

MIL-E-463B**14 MAY 1962****SUPERSEDING****MIL-E-463A****30 APRIL 1957****MILITARY SPECIFICATION****ETHYL ALCOHOL (FOR ORDNANCE USE)**

This specification has been approved by the Department of Defense and is mandatory for use by the Departments of the Army, the Navy, and the Air Force.

1. SCOPE

1.1 Scope. This specification covers the requirements for four grades of ethyl alcohol intended for Ordnance use (see 6.1).

1.2 Classification. Ethyl alcohol shall be of the following grades as specified (see 6.2).

Grade 1 — 95.0 percent by volume without denaturant.

Grade 2 — 94.9 percent by volume with denaturant.

Grade 3 — 99.0 percent by volume (anhydrous), with benzene denaturant.

Grade 4 — 95.0 percent by volume, denatured with tertiary-butyl alcohol and benzydiethyl (2.6 xylylcarbonyl) ammonium benzoate.

2. APPLICABLE DOCUMENTS

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

SPECIFICATIONS**FEDERAL**

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| O-E-760 | — Ethyl Alcohol (Ethanol); Denatured Alcohol; and Proprietary Solvent. |
| PPP-P-704 | — Pails; Shipping Steel (1 through 12 gallon). |
| PPP-D-729 | — Drums; Metal, 55-gallon (for Shipment Non-corrosive Materials). |

STANDARDS**MILITARY**

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| MIL-STD-105 | — Sampling Procedures and Tables for Inspection by Attributes. |
| MIL-STD-109 | — Inspection Terms and Definitions. |
| MIL-STD-129 | — Marking for Shipment and Storage. |

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MIL-E-463B**PUBLICATIONS****ORDNANCE CORPS**

ORD-M608-11 — Procedures and Tables
for Continuous
Sampling by Attri-
butes.

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

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

CODE OF FEDERAL REGULATIONS

49-CFR 71-90 — Interstate Commerce
Commission Rules
and Regulations for
the Transportation
of Explosives and
Other Dangerous
Articles.

(The Interstate Commerce Commission regulations are now a part of Federal Regulations (1949 Edition—latest revision) available from the Superintendent of Documents—Government Printing Office, Washington 25, D.C. Orders for the above publications should cite 49 CFR 71-90 latest revision).

3. REQUIREMENTS

3.1 Material. Ethyl alcohol, prior to the addition of dye or denaturant, shall be a

clear, transparent, colorless liquid, having a characteristic odor, and shall not contain visible insoluble material, either before or after the addition of dye or denaturant.

3.1.1 Applicable to Grade 1. Grade 1 ethyl alcohol shall contain neither dye nor denaturant.

3.1.2 Applicable to Grade 2. Grade 2 ethyl alcohol shall be made by the addition of benzene to alcohol that complies with the requirement of Grade 1, ethyl alcohol, or that has been recovered from the manufacturing operation in which it will be used.

3.1.3 Applicable to Grade 3. Grade 3 ethyl alcohol shall be made by the addition of benzene to an anhydrous grade of alcohol that complies with the requirements of Grade 1 ethyl alcohol.

3.1.4 Applicable to Grade 4. Grade 4 ethyl alcohol shall be made by the addition of $\frac{1}{8}$ gallon of tert-butyl alcohol and $\frac{1}{4}$ avoirdupois ounce of benzyldiethyl (2.6 xylylcarbomyl) ammonium benzoate to 100 gallons of ethyl alcohol that complies with the requirement of Grade 1 ethyl alcohol (see 3.1.1) and it shall be dyed with one part by weight of fuchsin dye to 500,000 parts, by weight, of ethyl alcohol. (See 6.4)

3.2 Chemical and Physical Requirement. Ethyl alcohol shall comply with the requirements shown in Table 1, when determined as specified in the applicable sub-paragraph of 4.8.

TABLE 1. Chemical and physical properties

Property	Grade 1	Grade 2	Grade 3	Grade 4
Ethyl alcohol by volume, minimum (min.) percent	95.0	94.9	99.0	94.9
Benzene by volume, maximum (max.) percent	0.01	0.75	0.75	...
Acidity, grams (gm.) per 100 milliliter (ml.) (as acetic acid), max	0.005	0.01
Aldehydes, max. milligram (mg.) per 100 ml.	20.0
Non-volatile matter, max. percent	0.004	0.006
Organic impurities max percent	0.1

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3.3 Taste (Grade 4 only). Grade 4 ethyl alcohol shall be distinctly bitter.

4. QUALITY ASSURANCE PROVISIONS

4.1 General quality assurance provisions. The supplier is responsible for the performance of all inspection requirements specified herein. Except as otherwise specified, the supplier may utilize his own or any other inspection facilities and services acceptable to the Government. Inspection records of the examinations and tests shall be kept complete and available to the Government as specified in the contract or order. The Government reserves the right to perform any of the inspections set forth in the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements. Reference shall be made to Standard MIL-STD-109 in order to define terms used herein. Inspection shall be performed in accordance with this specification and other specifications referenced in any of the contractual documents.

4.1.1 Contractor quality assurance system. If the contractor desires to utilize a quality assurance system, which is at variance with the quality assurance provisions of 4.2 and 4.3 and other documents referenced herein, he shall submit a written description of the system to the contracting officer for approval prior to initiation 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 quality assurance provisions required by the provisions of 4.2 and 4.3 and the other documents referenced herein. The contractor shall not be restricted to the inspection station or the method of inspection listed in this specification pro-

vided that an equivalent control is included in the approved quality assurance 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 referenced herein.

4.1.2 Submission of product. At the time the completed lot of product 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 quality assurance provisions of the approved current written description of the system.
- (b) Quantity of product inspected.
- (c) Results obtained for all inspection performed.
- (d) Specification number and date, together with an identification and date of changes.
- (e) Certificates of analysis on all material procured directly by the contractor, when such material is controlled by Government specifications listed in any of the contractual documents
- (f) Quantity of product in the lot.
- (g) Date submitted.

The 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

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the course of the contract, this authority is vested in another agent of the certifying organization.

4.1.3 Government verification. Using the contractor's written quality assurance procedure (see 4.1.1), this detailed specification, and other contractual documents as a guide, the Government inspector shall verify all quality assurance operations performed by the contractor. Verification shall be in accordance with a or b as applicable, the decision being the responsibility of the procuring activity. In either case, the inspector shall also ascertain, prior to acceptance that all quality assurance provisions of other specifications referenced in any of the contractual documents have been complied with. Deviations from prescribed or agreed upon procedures discovered by the Government inspector shall be brought to the attention of the supplier. Disposition of the product and remedial action shall be as directed by the Government inspector and, depending on the nature of the deviation, may consist of lot rejection, screening, re-sampling, re-instruction of the supplier's employees, or other appropriate action:

- (a) Verification at the point of manufacture shall be accomplished at unscheduled intervals in accordance with 4.1.3.1 and 4.1.3.2.
- (b) Verification at the point of delivery shall be in accordance with 4.1.3.2.

4.1.3.1 Surveillance. Surveillance shall include, but is not limited to:

- (a) Observation of procedures concerning lot formation and identification.
- (b) Observation of sampling procedures and applications of acceptance criteria.
- (c) Determination that all required examinations and tests are per-

formed in accordance with the prescribed procedures of this specification, or approved equivalents thereto.

- (d) Review of procedures for control and disposition of non-conforming material.

4.1.3.2 Product inspection. Product inspection shall consist of Government inspection of product which has been previously inspected by the contractor and found to meet the quality assurance provisions of this specification. The inspection by the Government shall be performed in order to determine that the product is of the quality required by this specification and that the contractor's records are reliable.

4.2 Inspection provisions.

4.2.1 Lot formation. A lot shall consist of ethyl alcohol of one grade only, from one or more batches, produced by one manufacturer in accordance with the same specification or same specification revision under one continuous set of operating conditions. Each batch shall consist of that quantity of ethyl alcohol that has been subjected to the same unit chemical or physical process intended to make the final product homogeneous.

4.2.2 Examination. Sampling plans and procedures for the following classification of defects shall be in accordance with Standard MIL-STD-105. Continuous sampling plans, in accordance with Handbook ORD-M608-11 may be used if approved by the procuring activity. Also, at the option of the procuring activity, AQL's and sampling plans may be applied to the individual characteristics listed using an AQL of 0.25 percent for each major defect.

4.2.2.1 Scaled container.

Categories	Defects	Method of inspection
Critical:	None defined	
Major:	AQL 0.65 percent	
101.	Container not filled to correct volume	Balance

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102.	Closure improper	Visual
103.	Seal improper	Visual
104.	Marking incorrect, incomplete or illegible	Visual
105.	Leak in container	Visual
Minor: None defined		

4.2.3 *Testing.*4.2.3.1 *Sampling.*

4.2.3.1.1 *Containers.* From each inspection lot, two containers shall be selected at random. A composite sample shall be prepared by taking a 16 ounce specimen from each of the selected containers. Transfer the specimens to a 32 ounce air tight glass bottle having a glass stopper or a cap containing a cork or cardboard liner covered with metal foil, and labeled to show the name of the material, grade, manufacturer, plant contract or purchase number, lot number and lot size. If the samples fail to comply with any of the requirements, the lot shall be rejected.

4.2.3.1.2 *Tank cars.* By means of a clean, weighted, small-neck, glass bottle approximately 1 quart of the material shall be removed from the tank car. The unstoppered bottle shall be rinsed with the material being sampled, and lowered to the bottom of the tank by means of a cord, chain, or rod. The bottle shall be immediately withdrawn to the surface. In order to obtain a representative cross-section of the material, the speed of lowering and raising the bottle shall be uniform, and so regulated that the bottle, is just filled as it reaches the surface of the liquid. This sample shall be placed in an airtight glass bottle, having a glass stopper or a cap containing a cork or cardboard liner covered with metal foil, and labeled to show the name of the material, manufacturer, plant, contract or order number, lot number, and lot size. If the sample fails to comply with any of the requirements, the lot shall be rejected.

4.3 *Test methods and procedures.*

4.3.1 *Ethyl alcohol content.* The specific gravity shall be determined at 15.6 degrees Centigrade (C.)/15.6 degrees C. (60 degrees Fahrenheit (F.)/60 degrees F.) by means of a calibrated hydrometer, pycnometer or other standard method. The percentage of alcohol by volume shall be obtained by reference to Table 2.

4.3.2 *Benzene.* The test for benzene in Grade 1 ethyl alcohol shall be made in accordance with the colorimetric method described in 4.3.2.1, and the tests for benzene in Grades 2 and 5 ethyl alcohol shall be made in accordance with the spectrophotometric method described in 4.3.2.2 or 4.3.2.3.

4.3.2.1 *Colorimetric method.* A 10 ml. portion of nitrating mixture, made by mixing equal parts, by volume, of sulfuric acid (specific gravity 1.84) and fuming nitric acid, free of brown oxides of nitrogen shall be placed in a 50 ml. beaker. Precautions shall be taken to prevent rise of temperature above 25 degrees C. (and subsequent evolution of brown fumes) by use of a buret to permit slow dropwise addition of the sample, and a mechanical stirrer to effect rapid and thorough mixing. Then, 0.5 ml. of the sample shall be added. With vigorous stirring, the resultant mixture shall be slowly poured into 40 ml. of water. The mixture shall be transferred, at a temperature of not more than 25 degrees C. to a 125 ml. separatory funnel, and extracted once with 20 ml. of ethyl ether by shaking for approximately 1 minute. The lower layer shall be discarded. A 20 ml. portion of water shall be added, and shaken vigorously for approximately 1 minute. The wash water (lower layer) shall be discarded. A 20 ml. solution, made by diluting 5 ml. of saturated sodium bicarbonate solution with 15 ml. of water, shall be added. The alkaline wash solution, which should have a yellow to brownish-yellow color, shall be slowly removed and tested for alkalinity with a universal indicator test paper. If the solution is acid, the other portion shall again be treated with dilute

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sodium bicarbonate solution. The wash solution shall be discarded. The ether layer shall be transferred through the mouth of a separatory funnel to a dry 50 ml. beaker and almost, but not completely, evaporated to dryness on a steam bath. The contents shall be washed into a dry test tube (approximately 16 by 150 millimeter (mm.) with 10 ml. of benzene free 95 percent ethyl alcohol. Then 1 ml. of butanone (methyl ethyl-ketone) shall be added, and the solution shaken. A 0.5 ml. portion of alcoholic NaOH solution, made by dilution of 1 volume of aqueous NaOH solution (40 gm. NaOH per 100 ml. of aqueous solution) to 10 volumes with benzene-free 95 percent ethyl alcohol shall be added. The solution shall be thoroughly mixed, and allowed to stand for 5 minutes. A blank shall be run simultaneously with the sample, using benzene-free 95 percent ethyl alcohol. In the absence of benzene, the solution has a yellow to yellow-orange color. The presence of benzene is indicated by a reddish color, having a greater intensity than that obtained when a synthetic mixture of 0.01 percent benzene has been tested in benzene-free alcohol.

4.3.2.2 Spectrophotometric method. This method is based on the fact that benzene has a characteristic absorption curve in the ultra-violet region.

4.3.2.2.1 Apparatus. Absorbance measurements shall be made using a spectrophotometer with ultra-violet accessories, matched 1 centimeter silica cells and a blue sensitive phototube in position. (A Beckman Model DU spectrophotometer has been found to be satisfactory.)

4.3.2.2.2 Standard curve. Standard solutions of benzene in ethyl alcohol shall be prepared by pipetting 0.2, 0.5 and 0.8 ml. of reagent grade benzene respectively into labelled 100 ml. volumetric flasks. The benzene in the flasks shall be diluted to the mark with benzene free reagent grade ethyl alcohol (95 percent or absolute). Ten ml. of each

standard shall be pipetted to suitably labelled 100 ml. volumetric flasks, diluted to volume with reagent grade methanol and mixed thoroughly. The absorbance readings of these solutions shall be taken at a wavelength of 261 millimicrons using a methanol blank. The absorbance readings shall be plotted against the concentration. This should be a straight line passing through the origin. All pertinent data shall be recorded. The graph for a particular instrument may be retained and used for future routine work by checking two points on the curve.

4.3.2.2.3 Procedure. A 10 ml. portion of the sample shall be transferred, quantitatively, to a 100 ml. volumetric flask and diluted to a volume with reagent grade methanol. The solution shall be mixed thoroughly and one of the silica cells of the apparatus shall be filled with the sample solution and the other cell filled with methanol. The cells shall be inserted in the cell holder and the optical density at 261 millimicrons shall be recorded, after proper adjustment of the instrument. (Use of a slit width chosen for the best sensitivity). The quantity of benzene present shall be read from the standard graph (see 4.3.2.2.2).

4.3.2.3 Alternate method. A 0.10 ml. portion of the sample shall be transferred, by means of a pipette, to a dry test tube. Then 5 ml. of concentrated sulfuric acid, containing 0.5 percent of formaldehyde solution (not less than 37 percent formaldehyde), shall be added by means of a pipette. The test tube and contents shall be agitated. The color developed shall be no darker than that of a 0.75 percent solution of benzene in 95 percent alcohol, by volume, when treated in the same manner as the sample. In case of question, doubt, or dispute, the spectrophotometric method specified in 4.3.2.2 shall be mandatory.

4.3.3 Acidity. Mix 100 ml. of sample with 100 ml. of carbon-dioxide free distilled water. Add two drops of bromothymol blue indi-

cator (0.04 percent LaMotte or Taylor solutions) and titrate with 0.01 Normal Sodium Hydroxide to a blue endpoint. Calculate acidity as acetic acid as follows:

$$\text{Acetic acid (gm. per 100 ml.)} = 0.06 \text{ VN}$$

where:

$$\begin{aligned} V &= \text{ml. of alkali used} \\ N &= \text{Normality alkali} \end{aligned}$$

4.3.4 Aldehydes. 120 ml. of sample shall be transferred to a 250 ml. Erlenmeyer flask, add approximately 20 mls. of distilled water and a few granules of carborundum. Distill slowly into a 100 ml. volumetric flask, to the mark, and mix.

4.3.4.1 Procedure. The 100 ml. of freshly distilled ethyl alcohol shall be placed in a 500 ml. flask and approximately 100 ml. of distilled water and excess of .05 normal sodium bisulfite shall be added and allowed to stand approximately 30 minutes shaking occasionally (excess sodium bisulfite should be equivalent of approximately 25 ml. of .05 normal iodine). Excess iodine .05 normal solution shall be added and this excess titrated with .05 normal sodium thiosulfate. A blank shall be run using the same quantities of .05 normal iodine and sodium bisulfite as used in the sample.

$$\text{Aldehydes in mg. per 100 ml.} = A \times 1.1$$

where:

$$A = \text{difference in ml. between the two titration of sodium thiosulfate used.}$$

4.3.5 Nonvolatile matter. Evaporate 100 ml. of the sample on a steam bath in a tared platinum or other suitable dish. Dry the dish and residue to constant weight in an oven at 105 degrees C. to 110 degrees C. The increase in weight of dish shall be calculated as percentage non-volatile residue. Calculate the increase as follows:

$$\begin{aligned} \text{Non-volatile matter in gm. per} \\ 100 \text{ ml.} &= B - A \end{aligned}$$

where:

$$\begin{aligned} A &= \text{tare weight of dish.} \\ B &= \text{weight of dish plus residue.} \end{aligned}$$

4.3.6 Organic impurities. A 0.1 ml. portion of reagent grade, isoamyl alcohol (isobutyl-carbinol) shall be transferred to a volumetric flask, and made up to 100 ml. with reagent grade absolute ethyl alcohol (standard solution). Both of the following tests, on this standard solution, and on the sample, shall be conducted using test tubes of uniform size. These tests are especially intended for the detection of an excessive percentage of fuse oil.

4.3.6.1 Sulfuric acid method. To 10 ml. of the sample in a large test tube, 10 ml. of sulfuric acid (specific gravity 1.84) shall be cautiously added down the side of the test tube. During this addition, the test tube shall be gently swirled to obtain thorough mixing of the acid with sample. The temperature of the mixture will rise to approximately 90 degrees C. This procedure shall be repeated on 10 ml. of the standard solution, in another test tube of the same size. Both test tubes shall be placed in an oven or bath at 65 degrees C. for 18 hours. The development of a definitely darker color in the sample than in the standard solution shall be cause for rejection.

4.3.6.2 Potassium permanganate method. Two clean test tubes of the same size shall be selected. A 10 ml. portion of the sample shall be placed in one test tube, and 10 ml. of the standard solution in the other test tube. The temperature shall be adjusted to 25 degrees plus or minus 0.2 degrees C. One drop of potassium permanganate solution (1 gm. KMnO_4 , per liter) from 10 ml. burnette shall be added to each test tube, and the time recorded. Complete fading of the pink color in less than ten minutes indicates the presence of more than 0.1 percent organic impurities. There shall be almost no pink color in the standard solution, after standing for ten minutes.

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TABLE II. *Percentage by volume of ethyl alcohol corresponding to apparent specific gravities at 15.6 degrees C./15.6 degrees C. (in air)*

Specific gravity	Percentage of ethyl alcohol	Specific gravity	Percentage of ethyl alcohol
0.8233	93.00	0.8181	94.40
0.8232	93.03	0.8180	94.43
0.8231	93.05	0.8179	94.46
0.8230	93.08	0.8178	94.48
0.8229	93.11	0.8177	94.51
0.8228	93.14	0.8176	94.53
0.8227	93.16	0.8175	94.56
0.8226	93.19	0.8174	94.59
0.8225	93.22	0.8173	94.61
0.8224	93.25	0.8172	94.64
0.8223	93.27	0.8171	94.66
0.8222	93.30	0.8170	94.69
0.8221	93.33	0.8169	94.72
0.8220	93.36	0.8168	94.74
0.8219	93.38	0.8167	94.77
0.8218	93.41	0.8166	94.79
0.8217	93.44	0.8165	94.82
0.8216	93.47	0.8164	94.84
0.8215	93.49	0.8163	94.87
0.8214	93.52	0.8162	94.90
0.8213	93.55	0.8161	94.92
0.8212	93.58	0.8160	94.95
0.8211	93.60	0.8159	94.97
0.8210	93.63	0.8158	95.00
0.8209	93.66	0.8157	95.03
0.8208	93.68	0.8156	95.05
0.8207	93.71	0.8155	95.08
0.8206	93.74	0.8154	95.10
0.8205	93.76	0.8153	95.13
0.8204	93.79	0.8152	95.15
0.8203	93.82	0.8151	95.18
0.8202	93.84	0.8150	95.20
0.8201	93.87	0.8149	95.23
0.8200	93.90	0.8148	95.25
0.8199	93.92	0.8147	95.28
0.8198	93.95	0.8146	95.30
0.8197	93.98	0.8145	95.33
0.8196	94.01	0.8144	95.36
0.8195	94.03	0.8143	95.38
0.8194	94.06	0.8142	95.41
0.8193	94.08	0.8141	95.42
0.8192	94.11	0.8140	95.46
0.8191	94.14	0.8139	95.48
0.8190	94.16	0.8138	95.51
0.8189	94.19	0.8137	95.53
0.8188	94.22	0.8136	95.56
0.8187	94.24	0.8135	95.58
0.8186	94.27	0.8134	95.61
0.8185	94.30	0.8133	95.63
0.8184	94.32	0.8132	95.66
0.8183	94.35	0.8131	95.68
0.8182	94.38	0.8130	95.71

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TABLE II. Percentage by volume of ethyl alcohol corresponding to apparent specific gravities at 15.6 degrees C./15.6 degrees C. (in air)—Continued

Specific gravity	Percentage of ethyl alcohol	Specific gravity	Percentage of ethyl alcohol
0.8129	95.78	0.8076	97.02
0.8128	95.76	0.8075	97.04
0.8127	95.78	0.8074	97.07
0.8126	95.81	0.8073	97.09
0.8125	95.83	0.8072	97.11
0.8124	95.86	0.8071	97.14
0.8123	95.88	0.8070	97.16
0.8122	95.91	0.8069	97.18
0.8121	95.93	0.8068	97.21
0.8120	95.96	0.8067	97.23
0.8119	95.98	0.8066	97.25
0.8118	96.01	0.8065	97.28
0.8117	96.03	0.8064	97.30
0.8116	96.06	0.8063	97.32
0.8115	96.08	0.8062	97.35
0.8114	96.10	0.8061	97.37
0.8113	96.13	0.8060	97.39
0.8112	96.15	0.8059	97.42
0.8111	96.18	0.8058	97.44
0.8110	96.20	0.8057	97.46
0.8109	96.23	0.8056	97.49
0.8108	96.25	0.8055	97.51
0.8107	96.28	0.8054	97.53
0.8106	96.30	0.8053	97.55
0.8105	96.32	0.8052	97.58
0.8104	96.35	0.8051	97.60
0.8103	96.37	0.8050	97.62
0.8102	96.40	0.8049	97.64
0.8101	96.42	0.8048	97.67
0.8100	96.45	0.8047	97.69
0.8099	96.47	0.8046	97.71
0.8098	96.50	0.8045	97.73
0.8097	96.52	0.8044	97.76
0.8096	96.54	0.8043	97.78
0.8095	96.57	0.8042	97.80
0.8094	96.59	0.8041	97.82
0.8093	96.61	0.8040	97.85
0.8092	96.64	0.8039	97.87
0.8091	96.66	0.8038	97.89
0.8090	96.69	0.8037	97.91
0.8089	96.71	0.8036	97.94
0.8088	96.73	0.8035	97.96
0.8087	96.76	0.8034	97.98
0.8086	96.78	0.8033	98.00
0.8085	96.81	0.8032	98.03
0.8084	96.83	0.8031	98.05
0.8083	96.85	0.8030	98.07
0.8082	96.88	0.8029	98.09
0.8081	96.90	0.8028	98.11
0.8080	96.93	0.8027	98.14
0.8079	96.95	0.8026	98.16
0.8078	96.97	0.8025	98.18
0.8077	97.00	0.8024	98.20

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Specific gravity	Percentage of ethyl alcohol	Specific gravity	Percentage of ethyl alcohol
0.8023	98.22	0.7979	99.15
0.8022	98.25	0.7978	99.17
0.8021	98.27	0.7977	99.19
0.8020	98.29	0.7976	99.21
0.8019	98.31	0.7975	99.23
0.8018	98.33	0.7974	99.25
0.8017	98.35	0.7973	99.27
0.8016	98.38	0.7972	99.29
0.8015	98.40	0.7971	99.31
0.8014	98.42	0.7970	99.33
0.8013	98.44	0.7969	99.35
0.8012	98.46	0.7968	99.37
0.8011	98.48	0.7967	99.39
0.8010	98.50	0.7966	99.42
0.8009	98.53	0.7965	99.44
0.8008	98.55	0.7964	99.46
0.8007	98.57	0.7963	99.48
0.8006	98.59	0.7962	99.50
0.8005	98.61	0.7961	99.52
0.8004	98.63	0.7960	99.54
0.8003	98.65	0.7959	99.56
0.8002	98.67	0.7958	99.58
0.8001	98.70	0.7957	99.60
0.8000	98.72	0.7956	99.61
0.7999	98.74	0.7955	99.63
0.7998	98.76	0.7954	99.65
0.7997	98.78	0.7953	99.67
0.7996	98.80	0.7952	99.69
0.7995	98.82	0.7951	99.71
0.7994	98.84	0.7950	99.73
0.7993	98.86	0.7949	99.75
0.7992	98.88	0.7948	99.77
0.7991	98.90	0.7947	99.79
0.7990	98.92	0.7946	99.81
0.7989	98.95	0.7945	99.83
0.7988	98.97	0.7944	99.85
0.7987	98.99	0.7943	99.87
0.7986	99.01	0.7942	99.89
0.7985	99.03	0.7941	99.91
0.7984	99.05	0.7940	99.93
0.7983	99.07	0.7939	99.95
0.7982	99.09	0.7938	99.97
0.7981	99.11	0.7937	99.99
0.7980	99.13	0.7936	100.00

5. PREPARATION FOR DELIVERY**5.1 Packing.**

5.1.1 *Level A.* Ethyl alcohol shall be furnished in 5-gallon or 55-gallon metal con-

tainers, as specified (see 6.2). The 5-gallon container shall conform to Type I, Class 8 or 8 of Specification PPP-D-704. The 55-gallon drums shall conform to Type I or Type II of Specification PPP-D-729. The 5-gallon drums shall be equipped with flexi-

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ble spout or snap-on type closures. Each closure shall be provided with a closure seal to prevent tampering.

5.1.2 *Level C.* Ethyl alcohol shall be furnished in 5-gallon or 55-gallon standard commercial steel drums or in tank cars, as specified (see 6.2). Containers shall conform to Interstate Commerce Commission Regula-

tions, or the regulations of other carriers as applicable to the mode of transportation.

5.2 *Marking.* In addition to any special marking required by the contract or order, marking of shipments shall be in accordance with Standard MIL-STD-129. In addition for grades 2, 3, and 4, containers shall be plainly marked with a "Poison" label and with the following:

DANGER

Denatured Ethyl Alcohol

Flammable

Vapor harmful

May be fatal if taken internally

Cannot be made nonpoisonous

Poison

First Aid treatment — Antidote. If swallowed: Give a tablespoonful of salt in a glass of warm water and repeat until vomit fluid is clear. Give two teaspoonful of baking soda in a glass of water. Have patient lie down and keep warm. Cover eyes to exclude light. Call a physician. If splashed in eyes, immediately flush with water for at least 15 minutes. Get medical attention.

6. NOTES

6.1 *Intended use.* Ethyl alcohol covered by this specification is intended for uses outlined below:

Grade 1 — For use in the manufacture of mercury fulminate, smokeless powder (where a denaturant is not required), optical elements and small arms primers.

Grade 2 — For use in the manufacture of smokeless powder, ethylene, ether, and shellac mixtures.

Grade 3 — For use in shellac mixtures for ammunition.

Grade 4 — Denatured alcohol for general use where the grade in Specification O-E-760 is not suitable for use.

The material is not intended for general uses for ethyl alcohol such as fuel, analyti-

cal laboratory reagent, solvent, or cleaner, etc. For such uses, see Specification O-E-760.

6.2 *Ordering data.* Procurement documents should specify the following:

- (a) Title, number, and date of this specification.
- (b) Grade required (see 1.2).
- (c) The size and type of container required (see 5.1).
- (d) Selection of applicable levels of packing (see 5.1).

6.3 *Unit of purchase.* When ethyl alcohol is purchased by volume, the unit should be a U.S. gallon at 15.6 degrees C. (60 degrees F.).

6.4 *Benzyl-diethyl (2.6 xylyl-carbamoyl) ammonium, benzoate suggested source* Walker Chemicals, Inc., 22 West First Street, Mount Vernon, New York or other source.

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Notice. When Government drawings, specifications, or other data are used for any purpose other than in connection with a definitely related Government procurement operation, the United States Government thereby incurs no responsibility nor any obligation whatsoever; and the fact that the Government may have formulated, furnished, or in any way supplied

the said drawings, specifications, or other data is not to be regarded by implication or otherwise as in any manner licensing the holder or any other person or corporation, or conveying any rights or permission to manufacture, use, or sell any patented invention that may in any way be related thereto.

Custodian:

Army—Ordnance Corps
Navy—Bureau of Naval Weapons
Air Force—MAA

Preparing activity:

Army—Ordnance Corps

SPECIFICATION ANALYSIS SHEET

Form Approved
Budget Bureau No. 119-R004INSTRUCTIONS

This sheet is to be filled out by personnel either Government or contractor, involved in the use of the specification in procurement of products for ultimate use by the Department of Defense. This sheet is provided for obtaining information on the use of this specification which will insure that suitable products can be procured with a minimum amount of delay and at the least cost. Comments and the return of this form will be appreciated. Fold on lines on reverse side, staple in corner, and send to preparing activity (as indicated on reverse hereof).

SPECIFICATION

ORGANIZATION (Of submitter)

CITY AND STATE

CONTRACT NO.

QUANTITY OF ITEMS PROCURED

DOLLAR AMOUNT

\$

MATERIAL PROCURED UNDER A

☐ DIRECT GOVERNMENT CONTRACT☐ SUBCONTRACT

1. HAS ANY PART OF THE SPECIFICATION CREATED PROBLEMS OR REQUIRED INTERPRETATION IN PROCUREMENT USE?

A. GIVE PARAGRAPH NUMBER AND WORDING.

B. RECOMMENDATIONS FOR CORRECTING THE DEFICIENCIES.

2. COMMENTS ON ANY SPECIFICATION REQUIREMENT CONSIDERED TOO RIGID

3. IS THE SPECIFICATION RESTRICTIVE?

☐ YES☐ NO IF "YES", IN WHAT WAY?

4. REMARKS (Attach any pertinent data which may be of use in improving this specification. If there are additional papers, attach to form and place both in an envelope addressed to preparing activity)

SUBMITTED BY (Printed or typed name and activity)

DATE

FOLD

FOLD

DEPARTMENT OF THE NAVY

POSTAGE AND FEES PAID
NAVY DEPARTMENT

OFFICIAL BUSINESS

Commanding Officer