MIL-A-24641A
27 October 1986
SUPERSEDING
MIL-A-24641(SH)
5 September 1984
(See 6.7)

MILITARY SPECIFICATION

ACID, HYDROFLUORIC; 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 a technical grade of hydrofluoric acid.

2. APPLICABLE DOCUMENTS

2.1 Government documents.

2.1.1 Specifications and standards. The following specifications and standards form a part of this specification to the extent specified herein. Unless otherwise specified, the issues of these documents shall be those listed in the issue of the Department of Defense Index of Specifications and Standards (DoDISS) and supplement thereto, cited in the solicitation.

SPECIFICATIONS

FEDERAL

PPP-B-585 - Boxes; Wood, Wirebound.
PPP-B-601 - Boxes, Wood, Cleated-Plywood.
PPP-B-621 - Boxes, Wood, Nailed and Lock-Corner.
PPP-B-636 - Boxes, Shipping, Fiberboard.

STANDARDS

FEDERAL

FED-STD-313 - Material Safety Data Sheets, Preparation and the Submission of.

Beneficial comments (recommendations, additions, deletions) and any pertinent data which may be of use in improving this document should be addressed to: Commander, Naval Sea Systems Command, SEA 55Z3, Department of the Navy, Washington, DC 20362-5101 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

MILITARY

MIL-STD-105 - Sampling Procedures and Tables for Inspection by Attributes.

MIL-STD-129 - Marking for Shipment and Storage.

* 2.1.2 Other Government documents. The following other Government documents form a part of this specification to the extent specified herein. Unless otherwise specified, the issues shall be those in effect on the date of the solicitation.

DEPARTMENT OF TRANSPORTATION (DOT)

Code of Federal Regulations (CFR), Title 49

49 CFR 171.1 - Department of Transportation Rules and Regulations for Transportation of Explosives and Other Dangerous Articles.

DEPARTMENT OF LABOR

Occupational Safety and Health Administration (OSHA)

Code of Federal Regulations

29 CFR, Part 1910.1200 - Hazard Communication Standard.

(Application for copies should be addressed to the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.)

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

* 2.3 Order of precedence. In the event of a conflict between the text of this specification and the references cited herein (except for associated detail specifications, specification sheets or MS standards), the text of this specification shall take precedence. Nothing in this specification, however, shall supersede applicable laws and regulations unless a specific exemption has been obtained.

3. REQUIREMENTS

3.1 Material. Hydrofluoric acid, technical, shall contain not less than 60 percent of hydrogen fluoride (HF) by weight, in water solution, when tested as specified in 4.4.1.

* 3.2 Labeling. Each container shall be durably and legibly labeled with the following:

HYDROFLUORIC ACID

DANGER!

Hazardous liquid and vapor causes severe burns which may not be immediately painful or visible.

VAPOR will burn eyes, nose and throat, HARMFUL IF INHALED. LIQUID will burn skin and eyes, HARMFUL IF SWALLOWED. Do not get in eyes, on skin or clothing. Do not breathe vapor. Keep container closed when not in use. Use with adequate ventilation. Wash thoroughly after handling. Store out of sun and away from direct heat.

FIRST AID

VAPOR EXPOSURE: Move to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen. If in eyes, flush with plenty of water for at least 30 minutes. Get medical attention.

LIQUID EXPOSURE: Always have on hand a supply of 50 percent magnesium sulfate solution. Remove all contaminated clothing. Flush affected areas with plenty of water. (Avoid high pressure water streams to prevent further damage to already burned skin.) Place the affected areas in a cool solution of 25 percent magnesium sulfate (dilute vials of 50 percent magnesium sulfate one to one with water). If the affected body area is large or on the trunk, cool compresses saturated with the 25 percent magnesium sulfate solution should be used. If in the eyes, flush with plenty of water for at least 30 minutes. If swallowed and victim is conscious, have victim drink water or milk. DO NOT INDUCE VOMITING. Seek medical attention for any exposure to HF. Wash clothing before reuse.

Fifty percent magnesium sulfate solution is available under NSN 6505-00-216-5371 in 2-cubic centimeter (cc) vials and in 50-cc vials through federal supply listing contract no. V797P-5553I, Medication Systems, 1886 Santa Anita Ave., South, El Monte, CA 91753. Phone (800) 423-4136.

3.2.1 Material safety data sheet. The contracting activity shall be provided a material safety data sheet (MSDS) at the time of contract award. The MSDS shall be provided in accordance with the requirements of FED-STD-313 and 29 CFR 1910.1200. When FED-STD-313 is at variance with the CFR, 29 CFR 1910.1200 shall take precedence, modify, and supplement FED-STD-313.

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.

* 4.1.1 Responsibility for compliance. All items must 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 assuring that all products or supplies submitted to the Government for acceptance comply with all requirements of the contract. Sampling in quality conformance does not authorize submission of known defective material, either indicated or actual, nor does it commit the Government to acceptance of defective material.

4.2 Quality conformance inspection.

4.2.1 Lot. A sampling lot shall consist of not more than 16,000 pounds of hydrofluoric acid offered for delivery at one time. Material in a lot shall be identified by order of production until ultimate action is taken as to the acceptance or rejection of the lot.

4.2.2 Sampling procedure for quality conformance tests. From each lot, three separate 1-quart samples shall be taken. The samples shall be taken to represent respectively, the first, middle and last part of the run which produced the lot. Samples shall be taken only in containers made of steel, lead, hard rubber, cerasin or polyethylene, since the acid covered by this specification is highly corrosive and attacks other metals and glass. Each sample shall be thoroughly mixed and divided into three equal portions. The portions shall be placed in clean, dry containers which shall be sealed and carefully marked. The three portions of the sample shall be used as follows:

(a) One for quality conformance inspection tests.
(b) One for the contractor.
(c) One to be held by the Government to be used for retests in case of dispute.

4.2.3 Sampling for inspection of containers. A random sample of filled containers shall be selected in accordance with MIL-STD-105 at inspection level I and acceptable quality level of 4.0 percent defective to verify compliance with this specification regarding fill, closure, marking and other requirements not involving tests.

4.3 Retests and rejections. Failure of the material to conform to the requirements of this specification during inspection shall be cause for rejection of the lot represented. If, in the opinion of the contractor, the failure was due to faulty test methods, the tests may be repeated on the contractor's retained sample. In case of a controversy, the test shall be repeated on the Government retained sample. Failure of any two of the three samples to meet the requirements shall be cause for final rejection of the lot represented. Material which has been rejected may be reworked to correct the defects and resubmitted for acceptance. Information concerning previous rejection and the action taken to correct the defects found in the original material shall be furnished before resubmitting material.

4.4 Test procedures.

4.4.1 Hydrogen fluoride.

4.4.1.1 Apparatus. The following apparatus shall be used in the testing procedures:

(a) A 100-milliliter (mL) burette.
(b) Platinum weighing tube (10 mL capacity), fitted with a platinum cap.
(c) Two platinum dishes (125 mL capacity).
(d) Hot plate.
(e) Steam bath.
(f) Gravimetric balance.

4.4.1.2 Reagents. Reagents shall consist of standardized 1 normal sodium hydroxide (NaOH) solution, which shall be kept in a ceresin-lined container to prevent contamination with silica; standardized 1/10 normal iodine solution; a saturated solution of potassium nitrate (KNO_3); phenolphthalein indicator; and starch indicator.

4.4.1.3 Procedure for determining total acidity and hydrofluorosilicic acid. A portion of 3 grams of the sample shall be accurately weighed in a platinum weighing tube. Ten mL of a saturated solution of KNO_3 shall be poured into a platinum dish of approximately 125 mL capacity and chopped ice added. Fifty mL of standard 1 normal NaOH shall be run in from a burette and 3 drops of phenolphthalein indicator added. The weighing tube containing the weighed sample shall be immersed beneath the surface of the caustic and the cover slowly removed with a platinum wire to allow the sample to mix slowly with the caustic. The solution shall be kept cold and titrated with the standard NaOH in the burette to the first permanent pink color. The total milliliters used shall be noted as (A). The dish shall be put on a hot plate and the solution warmed to 176 degrees Fahrenheit (°F) (80 degrees Celsius (°C)). Additional standard NaOH shall be added to obtain the second end point and the additional milliliters noted as (B).

4.4.1.4 Procedures for determining sulfuric acid in hydrofluoric acid. A portion of 10 grams of the sample shall be accurately weighed in a platinum weighing tube and transferred to a platinum dish. The weighing tube shall be rinsed into the dish with distilled water. The solution shall be evaporated to constant volume (near dryness) on a steam bath. A few drops of water shall be added and the evaporation repeated. Lack of odor during the second evaporation indicates that all acids other than sulfuric have been expelled. The residue shall be cooled, dissolved in 100 mL of carbon dioxide (CO_2) free water, and titrated with the standard 1 normal NaOH solution, using phenolphthalein indicator. The milliliters needed shall be noted as (C).

4.4.1.5 Procedure for determining sulfurous acid in hydrofluoric acid. A portion of 10 grams of the sample shall be accurately weighed in a platinum dish with 75 mL of water. This solution shall be titrated with standard 1/10 normal iodine using starch indicator. The milliliters used shall be noted as (D).

4.4.1.6 Calculation of the percentage of hydrogen fluoride. The percentage of hydrogen fluoride may be calculated by the following formula:

$$\text{Percent HF} = \left[\frac{2A-B}{S_1} - \frac{2C}{S_2}\right] N_S - \frac{2DN_1}{S_3}$$

Where A, B, C and D are the milliliters used and S_1, S_2 and S_3 are the samples taken in following the procedures specified in 4.4.1.3, 4.4.1.4 and 4.4.1.5. N_S and N_1 are the normalities of the sodium hydroxide and iodine solutions, respectively.

4.5 Inspection of packaging. Sample packages and packs, and the inspection of the preservation-packaging, packing and marking for shipment and storage shall be in accordance with the requirements of section 5 and the documents specified therein.

5. PACKAGING

(The packaging requirements specified herein apply only for direct Government acquisition.)

5.1 Preservation. Preservation shall be level A.

* 5.1.1 Level A. Hydrofluoric acid shall be furnished in 1-pint or 1-gallon natural hard rubber, ceresin or polyethylene bottles, or 20-gallon rated capacity steel overpacks as specified (see 6.2). Polyethylene bottles shall be in accordance with 2E of DOT regulations (see 2.1.2) with a minimum thickness of 0.030 inch for 1-gallon bottles. Drums shall be in accordance with 6D or 37M with inside 2S or 2SL polyethylene liners of DOT regulations with thread closures and vent plugs lubricated after filling to prevent thread seizure.

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

5.2.1 Level A. Hydrofluoric acid preservation-packaged in 1-pint or 1-gallon containers as specified in 5.1.1 shall be packed in wood-cleated plywood, nailed wood or wirebound wood boxes in accordance with overseas type of PPP-B-601, overseas class 2 of PPP-B-621 or class 3 of PPP-B-585, respectively. Box closures shall be as specified in the applicable box specification or appendix thereto. The gross weight of shipping containers shall not exceed 70 pounds. Additional packing for the 20-gallon steel overpacks shall not be required.

5.2.2 Level B. Hydrofluoric acid preserved in 1-pint or 1-gallon containers as specified in 5.1.1 shall be packed in wood-cleated plywood, nailed wood or wirebound wood boxes in accordance with domestic type of PPP-B-601, class 1 of PPP-B-621 or class 2 of PPP-B-585 respectively. Hydrofluoric acid preserved in polyethylene containers as specified in 5.1.1 shall only be packed in fiberboard boxes in accordance with PPP-B-636 weather resistant. Box closures shall be as specified in the applicable box specification or appendix thereto except that method V closure shall apply for fiberboard boxes. The gross weight of wood boxes shall not exceed 200 pounds with fiberboard limited to a maximum of four 1-gallon containers or a net weight of 25 pounds of 1-pint containers. Additional packing for the 20-gallon steel overpacks shall not be required.

5.2.3 Level C. Hydrofluoric acid preserved as specified in 5.1 shall be packed as specified in 5.2.2 except that fiberboard boxes may be of the domestic class, minimum grade 275 with method I closure applicable.

5.3 Marking. In addition to the marking specified in 3.2 and any special marking required by the contract or order (see 6.2), each unit and shipping container shall be marked in accordance with MIL-STD-129, DOT regulations, and 29 CFR 1910.1200 (see 2.1.2) as applicable.

5.4 Material safety data sheet. A copy of the material safety data sheet shall be attached to the shipping document for each destination (see 3.2.1).

6. NOTES

6.1 Intended use. Hydrofluoric acid, technical grade, is intended for use in removing sand particles from metallic castings and for etching glass.

6.2 Ordering data. Acquisition documents should specify the following:

(a) Title, number and date of this specification.
(b) Container required (see 5.1.1).
(c) Level of packing required (see 5.2).
(d) Special marking required (see 5.3).

6.3 Transportation description. Transportation description applicable to these items are:

Acid, hydrofluoric.
Carload weight 36,000 pounds.
Truckload weight 36,000 pounds.

6.4 Hydrofluoric acid should be purchased by volume, the unit being a U.S. gallon, 231 cubic inches at 77°F (25°C).

6.5 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 and 29 CFR 1910.1200. The pertinent Government mailing addresses for submission of data are listed in appendix B of FED-STD-313.

6.6 Subject term (key word) listing.

Hydrofluoric acid
Hydrofluorosilicic acid
Hydrogen fluoride
Sulfuric acid
Sulfurous acid

6.7 Changes from previous issue. The margins of this specification are marked with asterisks to indicate where changes (additions, modifications, corrections, deletions) from the previous issue were made. This was done as a convenience only and the Government assumes no liability whatsoever for any inaccuracies in these notations. Bidders and contractors are cautioned to evaluate the requirements of this document based on the entire content irrespective of the marginal notations and relationship to the last previous issue.

* Custodians:
Army - EA
Navy - SH
Air Force - 68

Review activity:
DLA - GS

Preparing activity:
Navy - SH
(Project 6810-B537)

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STANDARDIZATION DOCUMENT IMPROVEMENT PROPOSAL

(See Instructions – Reverse Side)

1. DOCUMENT NUMBER	2. DOCUMENT TITLE
MIL-A-24641A	ACID, HYDROFLUORIC; TECHNICAL

3a. NAME OF SUBMITTING ORGANIZATION	4. TYPE OF ORGANIZATION *(Mark one)*
	☐ VENDOR
b. ADDRESS *(Street, City, State, ZIP Code)*	☐ USER
	☐ MANUFACTURER
	☐ OTHER *(Specify)*:

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
c. MAILING ADDRESS *(Street, City, State, ZIP Code)* – Optional	8. DATE OF SUBMISSION *(YYMMDD)*

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