

INCH-POUND

MIL-E-51454A

23 June 1994

SUPERSEDING

MIL-E-51454

12 October 1979

MILITARY SPECIFICATION

ETHYL ALCOHOL (ETHANOL)

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

1. SCOPE

1.1 Scope. This specification covers four types of ethyl alcohol (ethanol).

1.2 Classification. Ethyl alcohol shall be of the following types and grades as specified (see 6.1):

Type I – Pharmaceutical

Grade A – Anhydrous, no less than 99.8 percent by volume

Grade B – 94.9 to 96.0 percent by weight (meets the requirements for United States Pharmacopeia (U.S.P.) alcohol)

Type II – Denatured (standard formulas designated by the Bureau of Alcohol, Tobacco, and Firearms)

Type III – Proprietary solvents (standard formulas designated by the Bureau of Alcohol, Tobacco, and Firearms)

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Technical Director, U.S. Army Edgewood Research, Development and Engineering Center, ATTN: SCBRD-ENE-S, Aberdeen Proving Ground, MD 21010-5423 by using the self-addressed Standardization Document Improvement Proposal (DD Form 1426) appearing at the end of this document or by letter.

AMSC N/A

FSC 6810

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

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Type IV – Special industrial solvents (restricted sale, standard formulas designated by the Bureau of Alcohol, Tobacco, and Firearms).

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications, standards, and handbooks. The following specifications, standards, and handbooks form a part of this document to the extent specified herein. Unless otherwise specified, the issues of these documents are those listed in the issue of the Department of Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.1)

SPECIFICATIONS

FEDERAL

- | | |
|------------|--|
| NN-P-71 | - Pallets, Material Handling, Wood, Stringer Construction, 2-Way and 4-Way (Partial) |
| TT-E-485 | - Enamel, Semi-Gloss, Rust-Inhibiting |
| TT-W-572 | - Wood Preservative: Water-Repellent |
| PPP-B-585 | - Boxes, Wood, Wirebound |
| PPP-B-601 | - Boxes, Wood, Cleated-Plywood |
| PPP-B-621 | - Boxes, Wood, Nailed and Lock-Corner |
| PPP-C-96 | - Can, Metal, 28 Gauge and Lighter |
| PPP-C-186 | - Container, Packaging and Packing for Drugs, Chemicals, and Pharmaceuticals |
| PPP-C-1337 | - Container, Composite; (Steel Drum with Polyethylene Insert) |
| PPP-C-2020 | - Chemicals, Liquid, Dry, and Paste: Packaging Of |
| PPP-D-729 | - Drums, Shipping and Storage, Steel, 55-Gallon (208 Liters) |
| PPP-P-704 | - Pails, Metal: (Shipping, Steel, 1 Through 12 Gallons) |

STANDARDS

FEDERAL

- | | |
|-------------|--|
| FED-STD-123 | - Marking for Shipment (Civil Agencies) |
| FED-STD-313 | - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to Government Activities |

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- MIL-STD-129 – Marking for Shipment and Storage
- MIL-STD-147 – Palletized Unit Loads

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

2.1.2 Other Government documents, drawings, and publications. The following other Government documents, drawings, and publications form a part of this document to the extent specified herein. Unless otherwise specified, the issues are those cited in the solicitation.

CODE OF FEDERAL REGULATIONS (CFR)

- 16 CFR 1500 – Consumer Product Safety Commission Regulations
Relating to Hazardous Substances and Articles;
Administration and Enforcement Regulations
- 27 CFR 211 – Bureau of Alcohol, Tobacco, and Firearms Regulations
Relating to the Distribution and Use of Denatured
Alcohol and Rum
- 27 CFR 212 – Bureau of Alcohol, Tobacco, and Firearms Regulations
Relating to Formulas for Denatured Alcohol and Rum
- 29 CFR 1910 – Occupational Safety and Health Standards
- 49 CFR 171 to 199 – Department of Transportation Hazardous Materials
Regulations

(The Code of Federal Regulations and Federal Register (FR) are for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. When indicated, reprints of certain regulations may be obtained from the Federal agency responsible for issuance thereof.)

2.2 Non-Government publications. The following documents form a part of this document to the extent specified herein. Unless otherwise specified, the issues of the documents which are DOD adopted are those listed in the issue of the DODISS cited in the solicitation. Unless otherwise specified, the issues of documents not listed in the DODISS are the issue of the documents cited in the solicitation (see 6.1).

AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS

- D 891 – Specific Gravity, Apparent, of Liquid Industrial Chemicals
- D 1193 – Reagent Water
- D 1209 – Color of Clear Liquids (Platinum – Cobalt Scale)
- D 1363 – Permanganate Time of Acetone and Methanol

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- D 1613 – Acidity in Volatile Solvents and Chemicals Intermediates Used in Paint, Varnish, Lacquer, and Related Products
- D 3953 – Strapping, Flat Steel and Seals
- D 4649 – Selection of Stretch, Shrink, and Net Wrap Materials
- D 4727 – Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes

(Application for copies should be addressed to ASTM, 1916 Race Street, Philadelphia, PA 19103.)

INTERNATIONAL CIVIL AVIATION ORGANIZATION

“Technical Instructions for the Safe Transport of Dangerous Goods by Air”

(Application for copies should be addressed to Document Sales Unit, International Civil Aviation Organization, 1000 Sherbrooke Street West, Suite 400, Montreal, Quebec, Canada H3A 2R2.)

INTERNATIONAL MARITIME ORGANIZATION

“International Maritime Dangerous Goods Code”

(Application for copies should be addressed to the International Maritime Organization, 4 Albert Embankment, London SE1 75R.)

UNITED STATES PHARMACOPEIAL CONVENTION, INC.

“The United States Pharmacopeia and The National Formulary”

(Application for copies should be addressed to the United States Pharmacopeial Convention, Inc., 12601 Twinbrook Parkway, Rockville, MD 20852.)

(Industry association specifications and standards are generally available for reference from libraries. They are also distributed among technical groups and using Federal agencies.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein(except for the Code of Federal Regulations), 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 Type I.**

3.1.1 Sediment and suspended matter. Type I ethyl alcohol shall be free of sediment and suspended matter when tested as specified in 4.2.4.1.

3.1.2 Color. Type I ethyl alcohol shall be no darker than APHA No. 10 when tested as specified in 4.2.4.2.

3.1.3 Chemical and physical requirements. Type I ethyl alcohol shall conform to the chemical and physical requirements of table I when tested as specified therein.

TABLE I. Chemical and physical requirements for type I ethyl alcohol

Requirement	Type I		Test paragraph
	Grade A	Grade B	
Assay, percent by volume ethyl alcohol	99.8 to 100.0	94.9 to 96.0	4.2.4.3
Acidity as acetic acid, maximum percent by weight	0.003	0.003	4.2.4.4
Nonvolatile residue, grams per 100 milliliters maximum	0.003	0.003	4.2.4.5
Solubility in water	pass	pass	4.2.4.6
Methyl alcohol (limit 0.1 percent by weight)	pass	pass	4.2.4.7
Fusel oil	pass	pass	4.2.4.8
Substances reducing permanganate (aldehydes and organic impurities), minimum minutes	30	50	4.2.4.9
Acetone, other ketones, isopropyl alcohol, and tertiary butyl alcohol	pass	pass	4.2.4.10

3.2 Type II. Type II ethyl alcohol shall be made from alcohol which conforms to the requirements of type I, prior to denaturing. In addition, it shall be one of the formulas contained in 27 CFR 212, Formulas for Denatured Alcohol and Rum. Unless otherwise specified in the contract or order (see 6.1), type II denatured alcohol shall conform to Formula No. 3-A. The contractor shall provide evidence that this requirement has been met.

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3.3 Type III. Type III ethyl alcohol shall consist of type II, Specially Denatured Alcohol Formula No. 1 (27 CFR 212.16), further modified in accordance with formulas in 27 CFR 211.170, or under such rulings or regulations as may be hereinafter promulgated by the Bureau of Alcohol, Tobacco, and Firearms. The contractor shall provide evidence that this requirement has been met.

3.4 Type IV. Type IV ethyl alcohol shall consist of Specially Denatured Alcohol Formula No. 1 (27 CFR 212.16) or Formula No. 3-A (27 CFR 212.19), further modified in accordance with the formulas in 27 CFR 211.180, or under such rulings or regulations as may be hereinafter promulgated by the Bureau of Alcohol, Tobacco, and Firearms. The contractor shall provide evidence that this requirement has been met.

3.5 Material Safety Data Sheets. Material Safety Data Sheets for ethyl alcohol (ethanol) shall be prepared and submitted by the contractor in accordance with FED-STD-313 (see 6.2).

4. QUALITY ASSURANCE PROVISIONS

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

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

4.1.2 Contractor assurance of compliance. The contractor's quality program or detailed inspection system shall provide assurance of compliance of all characteristics with the applicable drawing, special packaging instruction, and specification requirements using, as a minimum, the conformance criteria specified herein.

4.1.3 Alternative inspection provisions. Alternative inspection procedures, methods, or equipment, such as statistical process control, tool control, and other types of sampling proce-

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dures may be used by the contractor when they provide, as a minimum, the level of quality assurance required by the inspection provisions specified 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 and approval. (See 6.3.) When required, the contractor shall demonstrate that the effectiveness of each proposed alternative is equal to or better than the quality assurance provisions specified herein. In cases of dispute as to whether the contractor's proposed alternative provides equal quality assurance, the provisions of this specification shall apply. All approved alternative inspection provisions shall be specifically incorporated into the contractor's quality program or detailed inspection system, as applicable.

4.2 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the ethyl alcohol of the same type and grade, produced by one manufacturer, at one plant, from the same materials, and under the same manufacturing conditions provided the operation is continuous. In the event the process is a batch operation, each batch shall constitute a lot (see 6.4).

4.2.2 Sampling.

4.2.2.1 For examination of packaging. Sampling shall be conducted in accordance with table II. The sample unit shall be one filled unit or shipping container, as applicable, ready for shipment.

TABLE II. Sampling for examination of packaging

Number of containers in batch or lot	Number of sample containers
1	all
2 to 25	2
26 to 150	3
151 to 1,200	5
1,201 to 35,000	8
Over 35,000	13

4.2.2.2 For type I ethyl alcohol test. See 6.5 for sampling and testing precautions. From each lot, two containers shall be taken at random. From each of the two containers, approximately one quart (0.95 liters) of alcohol shall be taken and placed in separate, clean, dry, metal or glass containers, sealed, and marked. Lots made up of 1-quart (0.95-liter) or smaller containers shall be sampled by selecting at random a sufficient number of containers to obtain approximately 2 quarts (1.9 liters) of alcohol. They shall be marked and sealed. Do not seal the sample with wax, and if cork stoppers are used, cover the corks with tin foil. Portions shall be withdrawn

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from the containers in such a way that the upper layer, which is liable to dilution if the the container has not been properly closed, and the bottom layer, which may contain sediment, will be equally represented in the portion taken from each container.

4.2.2.3 For container leakage test. Sampling shall be conducted in accordance with table III. The sample unit shall be one filled unit or shipping container, as applicable, ready for shipment.

TABLE III. Sampling for container leakage test

Number of containers in batch or lot	Number of sample containers
1	all
2 to 15	2
16 to 25	3
26 to 90	5
91 to 150	8
151 to 500	13
501 to 1,200	20
1,201 to 10,000	32
10,001 to 35,000	50
35,001 to 500,000	80
Over 500,000	125

4.2.3 Inspection procedure.

4.2.3.1 For examination of packaging. Sample unit and shipping containers shall be examined for the characteristics listed below. Failure of any sample unit or shipping container to conform to all characteristics shall be cause for rejection of the lot represented.

- (a) Contents per container as specified
- (b) Container as specified
- (c) Container closure as specified
- (d) Container undamaged and not leaking
- (e) Unit pack interior clean, and free of rust and contamination
- (f) Fiberboard pads and partitions as specified (when required)
- (g) Interior and exterior coating as specified (when required)
- (h) Palletization as specified
- (i) Marking correct

4.2.3.2 For type I ethyl alcohol test. See 6.5 for sampling and testing precautions. Each sample specimen taken in 4.2.2.2 shall be tested as specified in 4.2.4. Failure of any test by either specimen shall be cause for rejection of the lot represented.

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4.2.3.3 For container leakage test. The sample containers selected in 4.2.2.3 shall be tested as specified in 4.2.5. Failure of the container leakage test by any sample container shall be cause for rejection of the lot represented.

4.2.4 Tests. See 6.5 for sampling and testing precautions. Water in accordance with ASTM D 1193 and reagent grade chemicals shall be used throughout the tests. Where applicable, blank determinations shall be run and corrections applied where significant. Tests shall be conducted as follows:

4.2.4.1 Sediment and suspended matter. Visually examine the specimen for evidence of sediment and suspended matter.

4.2.4.2 Color. Determine the color of the specimen in accordance with ASTM D 1209.

4.2.4.3 Assay. Determine the specific gravity of the specimen at 15.6°C/15.6°C in accordance with ASTM D 891. The specific gravity for type I, grade A ethyl alcohol shall be 0.7936 to 0.7946. The specific gravity for type I, grade B ethyl alcohol shall be 0.8118 to 0.8162.

4.2.4.4 Acidity. Determine the acidity of the specimen in accordance with ASTM D 1613.

4.2.4.5 Nonvolatile residue. Evaporate 50 milliliters (mL) of the specimen in a weighed platinum or porcelain dish, using a water bath. Dry for 30 minutes in an oven at approximately 105°C, cool in a desiccator, and weigh. To determine the nonvolatile residue, multiply the increase in weight in grams (g) of the dish by 2.

4.2.4.6 Solubility in water. Mix 15 mL of the specimen with 45 mL of water in a color comparison tube and allow to stand for 1 hour. Compare the mixture with an equal volume of water by transmitted lights. The mixture shall be equal in clarity to the water.

4.2.4.7 Methyl alcohol.

(a) **Potassium permanganate solution.** Prepare 100 mL of an aqueous solution containing 15 mL of 85-percent phosphoric acid and 3 g of potassium permanganate. Renew reagent every 4 weeks.

(b) **Chromotropic acid solution.** Prepare a 5-percent aqueous solution of 4,5-dihydroxy-2,7-naphthalene-disulfonic acid or its sodium salt.

(c) **Procedure.** Dilute a portion of the specimen with water until the ethyl alcohol content is 5- to 6-percent by weight. Pipet 2 mL of the potassium permanganate solution prepared in (a) into a 50-mL volumetric flask, chill in an ice bath, add 1 mL of the diluted specimen, and allow to oxidize for 30 minutes in the ice bath. Decolorize the oxidized sample with a small amount of dry sodium bisulfite; add 1 mL of the chromotropic acid solution prepared in (b); rotate the flask with a swirling motion, simultaneously adding by pipet 15 mL of

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concentrated sulfuric acid. Place the flask containing the solution in hot water (60° to 75° C) for 15 minutes. Remove the flask, cool the contents to room temperature, and make up to 50 mL with water. Compare the color of the sample with that of a standard control sample (95-percent ethyl alcohol containing 0.1-percent by weight methyl alcohol) which has been carried through the same procedure. The specimen passes the test if the depth of the color is less than that of the standard. The presence of methyl alcohol is indicated by a purple colored solution and its absence by a colorless to light straw colored solution.

4.2.4.8 Fusel oil. Mix 10 mL of the specimen with 5 mL of water and 1 mL of glycerin, U.S.P. Allow to evaporate spontaneously from clean, odorless, absorbent paper. The specimen shall be considered as having passed the test if no foreign odor is perceptible when the last traces of alcohol leave the paper.

4.2.4.9 Substances reducing potassium permanganate (aldehydes and organic impurities). Determine the permanganate time of the specimen in accordance with ASTM D 1363.

4.2.4.10 Acetone, other ketones, isopropyl alcohol, and tertiary butyl alcohol. To 1 mL of the specimen, add 3 mL of water and 10 mL of mercuric sulfate test solution (Deniges Reagent) prepared by mixing 5 g of yellow mercuric oxide with 40 mL of water, adding 20 mL of concentrated sulfuric acid while stirring slowly, adding 40 mL of water, and stirring until complete solution is obtained. Heat on a bath of boiling water. The specimen shall be considered as having passed the test if no precipitate appears within 3 minutes.

4.2.5 Container leakage test. Place the sample container in each of the following positions and leave it in each position for a period of 15 minutes:

- (a) upright
- (b) upside down
- (c) on one side (or one quadrant)
- (d) on one end (or second quadrant)
- (e) on other side (or fourth quadrant)

Examine the container after each period for any evidence of leakage.

5. PACKAGING

NOTE: The metric equivalents given for inch-pound quantities are nominal values provided for informational purposes and should not be considered as quantity requirements.

5.1 Packaging. Packaging (including marking and labeling) shall be in accordance with the applicable United Nations (UN) requirements in 49 CFR 171 to 199, and the International Civil Aviation Organization – Technical Instructions for Safe Transportation of Dangerous Goods by Air (ICAO-TDGA) or International Maritime Organization – International Maritime Dangerous Goods Code (IMO-IMDGC), as applicable to the mode of transportation.

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Regardless of mode of transportation, the inner packagings of combination packages shall meet the minimum requirements of either the IP.1 or IP.3 container, as described in ICAO-TDGA, and any other specifications required by 5.1.1. The packaging shall meet all applicable packaging performance tests specified in 49 CFR.

5.1.1 Unit packing.

5.1.1.1 One-pint (0.5-liter) quantity. A quantity of 1 (+0.125 or -0) pint (0.5 liter) of ethyl alcohol shall be unit packed in a nominal 1-pint (0.5-liter) glass bottle conforming to an IP.1 container of ICAO-TDGA. The IP.1 container shall conform to PPP-C-186, group A, class 1, type of glass optional, style 1, light penetration grade optional with matching screwcap closure A, B, P, or R. The closure shall be furnished with an aluminum or tin foil facing on a resilient liner. The liner material shall neither affect nor be affected by the ethyl alcohol. The closure shall be closed to a torque within a range of 2.03 to 2.26 Newton meters (Nm) (18 to 20 inch pounds) and shall then be secured to the neck of the bottle with outer seal A of PPP-C-186. There shall be no evidence of leakage when the bottle is tested for leakage as specified in 4.2.5. When specified, unit pack bottles of ethyl alcohol shall be protected in enclosure A or B of PPP-C-2020 (see 6.1).

5.1.1.2 One-gallon (4.0-liter) quantity. A quantity of 1 (+1 or -0 ounce) gallon (4.0 liters) of ethyl alcohol shall be unit packed in a nominal 1-gallon (4.0-liter) glass bottle or tin-plate metal can. The glass bottle shall conform to an IP.1 container of ICAO-TDGA. The requirements for the glass bottle and enclosure shall be the same as those for the 1-pint (0.5-liter) quantity, except for capacity and the following closure requirement: The closure shall be closed to a torque within a range on 2.26 to 2.82 Nm (20 to 25 inch pounds). The tin-plate metal can shall conform to an IP.3 container of ICAO-TDGA. The IP.3 container shall conform to PPP-C-96, type V, class A, oblong, formed from commercial designation electrolytic tin-plate number 100. The closure assembly shall be as specified for the bottle above except that the inner seal specified in the appendix to PPP-C-96 shall be required. There shall be no evidence of leakage when the bottle or can is tested as specified in 4.2.5. The can exterior shall be coated plan B with seam coating of TT-E-485 enamel as specified in PPP-C-96.

5.1.2 Packing. Packing shall be level A or B as specified (see 6.1).

5.1.2.1 Level A.

5.1.2.1.1 One-pint (0.5-liter) quantity. Twenty-four 1-pint (0.5-liter) bottles of ethyl alcohol shall be packed upright in a close-fitting wooden box. The wooden box shall conform to the requirements of a UN 4C1 container. The UN 4C1 container shall conform to PPP-B-585, class 3, style optional for a type 2 load not exceeding 85 pounds (lbs) (39 kilograms (kg)); to PPP-B-601, type overseas, style A, B, or I, grade A for a type 2 load not exceeding 75 lbs (34 kg); or to PPP-B-621, class 2, style 4, grade A for a type 2 load not exceeding 100 lbs (45.4 kg). Each bottle shall be placed in a close-fitting cell formed by full-box-height partitions made from fiberboard. Top and bottom pads shall be furnished. All inside faces of the box shall be lined

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with two thicknesses of pads. Pads shall be added as needed to prevent motion of contents. Liner pads and partitions shall be formed from fiberboard conforming to grade V3c of ASTM D 4727. The wood components of the PPP-B-585 box shall be preserved with preservative conforming to composition A of TT-W-572. Each box shall be closed and reinforced as specified in the applicable box specification.

5.1.2.1.2 One-gallon (4.0-liter) quantity. Four 1-gallon (4.0-liter) quantity unit packs of ethyl alcohol shall be packed upright for shipment in a close-fitting box as specified for the 1-pint (0.5-liter) bottles in 5.1.2.1.1.

5.1.2.1.3 Five-gallon (20.0-liter) quantity. A quantity of 5 (+5 or -0 ounces) gallons (20.0 liters) of ethyl alcohol shall be packed in a nominal 5-gallon (20.0-liter) steel shipping pail conforming to a UN 1A1 container, or steel shipping drum with polyethylene insert conforming to a UN 6HA1 container. The steel shipping pail shall conform to PPP-P-704, type I, class 4 with flexible spout closure as specified therein. The entire interior surface of the pail shall be covered with two coats of baked-on clear phenolic resin compatible with the contents. The steel shipping drum with polyethylene insert shall conform to PPP-C-1337, type II, class 1. Closure shall be designed against or shall be furnished with a device to prevent their back-off. Either an inner or outer seal for the closure shall be furnished. There shall be no evidence of leakage from the containers when they are tested as specified in 4.2.5.

5.1.2.1.4 Fifty-four-gallon (204.0-liter) quantity. A quantity of 54 (+0.5 or -0 gallon) gallons (204.0 liters) of ethyl alcohol shall be packed in a nominal 55-gallon (210.0-liter) steel drum conforming to a UN 1A1 container, or steel drum with polyethylene insert conforming to a UN 6HA1 container. The steel drums shall conform to PPP-D-729, type I. All drums shall be furnished with closures having a hexagonal swaged into the head of the drum. The interior surface shall be coated as specified in 5.1.2.1.3 for the pail. The closing torque for the steel drum closures shall be within a range of 20 to 23 Nm (15 to 17 foot pounds) for the 3/4-inch (19-millimeter) plug and 40.7 to 44.7 Nm (30 to 33 foot pounds) for the 2-inch (50-millimeter) plug using gaskets of polyethylene or other material at least as effective in this service for preventing leakage. The closing torque for the steel drum with polyethylene inserts closures shall be within the range recommended by the manufacturer of the container. Cap seals shall be provided which are leak proof without the benefit of the closure plug. There shall be no evidence of leakage from the containers when they are tested as specified in 4.2.5.

5.1.2.2 Level B.

5.1.2.2.1 One-pint (0.5-liter) quantity. Twenty-four 1-pint (0.5-liter) bottles of ethyl alcohol unit packed as specified in 5.1.1.1 shall be packed upright in a close-fitting weather-resistant fiberboard box conforming to the requirements of a 4G container of ICAO-TDGA or IMO-IMDGC, as applicable. The box shall be for a type 2 load of 90 lbs (40.8 kg). Each bottle shall be placed in a close-fitting cell formed by full-box-height partitions made from fiberboard. Top and bottom pads shall be furnished. All inside faces of the box shall be lined with two

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thicknesses of pads. Pads shall be added as needed to prevent motion of contents. Liner pads and partitions shall be formed from fiberboard conforming to grade V3c of ASTM D 4727. Each box shall be closed as specified in accordance with the general packing requirements of ICAO-TDGA or IMO-IMDGC, as applicable.

5.1.2.2.2 One-gallon (4.0-liter) quantity. Four 1-gallon (4.0-liter) bottles of ethyl alcohol shall be packed as specified in 5.1.2.1.2 except that the box shall conform to the requirements of a UN 4G container. The box shall be closed as specified in accordance with the general packing requirements of ICAO-TDGA or IMO-IMDGC, as applicable.

5.2 Marking. Shipments for civil agencies shall be marked in accordance with FED-STD-123. Shipments for military activities shall be marked in accordance with MIL-STD-129.

5.2.1 Container compliance markings. Each shipping container shall be marked in accordance with 49 CFR 171 to 179 and either ICAO-TDGA or IMO-IMDGC, as applicable.

5.2.2 Hazard class label. Each shipping container and pallet load shall be labeled in accordance with 49 CFR 171 to 179 and either ICAO-TDGA or IMO-IMDGC, as applicable.

5.2.3 Proper shipping name. Each shipping container and pallet load shall be marked with the proper shipping name in accordance with 49 CFR 171 to 179 and either ICAO-TDGA or IMO-IMDGC, as applicable.

5.2.4 Precautionary markings. Each unit and shipping container shall be marked or labeled, as applicable, in accordance with 29 CFR 1910.1200(f), Hazards Communication, to show the required precautionary information. Each outer container shall be marked to show the top of the container by use of an arrow and the word "UP".

5.3 Palletization.

5.3.1 One-pint (0.5-liter) and one-gallon (4.0-liter) quantities. Level A and B packs of one-pint (0.5-liter) and one-gallon (4.0-liter) quantities shall be palletized in accordance with MIL-STD-147, load type I, using the soft wood pallet conforming to NN-P-71, type IV.

5.3.2 Five-gallon (20.0-liter) quantity. Level A and B packs of five-gallon (20.0-liter) quantity shall be palletized in accordance with MIL-STD-147, load type III, using the soft wood pallet conforming to NN-P-71, type IV.

5.3.3 Fifty-four-gallon (204.0-liter) quantity. Level A and B packs of fifty-four-gallon (204.0-liter) quantity shall be palletized in multiples of three drums on a pallet conforming to type IV of NN-P-71 and secured with 3/4-inch (19-millimeter) steel strapping conforming to ASTM D 3953 applied girthwise or with shrink-film bonding conforming to ASTM D 4649, as applicable.

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6. NOTES

6.1 Ordering data. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification,
- (b) Type and grade of material required (see 1.2),
- (c) Issue of DODISS to be cited in the solicitation, and if required, the specific issue of individual documents referenced (see section 2),
- (d) Unit quantity required (see 5.1.1),
- (e) If unit packed 1-pint (0.5-liter) bottles are to be protected in enclosure A or B of PPP-C-2020 (see 5.1.1.1),
- (f) Unit container required (see 5.1.1.2, 5.1.1.3, 5.1.1.4),
- (g) Level of packing required (see 5.1.2).

6.2 Material Safety Data Sheets. Contracting officers will identify those activities requiring copies of completed Material Safety Data Sheets prepared in accordance with FED-STD-313. The pertinent mailing addresses for submissions of data are listed in FED-STD-313.

6.3 Submission of alternative inspection provisions. Proposed alternative inspection provisions should be submitted by the contractor to the procuring contracting officer for evaluation and approval by the technical activity responsible for preparation of this specification.

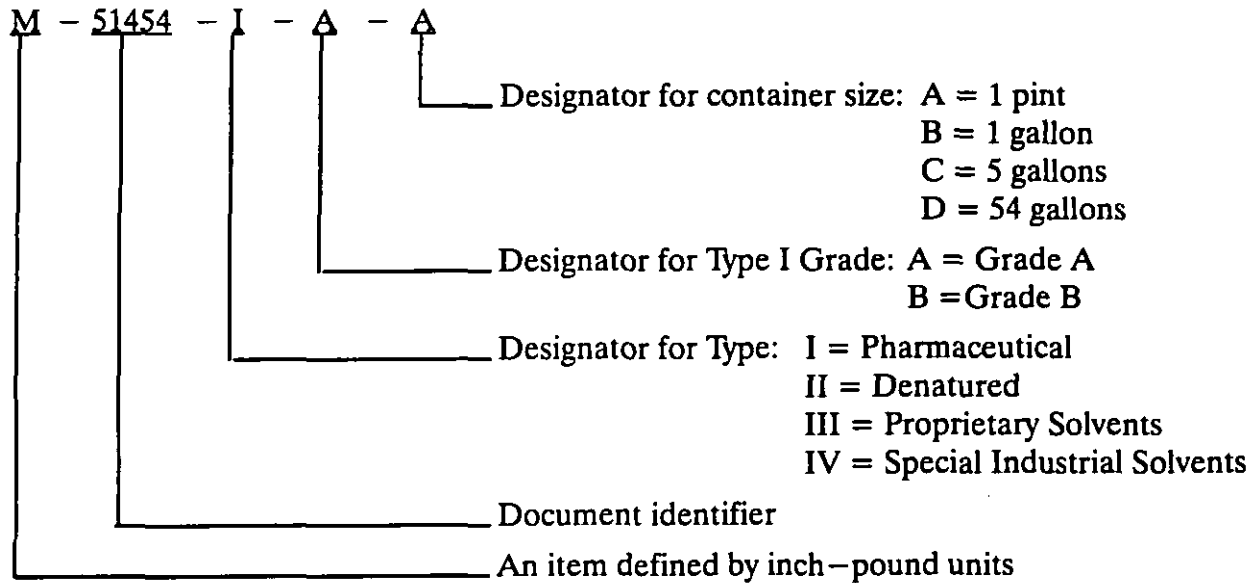
6.4 Batch. A batch is defined as that quantity of material which has been manufactured by some unit chemical process or subjected to some physical mixing operation intended to make the final product substantially uniform.

6.5 Sampling and testing precautions. This specification requires inspection and use of chemical material which is potentially dangerous to personnel. All applicable safety rules, regulations, and procedures must be followed in the sampling and testing of this material.

6.6 Significant places. For the purpose of determining conformance with this specification, an observed or calculated value should be rounded off "to the nearest unit" in the last right-hand place of figures used in expressing the limiting value, in accordance with the rounding-off method of ASTM E 29.

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6.7 Part identification numbering system. A recommended system is as follows:



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

6.9 Subject term (key word) listing.

acetone
aldehydes
Deniges Reagent
4,5-dihydroxy-2,7-naphthalene-disulfonic acid
ethyl alcohol
glycerin
isopropyl alcohol
ketone
methyl alcohol
phosphoric acid
potassium permanganate
sodium bisulfite
sulfuric acid
tertiary butyl alcohol
yellow mercuric oxide

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Custodians:

Army - EA
Navy - SH
Air Force - 68

Preparing activity:

Army - EA

Review activities:

Army - ME, SM
Navy - OS
DLA - GS

Project No. 6810-1309

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

INSTRUCTIONS

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

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I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
MIL-E-51454A

2. DOCUMENT DATE (YYMMDD)
940623

3. DOCUMENT TITLE

ETHYL ALCOHOL (ETHANOL)

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)

7. DATE SUBMITTED
(YYMMDD)

(1) Commercial

(2) AUTOVON
(If applicable)

8. PREPARING ACTIVITY

a. NAME

U.S. Army Edgewood Research, Development
and Engineering Center

b. TELEPHONE (Include Area Code)

(1) Commercial

(410) 671-3259

(2) AUTOVON

DSN 584-3259

c. ADDRESS (Include Zip Code)

Tech Dir, U.S. Army ERDEC

ATTN: SCBRD-ENE-S

Aberdeen Proving Ground, MD 21010-5423

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Defense Quality and Standardization Office

5203 Leesburg Pike, Suite 1403, Falls Church, VA 22041-3466

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