

INVITATION FOR SEALED BID

TAC 107

Description: HYDROFLUOSILICIC ACID

Department: PUBLIC WORKS

NIGP Commodity Code(s): 175-13-00-000-0

Total pages including this page is 26

NOTE: FAXING OF BID IS NOT ACCEPTED

Important Instruction – Read Carefully:

If you have obtained these bid specifications from either of:

City of Tulsa's Fax-on-Demand (918-596-1171) or

City of Tulsa's Web-site : www.cityoftulsapurchasing.org

you must notify the buyer **Darlene Donica** of your intent to bid by e-mail ddonica@ci.tulsa.ok.us in order to receive addenda. The buyer will always acknowledge your e-mail for your records. All addenda will be posted on fax-on-demand and the web-site.

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Pay special attention to those pages with a reference to the following notes:

Note #1: Signature of authorized agent required

Note #2: Signature of an authorized agent and notarized required

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Your bid response should follow the same format listed above plus any additional format requested in the body of the bid invitation.

**INVITATION FOR SEALED BIDS
TO
City of Tulsa**

200 CIVIC CENTER, ROOM 109, TULSA, OKLAHOMA 74103

Bid number and date of bid opening must appear on the lower
left outside corner of bid envelopes and all related containers.

DATE OF OPENING: **AUGUST 30, 2001**

BID NUMBER: **TAC 107**

BID MUST BE IN THE CITY CLERK'S OFFICE AT THE ABOVE ADDRESS BY 5:00 P.M. THE DAY PRECEDING THE "DATE OF OPENING" SHOWN ABOVE.

BIDS WILL BE OPENED AT 8:30 A.M. IN THE CITY COUNCIL ROOM ON THE DAY SPECIFIED UNDER "DATE OF OPENING."

PUBLISHED IN THE TULSA DAILY COMMERCE AND LEGAL NEWS: **AUGUST 13, 14, 15, 16, 17, 2001**

Bid must be accompanied by bidder's bond, cashier's check or certified check in the amount of: **NONE**

PLEASE READ TERMS AND CONDITIONS ON THE NEXT PAGE BEFORE COMPLETING BID DOCUMENTS

***** **THE FOLLOWING SECTION MUST BE COMPLETED BY BIDDER** *****

Delivery will be made in not more than _____ days after receipt of order.

Payment terms _____ % _____ days.

City of Tulsa may increase quantity of order at the unit price bid for _____ days. (Bidder to Specify Days)
I have examined the terms and specifications and the instructions to bidders herein and agree, provided I am awarded a contract, to provide the above described items for the sum shown in accordance with the terms and specifications stated herein. All deviations are in writing and attached hereto.

Enclosed is a [] BID BOND ; [] CASHIER'S CHECK; [] Certified Check in the amount of \$ _____, which I agree the City of Tulsa may retain as liquidated damages in the event of my failure to comply with the terms of this bid.

MUST BE SIGNED BY AUTHORIZED AGENT TO BE VALID

FIRM NAME _____ by _____
(Signature)

STREET _____ TITLE _____

CITY STATE _____ ZIP CODE _____ PHONE NUMBER _____ DATE _____

GENERAL TERMS AND CONDITIONS OF BIDS

THESE ITEMS APPLY TO AND BECOME A PART OF THE BID.

NO EXCEPTIONS TO THESE TERMS & CONDITIONS WILL BE CONSIDERED.

1. **BIDS MUST BE SUBMITTED ON THIS FORM ONLY INCLUDING A SIGNATURE OF AN AUTHORIZED AGENT.** Each bid shall be placed in a separate envelope. Be sure envelope is completely and properly identified and sealed, showing the bid number and date in the lower left hand corner. Bids must be time stamped in the office of the City Clerk by 5:00 P.M. on the day before date of opening.
2. No bidder may withdraw his proposal for a period of thirty (30) days after the date and hour set for the opening of bids.
3. All prices shall be quoted F.O.B. Tulsa, Oklahoma, and delivery to City of Tulsa location shall be without additional charge.
4. The bidder shall attach the manufacturer's name of the equipment or material to be furnished, type, model numbers, manufacturer's descriptive bulletins and specifications. All guarantees and warranties should be clearly stated. This data shall be in sufficient detail to describe accurately the equipment or material to be furnished. Manufacturer's specifications, in respect to the successful bidder, shall be considered as part of his contract with the City of Tulsa.
5. The bidder shall show in the proposal both the unit prices and total amount, where required, of each item listed. In the event of error or discrepancy in the mathematics, the unit prices shall prevail.
6. Any exceptions or deviations from written specifications shall be shown in writing and attached to the bid form.
7. Each bidder agrees to comply with the terms of Title 5, Chapter 1, of Tulsa, Oklahoma Charter and revised ordinances relating to equal employment opportunity.
8. **THE ENCLOSED FORMS REGARDING NON-COLLUSION AND FINANCIAL INTEREST MUST BE SIGNED, NOTARIZED, AND RETURNED WITH THE BID.**
9. The City of Tulsa reserves the right to reject any and all bids, to waive any technicalities in the bidding, and to award each item to different bidders or all items to a single bidder.
10. All bids must be accompanied by bidders bond, cash, certified or cashier's check in the amount shown on the face of the bid form. This amount shall be retained by the City of Tulsa as liquidated damages in the event the successful bidder (or bidders) fails to execute a contract, if required. The bidder agrees that said amount is presumed to be the damages sustained by the City due to the impracticability and extreme difficulty in fixing the actual damages. The office of the City Clerk will return the bid deposits to the unsuccessful bidders, after a contract has been awarded or all bids have been rejected.
11. In the event cash discounts are offered by the bidder, the discount date shall begin with the date of invoice, the date of receipt of all material covered by the purchase order, or the date of receipt by the City of Tulsa of the original copy of the purchase order with properly executed Affidavit of Claimant, whichever is the later date.
12. Direct purchase of certain items of equipment or material by the City of Tulsa are exempt from Federal Excise Tax and Oklahoma Sales Tax. In such cases the bidder shall quote prices which do not include Federal Excise Tax and Oklahoma Sales Tax. The City of Tulsa will furnish executed exemption certificates upon presentation by the bidder at the time of purchase.
13. Bid must show number of days required for delivery under normal conditions. Failure to state delivery time obligates bidder to complete delivery in fourteen (14) calendar days. Unrealistically short or long delivery promises may cause bid to be disregarded. Contractor must keep Purchasing Department advised at all times of status of order. Default in promised delivery or failure to meet specifications authorizes the Purchasing Agent to purchase supplies elsewhere and charge full increase of cost and handling to defaulting contractor. Consistent failure to meet delivery promises without valid reason may cause removal from bid list.
14. Bidder agrees to defend and save City of Tulsa from and against all demands, claims, suits, costs, expenses, damages and judgments based upon infringement of any patent relating to goods specified in this order or the ordinary use or operation of such goods by City or use or operation of such goods in accordance with bidders direction.
15. If the bid requires a written contract, the successful bidder shall execute a written contract with the City of Tulsa and return the required bonds and insurance certificates within ten (10) days after submission of contracts to said bidder by the City.

BIDDER AFFIDAVIT - TITLE 74 O.S. (1974 SUPP.) 85.22-85.25

STATE OF _____ COUNTY OF _____

_____, of lawful age, being first duly sworn on oath says

Authorized Agent

1. (s)he is the duly authorized agent of _____, the bidder submitting the competitive bid which is attached to this statement, for the purpose of certifying the facts pertaining to the existence of collusion among bidders and between bidders and municipal officials or employees, as well as facts pertaining to the giving or offering of things of value to government personnel in return for special consideration in the letting of any contract pursuant to the bid to which this statement is attached.
2. (s)he is fully aware of the facts and circumstances surrounding the making of the bid to which this statement is attached and has been personally and directly involved in the proceedings leading to the submission of such bid; and
3. neither the bidder nor anyone subject to the bidder's direction or control has been a party;
 - a. to any collusion among bidders in restraint of freedom of competition by agreement to bid at a fixed price or to refrain from bidding,
 - b. to any collusion with any municipal official or employee as to quantity, quality or price in the prospective contract, or as to any other terms of such prospective contract, nor
 - c. in any discussions between bidders and any municipal official concerning exchange of money or other thing of value for special consideration in the letting of a contract.

SIGNATURE OF AUTHORIZED AGENT

Subscribed and sworn to before me this _____ day of _____, 19_____.

Signature of Notary Public

MY COMMISSION EXPIRES

The Bidder Affidavit must be completed, signed by an authorized agent, and notarized.

CONTRACTOR/BIDDER INFORMATION SHEET

**To be completed by all Bidders
For Contracts with the City of Tulsa
(Please print or type)**

Project No. or Description _____

Full Name of Bidder _____

Legal Identity
(Corporation, Partnership,
Individual, etc.) _____

Address _____

Telephone No. _____

FAX No. _____

Taxpayer Identification Number _____

Contact Person _____

Phone No. _____

Fax No. _____

E-mail address _____

Webpage Address _____

Price Sheet Summary

Vendor Name: _____ Signature: _____
Date: _____

You will be able to obtain a copy of the Bid Summary on the City of Tulsa's Purchase-Net Fax-on-Demand and Web-site shortly after bid opening.

TAC 107

HYDROFLUOSILICIC ACID \$ _____ Per Ton

**Additional Charge per 1/2 hour beyond 4 hours of free time:
\$ _____**

For additional information please contact: Kerry Rowland @ 918-591-4361

TAC 107

HYDROFLUOSILICIC ACID

PUBLIC WORKS DEPARTMENT

INTENT:

The intent of this bid is to obtain a supply of **Hydrofluosilicic Acid** for the City of Tulsa's Water Treatment Plants.

REFERENCE SPECIFICATIONS:

The American Water Works Association Standard for Hydrofluosilicic Acid (ANSI/AWWA B703-00), or latest edition) shall apply to this specification unless otherwise specified herein. A copy of this standard is attached to this specification.

DELIVERY:

All prices shall be quoted F.O.B. Destination.

CONTRACT TIME:

The terms of the contract shall be for a period of one (1) year, and shall be renewable with the consent of both parties for two (2) successive one (1) year periods. Please see the section titled Price Adjustment Option for more information about renewal of the contract.

PRICE ADJUSTMENT OPTION:

The price paid for a commodity under this contract shall not change during the term of this contract. However, if the bidder anticipates that it will not be able to maintain firm prices for any renewal period, a change in price may be allowed in a renewal of this contract if the following criteria are met:

- (1) The bidder includes a formula, to be used to calculate a change in price at the time of renewal, **in the bid for the initial contract.** Such formula shall be reasonable, objective and capable of measurement.
- (2) The contractor notifies the City, in writing, no later than 30 days prior to the expiration of the initial contract period, or any renewal period, of its intent to exercise the right to escalate or de-escalate prices under the contract. The notice shall include a calculation of the price increase or decrease requested including the formula used.

BID SUBMITTAL:

The bidder shall submit with the formal bid the name of their personnel authorized to certify the Affidavit of Compliance required with each delivery. Please review the section on Shipment for more information.

QUANTITY:

The estimated annual quantity of Hydrofluosilicic Acid is listed below. The estimate is given for information purposes only. The bidder should not consider this estimate to guarantee a minimum or maximum amount to be delivered to the treatment plants. Neither an under-run nor an over-run, regardless of extent, in the actual quantity delivered compared to the estimated quantity listed below shall entitle the bidder to an adjustment in the unit price or to any other compensation.

Mohawk Plant	=	100 tons (By dry weight of H ₂ SIF ₆)
Jewel Plant	=	100 tons (By dry weight of H ₂ SIF ₆)

QUALITY:

1. The Hydrofluosilicic Acid shall conform to ANSI/AWWA Standard for Hydrofluosilicic Acid B703-00.
2. The bidder shall state the percent acid upon which the bid is based.
3. Hydrofluosilicic Acid shall contain not less than 23% H₂SIF₆ by weight.

ACCEPTANCE AND SAMPLING:

1. Truckload deliveries of Hydrofluosilicic Acid will be sampled and tested by Tulsa Water Treatment personnel in accordance with AWWA procedures.
2. Visual inspection of delivery equipment, the initial testing of the sampled material, and compliance with the quality requirements of these specifications as reported on the Affidavit of Compliance presented at time of delivery shall be sufficient evidence to accept and unload the shipment.

SHIPMENT:

1. Shipments shall be made in single-unit cargo trailers constructed of stainless steel or specially lined to handle Hydrofluosilicic Acid.
2. Loads are to be shipped bulk, not to exceed 25 tons per load.
3. Shipment shall be made in trailers that are dedicated to the delivery of Hydrofluosilicic Acid only.

4. The supplier shall furnish the City a current written list of all dedicated trailers.
5. Deliveries from trailers not on the current list shall be rejected and returned to the supplier at no charge to the City.
6. Upon arrival at the City of Tulsa water treatment plant, the truck driver shall present to on-site City personnel the following items:
 - * Shipping Invoice
 - * Weightmaster's Certificate of Weight and Measure
 - * Affidavit of Compliance (see next section)

AFFIDAVIT OF COMPLIANCE:

1. An Affidavit of Compliance with these specifications shall be submitted with each delivery.
2. The affidavit shall be as shown in **Attachment A** and shall contain the percent of H₂SIF₆ content.
3. If sample analysis of the delivered Hydrofluosilicic Acid shows that the H₂SIF₆ content differs from the content indicated by the contractor the City will submit to the Contractor the results of the analysis and the adjustment of payment made for the acid in that delivery. The City will make payment or the Contractor shall make a refund within thirty calendar days after receipt of the invoice or credit memorandum.

TIME OF DELIVERY:

1. Delivery shall be within five (5) calendar days after receipt of order at such intervals as required by the respective plant superintendents.
2. Delivery shall be made between the hours of 7:00 a.m. and 2:00 p.m., Monday through Friday, unless approved otherwise, in advance, by the respective plant superintendent or chief operator.

NOTE: Deliveries may not be made on City recognized holidays.

DELIVERY POINTS:

Prices quoted must be for deliveries F.O.B. Tulsa, Oklahoma to the following locations:

Mohawk Water Treatment Plant, 3600 E. Mohawk Blvd.

AB Jewel Water Treatment Plant, 18707 E. 21st Street

UNLOADING FACILITY:

1. Any modifications required to the existing fittings and/or the unloading facilities shall be at bidder's expense.
2. The City has provided a 2" cam-lock quick discharge coupling for the successful bidder to use in unloading.

UNLOADING DURATION:

1. Unloading time shall be free of charge for a minimum of four (4) hours, beginning upon arrival of the cargo trailer at either water treatment plant and ending upon its departure from the property.
2. Additional charges for each quarter of an hour beyond the four (4) hours of free time shall be as quoted on the Pricing Schedule page.
3. Each charge will be investigated and approved prior to payment.
4. In no case, will demurrage be charged if the bidder's unloading time exceeds free time through no fault of the City.
5. No charge shall be made for rejected shipments.

SPILLS:

1. If during delivery and unloading the bidder causes chemicals to be spilled or otherwise improperly discharged from storage vessels, piping, hoses and connections, the bidder shall contain, clean up and return the site to the condition existing before the spill.
2. The City shall not be liable for the costs of containment.
3. The bidder shall notify the City immediately in the case of a spill or accident.
4. If a spill is detected by City personnel after a delivery has been made and has not been contained, cleaned up, or disposed of, the City will immediately contain, clean up and return the site to the conditions existing before the spill.
5. The bidder shall, in this case, be liable for the costs of containment, clean up and returning the site to the pre-spill conditions.

HAZARD COMMUNICATION STANDARD:

The Oklahoma Hazard Communication Standard is hereby made a part of this specification. The seller shall provide Material Safety Data Sheets (MSDS) on the product delivered under this contract. The MSDS shall be equivalent to a U.S. OSHA Form 20 MSDS.

PERFORMANCE BOND:

Within ten (10) days following the award of the contract, the successful bidder will be required to execute and furnish a performance bond in the amount of **\$5,000.00** guaranteeing the proper and prompt performance of the contract in accordance with the provisions, requirements, terms and conditions of the contract.

PAYMENT:

All quotes shall be for a 23% H₂SIF₆ solution. Payment will be adjusted for actual analysis of each shipment.

DELIVERY GUARANTEE:

Bidders are required to submit the guarantee statements of the product.

BIDDER'S AFFIDAVIT:

Each bidder shall accompany their bid with a fully executed and notarized copy of the attached **Non-Collusion Affidavit** and the **Interest Affidavit**. Failure to do so may be cause for rejection of the bid.

ADDENDA AND INTERPRETATIONS:

If it becomes necessary to revise any part of this bid, a written addendum will be provided to all the bidders. The City of Tulsa is not bound by any oral representations, clarifications or changes made in the written specifications by City of Tulsa employees unless such clarification or change is provided to bidders in written addendum form from the Purchasing Division.

AWARD OF BID:

The bid shall be awarded to the firm whose proposal is responsive to the bid and is most advantageous to the City, considering the factors identified in the bid and Section 406E of Title 6, The Purchasing Ordinance set forth below:

406E. **AWARD OF CONTRACT**

1. Authority in the Mayor. The Mayor shall have the authority to award contracts within the purview of this chapter.

2. Lowest Secure Bidder. Contracts shall be awarded to the lowest secure bidder meeting specifications. Bid Specifications may include a point system for evaluating the lowest secure bid. In determining "lowest secure bidder", in addition to price, the following factors shall be considered:
 - a. The ability, capacity and skill of the bidder to perform the contract or provide the service required;
 - b. whether the bidder can perform the contract or provide the service promptly or within the time specified, without delay or interference;
 - c. the character, integrity, reputation, judgment, experience and efficiency of the bidder;
 - d. the quality of performance of previous contracts or services;
 - e. the previous and existing compliance by the bidder with laws and ordinances relating to the contract or service;
 - f. the sufficiency of the financial resources and ability of the bidder to perform the contract or provide the service;
 - g. the quality, availability and adaptability of the supplies or contractual services to the particular use required;
 - h. the ability of the bidder to provide future maintenance and service for the use of the subject of the contract;
 - i. where an earlier delivery date would be of great benefit to the requisitioning agency, the date and terms of delivery may be considered in the bid award, and
 - j. the number and scope of conditions attached to the bid.

ATTACHMENT "A"

Sample of Bid Specification Requiring Commitment:

MANUFACTURER COMMITMENT:

As evidence of our ability to supply Hydrofluosilicic Acid, we attach Hereto a letter from _____ as evidence that _____ tons of
(Name of Manufacturer)
material will be guaranteed available for one year after first delivery of product.

Sample of Manufacturer Commitment (should be on manufacturer's letterhead)

PRODUCT COMMITMENT

_____ has committed sufficient volume of Hydrofluosilicic
(Name of Manufacturer)
Acid to cover the _____ annual solution tons required for the City of
Tulsa for the period of _____ to _____.



AWWA STANDARD FOR FLUOROSILICIC ACID

SECTION 1: GENERAL

Sec. 1.1 Scope

This standard describes fluorosilicic acid (H_2SiF_6) for water supply service application.

Sec. 1.2 Purpose

The purpose of this standard is to provide purchasers, manufacturers, and suppliers with the minimum requirements for fluorosilicic acid, including physical, chemical, packaging, shipping, and testing requirements.

Sec. 1.3 Application

This standard can be referenced in specifications for purchasing and receiving fluorosilicic acid and can be used as a guide for testing the physical and chemical properties of fluorosilicic acid samples. The stipulations of this standard apply when this document has been referenced and only to fluorosilicic acid used in water supply service application.

SECTION 2: REFERENCES

This standard references the following document. In its latest edition, it forms a part of this standard to the extent specified in this standard. In any case of conflict, the requirements of this standard shall prevail.

Standard Methods for the Examination of Water and Wastewater. APHA,*
AWWA, and WEF† Washington, D.C. (20th ed., 1998).

SECTION 3: DEFINITIONS

The following definitions shall apply in this standard:

1. *Manufacturer*: The party that manufactures, fabricates, or produces materials or products.
2. *Purchaser*: The person, company, or organization that purchases any materials or work to be performed.
3. *Supplier*: The party that supplies materials or services. A supplier may or may not be the manufacturer.

SECTION 4: REQUIREMENTS

Sec. 4.1 Physical Requirements

4.1.1 The fluorosilicic acid supplied according to this standard shall be clean and free of visible suspended matter.

4.1.2 The fluorosilicic acid supplied according to this standard shall be water white to straw yellow. Straw yellow shall be determined as material with a maximum of 100 units in accordance with method 2120B, visual comparison method.‡

Sec. 4.2 Chemical Requirements

4.2.1 The fluorosilicic acid shall contain between 90 and 99 percent fluorosilicic acid by weight unless specified otherwise by the purchaser.

Sec. 4.3 Impurities§

4.3.1 *General*. The fluorosilicic acid supplied according to this standard shall contain no mineral or organic substances in quantities capable of producing

*American Public Health Association, 100 I Street, Washington, DC 20001.

†Water Environment Federation, 601 Wythe St., Alexandria, VA 22314-1994.

‡*Standard Methods for the Examination of Water and Wastewater*.

§See Sec. 1.C of the foreword.

deleterious or injurious effects on the health of those consuming water that has been properly treated with fluosilicic acid.

4.3.2 *Hydrofluoric acid content.* The fluosilicic acid supplied according to this standard shall contain a maximum of 1 percent hydrofluoric acid.

4.3.3 *Product certifications.* Fluosilicic acid is a direct additive used in the treatment of potable water. This material should be certified as suitable for contact with or treatment of drinking water by an accredited certification organization in accordance with ANSI/NSF Standard 60, Drinking Water Treatment Chemicals—Health Effects. Evaluation shall be performed in accordance with requirements that are no less restrictive than those listed in ANSI/NSF Standard 60. Certification shall be performed by a certification organization accredited by the American National Standards Institute.

SECTION 5: VERIFICATION

Sec. 5.1 Sampling and Laboratory Examination

Sampling shall be conducted in accordance with Sec. 5 of this standard. The laboratory examination of the samples shall be completed within the following time limitations:

1. Bulk shipments—before unloading, unless the shipment is accompanied by a certified analysis from the manufacturer or supplier.

2. Drum shipments—within five working days after receipt of the shipment.

5.1.1 *Sampling point.* Samples shall be taken at the point of destination.

5.1.2 *Amount of shipment to be sampled.* If the acid is supplied in drums, the number of drums sampled will be left to the discretion of the purchaser. In the case of bulk shipments, a composite sample should be taken from the tank truck or tank car.

5.1.3 *Sampling container.* Samples shall be collected in a clean, plastic or rubber container. Containers lined with acid-resistant plastic, wax, or rubber may also be used.

5.1.4 *Sampling method for drums.* When sampling from drums, the fluosilicic acid in the containers to be sampled shall first be mixed by rolling or other suitable means. A portion shall be taken from each container to be sampled so that the total gross sample consists of at least 2 L.

5.1.5 *Sampling method for bulk material.* When sampling from a tank truck or tank car, at least five different 500-mL portions shall be taken from different places in the container (top, middle, and bottom) and combined to form a gross sample that is representative of the entire tank.

5.1.6 *Sample handling.* After mixing of the gross sample, three 500-mL samples shall be sealed in airtight, moistureproof, plastic or rubber containers. Each sample container shall be labeled to identify it, and the label shall be signed by the sampler.

5.1.7 *Sample retention.* Samples shall be held for 30 days before disposal.

Sec. 5.2 Test Procedures

Testing of fluorosilicic acid shall be conducted in accordance with the procedures presented in the following sections. Alternative procedures can be used only on the written approval of the purchaser. In any case of conflict, the methods of this standard shall prevail.

5.2.1 *Test samples.* Test samples shall be obtained from the sealed material samples (Sec. 5.1.6) delivered to the laboratory. Material samples shall be unsealed only when it is necessary to remove quantities of the material for testing. Removal of material shall be performed quickly, and the material samples shall then be resealed for future reference.

5.2.2 *Determining fluorosilicic acid content.* Two methods are presented for determining the percentage of fluorosilicic acid content. The specific-gravity method will provide only a very rough approximation and should not be used for determining the exact amount of acid. If facilities are available, the hydrogen titration method is the preferred method for determining fluorosilicic acid content.

5.2.2.1 Hydrogen titration method.

1. *Principle.* Titration of ionizable hydrogen in a chilled solution from which the fluorosilicate ions have been precipitated as potassium fluorosilicate.

2. Reagents.

- a. Deionized ice.
- b. Potassium nitrate-saturated solution.
- c. Standard sodium hydroxide solution, 0.5N.
- d. Bromothymol blue, 0.2 percent solution.

3. Procedure.

a. Using a pipette bulb, pipette 25 mL of sample into a 500-mL volumetric flask. Dilute with deionized water to the mark and mix. If this suggested dilution produces a precipitate (Sec. 1A of the foreword), pipette a smaller sample volume (in 5-mL increments) until no precipitate forms.

b. Place 100 to 150 mL of clean deionized ice into a 400-mL beaker, add 25 mL of potassium nitrate solution, and using a pipette bulb, pipette a 25-mL aliquot of the diluted sample solution into the beaker. Wash down the sides of the beaker with deionized water.

c. Stirring constantly, promptly titrate with standard sodium hydroxide, using bromothymol blue as the end-point indicator. The end point has been reached when the blue color persists for at least 30 s. On standing longer, the indicator will turn yellow.

4. Calculation.*

$$\text{volume of sample taken, in millilitres (D)} = C \times \frac{A}{B} \quad (\text{Eq 1})$$

$$\text{weight of sample, in grams} = D \times \text{specific gravity (at room temperature)} \quad (\text{Eq 2})$$

$$\text{percent H}_2\text{SiF}_6 = \frac{\text{mL NaOH} \times N \times 0.072 \times 100}{\text{weight of sample, in grams}} \quad (\text{Eq 3})$$

Where:

A = original sample volume, in millilitres (step 1)

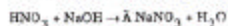
B = diluted sample volume, in millilitres (generally 500 mL)

C = aliquot volume, in millilitres (step 2)

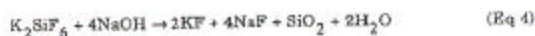
5.2.3 Determining free acid.

5.2.3.1 Procedure. The preceding method will include any free acid other than fluosilicic acid that may be present. If it is necessary to distinguish between

*Based on the following chemical equations:



fluorosilicic acid and other acids, plus the beaker, the contents of which have been titrated as above, on a hot plate and bring to a boil. Titrate the hot solution with the standard sodium hydroxide to the neutral point of the bromothymol blue. This titration breaks down the fluorosilicate radical of the potassium fluorosilicate:



If the fluorosilicic acid is 100 percent pure, the millilitres of NaOH used in the cold titration will equal exactly half the millilitres of NaOH used in the hot titration. If free acid other than fluorosilicic is present, the cold titer will exceed half the hot titer. If the fluorosilicate salts are present, half the hot titer will exceed the cold titer.

5.2.3.2 Calculation.

$$\frac{\left(\frac{\text{mL NaOH}^*}{2} - \frac{\text{mL NaOH}^\dagger}{2} \right) \times N \times 0.02 \times 100}{\text{weight of sample, in grams}} \quad (\text{Eq 5})$$

= percent free acid other than H_2SiF_6 , expressed as HF

$$\frac{\frac{\text{mL NaOH}^\dagger}{2} \times N \times 0.072 \times 100}{\text{weight of sample, in grams}} = \text{percent } \text{H}_2\text{SiF}_6 \quad (\text{Eq 6})$$

5.2.4 Specific-gravity method

5.2.4.1 Apparatus.

1. Acid-resistant plastic or glass cylinder or dish with sufficient depth to float a hydrometer.

2. Glass hydrometer (long stem) capable of being read to three significant figures. (If the density of the solution varies over a wide range, a set of three or more hydrometers should be available to cover the range.)

5.2.4.2 Procedure.

1. Carefully transfer the fluorosilicic acid from the sample container to the cylinder and adjust the temperature to 17.5°C (63.5°F). Insert the hydrometer and measure the specific gravity.

*Cold titer

†Hot titer

2. Do not keep the hydrometer and other glassware in contact with the fluorosilicic acid solution longer than is necessary. Thoroughly rinse the hydrometer and other glassware in clear, cool, running water immediately after using.

3. Determine the approximate percentage of fluorosilicic acid from a table* or graph that has been prepared from the analyses of a number of shipments from which both specific gravity and actual fluoride content have been determined.

5.2.5 Test procedure for heavy metals.

5.2.5.1 Reagents.

1. Ammonium hydroxide, 10 percent.[†]
2. 0.1N hydrochloric acid.
3. Hydrogen sulfide, saturated solution.[‡]
4. Lead nitrate, American Chemical Society (ACS)[§] reagent grade.
5. Concentrated nitric acid.
6. Lead nitrate stock solution. Dissolve 320.0 mg of ACS-reagent-grade lead nitrate [Pb(NO₃)₂] in 100 mL of deionized water containing 1 mL of concentrated nitric acid. Dilute to 1,000.0 mL with deionized water. Prepare and store this solution in glass containers that are free from lead salts.
7. Standard lead solution. On the day of use, dilute 10.0 mL of the lead nitrate stock solution to 100.0 mL with deionized water. Twenty mL of this solution contains 0.4 mg of lead, which is equivalent to 0.8 mg (0.02 percent) of heavy metals calculated as lead in 4.0 g of fluorosilicic acid.

5.2.5.2 Procedure.

1. In a 100-mL beaker, dilute 4.0 g of sample with 40 mL of deionized water.

*The use of a standard table from a handbook is not recommended. Because these tables are prepared from dilutions of cp-grade acid distilled water may introduce errors of more than 10 percent. Experience in the field has shown that the specific gravity of commercial grades of fluorosilicic acid in concentrations from 20 to 30 percent varies considerably between different manufacturers (5 to 14 percent less than that given in the standard table).

†CAUTION: Ammonium hydroxide fumes can cause damage to eyes and lungs. Use in a well-ventilated area under a fume hood.

‡CAUTION: Hydrogen sulfide is an extremely poisonous gas. Avoid breathing fumes. Use in a well-ventilated area or under a fume hood.

§ American Chemical Society, 1155 16th St. N.W., Washington, DC 20036.

2. Measure out 20 mL of this solution into a 100-mL beaker and adjust to pH 3-4 with 10 percent ammonium hydroxide,^{*} or 0.1N hydrochloric acid, or both.

3. Add 10 mL of a freshly prepared, saturated solution of hydrogen sulfide[†] in deionized water.

4. The brown color produced should not be greater than that formed in 20 mL of the standard lead solution after treatment as in steps 2 and 3.

5.2.6 Rejection.

5.2.6.1 Notice of nonconformance. If the fluorosilicic acid delivered does not meet the requirements of this standard, a notice of nonconformance shall be provided by the purchaser to the supplier within 10 working days after receipt of the shipment at the point of destination. The results of the purchaser's test shall prevail, unless the supplier notifies the purchaser within five working days after receipt of the notice of nonconformance that a retest is desired. On receipt of the request for a retest, the purchaser shall forward to the supplier one of the sealed samples taken in accordance with Sec. 5.1 of this standard. In the event that the results obtained by the supplier on retesting do not agree with the results obtained by the purchaser, the other sealed sample shall be forwarded, unopened, for analysis to a referee laboratory agreed on by both parties. The results of the referee analysis shall be accepted as final.

5.2.6.2 Material originating outside of North America. On request of the purchaser, the supplier shall inform the purchaser of the origin of the fluorosilicic acid to be provided. If the material to be provided was manufactured outside of North America, the purchaser may request from the supplier a written statement presenting the steps the supplier will take to ensure that the material to be supplied conforms to the requirements of this standard.

*CAUTION: Ammonium hydroxide fumes can cause damage to eyes and lungs. Use in a well-ventilated area or under a fume hood.

†CAUTION: Hydrogen sulfide is an extremely poisonous gas. Avoid breathing fumes. Use in a well-ventilated area or under a fume hood.

SECTION 6: DELIVERY*

Sec. 6.1 Marking**6.1.1 Required.**

6.1.1.1 Drum shipment labels. Each shipment shall contain clear identification of the material and a warning of potential danger in handling. Each drum shall have marked legibly on it the name of the acid, the net weight or volume of the contents, the percent strength of the acid, the name and address of the supplier or manufacturer, the lot number, and the brand name if any, and shall bear other markings as are required by applicable laws. The warning label should include suggestions for immediately rinsing away all acid coming in contact with the skin and the thorough dilution of acid accidentally spilled, including neutralization of the acid with lime.

6.1.1.2 Bulk shipment labels. On rail tank cars and tank truck shipments, the information listed under Sec. 6.1.1.1 shall accompany the bill of lading.

6.1.2 Optional. Packages may also bear the statement, "This material meets the requirements of AWWA B703-00, Standard for Fluorosilicic Acid," provided that the requirements of this standard are met and the material is not of a different quality or strength by separate agreement between the supplier and purchaser.

Sec. 6.2 Packaging and Shipping†

6.2.1 Packaging. Drums and any other nonbulk container used to package fluorosilicic acid shall comply to all applicable paragraphs of HM-181, part 178 of CFR 49.‡

6.2.2 Shipping regulations. Packaging and shipping of all fluorosilicic acid solutions shall conform to all applicable local, state, and federal (including US Department of Transportation (USDOT)) regulations and applicable interstate regulations).

*Governmental marking, packaging, and shipping references reflect US requirements. Users of AWWA B703 in Canada, Mexico, and non-North American countries should verify applicable local and national regulatory requirements.

†Because of the frequent changes in these regulations, all parties should remain informed of possible revisions. Provisions of the purchaser's specifications should not preclude compliance with applicable regulations.

‡Code of Federal Regulations, Title 49, part 178 (Transportation). Superintendent of Documents, US Government Printing Office, Washington, DC 20402.

6.2.3 *Containers.*

6.2.3.1 *General.* Containers shall be rubber-lined steel, cross-linked polyethylene, or other structures suitably lined to prevent corrosion by the fluorosilicic acid. USDOT regulations should be consulted for additional options.

6.2.3.2 *Structure.* The container must be structurally sound and designed to withstand all hydrostatic pressures and other forces encountered. The specific gravity of fluorosilicic acid at 30 percent solution is 1.27.

6.2.4 *Net weight.* The net weight or net volume of the containers shall not be less than the recorded weight or volume, or more than 10 percent greater. If exception is taken to the weight or volume of the material received, it shall be based on the certified weight or volume of not less than 10 percent of the containers, selected at random from the entire shipment. All tank truck shipments shall be accompanied by certified weight tickets.

Sec. 6.3 Affidavit of Compliance or Certified Analyses

The purchaser may require (1) an affidavit from the manufacturer or supplier that the fluorosilicic acid provided in the purchaser's specifications complies with all applicable requirements of this standard; (2) certified analyses of the fluorosilicic acid, provided by the manufacturer or supplier, covering items as required; or (3) both.

APPENDIX A

Containment Vessels

This appendix is for information only and is not a part of AWWA B703.

All tanks and containers must be manufactured from or lined with materials that are highly resistant to fluorosilicic acid. General materials in use include the following:

1. Fiberglass coated with resistant resin.
2. Polyethylene manufactured from high-density, cross-linked material that contains a minimum of 0.25 percent ultraviolet stabilizer.
3. Steel tanks lined with a minimum 2.4-mm (³/₃₂-in.) thickness of natural rubber, butyl rubber, or neoprene and secured to the metal surface with proper adhesive.

References to specific materials commonly in use include, but are not limited to, the following: polyvinyl chloride (PVC), type 1, grade 1; polyvinylidene fluoride (PVDF); ethylene propylene diene monomer (EPDM); ethylene chlorotrifluoroethylene (E-CTFE); Saran; Vinyl; Hypalon; Carpenter 20; and Hastelloy C.

When purchasing storage tanks or other appurtenances used to handle fluorosilicic acid, the purchaser may request certification from the materials manufacturer verifying the tested resistance of the particular material for use in contact with fluorosilicic acid. Bulk storage tanks should be provided with a certification plate containing (at minimum) the following:

1. Name of tank manufacturer.
2. Date of manufacture.
3. Chemical (chemicals) to be stored.
4. Mechanical properties of the structure.*
5. Mechanical properties of the lining.†

*For example, high-density, cross-linked polyethylene.

†For example, 2.4-mm (³/₃₂-in.) thick butyl rubber.