

O-M-232J

November 19, 1990

SUPERSEDING

O-M-232H (ARMY-EA)

July 9, 1990

O-M-232G

March 14, 1986

FEDERAL SPECIFICATION

METHANOL (METHYL ALCOHOL)

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

1. SCOPE

1.1 **Scope.** This specification covers two synthetic grades and one denaturing grade of methanol.

1.2 **Classification.** Methanol shall be of the following grades as specified (see 6.2):

Grade A - Synthetic, 99.85 percent by weight (solvent use)

Grade AA - Synthetic, 99.85 percent by weight (hydrogen-carbon dioxide generation use)

Grade C - Wood alcohol (denaturing grade)

2. APPLICABLE DOCUMENTS

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

Comments or suggestions pertaining to this specification should be addressed to: Commander, U.S. Army Chemical Research, Development and Engineering Center, ATTN: SMCCR-PET-S, Aberdeen Proving Ground, MD 21010-5423

FSC 6810

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

O-M-232J

Federal Specifications:

- L-S-300 - Sheeting and Tape, Reflective: Nonexposed Lens
- NN-P-71 - Pallets, Material Handling, Wood, Stringer Construction, 2-Way and 4-Way (Partial)
- TT-C-1060 - Coating Compound, Reflective
- PPP-C-96 - Cans, Metal, 28 Gauge and Lighter

Federal Standards:

- Fed. Std. No. 123 - Marking for Shipment (Civil Agencies)
- FED-STD-313 - Material Safety Data, Transportation Data and Disposal Data for Hazardous Materials Furnished to the Government
- FED-STD-595 - Colors

Commercial Item Description:

- A-A-1558 - Paint, Stencil

(Activities outside the Federal Government may obtain copies of Federal specifications, standards, and commercial item descriptions as outlined under General Information in the Index of Federal Specifications, Standards and Commercial Item Descriptions. The Index, which includes cumulative bimonthly supplements as issued, is for sale on a subscription basis by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

(Single copies of this specification, other Federal specifications, and commercial item descriptions required by activities outside the Federal Government for bidding purposes are available without charge from General Services Administration Business Service Centers in Boston, MA; New York, NY; Washington, DC; Philadelphia, PA; Atlanta, GA; Chicago, IL; Kansas City, MO; Fort Worth, TX; Denver, CO; San Francisco, CA; Los Angeles, CA; and Auburn, WA.

(Federal Government activities may obtain copies of Federal standardization documents and the Index of Federal Specifications, Standards and Commercial Item Descriptions from established distribution points in their agencies.)

Military Standards:

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

(Copies of military specifications and standards required by contractors in connection with specific acquisition functions should be obtained from the contracting activity or as directed by the contracting officer.)

Code of Federal Regulations (CFR):

- 27 CFR 21 - Formulas for Denatured Alcohol and Rum
- 29 CFR 1910.1200 - Occupational Safety and Health Standard on Hazard Communication
- 49 CFR 171 to 199 - Hazardous Materials Regulations

(The Code of Federal Regulations and the 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 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.

International Civil Aviation Organization

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

(Application for copies should be addressed to the 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, 101-104 Piccadilly, London, W1V 0AE, England.)

ASTM Standards:

- C 516 - Vermiculite Loose Fill Thermal Insulation
- D 1193 - Reagent Water
- D 1296 - Odor of Volatile Solvents and Diluents
- D 1353 - Nonvolatile Matter in Volatile Solvents for Use in Paint, Varnish, Lacquer, and Related Products
- E 346 - Analysis of Methanol

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

O-M-232J

(Non-Government standards and other publications are normally available from the organizations that prepare or distribute the documents. These documents also may be available in or through libraries or other informational services.)

2.3 Order of precedence. In the event of a conflict between the text of this document and the references cited herein, the text of this document takes precedence. Nothing in this document, however, supersedes applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Grades A and AA. Grades A and AA methanol shall conform to the chemical and physical characteristics of table I when tested as specified therein.

3.2 Grade C. Grade C methanol shall comply with the requirements for methyl alcohol used as a denaturant in 27 CFR 21.

3.3 Material Safety Data Sheets. Material Safety Data Sheets for methanol shall be prepared and submitted by the contractor in accordance with FED-STD-313 (see 6.3).

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.

TABLE I. Chemical and physical characteristics of grades A and AA methanol

Characteristic	Requirement		Test paragraph
	Grade A	Grade AA	
Acetone, percent by weight, maximum	0.003	0.002	4.2.4.1
Acidity (as acetic acid), percent by weight, maximum	0.003	0.003	4.2.4.2
Appearance	Free of opalescence, suspended matter, and sediment	Free of opalescence, suspended matter, and sediment	4.2.4.3
Carbonizable impurities, color, Pt-Co, maximum	No. 30	No. 30	4.2.4.4
Color, Pt-Co, maximum	No. 5	No. 5	4.2.4.5
Distillation range at 760 mm, maximum	1.0°C (and shall include 64.6° ± 0.1°C)	1.0°C (and shall include 64.6° ± 0.1°C)	4.2.4.6
Ethanol, percent by weight, maximum	----	0.001	4.2.4.7
Nonvolatile matter, mg per 100 mL, maximum	10	10	4.2.4.8
Odor	Characteristic, nonresidual	Characteristic, nonresidual	4.2.4.9
Permanganate time	No discharge of color in 30 minutes	No discharge of color in 30 minutes	4.2.4.10
Specific gravity at 20°/20°C, maximum	0.7928	0.7928	4.2.4.11
Water, percent by weight, maximum	0.15	0.10	4.2.4.12

O-M-232J

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 procedures 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 6.6.) 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 methanol produced by one manufacturer, at one plant, from the same materials, and under essentially 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.

4.2.2.2 For methanol test. See 6.5 for sampling and testing precautions. Sampling shall be conducted in accordance with table III. A representative specimen of approximately 0.9 liter shall be removed from each sample container and placed in a suitable clean, dry, glass container labeled to identify the lot and container from which it was taken.

TABLE II. Sampling for container examination

Number of containers in batch or lot	Number of sample containers
2 to 15	2
16 to 50	3
51 to 150	5
151 to 500	8
501 to 3,200	13
3,201 to 35,000	20
35,001 to 500,000	32
Over 500,000	50

TABLE III. Sampling for methanol tests

Number of containers in batch or lot	Number of sample containers
2 to 25	2
26 to 150	3
151 to 1,200	5
1,201 to 7,000	8
7,001 to 20,000	10
Over 20,000	20

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 container to conform to all characteristics shall be cause for rejection of the lot represented.

- (a) Contents per container
- (b) Container
- (c) Container closure
- (d) Vermiculite evident and correct (when required)
- (e) Container free of damage and leaks
- (f) Marking evident, correct, and legible
- (g) Palletization (when required)

O-M-232J

4.2.3.2 For methanol test. Each sample specimen taken in 4.2.2.2 shall be tested as specified in 4.2.4. Failure of any test by any specimen shall be cause for rejection of the lot represented.

4.2.4 Methanol 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. Tests shall be conducted as follows:

4.2.4.1 Acetone. Determine the percent by weight acetone in the specimen in accordance with the procedure for acetone in ASTM E 346; for grade AA methanol, use 1.5 milliliters (mL) of sample and 3.5 mL of water instead of the 1 mL of sample and 4 mL of water in the procedure and report acetone content as less than or greater than 0.002 percent by weight.

4.2.4.2 Acidity. Determine the percent by weight acidity as acetic acid in the specimen in accordance with the procedure for acidity in ASTM E 346.

4.2.4.3 Appearance. Dilute 15 mL of the specimen to 45 mL with water in a Nessler tube. Visually examine the solution for opalescence, suspended matter, and sediment during 30 minutes of standing.

4.2.4.4 Carbonizable impurities. Determine the carbonizable impurities in accordance with the procedure for carbonizables in ASTM E 346.

4.2.4.5 Color. Determine the color of the specimen in accordance with the procedure for color in ASTM E 346.

4.2.4.6 Distillation range. Determine the distillation range of the specimen in accordance with the procedure for distillation range in ASTM E 346.

4.2.4.7 Ethanol (grade AA only). Determine the parts per million ethanol in the specimen in accordance with the procedure for ethanol in ASTM E 346 and convert to percent by weight ethanol.

4.2.4.8 Nonvolatile matter. Determine nonvolatile matter in the specimen in accordance with ASTM D 1353.

4.2.4.9 Odor. Determine the odor of the specimen in accordance with ASTM D 1296.

4.2.4.10 Permanganate time. Determine the permanganate time of the specimen in accordance with the procedure for permanganate time in ASTM E 346.

4.2.4.11 Specific gravity. Determine the specific gravity of the specimen in accordance with the procedure for specific gravity in ASTM E 346.

4.2.4.12 Water. Determine the percent by weight of water in the specimen in accordance with the procedure for water in ASTM E 346.

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 shall be in accordance with the applicable requirements of 49 CFR 171 to 179 and the International Civil Aviation Organization - Technical Instructions for Safe Transport of Dangerous Goods by Air (ICAO-TDGA) or the International Maritime Organization - International Maritime Dangerous Goods Code (IMO-IMDGC), as applicable to the mode of transportation. The packaging shall meet the applicable packaging performance tests specified in ICAO-TDGA or IMO-IMDGC, as applicable.

5.2 Unit packing.

5.2.1 One-quart (1-liter) quantity. A quantity of 1 quart (1 liter) (+1/4 or -0 ounce) of methanol shall be unit packed in a nominal 1-quart (1-liter) round can conforming to an IP.3 container of ICAO-TDGA or IMO-IMDGC, as applicable. The can shall conform to type V, class 4, with plan B coating with side seam striping of PPP-C-96. The cap shall have a phenolic-faced, pulpboard liner. The closure shall be torqued to 20 (+0 or -5) inch-pounds.

5.2.2 One-gallon (4-liter) quantity. A quantity of 1 gallon (+1 or -0 ounce) (4 liters) of methanol shall be unit packed in a nominal 1-gallon (4-liter) can conforming to the requirements specified in 5.2.1. In addition the can shall have a leak-proof, tinned-plated, press-fitted inner seal. The closure shall be torqued to 35 (+0 or -5) inch-pounds.

5.3 Packing. Packing shall be level A or B as specified (see 6.2).

5.3.1 Level A.

5.3.1.1 One-quart (1-liter) quantity. Twenty-four 1-quart (1-liter) cans of methanol packaged as specified in 5.2.1 shall be packed upright in a four by six pattern in a close-fitting, water-repellent treated wooden or plywood box. The wooden box shall conform to the requirements of a 4C1 container of ICAO-TDGA or IMO-IMDGC, as applicable. The plywood box shall conform to the requirements of a 4D container of ICAO-TDGA or IMO-IMDGC, as applicable. The plywood shall be not less than 3/8 inch minimum thickness and the cleats shall be 3/4 inch thick by 1-3/4 inches wide minimum. In addition the box shall have a 4-mil polyethylene bag of sufficient size to form a liner and a sufficient quantity of vermiculite conforming to type I, grade 3 of ASTM C 516 shall be used to surround the cans to assure absorption of the entire contents in the event of leakage or breakage. Prior to closing the box, the bag shall be heat sealed. Each box shall be closed and reinforced as

O-M-232J

specified in accordance with the general packing requirements of ICAO-TDGA or IMO-IMDGC, as applicable.

5.3.1.2 One-gallon (4-liter) quantity. Six 1-gallon (4-liter) cans of methanol shall be packed as specified in 5.3.1.1, except that the pattern shall be two by three.

5.3.1.3 Five-gallon (20-liter) quantity. A quantity of 5 gallons (+5 or -0 ounces) (20 liters) of methanol shall be packed in a tight-head metal pail conforming to the requirements of a 1A1 container of ICAO-TDGA or IMO-IMDGC, as applicable.

5.3.1.4 Fifty-five-gallon (220-liter) quantity. A quantity of 55 (+1/2 or -0) gallons (220 liters) of methanol shall be packed in a steel drum conforming to the requirements of a 1A1 container of ICAO-TDGA or IMO-IMDGC, as applicable to the mode of transportation.

5.3.2 Level B.

5.3.2.1 One-quart (1-liter) quantity. Twenty-four 1-quart (1-liter) cans of methanol unit packed as specified in 5.2.1 shall be packed upright as specified in 5.3.1.1 except that the container shall be a close-fitting, weather-resistant fiberboard box conforming to the requirements of a 4G container of ICAO-TDGA or IMO-IMDGC, as applicable.

5.3.2.2 One-gallon (4-liter) quantity. Six 1-gallon (4-liter) cans of methanol shall be packed as specified in 5.3.2.1, except the pattern shall be two by three.

5.4 Palletization. All shipments of containers of 5 gallons or less shall conform to load type VI in accordance with MIL-STD-147, and the pallet shall conform to type IV or V of NN-P-71. When specified (see 6.2), all other shipments of methanol shall be palletized in accordance with the applicable requirements of MIL-STD-147.

5.5 Marking and labeling.

5.5.1 Container compliance markings. Each shipping container shall be marked in accordance with ICAO-TDGA or IMO-IMDGC, as applicable.

5.5.2 Civil agencies. In addition to the marking required by 5.5.1, shipments shall be marked in accordance with Fed. Std. No. 123 and shall show the date of manufacture and lot or batch number of the methanol.

5.5.3 Military activities. In addition to the marking required by 5.5.1, level A and B shipments shall be marked in accordance with MIL-STD-129 and shall show the date of manufacture and lot or batch number of the methanol.

5.5.4 Hazard class label. Each shipping container and pallet load shall be labeled in accordance with 49 CFR 171 to 199 and either ICAO-TDGA or IMO-IMDGC, as applicable.

5.5.5 Proper shipping name. Each shipping container and pallet load shall be marked with the proper shipping name in accordance with 49 CFR 171 to 199 and either ICAO-TDGA or IMO-IMDGC, as applicable.

5.5.6 Special identification markings. Special identification marking shall be applied to all Department of Defense shipments and, when specified (see 6.2), to civil agency shipments. Special identification marking shall consist of NATO Code No., nomenclature, specification number, grade, and national stock number. Letters and numerals shall be in blue conforming to color No. 35109 of FED-STD-595 over a yellow reflective background. The marking system shall be as specified in 5.5.6.1 or 5.5.6.2.

5.5.6.1 Preprinted marking on yellow reflective preprinted sheeting. The numerals and letters shall be preprinted on yellow reflective sheeting conforming to type I, class 4, reflectivity No. 1, color yellow of L-S-300. The reflective sheeting shall have a precoated adhesive backing as specified for class 4 of L-S-300, protected by a removable liner.

5.5.6.2 Marking on yellow reflective coating. The yellow reflective coating shall conform to TT-C-1060, color No. 33538 of FED-STD-595. The marking shall be applied with stencil paint conforming to class 1 of A-A-1558. The stencil paint shall not be overcoated.

5.5.6.3 Five-gallon (20-liter) pails. A 3-inch wide band of yellow reflective preprinted sheeting or yellow reflective coating shall be applied completely around the top area of the pail sides. The identification marking shall be applied on one side of the pail. The letters and numerals for the NATO Code No. shall be 3/4 inch in height. The remaining letters and numerals shall be 1/2 inch in height.

5.5.6.4 Fifty-five-gallon (220-liter) drums. An 8-inch wide band of yellow reflective preprinted sheeting or yellow reflective coating shall be applied completely across the diameter of the drum head, and a 6-inch wide band of yellow reflective preprinted sheeting or yellow reflective coating shall be applied completely around the top area of the drum sides. The identification marking shall be applied in 1-inch high letters and numerals, once on the drum head, and three times on the drum sides, equally spaced around the circumference of the drum. When preprinted sheeting is used, the 6-inch wide sheeting may be in three pieces of equal length with the required identification markings centrally preprinted on each piece. The three pieces shall be of sufficient length to completely encircle the drum when applied.

5.5.7 Precautionary marking. Each unit and shipping container shall be marked or labeled, as applicable, in accordance with 29 CFR 1910.1200(f) to show the required precautionary information. Each unit container shall be marked to show the skull and

O-M-232J

crossbones poison symbol and the word "POISON". Each outer container shall be marked to show the top of the container by use of an arrow and the word "UP".

6. NOTES

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

6.1 Intended use. Grade A methanol is intended for use as an industrial solvent. Grade AA methanol is intended for use in the generation of hydrogen and carbon dioxide. Grade C methanol (wood alcohol) is a product of the destructive distillation of wood and is intended for use as a denaturant.

6.2 Acquisition requirements. Acquisition documents must specify the following:

- (a) Title, number, and date of this specification
- (b) Grade of methanol required (see 1.2)
- (c) Unit quantity required
- (d) Level of packing required (see 5.3)
- (e) If palletization is required for shipments of containers over 5 gallons (see 5.4)
- (f) If special identification marking is required for civil agency shipments (see 5.5.6)

6.3 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 submission of data are listed in FED-STD-313.

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 of chemical material which is potentially hazardous to personnel. This specification does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this specification to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.

6.6 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.

6.7 Subject term (key word) listing.

Acetone
Denaturant
Industrial solvent
Material Safety Data Sheet
Wood alcohol

MILITARY INTERESTS:

CIVIL AGENCY COORDINATING ACTIVITIES:

Custodians:

GSA-FSS (9FTE-10)

Army - EA
Navy - OS
Air Force - 68

Review activities:

Army - AR, GL, MD, MI
DLA - GS
Misc - DS

User activity:

Navy - AS

Preparing activity:

Army - EA

Project No. 6810-1227

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 this form.

NOTE: This form may not be used to request copies of documents, nor to request waivers, or clarification of requirements on current contracts. Comments submitted on this form do not constitute or imply authorization to waive any portion of the referenced document(s) or to amend contractual requirements.

I RECOMMEND A CHANGE:

1. DOCUMENT NUMBER
0-N-232J

2. DOCUMENT DATE (YYMMDD)
90-11-19

3. DOCUMENT TITLE

METHANOL (METHYL ALCOHOL)

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 Chemical Research, Development
and Engineering Center

b. TELEPHONE (Include Area Code)

(1) Commercial (2) AUTOVON
(301) 671-3259 DSN 584-3259

c. ADDRESS (Include Zip Code)

Commander
U.S. Army CRDEC
ATTN: SMCCR-PET-S
Aberdeen Proving Ground, MD 21010-5493

IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:
Defense Quality and Standardization Office
5203 Leesburg Pike, Suite 1403, Falls Church VA 22041-3466
Telephone (703) 756-2340 AUTOVON 289-2340