance. However, three additional samples shall be selected and retested under the particular test procedure(s) which produced the outlying results. If one result fails to comply with the requirement on retest, the lot shall be rejected.

4.4.3.2 Not an "extreme observation". If the suspected result is not classified by the above criteria as an "extreme observation", the lot shall be rejected.

4.4.4 Sampling for product purity (for Class 1 applications only). The number of drums to be visually inspected for product purity shall be as specified in Table IV, following process qualification (see 6.6).

TABLE IV Drum inspection frequency

No. of previous nitrocellulose lots without any containers identified as being contaminated (see 3.10.1)	% of drums to be inspected for contaminants
0-10	50
11 or more	25

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4.5 Methods of inspection. The tests in 4.5.1 through 4.5.12 shall be performed using prescribed analytical procedures for replicate determinations given in standard analytical textbooks.

4.5.1 Nitrogen content. The nitrogen content shall be determined as specified in Standard MIL-STD-286, either Method 209.3 or Method 209.11.

4.5.2 Ether-alcohol solubles.

4.5.2.1 Preferred method. Approximately 10 grams (gm) of nitrocellulose shall be dried in a non-sparking and explosion-proof hot air blower for 30 minutes at 60 to 70 degrees C., and 20 to 40 pounds per square inch (p.s.i.). About 5 gms of the dried material shall be transferred to a weighing bottle and dried uncovered for 30 minutes in a steam-heated drying oven maintained at 100 degrees to 105 degrees C. A steam-heated oven should be the only type of oven used for this purpose. The bottle shall be removed, cooled in a desiccator, and then weighed to the nearest centigram (cg.). A 2 gm specimen from the bottle shall be weighed by difference, into a 16 ounce, screw-capped jar. A 75 milliliter (ml) portion of ethyl alcohol shall be added and the sample shall be permitted to soak for 30 minutes. A 150 ml portion of ether shall be added to the jar and contents. The screw cap shall be tightened and the jar and contents shall be shaken (manually or by a shaker) for at least 5 minutes. Place jar and contents in a water bath maintained at 15.5 degrees C and allow to settle for 30 minutes. Alternate, maintain the closed jar in a vapor proof refrigerator for 30-45 minutes. A 50 ml. portion of the clear supernatant liquid shall be transferred, by means of a graduate, to a tared aluminum container (50 millimeter (mm) in height and 90 mm. in diameter, having a tightly fitted cover). The container and content shall be placed on a steam bath for 1 to 2 minutes to evaporate some of the ether, and then the nitrocellulose shall be precipitated by the drop-wise addition, with vigorous stirring of 20 ml. of distilled water. The contents shall be permitted to evaporate to dryness on the steam bath. The container shall be transferred to an oven and dried for 30 minutes at 100 degrees to 105 degrees C. The container shall then be removed, cooled in a desiccator and weighed. The gain in weight of the aluminum can shall be considered to be that of soluble nitrocellulose. A blank shall be run concurrently with the specimen. The same proportions of reagents shall be used for the blank as for the specimen. The blank shall be subjected to the same process and operations as the specimen. Any residue obtained with the blank shall be deducted from that found in the determination. The percentage of soluble material shall be calculated as follows:

$$\text{Percent ether-alcohol solubles} = \frac{\text{residue in gms. x 450}}{\text{weight of specimen in gms.}}$$

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4.5.2.2 Alternate method. A one gm. sample of the dried nitrocellulose shall be placed in an ether-alcohol solubility tube. A 100 ml. portion of ethyl-alcohol shall be added and the mixture shaken for approximately 5 minutes. A 200 ml. portion of ethyl ether shall be added, and the tube and contents shaken for an additional 5 minutes. The tube shall be allowed to stand in a vertical position for one hour. The volume of insoluble material shall be determined from the scale on the tube. If the volume is 0.25 ml. or less, the percentage of insoluble material will be considered to be 1 percent. If the volume exceeds 0.25 ml., the method specified in 4.5.2.1 shall be used.

4.5.3 Acetone insolubles.

4.5.3.1 Standard Method. A 1.0 gm. portion of the previously dried nitrocellulose (see 4.5.2) weighed to the nearest 0.1 milligram (mg.), shall be transferred to an appropriate size glass container (e.g., 250 ml.). The material shall be moistened with 10 ml. of ethyl alcohol. A 150 ml. portion of filtered, reagent grade acetone shall be added and this mixture shaken until solution is complete. The solution shall be filtered through a well prepared and tared Gooch crucible. Any residue in the flask shall be transferred to the Gooch by means of several small rinses of acetone. The excess of acetone in the crucible shall be removed by sucking air through for several seconds. The crucible shall be dried for 45 minutes in an oven maintained at 100 degrees to 105 degrees C. Any increase in weight of the crucible shall be calculated as percentage of acetone insoluble materials.

4.5.3.2 Alternate method. A visual inspection of the solution shall be made after the 150 ml portion of the filtered reagent grade acetone is added, and the mixture shaken. If the visual inspection shows only a few fibers to be present, the acetone insolubles are reported as a trace. If more than a few fibers remain undissolved, transfer the solution to a graduated solubility tube and allow to stand approximately four hours. If the residue does not exceed 0.1 ml, the acetone insolubles are reported as a trace. If it is apparent that the acetone insolubles exceed 0.1 ml, filter the solution through a tared Gooch crucible and proceed as described in 4.5.3.1.

4.5.4 Ash. A 2.0 gm. portion of the previously dried nitrocellulose (4.5.2) weighed to the nearest 0.1 mg. shall be placed in an ignited and tared crucible. With gentle stirring, sufficient acetone, containing 5 percent by volume of caster oil shall be added to gelatinize the nitrocellulose. The crucible shall be ignited gently and then the nitrocellulose shall be allowed to burn (without applying any further heat) until a charred residue remains. If preferred, the nitrocellulose may be digested in the crucible with nitric acid and then ignited directly. Avoid spattering of liquids while heating. The ignition shall be continued until no further change is noted in the contents. The crucible shall be cooled in a desiccator and

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reweighed. The gain in weight of the crucible shall be calculated as percentage of ash. A blank shall be run concurrently with the specimen on the same volume of reagent employed. The blank shall be treated in the same manner as the specimen. Any residue of ash found in the blank shall be subtracted from the ash found in the nitrocellulose specimen.

4.5.5 Viscosity.

4.5.5.1 Apparatus.

4.5.5.1.1 Viscosimeter. The viscosimeter employed for this determination shall be the falling ball viscosimeter or approved equal. This viscosimeter consists of a glass tube 14 inches in length with an internal diameter of 1 inch. The lower end of the tube is closed by means of a tightly fitting silicon rubber stopper. A circle is etched on the tube 2 inches from each end, making 2 marks exactly 10 inches apart (see 6.9).

4.5.5.1.2 Spheres.

4.5.5.1.2.1 Physical properties. The steel balls shall be ordinary 5/16 inch steel ball bearings, having a diameter of 0.793 to 0.795 centimeter and weighing 2.025 to 2.045 gm.

4.5.5.1.2.2 Calibration. To calibrate the spheres, the viscosimeter tube shall be filled with oil or solution of known viscosity (sugar, glycerin, etc.) and immersed in a constant temperature bath maintained at 25 degrees plus or minus 0.2 degrees C. until its contents reach equilibrium. The balls shall be individually dropped through the tube. The time of passage between the etched circles (see 4.5.5.1.1) shall be noted. The tube factor K shall be determined as follows:

$$K = N/[t(D-d)]$$

where:

N = viscosity in centipoises of solution
t = time in seconds
D = density of the ball gm/ml. at 25 degrees C.
d = density of the liquid gm/ml. at 25 degrees C.

When 1 ball has been selected by careful measurement, it shall be weighed and the other spheres chosen shall be of approximately the same weight. The other balls shall be calibrated and only those are retained which have the same constant within plus or minus 5 percent of that of the first ball selected. Specific gravity and density are at 25 degrees C. referred to water at 40 degrees C.

4.5.5.2 Drying of sample. About 50 gm of wet nitrocellulose shall be spread in a layer not more than 1/4 inch thick, on a paper tray, and air dried for at least 16 hours at room temperature; or the nitrocellulose shall be placed in a

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cylindrical container, open at one end and screened at the other, which is set in a hot air blower (see 4.5.2) through which air at a temperature of 65 degrees + 10 degrees C. and a pressure of 20-40 p.s.i. is blown for 15 minutes. In either case the material shall be dried until lumps can be removed by rubbing the material through a coarse United States (U.S.) Standard Sieve Numbers (Nos.) 8 to 10, conforming to the requirements of RR-S-366. The material shall then be spread out on a paper tray in layer form which is not more than 1/4 inch thick, and drying continued, preferably in an oven (see 4.5.2.1), for one and one half hours at 70 degrees C. The material shall then be transferred to a tightly stoppered container.

4.5.5.3 Preparation of specimen. A 20 gm portion of the dried nitrocellulose, weighed to nearest cg., shall be transferred to a 16 ounce wide-mouthed bottle, or a 1 liter Kjeldahl flask. A 20 gm. portion of ethyl alcohol (U.S.P. Grade) shall be added and the mixture shaken gently to wet the mixture as thoroughly as possible. A 160 gm. portion of acetone shall be added and the container stoppered. The stopper should be covered with metal foil. The container shall be fastened to a shaking device so that the material will flow rather than mix with air (a rotating wheel with the bottle held at an angle of 45 degrees to the plane of rotation is satisfactory). Mixing shall be continued until solution is complete and the solution immediately poured into the viscosimeter tube.

4.5.5.4 Procedure. The lower end of the glass viscosimeter tube shall be closed tightly by means of a silicon rubber stopper. The tube shall then be filled with nitrocellulose solution until the liquid level is at least 1 inch above the upper circle. In order to reach equilibrium, the tube shall then be immersed in a constant temperature bath maintained at 25 degrees C. plus or minus 0.2 degrees C for at least 1 hour. At the end of this period the tube shall be withdrawn from the bath, wiped dry and then supported in a vertical position by means of a clamp and ring stand. Two or more steel balls, previously calibrated (see 4.5.5.1.2.2) shall be allowed to fall separately through the solution, and the time required for each ball to fall from the upper to the lower etched circle shall be noted by means of a stopwatch. The axis of the tube shall be adjusted until the balls fall concentrically, thus showing the glass tube to be in a vertical position. The arithmetic average in seconds, of the time required for the balls to fall from the upper to the lower etched circle shall be reported as the desired value.
Calculation for viscosity:

(n) Viscosity = KT(D-d)

where:

n = viscosity in centipoises.
K = constant expressed in centipoises
T = average falling time

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D = density of spheres gm/cc at 25 degrees C.
d = density of liquid gm/cc at 25 degrees C.

4.5.6 Fineness. A 10 gm. specimen, previously dried at 100 degrees to 105 degrees C. and weighed to the nearest decigram, shall be placed in a 250 ml. beaker. A 100 to 150 ml. portion of distilled water shall be added and mixed gently rotating the beaker. The mixture shall be transferred to a 250 ml. glass - stoppered measuring cylinder, graduated in 2 ml. divisions over a length of approximately 10 inches. The beaker shall be rinsed several times with small washes of distilled water, adding each wash to that present in the cylinder until the suspension measures approximately 200 ml. The cylinder shall be stoppered and then shaken vigorously with a vertical motion. The stopper shall be removed and the stopper and sides of the cylinder shall be rinsed down until the volume of the suspension reaches 250 ml. The stopper shall be replaced and the cylinder allowed to stand for 1 hour. At the end of this time the volume in ml. occupied by the nitrocellulose, shall be read and this value shall be considered as fineness.

4.5.7 134.5 degrees C. heat test. The test shall be conducted in accordance with Standard MIL-STD-286, Method 404.1.

4.5.8 65.5 degrees C heat test (with K.I. starch paper).

4.5.8.1 Drying of sample. If the nitrocellulose contains a large excess of water, about a 50 gm. portion shall be pressed in a clean cloth or wrung out in a wringer. The cake in the cloth shall be rubbed out until fine, taking care that it does not come into contact with the hands. The material shall be spread out on clean paper trays, and dried in a steam-operated air bath at 40 degrees to 45 degrees C. The time required for drying at 40 degrees C to 45 degrees C. may be reduced by blowing previously cleaned (filtered) air at room temperature for approximately 10 minutes through the nitrocellulose sample container, in a suitable holder. Drying shall continue until the proper moisture content is obtained. The desired moisture content shall be that which will give condensation of moisture in diminishing amounts in the 5 test tubes to be used, ranging from an appreciable amount in the first test tubes to none in the fifth, as the test progresses. The proper condition of the nitrocellulose for the first sample shall be indicated when the nitrocellulose clings, after rubbing, to a spatula or to tissue paper which has been wrapped about the fingers.

4.5.8.2 Preparation of specimens in tubes. A specimen of 1.3 gm. shall be weighed out to the nearest cg. and transferred to a tube, by means of a paper cylinder inserted to within 2 inches of the bottom of the test tube, which is withdrawn after consolidation of the specimen, or a similar device. Tubes 5.5 inches long, 0.5 inch internal diameter and 0.62 inch external diameter shall be used. Drying of the nitrocellulose shall be continued and additional specimens selected at intervals of 4 to

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5 minutes until 5 tubes have been prepared. The nitrocellulose shall be pressed down or shaken in each tube until it occupies a space 1.62 inches long. A blank assembly without nitrocellulose shall also be prepared. During the test each tube shall be closed by means of a clean, tightly fitting cork stopper through which passes a tightly fitting glass rod equipped with a platinum holder. A 1/2 inch stainless steel holder (rod with hook at end) may be used as a substitute for the glass rod with hooks. The holder is prepared by twisting approximately 2 inches of platinum wire into a helix composed of 2 coils. A strip of standard KI starch test paper, approximately 1 inch in length and 0.37 inch wide, shall be inserted between the coils of the helix of the platinum holder.

4.5.8.3 Procedure. The temperature of the heating bath shall be regulated at 65.5 degrees plus or minus 0.5 degrees C. and placed so that a bright reflected light (not direct sunlight) is obtained. The upper half of the test paper shall be moistened with 50 percent solution of U.S.P. glycerin in distilled water. Each tube shall be immersed in the bath to a depth of 2.25 inches. The time when the tubes are placed in the bath, shall be noted. As the tests proceeds, the line of demarcation between wet and dry test paper shall be kept abreast of the lower edge of the moisture film on the wall of the tube. The first appearance of discoloration on the damp portion of the test paper shall be considered as the end of the test for each tube, and the minimum test value obtained shall be considered as the test value of the sample. Any discoloration not greater than that obtained at the same time with the blank shall be disregarded.

4.5.9 Determination of water and alcohol contents (see 4.4.2.2 and 6.4.1). A 5.0 to 15.0 grams specimen of nitrocellulose and water mixture, or nitrocellulose and alcohol mixture shall be weighed by difference to the nearest 0.1 milligram, into a previously dried and tared aluminum dish. The dish and contents shall be placed on a closed steam bath for two hours and then placed in an oven maintained at 100 degrees C. to 105 degrees C., and dried for one hour. The dish and contents shall be removed, cooled in a desiccator and weighed. The percentage of water, alcohol or solvent shall be calculated as follows:

$$\text{Percentage of water, alcohol, or solvent} = \frac{(A-B) \times 100}{A}$$

Where:

A = original weight of specimen before drying
B = weight of specimen after drying to constant weight

4.5.10 Product purity visual test. Visually examine the nitrocellulose at the top of the drum for any non-nitrocellulose material; multiple contaminants (more than three particles) found in a barrel constitutes a failure of this test. The inspection

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area shall have adequate lighting and precautions shall be taken to keep any new contamination from entering the nitrocellulose.

4.5.11 Product purity analysis. Remove approximately one quarter of a pound (center core sample) of nitrocellulose from the drum using an appropriate instrument. Record the weight of the sample. This nitrocellulose sample shall be tested as follows:

(1) The sample for determination of magnetic metal, wood and non-nitrocellulose material shall be spread as thinly as possible on a suitable clean table.

(2) Select a clean bar magnet that is capable of lifting a one (1) pound metal plate.

(3) Pass the magnet over the nitrocellulose approximately one quarter (1/4) inch above the nitrocellulose. Care should be taken to make sure that the magnet passes over all nitrocellulose.

(4) Remove all clinging material from the magnet, weigh material, and determine the size of the largest particle by appropriate means of measurement.

(5) Select a tweezer suitable for safely picking up small amounts of nitrocellulose.

(6) Examine the nitrocellulose, pick out any wood contaminants with the tweezer, weigh contaminants, and determine the size of the largest particle by appropriate means of measurement.

(7) Pick out any remaining contaminants, weigh, and determine the size of the largest particle by appropriate means of measurement.

4.5.12 Oil and grease content test. Determine the oil and grease content of the nitrocellulose using an established method and a sampling plan which has been submitted to and approved by the technical agency (see 6.13).

4.6 Inspection equipment. The inspection equipment required to perform the inspections specified herein is identified in the "Inspection Method Reference" column of the Classification of Characteristics listings starting with 4.4.2.1. Contractor inspection equipment designs shall be submitted for Government approval as specified in the contract. Designs which provide variable measurements instead of attributes data are preferred in order to facilitate the use of statistical process control. See 6.10 herein.

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5. PACKAGING

5.1 Packing. Packaging requirements shall be as specified in the contract or order (see 6.2 and 6.4)

5.2 Marking. Unless otherwise specified (see 6.2 and 6.4.3), marking shall be in accordance with MIL-STD-129.

6. NOTES

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

6.1 Intended use & applications of nitrocellulose classes. Nitrocellulose is used as an energetic ingredient for the production of propellants. Applications for nitrocellulose classes are listed below:

Class 1 - For combustible cartridge applications.

Class 2 - For other applications.

6.2 Acquisition requirements. Acquisition documents must specify the following:

(a) Title, number, and date of this specification.

(b) Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see 2.2.1).

(c) Requirements for submission of first article sample.

(d) Packaging requirements. (See 6.4)

(e) Certificate of conformance for each lot or shipment of product.

(f) Class, grade, or grade and type required (see 1.2).

(g) Ether-alcohol solubility limits for Grade C nitrocellulose (see Table II Note 2).

(h) Viscosity required (see 3.4)

(i) Fineness required (see 3.6).

(j) Process.

6.3 Consideration of data requirements. The following data requirements should be considered when this specification is applied on a contract, per the Contract Data Requirements List, DD Form 1423.

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Reference Paragraph	DID Number	DID Title	Suggested Tailoring
6.4.4	DI-Pack-81059	POP Test Report	none

The above DID's were those cleared as of the date of this specification. The current issue of DOD 5010.12-L, Acquisition Management Systems and Data Requirements Control List (AMSDL), must be researched to ensure that only current, cleared DID's are cited on the DD Form 1423.

6.4 Acceptable packaging requirements. The following packaging and marking requirements have been used for packaging nitrocellulose, and are found to be acceptable to the Government. These requirements should be included in the contract or order for the procurement of nitrocellulose because nitrocellulose is a hazardous energetic material. (Caution: If the following paragraphs are to be incorporated in a contract, they must be modified, using standard contract language, to make them compulsory requirements.)

6.4.1 Preservation.

6.4.1.1 Condition-1. Nitrocellulose should be uniformly wetted with not less than 25 percent by weight of water and has to be packed in a Department of Transportation Specification Container (see 6.4.2.1).

6.4.1.2 Condition-2. Nitrocellulose should be uniformly wetted with not less than 25 percent by weight of alcohol or a solvent with a flash point not lower than 25 degrees F, and has to be packed in a Department of Transportation Specification Container (see 6.4.2.1).

6.4.2 Packaging/packing

6.4.2.1 Level A. Level A packaging for condition 1 or condition 2 materials should be packed in steel drums with a nominal capacity of 55 U.S. gallons conforming to specification 1A2, paragraph 178.504 of Title 49, Code of Federal Regulations (49CFR). The drums should be free of any foreign materials. A bag conforming to Type-I, Class-B, Style-2, MIL-B-117 (an alternate bag which meets the requirements of the present bag may be used), should be placed in the drum and filled with material conforming to 6.4.1.1 or 6.4.1.2, as applicable. Close the bag and secure with tape conforming to Type-IV, Class-1, PPP-T-60, 1 inch wide minimum, (an alternate closure of a plastic cable tie is permissible provided that no damage occurs to the bag). Close and seal the drum.

6.4.2.1.1 Container weight. Gross weight of container should not exceed 490 pounds.

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6.4.2.2 Level B. Level B should be the same as Level A.

6.4.2.3 Level C. Level C should be the same as Level A.

6.4.3 Marking. The drums should be marked as required in accordance with MIL-STD-129, 49 CFR and all other applicable regulations.

6.4.4 Performance oriented packaging (POP). The exterior pack cited above has to meet all of the POP requirements in accordance with 49 CFR, including testing and retesting, as necessary. POP test reports should be generated in accordance with Data Item DI-PACK-81059 following the tests. POP testing may be waived in accordance with 49 CFR, if an acceptable analogy can be made to another pack which has successfully completed the testing. An analogy also has to be documented IAW DI-PACK-81059. When completed, all test reports should be kept on file by the contractor and also should be submitted to the U.S. Army Armament Research, Development and Engineering Center, ATTN: AMSTA-AR-AEP, Picatinny Arsenal, N.J. 07806-5000.

6.4.5 Item hazard classification. All U.S. manufacturers should make certain that every hazardous item is tested in accordance with Part 173 of 49 CFR in order to assign proper Class and Division for the item. Registration with the Associate Administrator of Hazardous Materials Safety is required by 49 CFR so that containers may be properly marked in accordance with 49 CFR.

All foreign manufacturers should make certain that the dangerous goods are tested in accordance with the United Nations Committee of Experts on the Transportation of Dangerous Goods (as published in UN document ST/SG/AC.10.11, latest revision, Recommendations on the Transportation of Dangerous Goods - Tests and Criteria) to determine the proper Class and Division. Registration for air and vessel is required with each manufacturing country's National Competent Authority. The Hazard Classification letter of Competent authority is issued in accordance with Part 2, Paragraph 1.3 of the International Civil Aviation Organization (ICAO) Technical Instructions and approves the Hazard Classification and Compatibility Group assignment and assigns the appropriate shipping name to the dangerous goods. The proper packaging, marking, and labeling is contained in the United Nations Committee of Experts on the Transportation of Dangerous Goods (as published in UN Document ST/SG/AC.10.11 latest revision, Recommendations on the Transport of Dangerous Goods).

For air transport, the dangerous goods have to comply with the provisions of the International Air Transport Association (IATA) Dangerous Goods Regulations. Vessel transport requires that dangerous goods are complied with the provisions of the Intragovernmental Maritime Organization's International Maritime dangerous Goods Code (IMDG Code).

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These documents should be forwarded to the U.S. Army Headquarter Industrial Operation Command ATTN: AMSIO-DMS, AMSIO-ACG, Rock Island, Illinois 61299-6000, and U.S. Army TACOM, Armament Research, Development and Engineering Center, ATTN: AMSTA-AR-ESK, Rock Island, Illinois 61299-6000.

6.4.6 Referenced documents for packaging. The following list of documents referenced in 6.4 should be included in the contract or purchase order as requirement documents. Document users are cautioned that they must meet all requirements of these documents if cited in the contract or purchase order.

(a) Federal and military specifications. (See 2.2.1 for issues of documents and address to obtain the documents)

PP-T-60 - Tape: Packaging, Waterproof
MIL-B-117 - Bags, Sleeves and Tubing Interior Packaging

(b) 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.

CODE OF FEDERAL REGULATION

49 CFR Parts 106-180 - Transportation, Research and Special Programs, Department of Transportation

(The Code of Federal Regulations are available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. Orders for the above publications should cite, "49 CFR 106-180 (latest revision)").

United Nations Committee of Experts on the Transportation of Dangerous Goods, (UN Document ST/SG/AC.10.11, latest revision)

International Air Transport Association (IATA) Dangerous Good Regulations

International Civil Aviation Organization (ICAO) Technical Instructions

Intragovernmental Maritime Organization's International Maritime Dangerous Goods Code (IMDG Code)

(The UN document can be obtained from United Nations Headquarter, Publications Sale Department, New York City, N.Y. 10017. The IATA, ICAO and IMO Dangerous Goods Code/Regulations can be obtained from INTEREG, 5724 N. Pulaski Road, Chicago, Illinois 60646)

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6.5 Quality of nitrocellulose material. As part of the contractor's Quality Program Plan, prepare a list of possible product contamination using contractor's format. This document should list all the key inspections performed by the manufacturer to eliminate potential contaminants.

The definition of non-nitrocellulose materials is those materials present which are visible to the un-aided eye that also include contaminants inherent to the process and equipment used to manufacture the nitrocellulose (i.e. wood, rust, paint chips, metallic particles, etc.)

6.6 Process qualification. The manufacturer of nitrocellulose that is to be used in combustible paper product type components (Class 1 applications) should qualify the manufacturing process to establish baseline data of non-nitrocellulose material observed in the nitrocellulose packaged for shipment. The process qualification should consist of 100% inspection testing and reporting of data, to the requirements delineated in 3.10.1 for ten (10) lots of material sampled and tested for foreign material. Thereafter, inspection and testing have to be performed to the frequency stated in 4.4.4, Table IV. The reporting of data should be made to the technical agency (see 6.13).

6.7 "Extreme observation". "Extreme observation" is defined as an observation that is too far removed from the other observation to warrant the assumption that it is from the same population as the other observations. The probability of such an assumption is less than 5 percent.

6.8 Hercules laboratory type blower system. The "Hercules Laboratory Type Blower System" has been found to be satisfactory for this purpose.

6.9 Falling ball viscometer. The falling ball viscosimeter described in ASTM D-1343-93 has also been found satisfactory and therefore is an approved equal.

6.10 Submission of contractor inspection equipment designs for approval. Submit copies of designs as required to:

Commander, U.S. Army ARDEC, ATTN: AMSTA-AR-QAT-P, Picatinny Arsenal, New Jersey 07806-5000. This address will be specified on the Contract Data Requirements List, DD Form 1423 in the contract.

6.11 Submission of alternative conformance provisions. All contractor proposed alternative conformance provisions should be submitted to the Government for evaluation and approval as directed by the contracting activity.

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6.12 Subject term (keyword) listing.

Cellulose nitrate
Pyrocellulose
guncotton.

6.13 Technical agency. All correspondence to the technical agency should be submitted through the Contracting Officer to: Commander, ARDEC, ATTN: AMSTA-AR-QAT-P, Picatinny Arsenal, N.J. 07806-5000.

6.14 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.

Custodian:
Army - AR
Navy - OS
Air Force - 99

Preparing activity:
Army-AR

(Project 1375-0035)

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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.

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I RECOMMEND A CHANGE:	1. DOCUMENT NUMBER **MIL-DTL-244B**	2. DOCUMENT DATE (YYMMDD) **961112**

3. DOCUMENT TITLE

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4. NATURE OF CHANGE (*Identify paragraph number and include proposed rewrite, if possible. Attach extra sheets as needed.)*

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)*	7. DATE SUBMITTED (*YYMMDD)*

8. PREPARING ACTIVITY

a. NAME **U. S. Army ARDEC**	b. TELEPHONE (*Include Area Code)* (1) Commercial **(201) 724-6671**	(2) AUTOVON **880-6671**
c. ADDRESS (*Include Zip Code)* **ATTN: AMSTA-AR-EDE-S, B-12** **Picatinny Arsenal, NJ 07806-5000**	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	