

INCH-POUND

MIL-E-50011C

23 June 1994

SUPERSEDING

MIL-E-50011B

15 September 1982

## MILITARY SPECIFICATION

### ETHANOLAMINES (MONOETHANOLAMINE, DIETHANOLAMINE, AND TRIETHANOLAMINE), TECHNICAL

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

#### 1. SCOPE

**1.1 Scope.** This specification covers monoethanolamine, diethanolamine, and triethanolamine, technical grade.

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

Type I - Monoethanolamine (MEA)

Type II - Diethanolamine (DEA)

Type III - Triethanolamine (TEA)

#### 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

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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Defense Index of Specifications and Standards (DODISS) and supplement thereto, cited in the solicitation (see 6.2)

## SPECIFICATIONS

## FEDERAL

- NN-P-71 - Pallets, Material Handling, Wood, Stringer Construction, 2-Way and 4-Way (Partial)
- PPP-B-585 - Boxes, Wood, Wirebound
- PPP-B-601 - Boxes, Wood, Cleated-Plywood
- PPP-C-186 - Container, Packaging and Packing for Drugs, Chemicals, and Pharmaceuticals
- 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

## MILITARY

- 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)

- 29 CFR 1910 - Occupational Safety and Health Standards
- 49 CFR 171 to 199 - Department of Transportation Hazardous Materials Regulations

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(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 6.2).

### AMERICAN SOCIETY FOR TESTING AND MATERIALS (ASTM) STANDARDS

- D 86 – Distillation of Petroleum Products
- D 1193 – Reagent Water
- D 1209 – Color of Clear Liquids (Platinum – Cobalt Scale)
- D 1974 – Methods of Closing, Sealing, and Reinforcing Fiberboard Shipping Containers
- D 4727 – Corrugated and Solid Fiberboard Sheet Stock (Container Grade) and Cut Shapes
- D 5118 – Fabrication of Fiberboard Shipping Boxes
- E 203 – Water Using Karl Fischer Reagent

(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.)

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

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**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.

### 3. REQUIREMENTS

**3.1 Appearance.** Ethanolamines shall be clear, viscous, and free of suspended matter in the liquid state when tested as specified in 4.2.4.1. When in solid form, ethanolamines shall have a white, crystalline appearance, without visual evidence of impurities or discoloration.

**3.2 Chemical and physical characteristics.** Ethanolamines shall conform to the chemical and physical characteristics of table I when tested as specified therein.

TABLE I. Chemical and physical characteristics

Characteristic	MEA	DEA	TEA	Test paragraph
Specific gravity at 20°C/20°C	1.017 to 1.021	*1.090 to 1.095	1.124 to 1.129	4.2.4.2
Percent by volume distilled between 165°C and 175°C	90 minimum			4.2.4.3
Color, (Pt - Co scale)	20 maximum	40 maximum	100 maximum	4.2.4.4
Water content, percent by weight	1.0 maximum	1.0 maximum	1.0 maximum	4.2.4.5
MEA content, percent by weight	98 minimum	1.0 maximum	1.0 maximum	4.2.4.6
DEA content, percent by weight	1.5 maximum	98 minimum	1.5 maximum	4.2.4.6
TEA content, percent by weight	1.0 maximum	1.5 maximum	98 minimum	4.2.4.6

\* Specific gravity at 30°C/20°C

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

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#### 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 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 6.4.) 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.

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**4.2 Quality conformance inspection.**

**4.2.1 Lotting.** A lot shall consist of the ethanolamine of one type, 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 6.5).

**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, intermediate, 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 ethanolamine test.** See 6.6 for sampling and testing precautions. Sampling shall be conducted in accordance with table III. A representative specimen of approximately 1 liter shall be removed from each sample container and placed in a suitable clean, dry container labeled to identify the lot and container from which it was taken.

TABLE III. Sampling for ethanolamine test

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

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

TABLE IV. 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, intermediate, 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) Polyethylene insert as specified
- (f) Paint as specified (when required)
- (g) Baked-on enamel as specified (when required)
- (h) Paperboard collars as specified (when required)
- (i) Fiberboard pads and partitions as specified (when required)
- (j) Marking correct

**4.2.3.2 For ethanolamine test.** See 6.6 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 any 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 6.6 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 Appearance.** Thoroughly mix the specimen and transfer 25 milliliters (mL) into a 50-mL test tube. Stopper the test tube and allow it to stand until the bubbles have disappeared completely. Examine by transmitted light for uniformity and for freedom from particles and foreign matter.

**4.2.4.2 Specific gravity.** Measure the specific gravity of types I and III ethanolamine specimens at 20°C/20°C, and type II ethanolamine specimen at 30°C/20°C, with a specific gravity balance (chainomatic) adjusted to give a 1.000 value for the specific gravity of water at 20°C.

**4.2.4.3 Percent by volume distilled between 165°C and 175°C.** Determine the percent by volume distilled of the specimen between 165°C and 175°C in accordance with ASTM D 86.

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

**4.2.4.5 Water content.** Determine the water content of the specimen in accordance with ASTM E 203.

**4.2.4.6 MEA, DEA, TEA content.**

(a) **Apparatus.** Use a gas chromatograph with thermal conductivity detector, temperature programmer, glass lined injected port, and 1-millivolt recorder.

(b) **Chromatographic conditions.** Recommended conditions for a Varian Model 3700 gas chromatograph are shown in table V. Other equivalent instrumentation may be used but may require modification of conditions in order to obtain good peak shape, adequate resolution, and appropriate retention time.



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TABLE V. Chromatographic conditions

Characteristic	Condition
Column material	Nickel tubing (0.015-inch wall)
Column dimensions	5 feet (1/8-inch OD)
Column support	1.4 g of 60/80 mesh "TENAX GC"
Column temperature	180°C to 260°C at 25°C/min hold for 10 min*
Injection temperature	290°C
Detector temperature	290°C
Detector current	150 ma
Filament temperature	300°C
Range mv	0.5
Carrier gas	Helium
Carrier gas flow rate, cc per min	24

\* Periodically increase the column temperature to 300°C for 15 minutes.

(c) **Standard solution.** Use MEA, DEA, and TEA of no less than 99 percent by weight purity in preparing the standard solution. Prepare the standard solution by thoroughly mixing equal amounts by weight of the three amines. Pass the standard solution through the column repeatedly, in 2-microliter quantities to assure accurate operation of the apparatus. Repeat the 2-microliter injections until the peak areas for MEA, DEA, and TEA duplicate within 2-percent. Measure the peak areas and calculate the average MEA, DEA, and TEA peak areas. Approximate elution times are 8, 11, and 13 minutes for MEA, DEA, and TEA, respectively.

(d) **Procedure.** Inject 2 microliters of the specimen into the chromatograph. Repeat the 2-microliter injections until the peak areas for MEA, DEA, and TEA duplicate within 2-percent. Calculate the average peak areas for MEA, DEA, and TEA.

(e) **Calculations.** Calculate the percent by weight of MEA, DEA, and TEA as follows:

$$\text{Percent by weight MEA} = \frac{33.3A}{S}$$

where: A = Average MEA peak area for specimen and  
S = Average MEA peak are for standard.

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$$\text{Percent by weight DEA} = \frac{33.3B}{T}$$

where: B = Average DEA peak area for specimen and  
 T = Average DEA peak are for standard.

$$\text{Percent by weight TEA} = \frac{33.3C}{U}$$

where: C = Average TEA peak area for specimen and  
 U = Average TEA peak are for standard.

**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. Regardless of mode of transportation, the inner packagings of combination packages shall meet the minimum requirements of the IP.2 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-gallon (3.8-liter) quantity.** A quantity of 1 (+1 or -0 ounce) gallon (3.8 liters) of ethanolamine shall be unit packed in a nominal 1-gallon (3.8-liter) plastic bottle conforming to an IP.2 container of ICAO-TDGA. The IP.2 container shall conform to group A, class 2, style 1, grade optional, closure A or B with outer seal of PPP-C-186. The bottle shall

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be torqued closed and sealed in accordance with the bottle manufacturer's instructions. There shall be no evidence of leakage from the filled bottle when tested as specified in 4.2.5.

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

**5.1.2.1 Level A.**

**5.1.2.1.1 One-gallon (3.8-liter) quantity.** One 1-gallon (3.8-liter) bottle of ethanolamine, unit packed as specified in 5.1.1.1, shall be packed in a close-fitting weather-resistant fiberboard box conforming to a UN 4G container. The UN 4G container shall conform to grade V3c of ASTM D 5118. A cylindrical paperboard collar shall be inserted over the neck of the bottle to prevent any contact of the closure of the bottle with the underside of the closed box flaps. The box shall be closed as specified in accordance with the general packing requirements of ICAO-TDGA or IMO-IMDGC, as applicable.

**5.1.2.1.2 Five-gallon (18.9-liter) quantity.** A quantity of 5 (+5 or -0 ounces) gallons (18.9 liters) of ethanolamine shall be packed in a nominal 5-gallon (18.9-liter) steel pail (minimum 24 gauge metal) with polyethylene insert conforming to a UN 6HA1 container. The exterior of the pail shall be painted as specified for the pails of PPP-P-704. The pail shall be closed in accordance with the pail manufacturer's instructions. There shall be no evidence of leakage from the filled pail when tested as specified in 4.2.5.

**5.1.2.1.3 Fifty-five-gallon (208.2-liter) quantity.** A quantity of 55 (+0.5 or -0 gallon) gallons (208.2 liters) of ethanolamine shall be packed in a nominal 55-gallon (208.2-liter) tin-plated steel drum (minimum 14 gauge metal) conforming to a UN 1A1 container, or steel drum (minimum 18 gauge metal) with polyethylene insert conforming to a UN 6HA1 container. The drum shall be closed in accordance with the drum manufacturer's instructions. The exterior surfaces of the steel drum shall be prepared and painted as specified for the drums of PPP-D-729. There shall be no evidence of leakage from the filled drum when tested as specified in 4.2.5.

**5.1.2.2 Level B.**

**5.1.2.2.1 One-gallon (3.8-liter) quantity.** Four 1-gallon (3.8-liter) bottles of ethanolamine shall be packed in a close-fitting weather-resistant fiberboard box conforming to a UN 4G container. The box shall conform to grade V3c or V2s of ASTM D 5118. The bottles shall be inserted in close-fitting cells formed from full-box-height, half-slotted fiberboard partitions. They shall be further protected by full-box-face sized inner linings on all inside faces of the box (sides, ends, top, and bottom). Each bottle shall have a cylindrical collar, formed from paperboard, fitted over the neck. The collar shall be designed to prevent contact of the closure of the bottle with the underside of the closed box flaps. Motion of contents in the box shall be prevented by the addition of extra fiberboard pads as needed. Partitions and pads shall be formed from fiberboard conforming to grade W5c or V3c of ASTM D 4727. The box shall be closed as specified in accordance with the general packing requirements of ICAO-TDGA or IMO-IMDGC, as applicable.

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**5.1.3 Overpacking.****5.1.3.1 Level A.**

**5.1.3.1.1 One-gallon (3.8-liter) quantity.** Four packs of one-gallon (3.8-liter) bottles of ethanolamine shall be overpacked in a close-fitting water-repellent treated wooden or plywood box. The wooden box shall conform to class 3, style 1 or 2 of PPP-B-585, or overseas type, style A, B, or I of PPP-B-601. Motion of contents shall be prevented by inserting fiberboard pads as needed. Fiberboard pads shall conform to class weather-resistant, grade V3c of ASTM D 4727. The box shall be closed as specified in the appendix to PPP-B-585 or PPP-B-601.

**5.1.3.2 Level B.**

**5.1.3.2.1 One-gallon (3.8-liter) quantity.** Four packs of one-gallon (3.8-liter) bottles of ethanolamine shall be overpacked Level B in the same manner as specified for Level A, except that the box shall conform to class weather-resistant, grade V3c of ASTM D 5118. The fiberboard box shall be closed as specified in ASTM D 1974 for closure of boxes used as exterior containers.

**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, pack, 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".

**5.2.5 Overpack markings.** Each overpack shall be marked "Inner packages comply with prescribed specification 4G."

**5.3 Palletization.** A uniform quantity of packs of 1-gallon bottles of ethanolamine shall be palletized in accordance with load type 1 or 1a, as applicable, of MIL-STD-147. Bonding by means of strapping shall be used. Five-gallon pails of ethanolamine shall be unitized in

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accordance with MIL-STD-147, using load type III, arranged in two tiers of pails per pallet. The pallet shall conform to NN-P-71, type IV.

## 6. NOTES

**6.1 Intended use.** Monoethanolamine is intended for use as a decontaminant for riot control agent CS. It may also be used to decontaminate the equipment for dispersing chemical agent CS1. Monoethanolamine and diethanolamine are intended for the removal of carbon dioxide from air, other gases, and liquids by absorption. Triethanolamine is intended for use when an organic base is required, as in maintaining alkalinity of water solutions to prevent corrosion in such equipment as boilers, pipes, and radiators.

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

- (a) Title, number, and date of this specification,
- (b) Type 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) Level of packing required (see 5.1.2).

**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 submissions of data are listed in FED-STD-313.

**6.4 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.

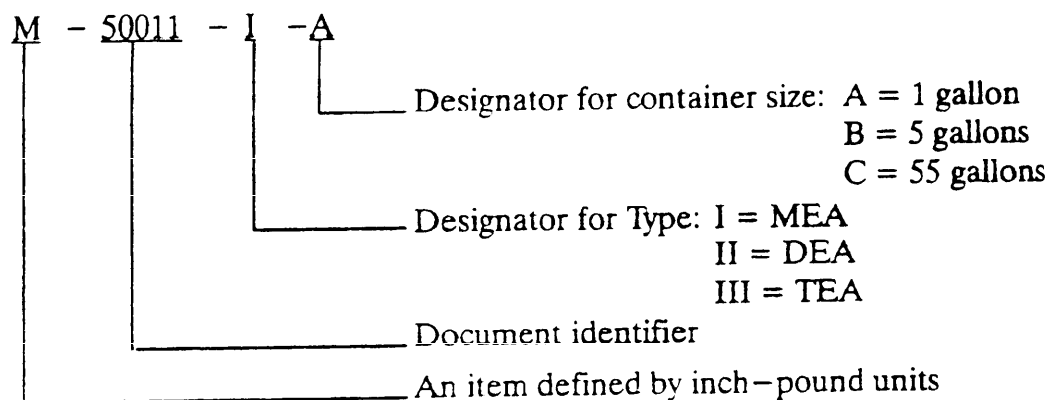
**6.5 Batch.** A batch is defined as that quantity of material which has been manufactured by some unit chemical process or subjected to some physical mixing operation intended to make the final product substantially uniform.

**6.6 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.

**6.7 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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**6.8 Part identification numbering system.** A recommended system is as follows:



**6.9 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.

**6.10 Subject term (key word) listing.**

chemical agent CS1  
diethanolamine  
ethanolamine  
monoethanolamine  
riot control agent CS  
triethanolamine

Custodians:

Army - EA  
Air Force - 68

Preparing activity:

Army - EA

Review activities:

Army - ME, SM  
DLA - GS

Project No. 6810-1310

User activities:

Navy - AS, OS  
DLA - CT



# 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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### 1. RECOMMEND A CHANGE:

1. DOCUMENT NUMBER  
MIL-E-50011C

2. DOCUMENT DATE (YYMMDD)  
940623

### 3. DOCUMENT TITLE

ETHANOLAMINES (MONOETHANOLAMINE, DIETHANOLAMINE, AND TRIETHANOLAMINE), TECHNICAL

### 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 (Print Name, Middle Initial)

c. ADDRESS (Include Zip Code)

### 6. ORGANIZATION

d. TELEPHONE (Include Area Code)

(1) Commercial

(2) AUTOVON

(If Applicable)

7. DATE SUBMITTED  
(YYMMDD)

### 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

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  
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