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FEDERAL SPECIFICATION

ETHYL ALCOHOL (ETHANOL): DENATURED ALCOHOL:
PROPRIETARY SOLVENTS AND SPECIAL INDUSTRIAL SOLVENTS

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

1. SCOPE AND CLASSIFICATION

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

1.2 Classification.

Type I - Analytical reagent (A.C.S. grade). (See 3.1.2 and 6.2)

Grade A - Absolute (99.5 percent by volume).

Grade B - 95 percent by volume.

Type II - Pharmaceutical. (See 3.1.2 and 6.2)

Grade A - Anhydrous, not less than 99.8 percent by volume (Meets requirements for U.S.P. alcohol).

Grade B - U.S.P., not less than 94.9 percent and not more than 96.0 percent by volume.

Type III - Denatured. (See 3.2 and 6.2)

Type IV - Propriety Solvents (Standard formulas designated by the Bureau of Alcohol, Tobacco and Firearms). (See 3.3 and 6.2)

Type V - Special Industrial Solvents (restricted sale) [Standard formulas designated by the Bureau of Alcohol, Tobacco and Firearms (See 3.4 and 6.2)].

FSC 6505, 6810

O-E-760D

2. APPLICABLE DOCUMENTS

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

Federal Specifications:

- TT-E-485 - Enamel, Semi-Gloss, Rust-Inhibiting
- PPP-C-96 - Cans, Metal, 28 Gage and Lighter
- PPP-C-186 - Containers, Packaging and packing for Drugs, Chemicals and Pharmaceuticals
- PPP-D-729 - Drums, Shipping and Storage, Steel, 55-gallon (208 liters)
- PPP-D-1152 - Drums, Shipping: Steel, 55-Gallon (24 and 21 Gage Reinforced)
- PPP-P-704 - Pails, Metal (Shipping, Steel, 1 through 12 Gallons)

Federal Standards:

- Fed. Std. No. 123 - Marking for Domestic Shipment (Civilian Agencies).

(Activities outside the Federal Government may obtain copies of Federal Specifications, Standards, and Handbooks as outlined under General Information in the Index of Federal Specifications and Standards and at the prices indicated in the Index. The Index, which includes cumulative monthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402.)

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

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

Military Standards:

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

(Copies of Military Specifications and Standards required by contractors in connection with specific procurement functions should be obtained from the procuring activity or as directed by the contracting officer.)

Law and Regulations:

- 16 CFR 1500 - U.S. Consumer Product Safety Commission Regulations relating to Hazardous Substances.
- 27 CFR 30 - U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms, Gauging Manual.

O-E-760D

- 27 CFR 19 - U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms, Regulations relating to Distilled Spirits Plants.
- 27 CFR 20 - U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms, Regulations relating to the Distribution and Use of Denatured Alcohol and Rum.
- 27 CFR 21 - U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms, Regulations relating to Formulas for Denatured Alcohol and Rum.
- 27 CFR 22 - U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms, Regulations relating to Distribution and Use of Tax-Free Alcohol.
- 29 CFR 1900.1200 - U.S. Department of Labor, Occupational Safety and Health Administration, Hazard Communication Standard Regulations.
- 46 CFR 146 - Department of Transportation, Coast Guard Regulations for Transportation or Storage of Explosives of other Dangerous Articles or Substances, and Combustible Liquids on Board Vessels.
- 49 CFR 171-179 - Department of Transportation Rules and Regulations for the Transportation of Explosives and Other Dangerous Articles.

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

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

American Chemical Society (ACS) Specifications:

Reagent Chemicals

(Application for copies should be addressed to the American Chemical Society, 1155 Sixteenth Street, NW, Washington, DC 20036).

Association of Official Analytical Chemists Publications:

Methods of Analysis

(Application for copies should be addressed to 1111 North 19th Street, Suite 210, Arlington, VA 22209).

U.S. Pharmacopeial Convention publications:

United States Pharmacopeia
The National Formulary

(Application for copies should be addressed to 12601 Twinbrook Parkway, Rockville, MD 20852).

O-E-760D

American Society for Testing and Materials:

- ASTM D-1193 - Specifications for Reagent Water
- ASTM D-1209 - Color of Clear Liquids (Platinum-Cobalt Scale)
- ASTM D-1353 - Nonvolatile Matter in Volatile Solvents for use in Paint, Vanish, Lacquer, and Related Products
- ASTM D-1613 - Acidity in Volatile Solvents and Chemical Intermediates Used in Paint Varnish, Lacquer, and Related Products

(Copies of ASTM publications may be obtained upon application to the American Society for Testing and Materials, 1916 Race Street, Philadelphia, PA 19102).

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

3. REQUIREMENTS

3.1 Material. Material for types I and II shall be ethyl alcohol, free of sediment, and shall meet the requirements specified herein.

3.1.1 Color. Ethyl alcohol shall be clear and colorless when tested in accordance with ASTM O-1209.

3.1.2 Chemical and physical requirements. Type I and type II ethyl alcohol shall conform to the chemical and physical requirements for the type and grade specified in Table I.

TABLE I. Chemical and physical test requirements for types I and II ethyl alcohol.

Requirements	Type I		Type II		Test paragraphs
	Grade A	Grade B	Grade A	Grade B	
Specific gravity at 15.56 deg. C/15.56 deg. C maximum. (in air)	0.7962	0.8158	0.7948	0.8162	4.7.1.1
Acidity as acetic acid, maximum, percent.	.003	.003	.003	.003	4.7.1.2
Nonvolatile residue grams per 100 ml, maximum.	.001	.001	.003	.003	4.7.1.3
Solubility in H ₂ O	pass	pass	pass	pass	4.7.1.4

O-E-760D

Requirements	Type I		Type II		Test paragraphs
	Grade A	Grade B	Grade A	Grade B	
Methyl alcohol (limit about 0.1 percent).	pass	pass	pass	pass	4.7.1.5
Fusel oil.	pass	pass	pass	pass	4.7.1.6
Substances reducing permanganate (aldehydes and organic impurities), minutes minimum.	5	5	5	5	4.7.1.7
Acetone, other ketones, isopropyl alcohol, and tertiary butyl alcohol.	pass	pass	pass	pass	4.7.1.8
Alkalinity, as NH_4OH , maximum.	3 ppm	3 ppm	3 ppm	3 ppm	4.7.1.9
Substances darkened by sulfuric acid.	pass	pass	pass	pass	4.7.1.10

3.2 Type III. Type III ethyl alcohol shall be made from alcohol which conforms to the requirements of type II, grade A prior to denaturing. In addition, it shall be one of the formulas contained in 27 CFR 21, Formulas for Denatured Alcohol and Rum, issued by U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms. Unless otherwise specified in the contract or order, type III denatured alcohol shall conform to Formula No. 3-A.

3.3 Type IV. Type IV ethyl alcohol (Standard Propriety Solvents) shall consist of type III, specially Denatured Alcohol Formula No. 1 (27 CFR 21.32) or Formula No. 3-A (27 CFR 21.35), further modified in accordance with formulas authorized by the Bureau of Alcohol, Tobacco and Firearms in 27 CFR 20, Distribution and Use of Denatured Alcohol and Rum, under Section 20.113, Propriety Solvents general-use formula, or under such rulings or regulations as may hereafter be promulgated by the Bureau of Alcohol, Tobacco and Firearms.

3.4 Type V. Type V ethyl alcohol (Special Industrial Solvents) shall consist of Specially Denatured Alcohol Formula No. 1 (27 CFR 21.32) or Formula No. 3-A (27 CFR 21.35) or Formula 3-C (27 CFR 21.37), further modified in accordance with the formulas and Use of Denatured Alcohol and Rum, under Section 20.112, Special industrial solvents general-use formula, or under such rulings or regulations as may be hereafter be promulgated by the Bureau of Alcohol, Tobacco and Firearms.

O-E-760D

4. QUALITY ASSURANCE PROVISIONS

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

4.2 Sampling for lot acceptance.

4.2.1 Inspection lot. For purpose of sampling a lot shall consist of all ethyl alcohol of the same type and grade manufactured as one batch or in one continuous process run, using the same raw materials, and offered for delivery at one time.

4.2.2 Sampling for inspection of filled containers. A random sample of filled containers shall be taken from each lot in accordance with MIL-STD-105 at inspection Level I, and Acceptable quality Level = 2.5 percent defective to verify compliance with all stipulations of this specification regarding requirements not involving tests.

4.2.3 Sampling for tests. Sample the inspection lots of 1-quart or smaller containers to total two quarts of alcohol. From other inspection lots, randomly select two containers, and take 1-quart samples from each. Withdraw the portions in such a way so that the top and bottom layers will be about equally represented because the top layer may have become diluted if the container was improperly closed, and the bottom may contain sediment. Seal the containers, but do not use wax. If cork stoppers are used, cover the corks with aluminum foil. Mark the containers, and send them to the appropriate designated testing laboratory.

4.3 Inspection.

4.3.1 Inspection of filled containers. Each filled sample container taken in accordance with 4.2.2 shall be examined for defects of the container and the closure, for evidence of leakage, and for unsatisfactory markings; each sample filled container shall also be weighed to determine the amount of the contents. Any container in the sample, having one or more defects or under required fill, shall be rejected and if the number of defective containers in any sample exceeds the acceptance number for the appropriate sampling plan of MIL-STD-105, the lot represented by the sample shall be rejected. Rejected lots may be resubmitted for acceptance tests provided that the contractor has removed or repaired all nonconforming containers.

4.4 Lot acceptance tests. The sample specimens taken in accordance with 4.2.3 shall be subjected separately to the tests specified in 4.6. If either specimen fails one of these tests, the lot shall be rejected. Rejected lots may be resubmitted for acceptance test provided the contractor has removed or reworked all nonconforming products.

4.5 Examination or preparation for delivery. The examination of preparation for delivery shall be performed in accordance with the quality assurance provisions of PPP-C-186 or as provided below, as applicable.

4.5.1 An examination shall be made to determine whether the packaging, packing and marking comply with the requirements of Section 5. Defects shall be scored as listed in table II. Sampling shall be in accordance with MIL-STD-105. The sample unit will be one container fully prepared for delivery. The lot shall be the number of containers offered for inspection at one time. The inspection level shall be S-2 with an [word missing] of 4.0 expressed in terms of defects per hundred units.

TABLE II. Examination of preparation for delivery

<u>Examine</u>	<u>Defect</u>
Container	Not as specified
Contents	Not as specified
Markings	Omitted; incorrect; illegible; Improper size, location, sequence or method of application
Materials	Component missing or damaged
Workmanship	Cushioning inadequate, improper or missing.

4.6 Chemicals. Unless otherwise specified, all chemical tests shall be made with ACS specification reagent grade chemicals and ASTM D-1193, Type III, Reagent Water.

4.7 Test methods.

4.7.1 Specific gravity (in air). A specific gravity determination at 15.56 degrees C/15.56 degrees C shall be made by means of a calibrated hydrometer, pycnometer or Westphal Balance. When desired, conversion of results to percent alcohol by weight or volume shall be made by reference to Official and Tentative Methods of Analysis of the Association of Official Analytical Chemists, or Table No. 6 in the Bureau of Alcohol, Tobacco and Firearms Gaging Manual.

4.7.1.2 Acidity. Acidity measured as acetic acid shall not exceed 0.003% in both tables I and II when tested in accordance with ASTM D-1613.

4.7.1.3 Nonvolatile residue. Nonvolatile residue shall not exceed 0.001 milligrams per 100 milliliters in Type I and 0.003 milligrams per 100 milliliters in Type II when tested in accordance with ASTM D-1353.

4.7.1.4 Solubility in water. Mix 30 ml of the sample with 30 ml of distilled water in a [word missing] comparison tube and allow to stand for 30 minutes after cooling to 10 degrees C. Compare the mixture with an equal volume of distilled water by transmitted light. The mixture should equal in clarity to the distilled water.

4.7.1.5 Methyl alcohol.

4.7.1.5.1 Preparation of reagents.

O-E-760D

Potassium permanganate solution. 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.

Chromotropic acid solution. A 5 percent aqueous solution of the acid (1,8-dihydroxynaphthalene-3,6-disulfonic acid) or its sodium salt.

4.7.1.5.2 Procedure. Dilute a portion of the alcohol sample with distilled water until the ethyl alcohol content is about 5 to 6 percent. Pipet 2 ml of the KMnO_4 solution into a 50 ml volumetric flask, chill in an ice bath, add 1 ml of the dilute sample 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; rotate the flask with a swirling motion, at the same time adding by pipet 15 ml of sulfuric acid. Place the flask containing the solution in hot water (60 degrees-75 degrees C) for 15 minutes. Remove flask, cool contents to room temperature and make up to 50 ml with distilled water. Compare the color of the sample with that of a standard control sample (95 percent ethyl alcohol containing 0.1 percent methyl alcohol) which has been carried through the same procedure. The sample passes the test if the depth of color is less than that of the standard. The presence of methyl alcohol is indicated by a purple color and its absence by a colorless to light straw colored solution.

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

4.7.1.7 Substances reducing potassium permanganate (aldehydes and organic impurities). Cool 20 ml of the alcohol to be tested to stand at 15 degrees C. Add 0.1 ml of 0.1N potassium permanganate and allow to stand at 15 degrees C for 5 minutes. The pink color should not entirely disappear.

NOTE: The following precautions should be observed:

- (1) The tests should not be performed in bright light.
- (2) The temperature should be held to approximately 15 degrees to 16 degrees C, during the course of the reaction.
- (3) The glass cylinders should be thoroughly cleansed before making test.
- (4) The alcohol should not come in contact with cork stoppers.

4.7.1.8 Acetone, other ketones, isopropyl alcohol, and tertiary butyl alcohol. Mix 5 g yellow HgO with 40 ml H_2O and add, with stirring, 20 ml H_2SO_4 and 40 ml H_2O . Stir until completely dissolved. CAUTION: Mercury salts are highly toxic; use proper precautions when handling. To 2 ml sample, add 3 ml H_2O and 10 ml HgSO_4 solution. Heat on boiling H_2O bath 3 minutes. White or yellow precipitate forming within 3 minutes indicates presence of acetone, other ketones, or t-butyl alcohol. Disregard any precipitate forming after 3 minutes on boiling H_2O bath. If no precipitate forms, test for isopropanol as follows: Place 8 g CrO_3 in 100 ml Kohlrausch flask, and add 15 ml H_2O and 2 ml H_2SO_4 . Connect flask with reflux condenser and add 5 ml sample very slowly through condenser. Reflux 30 minutes: then cool and distill 2 ml, collecting distillate in 10 ml graduate. Add 3 ml H_2O and 10 ml HgSO_4 solution, and proceed as above.

4.7.1.9 Alkalinity. Dilute 25 ml of water and add 0.05 ml of methyl red indicator solution. Not more than 0.40 ml of 0.01N sulfuric acid should be required to produce a pink color.

4.7.1.10 Substances darkened by sulfuric acid. Cool 10 ml of sulfuric acid, contained in a small conical flask to 10 degrees C and add dropwise, with constant agitation, 10 ml of the sample, meanwhile keeping the temperature of the mixture below 20 degrees C. The resulting solution should have no more color than either of the two liquids before mixing.

4.7.1.11 Alternate analytical method - Gas Chromatography. Sample purity may be determined by means of a gas chromatograph having temperature-programming capabilities. Water, methanol, ethanol, and isopropanol should be cleanly separated. Suggested conditions for analysis are as listed.

1. Column: a 1/8 inch outer diameter, 4 feet long, stainless steel column packed with Porapak Q or equivalent.
2. Injection port temperature: 190 degrees C.
3. Detector: thermal conductivity (TCD).
4. Detector temperature: 210 degrees C.
5. Oven temperature program: Hold initial temperature at 90 degrees C for 2 minutes, then raise temperature at 20 degrees C/min. up to a final temperature of 190 degrees C.
6. Carrier gas: helium, at 45 ml/min.

To obtain calibration factors, prepare a standard solution of known weights of water, methanol, ethanol, and isopropanol. Obtain at least two chromatograms of the mixture. Use attenuation settings that allow maximum peak heights without going off scale. Determine the area under each peak except injection peak. Calculate the calibration factors as follows:

$$F_{i\gamma} = W_{i\gamma} / A_{i\gamma}$$

where:

$F_{i\gamma}$ = calibration factor for component i

$W_{i\gamma}$ = weight percent of component i in the standard mixture, and

$A_{i\gamma}$ = average area percent of component i in the standard mixture.

Calculate the area percentage of each component as follows:

$$A_{i\%} = A_{i\gamma} T_{i\gamma} \times 100 / (A_{1\gamma} T_{1\gamma}) + (A_{2\gamma} T_{2\gamma}) + \dots (A_{n\gamma} T_{n\gamma})$$

where:

$A_{i\%}$ = area percent for component i,

$A_{1\gamma}$ = area for component 1,

$A_{2\gamma}$ = area for component 2,

$A_{n\gamma}$ = area for component n,

$T_{i\gamma}$ = attenuation for component i

$T_{2\gamma}$ = attenuation for component 2, and

$T_{n\gamma}$ = attenuation for component n.

O-E-760D

Calculate the corrected area of each component as follows:

$$A_{ci} = A_{\%i} \times F_{i}$$

where:

A_{ci} = corrected area for component i ,
 $A_{\%i}$ = area percent for component i , and
 F_{i} = calibration factor for component i .

Calculate the weight percent of each component as follows:

$$C_i = A_{ci} \times 100 / (A_{c1} + A_{c2} + \dots + A_{cn})$$

where:

C_i = weight percent of component i ,
 A_{ci} = corrected area for component i ,
 A_{c1} = corrected area for component 1,
 A_{c2} = corrected area for component 2, and
 A_{cn} = corrected area for component n .

To convert weight percent to volume, divide each component's weight percent by its respective density at ambient conditions.

4.7.2 For type III. The Government inspector shall verify that type III alcohol is prepared from type II alcohol and conforms to one of the formulas prescribed by the U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms, in 27 CFR 21, Formulas for Denatured Alcohol and Rum.

4.7.3 For type IV. The Government inspector shall verify that type IV Proprietary Solvent is prepared from type III, Specially Denatured Alcohol Formula No. 1 or Formula No. 3-A or Formula No. 3-C and conforms to the formula authorized by the Bureau of Alcohol, Tobacco and Firearms. (See 3.4).

5. PREPARATION FOR DELIVERY

5.1 Packaging. Packaging shall be level A, B, or C as specified. (See 6.1).

5.1.1 Level A. The subject commodity shall be packaged in 1- and 5-gallon cans conforming to PPP-C-96, type V, class 4, 5, or 6 or in 5-gallon steel drums conforming to PPP-P-704, type I class 3, or in 55-gallon drums conforming to PPP-D-729, type I. Cans shall be provided with inner seals, as specified in the appendix to PPP-C-96; and drums shall be provided with tamper proof closure or cap seals, as specified in PPP-P-704 and PPP-D-729, respectively. The exterior of cans shall be coated in accordance with coating plan B, with side seam striping of TT-E-485 material, as specified in PPP-C-96.

O-E-760D

5.1.2 Level B. Subject commodity shall be packages in 55-gallon drums conforming to PPP-D-1152 or type II drums of PPP-D-729, type II. Protective measures shall be in accordance with 5.1.1 or PPP-D-1152, as applicable. Ethyl alcohol of one grade and class 4-ounce, or 1-quart quantities as specified shall be packaged in glass or metal containers in accordance with the manufacturer's commercial practice. One gallon quantities shall be packaged in accordance with can specified in 5.1.1.

5.1.3 Level C. Ethyl alcohol shall be packaged in 4-ounce or in 1-quart bottles, or in 1-gallon metal containers in accordance with the manufacturer's commercial practice. Five-gallon quantities shall be furnished in steel pails of the type commonly used by the manufacturer for this purpose. Fifty-five gallon drums shall conform to PPP-D-1152 or PPP-D-729, type II.

5.2 Packing. Packing shall be level A, B, or C as specified (see 6.1).

5.2.1 Levels A and B. One-gallon and 5-gallon metal containers shall be packed in accordance with the appendix to PPP-C-96; 55 gallon drums shall require no further packing. The bottles shall be intermediately packaged and packed in accordance with PPP-C-186.

5.2.2 Level C. Four-ounce, or 1-quart, or 1-gallon cans of ethyl alcohol shall be packed in containers of the type, size, and kind commonly used for the purpose, to insure acceptance by common carrier, and safe delivery at destination. Containers shall comply with the Department of Transportation Rules and Regulations for the Transportation of Explosives and other Dangerous Articles by Freight. Ethyl alcohol furnished in 5- or 55-gallon steel pail or drums shall require no further packing. Ethyl alcohol delivered in bulk (tank car) shipments shall comply with the Department of Transportation Rules and Regulations.

5.3 Marking and labeling.

5.3.1 Special labeling. Packages shall be labeled to comply with the requirements of Federal laws and regulations issued pursuant thereto, as consolidated 27 CFR 20, 16 CFR 1500, and the target organs and acute or chronic effects warnings in accordance with 29 CFR 1900.1200. (See 2.1).

5.3.1.1 Type III Denatured Alcohol, type IV Proprietary Solvent and type V Special Industrial Solvent. In addition to the marking as specified in 5.3.1, 5.3.1.2, 5.3.1.3, 5.3.2 and 5.3.3, containers for type III Denatured Alcohol, type IV Proprietary Solvent, and type V Special Industrial Solvent, which contain methyl alcohol, shall be plainly marked with a poison label, printed in bold type with red ink and securely affixed to the container as follows:

O-E-760D

Poison

CONTAINS METHYL ALCOHOL
CANNOT BE MADE NONPOISONOUS
USE ONLY IN A WELL VENTILATED AREA
KEEP AWAY FROM HEAT AND OPEN FLAME
AVOID CONTACT WITH EYES

First Aid Treatment

If swallowed: Unless the patient is unconscious, having convulsions, or cannot swallow - give milk or water immediately; then call the nearest Poison Control Center or a physician for advice about whether or not you should make the patient vomit.

If splashed in eyes: Immediately flush with water for at least 15 minutes. Get medical attention.

Caution notices for type III Denatured Alcohol shall be in accordance with 5.3.1.

5.3.1.2 Type III Denatured Alcohol. In addition to the marking specified in 5.3.1, 5.3.1.1, 5.3.2, and 5.3.3, issue packages and shipping containers for type III Denatured alcohol shall be marked with the formula number in accordance with 27 CFR 21, Formulas for Denatured Alcohol. Each issue package of Completely Denatured Alcohol containing 5 gallons or less, must have affixed thereto the following label, printed in plain, legible letters (red on white):

Completely Denatured Alcohol

Completely Denatured Alcohol: Contains ingredients which render the product wholly unfit for beverage purposes; if taken internally it will cause serious consequences to health.

5.3.1.3 Type IV Proprietary Solvent and type V Special Industrial Solvent. In addition to the marking specified in 5.3.1, 5.3.1.1, 5.3.2, and 5.3.3, issue packages for type IV Proprietary Solvent and type V Special Industrial Solvent shall bear such identifying symbols as required by the Bureau of Alcohol, Tobacco and Firearms.

5.3.2 Civilian agencies. In addition to the marking and labeling specified in 5.3.1, 5.3.1.1, 5.3.1.2 and 5.3.1.3, and any special marking required by the contract or order, marking shall be in accordance with Fed. Std. No. 123.

5.3.3 Military agencies. In addition to the marking specified in 5.3.1, 5.3.1.1, and 5.3.1.2, and 5.3.1.3, and any special marking required by the contract or order, marking shall be in accordance with MIL-STD-129.

5.4 Material Safety Data Sheets. Chemical manufacturers, importers, and

O-E-760D

distributors shall prepare and supply complete Material Safety Data Sheets with each shipment in accordance with 29 CFR 1900.1200.

6. NOTES

6.1 Ordering data. Purchasers should select the preferred options permitted herein and include the following information in procurement documents:

- (a). Number, title, and date of this specification.
- (b). Type and grade required. (See 1.2).
- (c). Selection of applicable level of packaging and packing and quantity per container required. (See 5.1 and 5.2).
- (d). Size of container required and unit of purchase (i.e., U.S. Gallon at 60 degrees F).

NOTE: If the procurement officer desires a definite denaturant formula as specified in 27 CFR 21, Formulas for Denatured Alcohol, he should so specify.

6.2 Type I, grades A and B ethyl alcohols correspond to A.C.S. reagent grades for analytical use as specified by the American Chemical Society. Type II grade A ethyl alcohol is anhydrous (absolute) alcohol and corresponds to Alcohol as specified in the U.S. Pharmacopeia. Type II, grade B ethyl alcohol corresponds to Alcohol as specified by the U.S. Pharmacopeia. Type III ethyl alcohol is the same as type II prior to denaturing. Type IV consists of type III, Specially Denatured Alcohol Formula No. 1 or Formula No. 3-A to which has been added other ingredients specified under Proprietary solvents general-use formula (27 CFR 20.113). Type V consists of type III, Specially Denatured Alcohol Formula Nos. 1 or 3-A or 3-C to which has been added other ingredients specified under Special industrial solvents general-use formula (27 CFR 20.112).

MILITARY INTEREST:

Custodians:
Review activities:

Army - MD, MI, MU, SM, WC
Navy - SH
Air Force - 68
DLA - DGSC, DPSC

Preparing activity:

GSA-FSS
CIVIL AGENCIES INTEREST

CIA
COM
FAA
GSA
HHS
INT
JUS
NASA
VA - OSS

User activities:

Army - GL
Navy - MC

PC
SI
TR
TVA
VA
DOE
EPA
AEC
CGS

O-E-760D
AMENDMENT-2
January 14, 1991

FEDERAL SPECIFICATION

ETHYL ALCOHOL (ETHANOL): DENATURED ALCOHOL:
PROPRIETARY SOLVENTS AND SPECIAL INDUSTRIAL SOLVENTS

This amendment, which forms a part of Federal Specification O-E-760D, dated May 28, 1987, is approved by the Commissioner, Federal Supply Service, General Services Administration, for the use of all Federal Agencies.

Page 1

Paragraph 1.2, Type III. Change to read:

"Type III - Denatured (See 3.2).

Grade A - Made from Type II, Grade A
Grade B - Made from Type II, Grade B"

Page 4

Paragraph 3.2. Change to read:

"3.2 Type III. Type III ethyl alcohol shall be one of the of the formulas contained in 27 CFR, Formulas for Denatured Alcohol and Rum, issued by U.S. Treasury Department, Bureau of Alcohol, Tobacco and Firearms. Unless otherwise specified in the contract or order, type III denatured alcohol shall conform to Formula No. 3-A."

Page 6

Paragraph 4.7.1.2. Change to read: "4.7.1.2 Acidity. Test in accordance with ASTM D-1613."

Paragraph 4.7.1.3. Change to read: "4.7.1.3 Nonvolatile residue. Test in accordance with ASTM D-1353."

Page 7

Paragraph 4.7.1.8. Change to read:

"4.7.1.8 Acetone, other ketones, isopropyl alcohol, and tertiary butyl alcohol. To 1 ml of the sample, add 4 ml of distilled water and 10 ml of mercuric sulfate test solution (Deniges Reagent), prepared by mixing 5 gm of yellow mercuric oxide with 40 ml of water, then adding 20 ml of H_2SO_4 while stirring slowly, and adding 40 ml of water and stirring until complete solution is attained. Heat on a bath of boiling water. The sample shall be considered as having passed the test if no precipitate appears within 2 minutes."

PREPARING ACTIVITY

GSA - FSS

(PROJECT NO. 6810 - 1243)

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

FSC - 6810

NOTICE OF
REINSTATEMENT

INCH-POUND

O-E-760D
NOTICE 2
9 September 1993
SUPERSEDING
NOTICE 1
26 March 1993

MILITARY SPECIFICATION

ETHYL ALCOHOL (ETHANOL): DENATURED ALCOHOL:
PROPRIETARY SOLVENTS AND SPECIAL INDUSTRIAL SOLVENTS

O-E-760D, dated 28 May 1987, is hereby reinstated and may be used for acquisition. The Defense General Supply Center (GS) hereby assumes preparing activity responsibility in lieu of the Defense Medical Standardization Board (MB).

(Copies of the referenced federal and military specifications, standards, and handbooks are available from the Standardization Documents Order Desk, 700 Robbins Avenue, Building #4, Section D, Philadelphia, PA 19111-5094).

Preparing activity:

DLA - GS

(Project No. 6810 - 1307)

AMSC N/A
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