

INCH-POUND

O-A-445C  
6 August 2003  
SUPERSEDING  
O-A-445B  
25 February 1975

## FEDERAL SPECIFICATION

### AMMONIA, TECHNICAL

The general services administration has authorized the use of this federal specification by all federal agencies.

#### 1. SCOPE

1.1 Scope. This specification covers one grade of compressed anhydrous ammonia for refrigeration and nitriding purposes.

#### 2. APPLICABLE DOCUMENTS

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

##### Federal Standards

FED-STD-H28 - Screw-Thread Standards for Federal Services.

(Activities outside the federal government may obtain copies of federal standards as specified in the general information section of the index of federal specifications, standards and commercial item descriptions. The index is for sale on a subscription basis from the General Services Administration, Federal Supply Service, Specification Section, East 470 L'Enfant Plaza SW, Suite 8100, Washington, DC 20407.)

Beneficial comments, recommendations, additions, deletions clarifications, etc. and any data that may improve this document should be sent to: Defense Supply Center Richmond, ATTN: DSCR-VEB, 8000 Jefferson Davis Highway, Richmond, VA 23297-5616.

AMSC N/A

FSC 6830

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

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(Single copies of this specification, and other federal specifications and commercial item descriptions required by activities outside the federal government for bidding purposes are available without charge from the General Services Administration, Federal Supply Service, Specification Section, East 470 L'Enfant Plaza SW, Suite 8100, Washington, DC 20407.)

(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 Specifications

- |               |   |
|---------------|---|
| MIL-DTL-2     | - Valves, Cylinder, Gas (For Compressed or Liquefied Gases)<br>General Specification For. |
| MIL-DTL-11733 | - Cylinder, Compressed Gas: Ammonia, With Valve<br>(DOT 4AA480).                          |

#### Military Standards

- |              |  |
|--------------|--|
| MIL-STD-101  | - Color Code for Pipelines and for Compressed Gas Cylinders. |
| MIL-STD-129  | - Military Marking for Shipment and Storage.                 |
| MIL-STD-1916 | - DoD Preferred Methods for Acceptance of Product.           |

#### Military Handbook

- |              |                          |
|--------------|--------------------------|
| MIL-HDBK-774 | - Palletized Unit Loads. |
|--------------|--------------------------|

(Copies of military specifications, standards, and handbooks required by contractors in connection with specific procurement functions are obtained from the Standardization Document Order Desk, Building 4D, 700 Robbins Avenue, Philadelphia, PA 19111-5094. Electronic copies of specifications, standards, and handbooks may be obtained from <http://assist.daps.dla.mil/quicksearch/>.)

#### Code of Federal Regulations (CFR)

- |            |   |
|------------|---|
| 49 CFR 173 | - Shippers – General Requirements for Shipments and Packagings. |
| 49 CFR 178 | Specifications for Packagings.                                  |

(The Code of Federal Regulations (CFR) is for sale on a subscription basis from the Superintendent of Documents, P.O. Box 371954, Pittsburgh, PA 15250-7954. When indicated, reprints of certain regulations may be obtained from the federal agency responsible for issuing them. Electronic copies may be obtained from <http://www.access.gpo.gov/>.)

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 the date of invitation for bids or request for proposal shall apply.

ASTM International (ASTM)

- |             |  |
|-------------|--|
| ASTM D 3951 | - Standard Practice for Commercial Packaging (DoD adopted).  |
| ASTM D 4377 | - Standard Test Method for Water in Crude Oils by Potentiometric Karl Fischer Titration (DoD adopted). |

(Private sector and civil agencies may purchase copies of these voluntary standards from ASTM International, P.O. Box 700, 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959. Electronic copies may be obtained from <http://www.astm.org/>.)

Compressed Gas Association, Inc. (CGA)

- |           |   |
|-----------|---|
| CGA G-2   | - Anhydrous Ammonia (DoD adopted).  |
| CGA TB-17 | - Test Methods for Evaluating Paints and Coatings on Refillable Steel Compressed Gas Cylinders (DoD adopted). |

(Private sector and civil agencies may purchase copies of these voluntary standards from the Compressed Gas Association, Inc., 4211 Walney Road, 5th Floor, Chantilly, VA 20151-2923. Electronic copies may be obtained from <http://www.cganet.com/>.)

### 3. REQUIREMENTS

3.1 Material. The ammonia shall conform to table I.

TABLE I. Properties of ammonia.

Properties	Technical grade weight (percent)
Purity (min.) <sup>1</sup>	99.98
Oil (max.)	0.0005
Moisture (max.)	0.02

<sup>1</sup>Purity is the weight percent of ammonia by difference, when the weight percent of the residual evaporated at not greater than 86 °F (30 °C) is adjusted for absorbed NH<sub>3</sub> and subtracted from 100 percent.

3.1.1 Filtration. The ammonia shall be filtered by the use of a 10-micron nominal filter between the supplier's source and the container of delivery.

3.1.2 Contaminant testing. When the ammonia is produced with hydrogen from a source other than natural gas, it shall be tested for pyridine, naphthalene, and hydrogen sulfide. There shall be no evidence of the presence of the above compounds when tested in accordance with 4.4.6.1, 4.4.6.2, and 4.4.6.3.

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3.2 Containers and valves. Unless otherwise specified herein, the ammonia shall be contained in government-furnished containers, capacity as specified (see 6.2 and 6.4), in accordance with 49 CFR 178 and equipped with valves with outlet connection No. 240 in accordance with FED-STD-H28. When specified (see 6.2), new containers shall be furnished by the supplier, and shall be in accordance with MIL-DTL-11733, capacity as specified, and shall be equipped with valves in accordance with MIL-DTL-2. When specified (see 6.2), the ammonia shall be furnished in supplier-owned Department of Transportation approved containers, capacity as specified.

3.3 Container maintenance. Government and supplier-furnished containers that require maintenance shall be processed by the supplier for serviceability to meet the requirements of this specification, 49 CFR 173, and CGA G-2 (see 6.7).

3.3.1 Residual pressure. Before refilling, each container shall be checked for residual pressure. A container with an open valve or with insufficient pressure to cause an audible hiss, when the valve is slightly opened, shall be devalved, cleaned, dried, and revalved to assure that the internal condition of the cylinder will preserve the properties of the ammonia. Containers with residual pressure shall be bled to zero pressure in the horizontal position with the diptube turned up and the base slightly elevated. Any cylinder that displays condensation or freezing of water vapor at the valve or within the valve outlet shall be devalved, cleaned, dried, and revalved before filling. When the cylinder bled to zero pressure is free of water, the valve shall be closed and the cylinder is acceptable for refilling with anhydrous ammonia.

3.3.2 Cylinder drying. Containers subjected to hydrostatic testing, aqueous cleaning, or to water from any source in usage, shall be dried until effluent gas has a dew point lower than 40 °F (4 °C). Drying may be accomplished by use of heated inert gas, evacuation of ambient air from the bottom of the container submerged in a water bath at 180 °F (82 °C), or by forcing heated or dry air to the bottom of the cylinder. The cylinder shall be valved or plugged to retain the dry condition for refilling with ammonia.

3.3.3 Treatment and painting. Government-furnished containers for ammonia requiring repainting shall be stripped, treated, and painted as required in accordance with CGA TB-17. Each cylinder shall be color coded and marked in accordance with MIL-STD-101.

3.3.4 Valves. Unless otherwise specified (see 6.2), replacement valves for defective valves in government-furnished containers shall be supplier furnished and shall be in accordance with MIL-DTL-2.

3.3.5 Container filling. Containers with residual pressure approved for refill, shall be charged with anhydrous ammonia to their nominal weight. Cylinders that have been devalved, cleaned, dried, and revalved, shall be filled to nominal capacity and shall be immediately bled free of approximately 5 cubic feet of gases, purging the cylinder of the trapped atmospheric air. For anhydrous ammonia cylinder filling density, see 6.6.

3.4 Capacity. Containers shall be filled to rated capacity. The weight of ammonia supplied in each container shall be the difference between the filled weight and the unfilled tare weight of the container.

3.5 Leakage. Containers and valves shall not leak after being filled and examined by submersion or with leak solution.

#### 4. QUALITY ASSURANCE PROVISIONS

4.1 Responsibility for inspection. Unless otherwise specified in the contract or purchase order (see 6.2), the contractor is responsible for the performance of all inspection requirements as specified herein. Except as otherwise specified in the contract or purchase order (see 6.2), 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 that supplies and services conform to prescribed requirements.

4.1.1 Component and material inspection. The supplier is responsible for insuring that components and material used are manufactured, examined, and tested in accordance with referenced specifications and standards. The supplier shall verify that the production facility will produce anhydrous ammonia that complies with the percent by volume anhydrous ammonia purity requirements of 3.1 for the grade supplied (see 6.5). This verification may be by the current analytical records of anhydrous ammonia from the facility. The analytical records shall be considered current if taken within 180 days preceding the date of contract or purchase order. When current analytical reports are not available, or in case of process upset or equipment malfunction which affects the product purity, anhydrous ammonia from the facility shall be tested as specified in 4.4 prior to starting or continuing production.

4.2 Classification of inspections. Inspections shall be classified as follows:

- a. Quality conformance inspection (see 4.3).
- b. Inspection of packaging (see 4.5).

4.3 Quality conformance inspection.

4.3.1 Inspection lot. All cylinders filled from the same source on the same day, or each tank car or trailer shall be considered a lot.

4.3.2 Sampling. Sampling for testing shall be from filled containers and, unless otherwise specified herein (see 6.2), shall be as follows:

- a. With respect to cylinders, the manufacturer, in accordance with MIL-STD-1916, shall select the type of sampling plan. The sample size shall be selected in accordance with verification level II of MIL-STD-1916.

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b. Each tank car.

c. Bulk storage tank. When specified (see 6.2), bulk liquid ammonia used exclusively for filling an entire order of small cylinders may be sampled and tested prior to the actual transfer.

4.3.3 Examination. All cylinders shall be examined as specified in 4.4.1. Presence of any defect shall be cause for rejection.

4.3.4 Tests. Samples selected in accordance with 4.3.2 shall be tested as specified in 4.4.

4.3.5 Inspection procedure.

4.3.5.1 Examination. The filled ammonia cylinders shall be examined as specified herein for the following defects:

- 101 Cylinder and valve not as specified.
- 102 Cylinder not processed and dried as specified.
- 103 Painting, color coding, and marking not as
- 104 Capacity at 70 °F (21 °C) not as specified.
- 105 Container or valve leakage.

4.4. Test methods.

4.4.1 Sampling.

a. The flasks, tubes, and assemblies shall be cleaned with chlorinated solvent and dried. Boiling chips of known volume shall be placed in the sample containers and the following samples shall be taken from each inspection lot. For moisture residual and purity tests, use standard ASTM 100 milliliter (ml) centrifuge tubes calibrated in 0.05 ml increments to 1.0 ml. Prepare an adapter from a 1/2-inch Pyrex tube with a 1/4-inch lateral vent. Fit one end to receive the sampling hose and fit the other end with a one-hole stopper that will mate with the mouth of the centrifuge tube for a snug fit. Assemble the adapter, hose, and centrifuge tube into a unit and provide a vented stopper for each flask to be used. If possible, chill this equipment before taking samples.

b. Attach the hose of the 100 ml tube assembly to the container of ammonia to be tested, and as quickly and accurately as possible draw 100 ml into the centrifuge tube with the container shut-off valve. With the apparatus intact, allow the ammonia to evaporate to less than 0.5 ml. Repeat this sampling procedure four more times for a total sample size of 500 ml. With the final residue in the centrifuge tube and with the assembly intact, loosen the hose from the adapter and allow the ammonia to continue to evaporate at room temperature.

c. For oil determination draw a 1000 ml sample into a round bottom calibrated flask. Immediately stopper the flask with a vented stopper and allow to evaporate at room temperature. Read the pressure or temperature of the storage container to determine the evaporation factor from figure 1. The evaporation factor F is a correction for the evaporative cooling of liquid ammonia from the temperature corresponding to the pressure in the storage vessel to the boiling point at atmospheric pressure -27.94 °F (-33.3 °C).

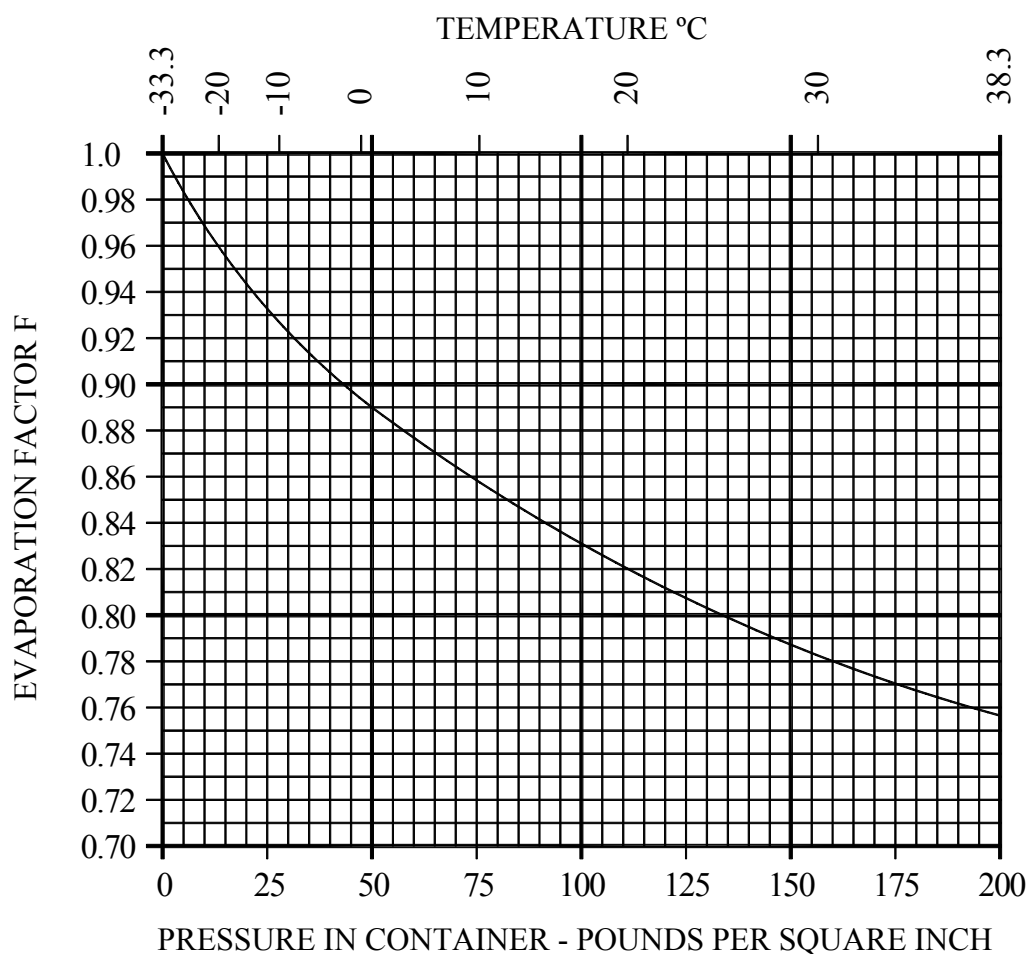


FIGURE 1. Evaporation factor.

4.4.2. Sample preparation. Place the tubes and the round bottom flasks in a circulating water bath until the ammonia evaporation is complete. The temperature of the bath shall not exceed 86 °F (30 °C). The remaining residue is a mixture of water, oil, nonvolatile impurities, and ammonia.

4.4.3 Moisture determination. The ammonia shall be tested for moisture by using the routine analysis method specified in 4.4.3.1. In case of dispute, the referee method specified in 4.4.4 shall be used as the determining criteria.

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4.4.3.1 Routine analysis method. After evaporation is complete (see 4.4.2), determine the volume of the residue remaining in the calibrated centrifuge tubes to the nearest 0.05 ml (corrected to eliminate the volume of the small piece of boiling chip). The composition of the residue will average 28 percent ammonia. The percent by weight of water residue in the sample shall be calculated as follows:

$$\text{Weight percent moisture} = (0.264)(0.72A)(F)$$

Where:

$$0.264 = \frac{[(100)(0.899 \text{ Sp. Gr. Residue})]}{(500\text{ml})(0.682 \text{ g/ml NH}_3)}$$

$$0.72 = 100 - 28 \text{ percent NH}_3 \text{ in the residue}$$

A = ml residue in 500 ml sample

F = Evaporation factor from figure 1

4.4.3.2 Purity. The purity of the ammonia shall be calculated as follows:

$$100 - \text{weight percent moisture (total residue)} = \text{weight percent purity}$$

4.4.3.3 Failure criteria. Nonconformance to 3.1 shall constitute failure of this test.

4.4.4 Referee (Karl Fischer) method. By means of gentle pressuring with dry nitrogen or air, transfer about 25 ml of anhydrous methanol, previously titrated to the dead-stop endpoint, from the aquameter reaction vessel to the tube containing residue (see figure 2). Mix by gentle swirling and then transfer the contents back into the aquameter vessel, by inverting the sample tube. Titrate to the dead-stop endpoint. Repeat the transfer and titration once more and record the total volume of Karl Fischer reagent used. Throughout the transfers and titrations avoid exposing the methanol or the glassware to the atmosphere to avoid absorption of atmospheric moisture.

4.4.4.1 Reagents and equipment. Reagents and equipment shall be in accordance with ASTM D 4377.

4.4.4.2 Calculations. Calculate the moisture content of the ammonia as follows:

$$\text{Weight percent moisture} = CF/W(10)$$

Where:

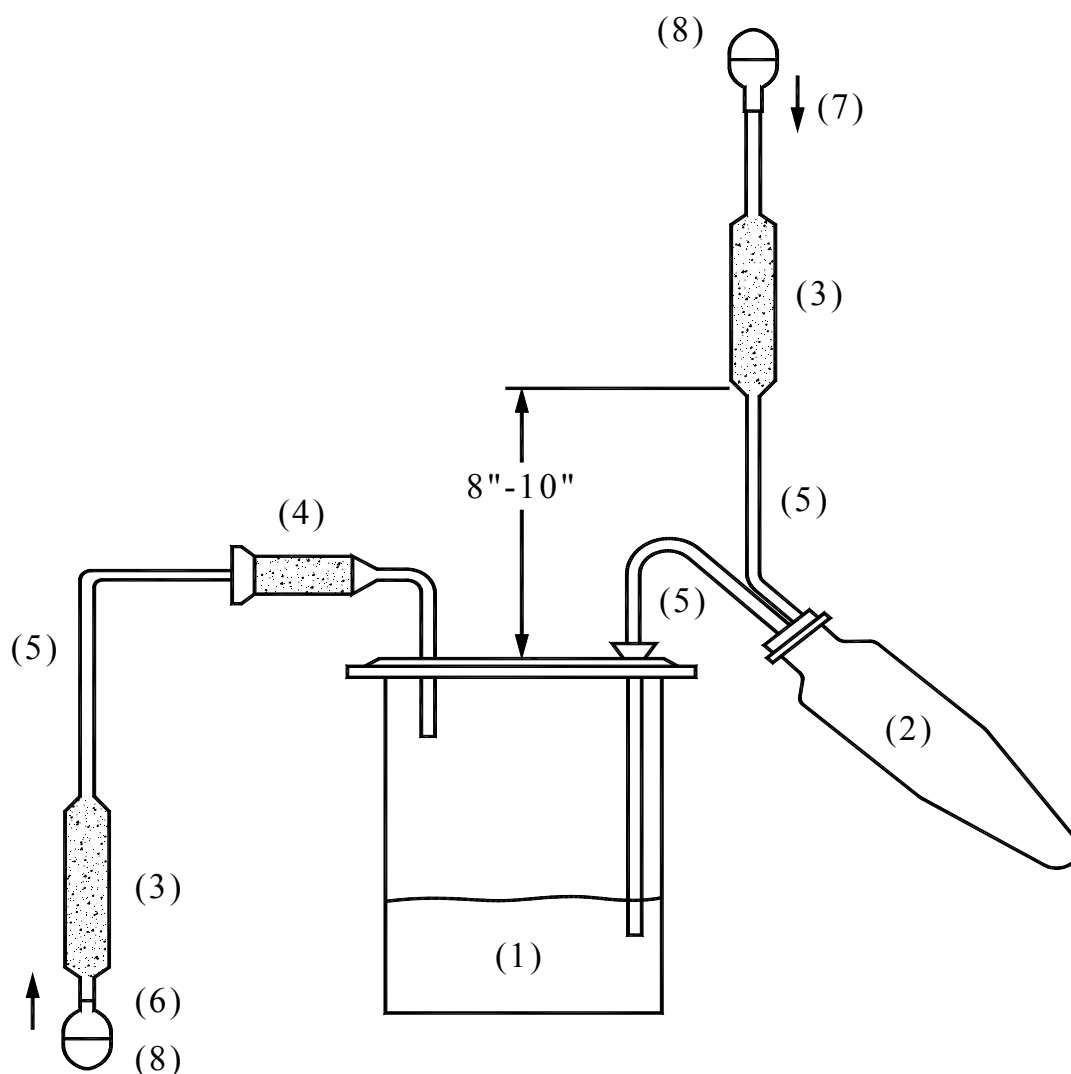
C = Karl Fischer reagent required to titrate the sample, ml

F = Water equivalence of Karl Fischer reagent, milligrams (mg)/ml

W = Sample used, g

10 = Factor for converting to percent

4.4.4.3 Failure criteria. Nonconformance to 3.1 shall constitute failure of this test.



1. Aquameter reaction vessel.
2. Sample tube (centrifuge).
3. Desiccant tube (6 inches).
4. Aquameter desiccant tube.
5. 3/16-inch plastic tubing (TYGON or equivalent).
6. Pressurize to mix dry methanol with sample.
7. Pressurize to return sample to reaction vessel.
8. Syringe bulbs or nitrogen source.

FIGURE 2. Adaptation to aquameter reaction vessel.

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**4.4.5 Oil determination.** Extract the residue in the round bottom flask with four 10 ml portions of carbon tetrachloride. Add the solvent from a 10-ml pipette and while adding each portion, run the tip of the pipet around the inside neck of the flask as the latter is rotated, to completely wash the inside wall of the flask. Carefully transfer each 10 ml portion of carbon tetrachloride (and any water present in the residue) to a separatory funnel, combining the extracts in the same funnel. The funnel should have a dry stopcock (no lubricant) and should have been previously rinsed with carbon tetrachloride. After shaking allow the water phase of the combined extract to separate and draw off the organic bottom layer through a dry filter paper into a weighed evaporating dish. Rinse the filter paper with two 10 ml portions of carbon tetrachloride. The filter paper should be washed previously with carbon tetrachloride and dried. Place the evaporating dish on a steam bath and evaporate the carbon tetrachloride. As the last of the solvent is evaporated, wipe the outside of the dish with a piece of absorbent tissue and cool the dish in a desiccator. Finally weigh the dish and residue to the nearest 0.1 mg. Make a blank evaporation of 60 ml of carbon tetrachloride for each lot of the solvent used.

**4.4.5.1 Reagents and equipment.**

a. Reagents.

1. Carbon tetrachloride, ACS reagent.
2. Calcium chloride, anhydrous, for use as desiccant.

b. Equipment.

1. Evaporation flask, 1 liter capacity, round bottom.
2. Evaporation dish, 100 ml capacity, glass flat bottom.
3. Pipet, 10 ml capacity.
4. Funnel, separatory, 125 ml capacity.
5. Paper, filter, Whatman No. 5 or No. 41 or equivalent.
6. Desiccator.
7. Analytical balance, accurate to 0.1 mg.

**4.4.5.2 Calculations.** Calculate the oil content of the sample by means of the following equations:

$$\text{Oil content, ppm} = (1.47)(A-B)(F)$$

Where:

A = Weight of oil residue, mg

B = Weight of carbon tetrachloride blank, mg

F = Evaporation factor derived from the chart (figure 1) relating evaporation factor to the pressure (or temperature) of ammonia in the tank from which the sample was drawn

$$1.47 = \frac{1000}{(1000 \text{ ml})(0.682 \text{ g/ml})}$$

where 0.682 g/ml is the density of liquid ammonia at atmospheric pressure (14.7 psig).

4.4.5.3 Failure criteria. Nonconformance to 3.1 shall constitute failure of this test.

4.4.6 Pyridine, naphthalene, and hydrogen sulfide determination. Unless the ammonia is made from natural gas, the following tests for pyridine, naphthalene, and hydrogen sulfide shall be made. Samples 100 ml in size shall be taken as specified in 4.4.1 instead of 500 ml samples when required.

4.4.6.1 Pyridine. About a 100-ml sample of ammonia, taken as specified in 4.4.1, shall be converted to a nitrate or a sulfate, using as little excess of acid as possible. Evaporate the solution until crystals begin to separate and transfer the concentrated solution to a separatory funnel. Make an alkaline with a saturated solution of reagent-grade sodium bicarbonate and shake with ethyl ether. The sodium bicarbonate has no action on the ammonia salt but liberates the pyridine which dissolves in the ethyl ether. Shake the solution two additional times with ethyl ether and treat the combined ether extract with distilled water and sufficient dilute nitric acid (1:3) to render it slightly acid. Evaporate the mixture to a small volume, transfer to a small distilling flask, together with a small piece of zinc to prevent bumping, and render the alkaline with sodium hydroxide solution. Distill over two thirds of the liquid into a small test tube containing 1 ml of saturated solution of reagent-grade mercuric chloride. Heat the distillate almost to boiling and filter into a small test tube. Cool to about 77 °F (25 °C). The presence of any cluster of needles shall indicate the presence of pyridine.

4.4.6.2 Naphthalene. About a 100-ml sample of ammonia, taken as specified in 4.4.1, shall be evaporated with 0.20 gram of reagent-grade picric acid. Dissolve the residue in 5 ml of boiling reagent-grade ethyl alcohol and gradually cool to about 77 °F (25 °C). Note whether any crystals have separated. Naphthalene shall be considered absent if no crystals separate out. Should crystals separate out, filter off the separated materials and recrystallize from a small amount of reagent-grade ethyl alcohol. Dry the crystals on a clay plate and determine the melting point. A melting point of  $302 \pm 2$  °F ( $150 \pm 1$  °C) indicates the presence of naphthalene.

4.4.6.3 Hydrogen sulfide. Place a strip of lead acetate paper in a small quantity of liquid ammonia drawn from the cylinder. Any black spots on the lead acetate paper indicate the presence of hydrogen sulfide.

4.4.6.4 Failure criteria. Evidence of the presence of any pyridine, naphthalene, or hydrogen sulfide shall constitute failure of this test.

4.5 Inspection of packaging. Cylinders packed for shipment shall be examined for compliance with the requirements of section 5 of this specification.

4.6 Non-conforming product. The contractor shall withhold non-conforming products from acceptance and initiate corrective action in accordance with MIL-STD-1916.

## 5. PACKAGING

5.1 General requirements. No contact preservatives shall be applied to cylinders, valves, or other cylinder components.

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5.2 Packing. Packing shall be level A, level B, or commercial, as specified (see 6.2).

5.2.1 Level A. Cylinders shall be palletized. Load type IX of MIL-HDBK-774 can be used for guidance. Strapping shall be finish B.

5.2.2 Level B. Cylinders shall be palletized as specified in 5.2.1, except that strapping shall be finish A.

5.2.3 Commercial. Cylinders shall be packed in accordance with the requirements of ASTM D 3951.

5.3 Marking. Marking for level A or B packing shall be in accordance with MIL-STD-129. Marking for commercial packing shall be in accordance with ASTM D 3951.

## 6. NOTES

INFORMATION FOR GUIDANCE ONLY. (This section contains information of a general or explanatory nature that is helpful, but is not mandatory.)

6.1 Intended use. The anhydrous ammonia is intended for use as a coolant in missiles, a refrigerant, and as an agent for metal nitriding.

6.2 Acquisition requirements. Acquisition documents should specify the following:

- a. Title, number, revision, and date of this standard.
- b. Capacity of government-furnished container required, when applicable (see 3.2).
- c. When new containers will be furnished to the government by the supplier, or when the ammonia will be contained in supplier-owned containers, and capacity of container required (see 3.2).
- d. When replacement valves for government-furnished cylinders are to be furnished by the government (see 3.3.4).
- e. Responsibility for inspection, if other than the contractor (see 4.1).
- f. Inspection facilities, if other than the contractor's facilities (see 4.1).
- g. When bulk liquid ammonia may be tested in lieu of sampling small liquid containers filled from the bulk source (see 4.3.2).
- h. Level of packing required (see 5.2).

6.3 Material safety data sheet (MSDS). Contracting officers will identify those activities requiring copies of completed MSDS prepared in accordance with FED-STD-313 and meeting the requirements of 29 CFR 1910.1200. The pertinent government mailing addresses for submission of the data are listed in FED-STD-313, and 29 CFR 1910.1200 requires that the MSDS for each hazardous chemical used in an operation must be readily available to personnel using the material. Contracting officers will identify the activities requiring copies of the MSDS.

6.4 Government-furnished containers. When applicable, the contracting officer should arrange to furnish the cylinders specified in 3.2.

6.5 Certification. When specified by the procurement agency, certification of the analysis by the manufacturer of the anhydrous ammonia may be accepted in lieu of an analysis of lot inspection, provided the ammonia is transferred directly from the manufacturer's tested container to acceptable government-furnished containers (see 4.1.1).

6.6 Filling density. Anhydrous ammonia containers shall be filled to a density not greater than 54 percent in weight ratio to the weight of the container's water capacity.

6.7 Maintenance of government-furnished containers. Purchasers should specify the extent to which government-furnished containers that require maintenance should be processed by the gas supplier.

6.7.1 Gas supplier. The gas supplier should furnish at no additional cost, all services that are required at each filling of a container to comply with applicable regulations and normal good practice. Such services would include, but not be limited to, all inspection, testing, evacuation, and handling services required for the gas supplied.

6.7.2 Allowable fees. A schedule of allowable fees should be specified by the purchaser for the gas supplier's performance of services such as the replacement of valves, valve parts, and cylinder caps, hydrostatic testing, cleaning, painting, color coding, marking, and handling of unserviceable containers as required. All materials and components for these services should be furnished by the gas supplier.

6.8 Unit of purchase. Anhydrous ammonia should be purchased by weight.

6.9 Subject term (key word) listing.

anhydrous  
compressed  
coolant  
cylinder  
missiles  
nitriding  
refrigeration

6.10 Changes from previous issue. Asterisks are not used in this revision to identify changes with respect to the previous issue due to the extent of the changes.

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MILITARY INTERESTS:

Custodians:

Navy - AS

Air Force - 68

CIVIL AGENCY  
COORDINATING ACTIVITY:

GSA - 7FLE

Preparing Activity:

DLA - GS3

(Project 6830-1054)

# 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.

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**  
O-A-445C

**2. DOCUMENT DATE (YYYYMMDD)**  
20030806

**3. DOCUMENT TITLE**  
AMMONIA, 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 (*Last, First, Middle Initial*)

b. ORGANIZATION

c. ADDRESS (*Include Zip Code*)

d. TELEPHONE (*Include Area Code*)  
(1) Commercial  
(2) DSN  
(*if applicable*)

**7. DATE SUBMITTED**  
(YYYYMMDD)

### 8. PREPARING ACTIVITY

a. NAME  
Defense Supply Center Richmond

b. TELEPHONE (*Include Area Code*)  
Commercial: (804) 279-5019 DSN: 695-5019

c. ADDRESS (*Include Zip Code*)  
ATTN: DSCR-VEB (C. Hammond)  
8000 Jefferson Davis Highway  
Richmond, VA 23297-5616

**IF YOU DO NOT RECEIVE A REPLY WITHIN 45 DAYS, CONTACT:**  
DEFENSE STANDARDIZATION PROGRAM OFFICE (DLSC-LM)  
8725 John J. Kingman Road, Suite 2533  
Fort Belvoir, VA 22060-6221  
Commercial: (703) 767-6888 DSN: 427-6888