

O-D-1271B

June 20, 1985

SUPERSEDING

O-D-1271A

May 15, 1975

FEDERAL SPECIFICATION

DIETHYLENETRIAMINE, TECHNICAL

This specification is approved by the Assistant Administrator, Office of Federal Supply and Services, General Services Administration, for the use of all Federal agencies.

1. SCOPE

1.1 Scope. This specification covers one technical grade of diethylenetriamine.

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:

Federal Specifications:

- PPP-B-601 - Boxes, Wood, Cleated Plywood
- PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner
- PPP-B-636 - Boxes, Shipping, Fiberboard
- PPP-C-96 - Cans, Metal, 28 Gauge 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-F-320 - Fiberboard: Corrugated and Solid, Sheet Stock (Container Grade), and Cut Shapes
- PPP-T-60 - Tape: Packaging, Waterproof

Federal Standard:

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

FSC 6810

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

O-D-1271B

(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 Seattle, 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-105 - Sampling Procedures and Tables for Inspection by Attributes
- MIL-STD-129 - Marking for Shipment 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.)

Code of Federal Regulations (CFR)

- 49 CFR 171 to 179 - 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.

Uniform Classification Committee, Agent:

Uniform Freight Classification

(Application for copies should be addressed to the Uniform Classification Committee, Room 1106, 222 South Riverside Plaza, Chicago, IL 60606.)

O-D-1271B

National Motor Freight Traffic Association, Inc., Agent:

National Motor Freight Classification

(Application for copies should be addressed to the American Trucking Associations, Inc., Traffic Department, 1616 P Street, NW, Washington, DC 20036.)

ASTM Standards:

- C 516 - Vermiculite Loose Fill Thermal Insulation
- D 86 - Distillation of Petroleum Products
- D 891 - Specific Gravity, Apparent, of Liquid Industrial Chemicals
- D 1193 - Reagent Water
- D 1364 - Water in Volatile Solvents (Fischer Reagent Titration Method)
- E 29 - Indicating Which Places of Figures Are to Be Considered Significant in Specified Limiting Values

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

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

2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for the Code of Federal Regulations), the text of this specification shall take precedence.

3. REQUIREMENTS

3.1 Appearance. Diethylenetriamine shall be clear, yellow, uniform, and free from suspended matter when tested as specified in 4.2.4.1.

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

TABLE I. Chemical and physical characteristics

Characteristic	Requirement		Test paragraph
	Minimum	Maximum	
Purity, percent by weight	97.0	----	4.2.4.2
Water content, percent by weight	----	0.5	4.2.4.3
Specific gravity at 20°/20°C	0.950	0.958	4.2.4.4
Distillation range at 760 mm Hg:			4.2.4.5
Initial boiling point, °C	185.0	----	
Dry point, °C	----	215.0	
Volume of distillate below 210°C, percent:	93.0	----	

O-D-1271B

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 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 the specification where such inspections are deemed necessary to assure supplies and services conform to prescribed requirements.

4.2 Quality conformance inspection.

4.2.1 Lotting. A lot shall consist of the diethylenetriamine 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 6.3).

4.2.2 Sampling.

4.2.2.1 For examination of packaging. Sampling shall be conducted in accordance with MIL-STD-105, inspection level S-2.

4.2.2.2 For diethylenetriamine tests. See 6.4 for sampling and testing precautions. Sampling for test shall be conducted in accordance with table II. Representative specimens of approximately 1 pint each shall be taken from the lot of diethylenetriamine and placed in separate suitable clean, dry, closed containers which have been purged immediately prior to filling by nitrogen gas containing no more than 25 parts per million each of carbon dioxide, oxygen, and water.

TABLE II. Sampling for diethylenetriamine tests

Pounds of diethylenetriamine in batch or lot	:	Number of samples
Under 1,000	:	2
1,000 to 5,000	:	3
Over 5,000	:	5
	:	

4.2.2.3 For container leakage test. Sampling shall be conducted in accordance with MIL-STD-105, inspection level S-4.

O-D-1271B

4.2.3 Inspection procedure.

4.2.3.1 For examination of packaging. The sample unit shall be one filled unit container, ready for shipment. Sample unit containers shall be examined for the following defects using an AQL of 4.0 percent defective:

- (a) Contents per container not as specified
- (b) Container not as specified
- (c) Container closure not as specified
- (d) Container damaged or leaking
- (e) Cushioning material missing or not as specified (when required)
- (f) Marking incorrect, missing or illegible

4.2.3.2 For diethylenetriamine 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.

4.2.3.3 For container leakage test. See 6.4 for sampling and testing precautions. The sample unit shall be one container. The sample containers selected in 4.2.2.3 shall be tested as specified in 4.2.5 using an AQL of 2.5 percent defective.

4.2.3.4 Significant places. For the purpose of determining conformance with this specification, an observed or calculated value shall 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.

4.2.4 Diethylenetriamine tests. See 6.4 for sampling and testing precautions. Water in accordance with ASTM D 1193, type as applicable, 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. Visually examine the specimen for clarity, color, uniformity, and suspended matter.

4.2.4.2 Purity. Weigh to the nearest 0.1 milligram (mg) 0.100 to 0.150 gram (g) of specimen into a tared glass ampule. Transfer the ampule to an appropriate titration vessel containing 75 to 100 milliliters (mL) of water. By means of a long glass rod flattened at the end, crush the ampule. Wash down the glass rod with water. Add several drops of bromothymol blue indicator (0.1 percent by weight in ethanol) and titrate using a previously standardized approximately 0.1N aqueous hydrochloric acid solution. Titrate either electrometrically past the first inflection point or to a faint greenish-yellow indicator end point (this corresponds to the primary amine content of the specimen). Calculate the percent by weight diethylenetriamine as follows:

$$\text{Percent diethylenetriamine} = \frac{5.16AB}{W}$$

O-D-1271B

where: A = Milliliters of hydrochloric acid used,
 B = Normality of the hydrochloric acid, and
 W = Weight of specimen in grams.

4.2.4.3 Water content. Determine water content in accordance with ASTM D 1364 except that glacial acetic acid shall be substituted for the ethylene glycol monomethyl ether.

4.2.4.4 Specific gravity. Determine specific gravity at 20°/20°C in accordance with the hydrometer method of ASTM D 891.

4.2.4.5 Distillation range. Determine distillation range in accordance with ASTM D 86.

4.2.5 Container leakage test.

4.2.5.1 Bottles. Keep the filled bottle in an inverted position at a temperature of $79^{\circ} \pm 5^{\circ}\text{F}$ for 2 hours and then at $120^{\circ} \pm 5^{\circ}\text{F}$ for an additional 4 hours. Observe for evidence of leakage during and at the end of this test.

4.2.4.2 Drums. Store the filled drum for at least 24 hours at a temperature of $75^{\circ} \pm 5^{\circ}\text{F}$. Then invert the drum and maintain at $75^{\circ} \pm 5^{\circ}\text{F}$ for 4 additional hours. Observe for evidence of leakage during and at the end of the 4-hour period.

5. PACKAGING

5.1 Unit packing. Diethylenetriamine shall be unit packed level A or C as specified (see 6.2).

5.1.1 Level A.

5.1.1.1 One-pint quantity. A quantity of 16 (+1/5 or -0) fluid ounces of diethylenetriamine shall be unit packed in a clean, dry glass bottle which has been purged of air immediately prior to filling by nitrogen gas containing no more than 25 parts per million each of carbon dioxide, oxygen, and water. The bottle shall be nominal 1-pint capacity conforming to group A, class 1, type d, closure b, using outer seal a of PPP-C-186. The bottle shall be closed immediately after filling using a torque of 23 to 27 inch-pounds on the properly seated screw cap. The bottle shall not leak prior to the application of the outer seal when tested as specified in 4.2.5.1. The closed and labeled bottle shall be centered upright in vermiculite cushioning in a metal can. A minimum of 1/2 pound of vermiculite conforming to type I, grade 2 or 3 of ASTM C 516 shall be used; however, a sufficient quantity shall be used to fill all voids in the can. The can shall conform to type VI of PPP-C-96 with exterior coating plan B with side seam striped. The seam of the can shall be sealed using tape conforming to type III, class optional of PPP-T-60.

O-D-1271B

5.1.1.2 Fifty-five-gallon quantity. A quantity of 55 (+1/2 or -0) gallons (gal) of diethylenetriamine shall be unit packed level A in a nominal capacity 55-gal steel drum conforming to type I, class A or type II of PPP-D-729 with cap seals with no zinc plating on that part of the plug or drum which contacts the contents. Immediately prior to filling, the drum shall be purged of air with nitrogen gas containing no more than 25 parts per million each of carbon dioxide, oxygen, and water. The exterior surface of the drum shall be phosphatized prior to painting. The 3/4-inch and 2-inch closures shall be closed to a torque of 15 and 30 foot pounds \pm 5 percent, respectively, after the drum has been filled. The filled drum shall not leak when tested as specified in 4.2.5.2.

5.1.2 Level C.

5.1.2.1 One-pint quantity. A quantity of 16 (+1/5 or -0) fluid ounces of diethylenetriamine shall be unit packed in a clean, dry, nominal 1-pint capacity glass bottle in a manner assuring retention of purity and prevention of leakage and damage until used by the first receiving activity after a limited term of storage.

5.1.2.2 Fifty-five-gal quantity. A quantity of 55 (+1/2 or -0) gal of diethylenetriamine shall be unit packed in a drum in a manner to assure maintenance of the originally specified quantity and purity for a minimum duration of 6 months. Immediately prior to filling, the drum shall be purged of air with nitrogen as specified in 5.1.1.2. The drum shall be in compliance with Department of Transportation (DOT) regulations and the regulations applicable to any other intended mode of transportation. The drum shall be acceptable to common carrier and shall be in accordance with Uniform Freight Classification Rules, National Motor Freight Classification Rules and the rules applicable to any other intended mode of transportation.

5.1.3 Intermediate packing for 1-pint bottles. Twelve bottles of diethylenetriamine unit packed as specified in 5.1.1.1 or 5.1.1.2 shall be intermediately packaged upright in a close-fitting fiberboard box. The bottles shall be arranged in four rows of three bottles per row. The box shall conform to grade W5c of PPP-B-636 for a type 2 load and shall be fitted with a sleeve, partitions, and top and bottom liners formed from fiberboard conforming to minimum grade W5c of PPP-F-320. A tight fit of contents in the box and in the cells formed by the partitions shall be assured by inserting, where needed, fiberboard pads formed from the same material as the liners. The box shall be closed as specified for closure of class weather-resistant boxes in the appendix to PPP-B-636.

5.2 Packing. Diethylenetriamine shall be packed level A or C as specified (see 6.2).

O-D-1271B

5.2.1 Level A.

5.2.1.1 One-pint quantity. Four intermediate packs prepared as specified in 5.1.3 shall be packed upright in either a cleated-plywood box conforming to type overseas, style A, B, or I, grade A of PPP-B-601 or a nailed wood box conforming to class 2, style 4, grade A of PPP-B-621. The box shall be designed for a type 2 load and shall be closed and reinforced by strapping as specified in the appendix to the applicable box specification.

5.2.1.2 Fifty-five-gal quantity. Diethylenetriamine unit packed as specified in 5.1.1.2 shall require no further protection for shipment.

5.2.2 Level C, 55-gal quantity. Diethylenetriamine unit packed as specified in 5.1.2.2 shall require no further protection for shipment.

5.3 Marking. Containers shall be marked in accordance with Fed. Std. No. 123 for civil agencies or MIL-STD-129 for military activities. Each intermediate and shipping container shall be marked with bar coding and to show the lot or batch number of the diethylenetriamine and to comply with DOT regulations and to show the following precautionary information:

DANGER! CAUSES SEVERE EYE AND SKIN BURNS

Do not get into eyes, on skin, or on clothing.
 Avoid prolonged or repeated breathing of vapor.
 In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes; for eyes, get immediate medical attention.
 Remove contaminated clothing, including shoes.
 Wash clothing before reuse; discard contaminated shoes.

6. NOTES

6.1 Intended use. Diethylenetriamine is intended for use in the manufacture of Decontaminating Agent, DS2.

6.2 Ordering data. Acquisition documents should specify the following:

- (a) Title, number, and date of this specification
- (b) Unit quantity required
- (c) Level of unit packing and packing required (see 5.1 and 5.2)

6.3 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.

O-D-1271B

6.4 Sampling and testing precautions. This specification covers inspection of chemical material which is potentially hazardous to personnel. All applicable safety rules, regulations and procedures must be followed in the handling and processing of this material.

MILITARY INTERESTS:

Custodians:

Army - EA
Air Force - 68

Review activities:

Army - MD
DLA - GS

CIVIL AGENCY COORDINATING ACTIVITIES:

GSA-7FCE
VA-OSS

Preparing activity:

Army - EA
Project No. 6810-B481

Orders for this publication are to be placed with the General Services Administration, acting as an agent for the Superintendent of Documents. See section 2 of this specification to obtain copies and other documents referenced herein.

STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions -- Reverse Side)

1. DOCUMENT NUMBER -D-1271B		2. DOCUMENT TITLE DIETHYLENETRIAMINE, TECHNICAL	
3. NAME OF SUBMITTING ORGANIZATION		4. TYPE OF ORGANIZATION (Mark one) <input type="checkbox"/> VENDOR <input type="checkbox"/> USER <input type="checkbox"/> MANUFACTURER <input type="checkbox"/> OTHER (Specify) _____	
b. ADDRESS (Street, City, State, ZIP Code)			
5. PROBLEM AREAS			
a. Paragraph Number and Wording:			
b. Recommended Wording:			
c. Reason/Rationale for Recommendation			
6. REMARKS			
7a. NAME OF SUBMITTER (Last, First, MI) - Optional		b. WORK TELEPHONE NUMBER (Include Area Code) - Optional	
MAILING ADDRESS (Street, City, State, ZIP Code) - Optional		8. DATE OF SUBMISSION (YYMMDD)	

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