

Town of Yorktown, New York
Consolidated Water District

CATSKILL AQUEDUCT WATER SUPPLY

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

New York State Department Of Health Grants Gateway DOH01-
DWF1R2-2016 Component 1: Planning Projects

JUNE 2019

DRINKING WATER FLUORIDATION ENGINEER'S REPORT



Vanessa McPherson, PE
Principal Engineer

**CATSKILL AQUEDUCT
DRINKING WATER
FLUORIDATION
ENGINEER'S REPORT**

New York State Department of Health
Grants Gateway DOH01-DWFR4-2017
Component 2: Implementation Projects

Prepared for:

Michael Quinn, PE
Town Engineer
Town of Yorktown
363 Underhill Avenue
Yorktown Heights, NY 10598

Prepared by:

Arcadis of New York, Inc.
44 South Broadway
9th Floor
White Plains
New York 10601
Tel 914 694 2100
Fax 914 694 9286

Our Ref.:

02328010.0000

Date:

June2019

This document is intended only for the use of the individual or entity for which it was prepared and may contain information that is privileged, confidential and exempt from disclosure under applicable law. Any dissemination, distribution or copying of this document is strictly prohibited.

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

CONTENTS

| | | |
|--------|---|----|
| 1 | Introduction | 1 |
| 1.1 | Project Intent..... | 1 |
| 1.2 | Drinking Water System Information | 1 |
| 1.3 | Fluoridation History of Catskill Transmission Line..... | 2 |
| 1.4 | Project Justification..... | 3 |
| 1.5 | Site Considerations..... | 3 |
| 2 | Design criteria | 4 |
| 2.1 | Drinking Water System Data | 4 |
| 2.2 | Fluoride Dose..... | 4 |
| 3 | Summary of Proposed Work..... | 5 |
| 3.1 | Process Mechanical..... | 5 |
| 3.1.1 | Bulk Storage Tank..... | 5 |
| 3.1.2 | Day Tank | 6 |
| 3.1.3 | Transfer Pump..... | 6 |
| 3.1.4 | Chemical Metering Pumps | 6 |
| 3.1.5 | Fluoride Analyzer..... | 7 |
| 3.1.6 | Chemical Systems Equipment Redundancy | 7 |
| 3.1.7 | Piping..... | 8 |
| 3.1.8 | Secondary Containment..... | 8 |
| 3.1.9 | Chemical Delivery..... | 9 |
| 3.1.10 | Personal Protection Equipment..... | 9 |
| 3.1.11 | Standby Generator | 9 |
| 3.2 | Structural and Architectural | 9 |
| 3.3 | Electrical | 9 |
| 3.4 | Instrumentation and Controls..... | 9 |
| 3.5 | HVAC | 11 |
| 3.6 | Plumbing | 11 |
| 3.7 | Site Work | 11 |
| 3.8 | Security & Fire Protection | 11 |

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

| | | |
|-----|---------------------------------------|----|
| 3.9 | Permitting Considerations..... | 11 |
| 4 | Cost estimate | 12 |
| 5 | schedule..... | 12 |
| 6 | Statement of Measures and means | A |

TABLES

| | | |
|------------|---|----|
| Table 1-1: | Population Served by the Water District's Catskill Transmission Line..... | 2 |
| Table 2-1: | Catskill Fluoride System Design Criteria..... | 4 |
| Table 2-2: | Catskill Fluoride System Dosing | 5 |
| Table 3-1: | Bulk Storage Tank Selection | 6 |
| Table 3-2: | Day Tank Selection | 6 |
| Table 3-3: | Transfer Pump Selection..... | 6 |
| Table 3-4: | Chemical Metering Pump Selection | 7 |
| Table 3-5: | Fluoride Analyzer Selection | 7 |
| Table 4-1: | Opinion of Probable Construction Cost..... | 12 |
| Table 4-2: | Opinion of Probable Project Cost..... | 12 |
| Table 5-1: | Preliminary Schedule | 12 |

APPENDICES

| | |
|------------|---|
| Appendix A | Chemical Dosing Calculations |
| Appendix B | Safety Data Sheet for Hydrofluorosilicic Acid |
| Appendix C | Equipment Data Sheets and Information |
| Appendix D | Material Compatibility Chart for Hydrofluorosilicic Acid |
| Appendix E | State Environmental Quality Review Act Type II Action Declaration |

1 INTRODUCTION

1.1 Project Summary

In August 2016, the Town of Yorktown (Town) applied to the New York State (NYS) Grants Gateway Drinking Water Fluoridation Component 1 grant opportunity (grant), which is administered by the NYS Department of Health, for funding towards fluoridation project planning. The Town was awarded the grant in November 2016. Pursuant to the grant requirements, the Town developed an Engineer's Report evaluating the technical feasibility of reinstating fluoridation of their drinking water system. The Town contracted with Arcadis of New York, Inc. (Arcadis) in February 2017 to provide engineering services related to development of the Engineer's Report, and the Engineer's Report was finalized in October 2017. That report focused on locating a new Fluoride Facility in the Town of Cortlandt at a proposed interconnection site.

In November 2017, the Town applied for a subsequent grant through the NYS Grants Gateway Drinking Water Fluoridation Component 2 opportunity to fund the design and construction of the Fluoride Feed Facility. The Town of Yorktown was successful in obtaining the grant. The location of the Fluoridation Facility will be at the Catherine Street Pump Station in lieu of the Cortlandt interconnection site previously identified, as further discussed in this document.

The purpose of this report is to summarize the key design elements to be considered and included in the drinking water fluoridation system implementation at the Catherine Street Pump Station for the Catskill Aqueduct Water Supply.

1.2 Drinking Water System Information

The Town is a member of the Northern Westchester Joint Water Works (NWJWW), which, in addition to the Town, includes the Towns of Somers and Cortlandt and the Montrose Improvement District.

The Yorktown Consolidated Water District's (Water District) two main water sources are the Amawalk Reservoir in the Town of Somers and the Catskill Aqueduct in the Town of Cortlandt. The water is treated prior to distribution at the Amawalk and Catskill Aqueduct Water Treatment Plant (WTP), respectively.

The Water District has a 24-inch transmission line leaving the Catskill WTP, which serves 42,500 people throughout the Town of Yorktown and a portion of the Towns of Somers, Putnam Valley, and Cortlandt through interconnections.

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

Table 1-1: Population Served by the Water District's Catskill Transmission Line

| Municipality | Population Served |
|---|-------------------|
| Town of Yorktown | 36,000 |
| Town of Somers (partial distribution) | 5,300 |
| Town of Putnam Valley (partial distribution to Mill Pond neighborhood and Putnam Valley High School) | 775 |
| Town of Cortlandt (partial distribution to Quarry Acres neighborhood) | 350 |

In 2018, an interconnect for the Town of Cortlandt was installed at the 24-inch transmission main and located between the Catskill WTP and Catherine Street Pump Station near Cortlandt Lanes. The Cortlandt Lanes interconnect line has a dedicated flow meter to measure the draw from the 24-inch transmission main.

The minimum, average, and maximum flows delivered to the Water District from the Catskill WTP are approximately 1.0, 2.1, and 4.0 million gallons per day (mgd), respectively.

The Catskill and Amawalk WTP's 24-inch water transmission lines are connected and provide water to the distribution system from two different sides, and therefore, the water from both supply sources is mixed and distributed via service mains throughout the Water District. During normal operation and when both WTPs are in service, the distribution water source ratio is typically 60% from the Amawalk WTP and 40% from the Catskill WTP. In recent years, the Amawalk WTP has been removed from service during the winter, and only water from the Catskill WTP is distributed to the Water District.

1.3 Fluoridation History of Catskill Transmission Line

Prior to 2000 the Water District drew water directly from the Catskill Aqueduct via the Catskill Aqueduct Pump Station, also known as the Catherine Street Pump Station, (Catherine Street PS) located in Town. The water received fluoridation prior to conveyance to a nearby 24-inch transmission line. Due to Federal requirements of the Clean Water Act requiring enhanced filtration of surface water, the Town suspended use of the Catskill Pump Station.

In 2000, the Town joined the Northern Westchester Joint Water Works (NWJWW), which constructed the Catskill WTP to treat water withdrawn from the Catskill Aqueduct, which is owned and operated by New York City. Between 2000 and 2010, fluoride was added to the Water District's transmission line at the Catskill WTP by the NWJWW.

In 2010, the fluoride feed equipment at the Catskill WTP was decommissioned due to deteriorated condition. A report was prepared in January 2016 outlining requirements for an upgrade to the fluoride system at the Catskill WTP. To avoid partial and inconsistent distribution of fluoridated water to Water District residents, fluoride addition at the Amawalk WTP was suspended in October 2017. Once the

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

Catherine Street Facility is online, then the Amawalk WTP will resume fluoridation of the Amawalk Reservoir water supply to the Water District.

NWJWW has noted that relocation of the fluoride feed equipment is desired in lieu of replacement within the Catskill WTP. The other entities served by NWJWW do not fluoridate, and moving the fluoride feed system to an alternate location would enable flexibility in the distribution of water.

1.4 Project Justification

The community served by the Water District is not receiving fluoride as recommended by the U.S. Department of Health and Human Services.

The Water District's community is in support of fluoridation and a fluoridation ordinance is already established. Town Code Section 280-1 states that in connection with the Town's water supply a fluoride compound of a type and manner approved by the Commissioner of Health of the Westchester County Health District shall be added to the public water supply to provide a concentration of approximately 1.0 parts per million of the fluoride ion; provided, however, that the concentration of such ion shall not exceed 1.5 parts per million.

1.5 Site Considerations

When the grant was submitted in August 2016, the Town was proposing to utilize the out-of-service Catherine Street PS as a site to install a new system to introduce fluoride into the Catskill WTP transmission main.

After the grant was awarded in November 2016, the Town was made aware of another project site by the NWJWW at a new interconnection currently under design by the Town of Cortlandt.

As part of the previous Engineer's Report prepared, three potential sites for the new Water District's Catskill Supply fluoride storage and feed system (Catskill fluoride system) were evaluated:

- Existing decommissioned fluoride room at the Catskill WTP
- Catherine Street PS
- Cortlandt project site (Maple Row and Croton Avenue)

As noted previously, NWJWW has indicated that relocation of the fluoride feed equipment is desired in lieu of replacement within the Catskill WTP. Through discussions with the Town of Cortlandt, it was determined that the interconnection project schedule did not align with the Fluoridation schedule, and thus the Catherine Street PS location was agreed upon as the preferred option.

Due to the age of the Catherine Street PS, hazardous materials testing was performed to check for the presence of Asbestos, Lead and Polychlorinated biphenyl (PCB) in the building materials. No soil sampling or testing was conducted. The results identified that while there are a few locations where detectable levels of hazardous materials are present, the levels are low enough that special disposal of removed materials is not required. However, the contractor(s) performing demolition will be required to have hazardous materials awareness training according to Occupational Safety and Health

Administration (OSHA). The Hazardous Materials Testing report will be included within the bid documents as reference material.

2 DESIGN CRITERIA

The flow requirements and operation conditions for the Catherine Street Facility system are presented herein. Design criteria was developed based upon supplied flow data and discussions with the Town, Water District, and NWJWW personnel.

NWJWW indicated that operation of the new Catherine Street Facility, including acceptance of chemical delivery, would be managed by NWJWW. Therefore, where possible, design considerations were made for the new Catherine Street Facility system based upon the existing Amawalk WTP fluoride system.

All proposed work for the Catherine Street Facility system is consistent with the guidelines of the Westchester County Water Supply Program, the 2012 Ten States Standards, and other relevant municipal, state, and federal guidelines.

2.1 Drinking Water System Data

Based upon information supplied by the NWJWW, the Catskill WTP pumps can deliver a flow range of 1.0 to 4.0 mgd to meet the full Water District's demand, and the average flow in 2015 and 2016 was 2.10 and 1.88 mgd, respectively. The Water District's Catskill WTP transmission line pressure normally ranges from 170 to 180 psi.

The design flow demands for the Catskill fluoride system are listed in Table 2-1.

Table 2-1: Catskill Fluoride System Design Criteria

| Condition | Design Criteria |
|--------------------|-----------------|
| Minimum | 1.0 mgd |
| Average | 2.1 mgd |
| Maximum | 4.0 mgd |
| Operating Pressure | 170 to 180 psi |

2.2 Fluoride Dose

Fluoride has historically been added to the Water District's drinking water in the form of hydrofluorosilicic acid. When the Water District's transmission line from the Catskill WTP was receiving fluoridation, the NWJWW utilized 25% hydrofluorosilicic acid to provide a residual fluoride dosage of 1.0 mg/L. At Amawalk WTP, the NWJWW utilized 23 to 25% hydrofluorosilicic acid.

Hydrofluorosilicic acid is available as a 20 to 35% aqueous solution with 23 to 25% being the most common concentration used for drinking water treatment. Refer to Appendix B for a Safety Data Sheet for the 23 to 25% hydrofluorosilicic acid solution previously used at Amawalk WTP.

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

The Town's ordinance on fluoridation is outlined in Chapter 280 Article 1, and states that the fluoride residual shall be approximately 1.0 mg/L, but shall not exceed 1.5 mg/L. In 2015, the U.S. Department of Health and Human Services (USDHHS) recommended an optimal fluoride concentration of 0.7 mg/l.

Based upon the Town ordinance, appropriate design practices for fluoride dosing, and recent USDHHS recommendations, the Catskill fluoride system has been designed to maintain an average concentration of 1.0 mg/L utilizing 23% hydrofluorosilicic acid with a minimum and maximum range of 0.7 to 1.5 mg/L.

Table 2-2: Catskill Fluoride System Dosing

| Condition | Flow (mgd) | Target Concentration (mg/L) |
|-----------|------------|-----------------------------|
| Minimum | 1.0 | 0.7 |
| Average | 2.1 | 1.0 |
| Maximum | 4.0 | 1.5 |

3 SUMMARY OF PROPOSED WORK

The Catherine Street PS building will be provided with all components to install a new fluoridation system, including bulk and day tanks, fluoride feed pumps, piping, and a fluoride residual analyzer. Since the building has been decommissioned for approximately 20 years, some building stabilization work is required, which is discussed further in Section 3.2. Throughout detailed design, coordination was done with NWJWW to provide consistency and standardization with Amawalk WTP fluoride storage and dosing equipment, as applicable and feasible. Refer to Appendix A for the chemical dosing calculations, Appendix B for the Safety Data Sheet for Hydrofluorosilicic Acid, and Appendix C for the equipment data sheets.

3.1 Process Mechanical

3.1.1 Bulk Storage Tank

Per the Ten State Standards, a chemical supply of at least 30 days is required. In order to achieve the minimum required storage, approximately 280 gallons of 23% hydrofluorosilicic acid is needed to provide a 1.0 mg/L fluoride dose at average flow rate conditions of 2.1 mgd.

Chemical deliveries are typically provided at a minimum of 100 gallons, so the bulk storage tank shall be sized for 300 gallons to meet the minimum 30-day storage requirement of 280 gallons.

A bulk storage tank will be provided and constructed of cross-linked polyethylene in accordance with AWWA recommendations. The tank will be equipped with openings to accommodate chemical delivery, sight glass, level sensor, overflow pipe, fill line to day tank, and valved drain. The bulk storage tank will be vented to the atmosphere through a penetration in the roof. The bulk tank will be elevated

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

approximately 2.5-feet to allow for gravity filling of the day tank via a manually valved fill line. Amawalk WTP utilizes gravity filling of the fluoride day tank from the bulk tank.

Table 3-1: Bulk Storage Tank Selection

| Equipment Description | |
|---------------------------------|---------------------------|
| Number of Tanks | 1 |
| Minimum Required Storage Volume | 280 gallons |
| Tank Volume | 300 gallons |
| Dimensions | 46" diameter x 51" high |
| Tank Material | Cross-linked polyethylene |

3.1.2 Day Tank

In order to provide 24-hours storage of 23% hydrofluorosilicic acid at the maximum fluoride dose of 1.5 mg/L and flow rate of 4.0 mgd, the day tank storage capacity is required to be approximately 27 gallons. Based upon tank size availability, a 35-gallon day tank shall be utilized for the Catskill fluoride system.

The day tank will be constructed of cross-linked polyethylene in accordance with AWWA recommendations. The tank will be equipped with openings for the fill line from the bulk tank, sight glass, level sensor, overflow pipe, and valved drain. The transfer of chemical from the bulk to the day tank will be accomplished via a manually valved gravity line connection. The day tank will be vented to the atmosphere through a penetration in the building roof.

Table 3-2: Day Tank Selection

| Equipment Description | |
|------------------------------------|---------------------------|
| Number of Tanks | 1 |
| Minimum Recommended Storage Volume | 27 gallons |
| Tank Volume | 35 gallons |
| Dimensions | 18" diameter x 33.5" high |
| Tank Material | Cross-linked polyethylene |

3.1.3 Chemical Metering Pumps

Fluoride will be injected into the Water District's 24-inch transmission main from the Catskill WTP using a positive displacement chemical metering (feed) pump as recommended by the Ten State Standards. The feed pump has been sized to operate for the flow rate and fluoride residual range according to the design criteria provided in Table 2.2. The metering pump system and sizing information is included in Table 3.4.

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

Accessories on the pump discharge assembly include diaphragm operated anti-siphon device, backpressure valve, pressure relief valve, and pressure release valve. In addition, a calibration tube for direct, physical feed rate measurement will be provided. All materials of construction will be compatible with hydrofluorosilicic acid. Reference Appendix D for Material Compatibility Chart for hydrofluorosilicic acid. An uninstalled spare metering pump will be provided and located on site.

Table 3-4: Chemical Metering Pump Selection

| Equipment Description | |
|---------------------------|--------------------------------|
| Flow Range | 0.13 to 1.11 gph |
| System Operating Pressure | 170 to 180 psi |
| Metering Pump | LMI, Model C901-499SI or equal |
| Rated Flow Range | 0.001 to 1.3 gph |
| Rated Pressure | 250 psi |
| Power Input | 44 watts |

3.1.4 Fluoride Analyzer

A fluoride monitoring system will be provided to indicate the concentration of the fluoride residual in the Water District's 24-inch transmission main. The fluoride analyzer will be Hach CA610.

Table 3-5: Fluoride Analyzer Selection

| Equipment Description | |
|-----------------------|-------------------|
| Fluoride Analyzer | Hach CA610 |
| Sample Range | 0.1 to 10.0 mg/L |
| Sample Cycle Time | Every 4.2 minutes |

3.1.5 Grinder Pump

The existing floor drain at the Catherine Street PS is connected to a storm drain line outside the building. Per the Town of Yorktown's Town Code, the floor drain cannot be connected to the storm drainage system. The existing floor drain will be disconnected on the exterior of the building and routed to a grinder pump packaged system, which will pump flow to a low-pressure sanitary sewer force main located on Garden Lane at Arthur Avenue. The existing tile drain will remain connected to the storm drain line.

The grinder pump station assembly includes a fiberglass basin and cover, float control system, control panel, check valve, and isolation valve. A check and isolation valve box assembly will be installed upstream of the grinder pump discharge connection to the low-pressure sanitary sewer force main.

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

Table 3-5: Grinder Pump Selection

| Equipment Description | |
|--------------------------|---|
| Grinder Pump System | Flygt, Model MF-3068, 24" simplex fiberglass basin assembly; or equal |
| Rated Flow Range | 8 to 15 gpm |
| Rated Discharge Pressure | 6 to 88 psi |
| Rated Power | 1.7 HP |

3.1.6 Chemical Systems Equipment Redundancy

Redundancy of the chemical metering system is not required as fluoride is not necessary for the protection of the drinking water supply. However, a second chemical metering pump will be provided, but not installed or connected to the Catskill fluoride system. This will allow for minimal fluoride feed interruption to the Town's drinking water supply, as the back-up chemical metering pump will already be available.

3.1.7 Piping

Polyethylene tubing and polyvinyl chloride (PVC) piping will be provided, and designed to minimize or contain chemical spills in the event of pipe ruptures. 2-inch PVC pipe will be provided from the chemical fill station to the bulk storage tank. 1-inch PVC pipe will be provided between the bulk and day tanks for manual chemical transfer. The metering pump suction line from the day tank will be 1/2-inch PVC. Polyethylene tubing (1/4-inch) will be provided on the discharge side of the metering pump to the injection point in the 24-inch transmission main. The fluoride feed tubing located outside of the containment curb will be in clear containment piping with a leak detection tee at a low point. Also, polyethylene tubing (1/2-inch) will be provided from the sampling point at the 24-inch transmission main to inside the building, then will transition to 1/2-inch PVC pipe, then back to 1/4-inch polyethylene tubing for connection to the fluoride analyzer.

The chemical injection and sampling points will be accessible via manholes outside of the facility.

3.1.8 Secondary Containment

Hydrofluorosilicic acid is not a regulated chemical through New York State Department of Environmental Conservation's Chemical/Petroleum Bulk Storage Program. However, per Ten State Standards recommendations, a secondary containment system will be provided. A 5-inch high curb will be provided around the chemical tanks and piping, which will provide 110% containment of all stored chemicals.

3.1.9 Chemical Delivery

The hydrofluorosilicic acid will be delivered to the Catherine Street Facility in bulk shipment. The Catskill Fluoride Facility will be provided with an exterior chemical fill station with piping routed from the chemical fill station, through an existing wall opening, and into the bulk storage tank. A liquid level indicator and alarm panel will be provided to notify the chemical delivery operator when the bulk storage tank is reaching capacity.

As hydrofluorosilicic acid is not a regulated chemical through New York State Department of Environmental Conservation's Chemical/Petroleum Bulk Storage Program, truck containment is not required.

Signage will be provided, as required, to facilitate chemical deliveries and indicate hazards.

3.1.10 Personal Protection Equipment

Personal protective equipment will be provided, as required, including an eye wash station and deluge shower in the Catherine Street Facility Metering Room.

3.2 Structural and Architectural

The existing Catherine Street PS is constructed of cast-in-place concrete and Concrete Masonry Units (CMU). Based upon the existing structural condition of the Catherine Street PS and the funding available within the grant, it was agreed with the Town that a stabilization approach would be taken to enable reuse of the building as part of the Fluoride Project. In addition to replacing the roof, stabilization will include grouting all concrete masonry unit (CMU) cells and a repair to the building corners. With the stabilization approach, no new wall penetrations or tie-ins will be made to the existing walls. As a building reuse and stabilization approach is being followed for this project, a complete Building Code review has not been performed.

3.3 Electrical

The existing electrical service at Catherine Street Facility is 480-volt. Based upon sizing of the fluoride equipment, the existing electrical service is oversized and not required. Electrical service for the new fluoride system at the Catherine Street Facility will be provided from the existing overhead lines in the street to a new utility meter installed on the exterior wall of the building. The electrical conduit will be buried.

A main circuit breaker and lighting panel will be provided in the Metering Room.

Switch operated interior and exterior lighting will be provided. All electrical work will conform to the requirements of the National Electrical Code or to the relevant local and state codes.

3.4 Instrumentation and Controls

A broadband cable connection will be utilized for communication between the Catherine Street Facility and Catskill WTP, so that the SCADA system can remotely monitor, alarm and allow secure selected

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

control functions of the Catherine Street Facility fluoride system. A main control panel will be installed at Catherine Street Facility to monitor, control, and alarm the fluoride system. Adjustment of setpoints and constants in the automatic equation will be possible at SCADA.

The following I/O points are proposed for the Catherine Street Facility fluoride system:

- Fluoride Day Tank – liquid level, low and high liquid level alarm
- Fluoride Bulk Storage Tank – liquid level, low and high liquid level alarm
- Fluoride Feed Pump – start/stop control in remote, speed control
- Fluoride Analyzer – fluoride residual, low and high fluoride residual alarm
- Communication - fail alarm
- Grinder Pump – fault, high level alarm
- Door Contact - opened alarm
- Eyewash/Shower Station – activation alarm
- Chemical Containment Area – leak detection alarm
- Water Line Pressure Transmitter – pressure

Due to the constraints of installing a dedicated flow meter at the Catherine Street Facility, it was discussed and agreed upon with the Town and NWJWW that a calculated flow rate will be utilized to pace the fluoride feed pump. The flow will be calculated based on the Town's 24-inch transmission main flow meter reading at Catskill WTP minus the Cortlandt Lanes interconnect flow meter reading. Per NWJWW, there are no other interconnects on the Town's 24-inch transmission main between Cortlandt Lanes and Catherine Street Facility.

While in automatic, fluoride dosage will be controlled by utilizing the calculated flow as the flow-paced component. The metering pump can be controlled both manually and remotely.

The day and bulk storage tanks will be provided with level sensors for high and low level alarms. Continuous level of the bulk storage tank will also be monitored. The low level alarm for the bulk storage tank is provided to alert operators to place an order for chemical delivery, while the low level alarm for the day tank is to notify operators to transfer chemical solution to the day tank. The high level alarm for the bulk storage tank will be provided as a control measure to prevent overflow of the tank during chemical delivery. The high level alarm switch will be wired to activate a horn at the exterior chemical fill station. In addition to the alarm at the chemical fill station, a liquid level indicator for the bulk storage tank will also be provided.

The fluoride analyzer is provided with high and low sample concentration level alarms and system error alarm. The system alarm shall activate for major variation in analyzer performance and shall shut down the analyzer until corrective action is taken.

3.5 HVAC

The Metering Room in the Catherine Street Facility will be provided with ventilation and heating. Ventilation will be accomplished via a roof mounted intake hood and wall exhaust fan with motorized damper. Two electric heating units will be used to maintain a temperature of 60°F throughout the facility during winter.

3.6 Plumbing

The existing building has a ¾ inch connection to 24-inch transmission main. A backflow preventer will be provided on the existing line. An electric hot water heater will be installed to provide tepid water to the emergency eyewash station, deluge shower, and service sink located in the Metering Room.

3.7 Site Work

The existing, capped 8- and 12-inch suction and discharge lines to the building will be used as a conduit to run the fluoride dosing and sampling tubing to/from the 24-inch transmission main. The existing suction and discharge lines are capped prior to the 24-inch transmission main; therefore, excavation will be required. Approximately 5 linear feet of piping and a new doghouse manhole will be provided at both the injection and sampling point at the 24-inch transmission main.

The grinder pump discharge piping will be routed down Garden Lane and connected to the low-pressure sanitary sewer force main near Garden Lane at Arthur Lane. The pipe length will be approximately 400 linear feet. The pipe depth will be a minimum of 42-inches below grade.

No modifications to the existing stormwater conveyance system is proposed.

To provide power and communication to the fluoride facility, the cables will be direct buried from the existing utility pole to the building.

3.8 Security & Fire Protection

A switch operated exterior LED light will be provided in accordance with local and state codes. A self-illuminated exit sign will be located in the Metering Room. In addition, a door contact will be provided, which shall alarm Catskill WTP when the door is opened, and will be deactivated via key pad at the main control panel.

Based upon the volume of chemicals stored onsite and that it is an unoccupied facility, fire protection is not required.

3.9 Permitting Considerations

As the Catherine Street PS has historically been used for the purpose of chemical addition, specifically fluoride, the current project has been reviewed and determined by the Town to be a Type II Action under the State Environmental Quality Review Act. Documentation of the Town review is included in Appendix E.

DRINKING WATER FLUORIDATION ENGINEER'S REPORT

The Facility is located on land owned by the New York City Department of Environmental Protection (NYCDEP), and as such, there is a Land Use Permit in place for Catherine Street. The Town is working with the NYCDEP on a renewal of the permit for the current activity.

APPENDIX A

Chemical Dosing Calculations



| | | | |
|--------------|---|----------|-----------------|
| Client: | Town of Yorktown | By: LAM | Date: 2/19/2019 |
| Project: | Drinking Water Fluoridation Engineer's Report | Checked: | Date: |
| Description: | Fluoride System Calculations | | |

Design Criteria

| | |
|----------------------|---|
| <u>Flow*</u> | |
| Average | 2.1 mgd (As indicated in email from NWJWW, dated 3/3/17 (2015 data), and subsequent discussions) |
| Maximum | 4.0 mgd (Max.capacity of Catskill WTP pumps as noted in Hazen report. Actual observed max. is 3.47 mgd; 2015 data.) |
| Minimum | 1.0 mgd (As indicated in follow-up email from NWJWW, dated 4/4/17) |
| Minimum (Worst Case) | 0.3 mgd (As indicated in email from NWJWW, dated 3/3/17 (2016 data), and subsequent discussions) |

* 2015 and 2016 flow data from NWJWW

| | |
|---------------------------------|----------------------------------|
| <u>Chemical Details</u> | |
| Fluorosilicic Acid | H ₂ F ₆ Si |
| Strength | 23% |
| Specific Gravity | 1.23 |
| Density | 10.26 lb/gal |
| Molecular Weight of Solution | 144 |
| Molecular Weight of Active Chem | 114 (Fluoride Ion) |
| Available Active Ions | 79% |
| Activity | 1.87 lb/gal |

Target Fluoride Concentrations

| | | |
|---------|----------|--|
| Average | 1.0 mg/L | Based on Town Ordinance |
| Maximum | 1.5 mg/L | Based on Town Ordinance |
| Minimum | 0.7 mg/L | Based upon appropriate design practice for Fluoride Dosing |

Chemical Feed Rates

| | |
|----------------------|-----------------|
| Average | 9.4 gpd |
| Maximum | 26.8 gpd |
| Minimum | 3.1 gpd |
| Minimum (Worst Case) | 1.0 gpd |
| Average | 0.39 gph |
| Maximum | 1.11 gph |
| Minimum | 0.13 gph |
| Minimum (Worst Case) | 0.04 gph |

$$\frac{Flow(mgd) \times Concentration(mg / L) \times 8.34}{Activity}$$

Requirements for Chemical Storage

| | | |
|-----------------------------------|---------|--|
| Number of Day Tanks | 1 | |
| Required Volume of Day Tank | 27 gal | (24 hours at Maximum Conditions) |
| Available Day Tank Size (Std.) | 35 gal | |
| Hours of Storage @ Max. Condition | 31 hrs | * Per Ten State Standards, no more than 30 hours |
| Required Volume of Bulk Tank | 281 gal | (For 30 days of Chemical Storage at Average Condition) |

APPENDIX B

Safety Data Sheet for Hydrofluorosilicic Acid



Fluorosilicic Acid (FSA)

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1. Product identifier

Product form : Substance
Substance name : Fluorosilicic Acid (FSA)
Chemical name : Hydro Fluorosilicic Acid (HSA)
Product code : M17200

1.2. Relevant identified uses of the substance or mixture and uses advised against

1.3. Details of the supplier of the safety data sheet

JR Simplot Company
P.O. Box 70013
Boise, ID 83707
T 1-208-336-2110

1.4. Emergency telephone number

Emergency number : CHEMTREC 1-800-424-9300

SECTION 2: Hazards identification

2.1. Classification of the substance or mixture

GHS-US classification

Met. Corr. 1 H290
Acute Tox. 4 (Oral) H302
Skin Corr. 1A H314

Full text of H-phrases: see section 16

2.2. Label elements

GHS-US labelling

Hazard pictograms (GHS-US) :



GHS05

GHS07

Signal word (GHS-US) :

Danger

Hazard statements (GHS-US) :

H290 - May be corrosive to metals
H302 - Harmful if swallowed
H314 - Causes severe skin burns and eye damage

Precautionary statements (GHS-US) :

P234 - Keep only in original container
P260 - Do not breathe dust/fume/gas/mist/vapours/spray
P264 - Wash ... thoroughly after handling
P270 - Do not eat, drink or smoke when using this product
P280 - Wear protective gloves/protective clothing/eye protection/face protection
P301+P312 - If swallowed: Call a poison center/doctor/... if you feel unwell
P301+P330+P331 - If swallowed: rinse mouth. Do NOT induce vomiting
P303+P361+P353 - If on skin (or hair): Take off immediately all contaminated clothing. Rinse skin with water/shower
P304+P340 - If inhaled: Remove person to fresh air and keep comfortable for breathing
P305+P351+P338 - If in eyes: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing
P310 - Immediately call a poison center/doctor/...
P321 - Specific treatment (see ... on this label)
P330 - Rinse mouth
P363 - Wash contaminated clothing before reuse
P390 - Absorb spillage to prevent material damage
P405 - Store locked up
P406 - Store in corrosive resistant/... container with a resistant inner liner
P501 - Dispose of contents/container to ...

Fluorosilicic Acid (FSA)

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

2.3. Other hazards

No additional information available

2.4. Unknown acute toxicity (GHS-US)

Not applicable

SECTION 3: Composition/information on ingredients

3.1. Substance

Name : Fluorosilicic Acid (FSA)

| Name | Product identifier | % | GHS-US classification |
|--|---------------------|-----|-----------------------|
| hexafluorosilicic acid, conc=25%, aqueous solution | (CAS No) 16961-83-4 | 100 | Skin Corr. 1B, H314 |

Full text of H-phrases: see section 16

3.2. Mixture

Not applicable

SECTION 4: First aid measures

4.1. Description of first aid measures

- First-aid measures general : Never give anything by mouth to an unconscious person. If you feel unwell, seek medical advice (show the label where possible).
- First-aid measures after inhalation : Remove victim to fresh air and keep at rest in a position comfortable for breathing. Immediately call a POISON CENTER or doctor/physician.
- First-aid measures after skin contact : Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower. Immediately call a POISON CENTER or doctor/physician.
- First-aid measures after eye contact : Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. Immediately call a POISON CENTER or doctor/physician.
- First-aid measures after ingestion : Rinse mouth. Do NOT induce vomiting. Call a POISON CENTER or doctor/physician if you feel unwell. Immediately call a POISON CENTER or doctor/physician.

4.2. Most important symptoms and effects, both acute and delayed

- Symptoms/injuries : Causes severe skin burns and eye damage.
- Symptoms/injuries after ingestion : Swallowing a small quantity of this material will result in serious health hazard.

4.3. Indication of any immediate medical attention and special treatment needed

No additional information available

SECTION 5: Firefighting measures

5.1. Extinguishing media

- Suitable extinguishing media : Foam. Dry powder. Carbon dioxide. Water spray. Sand.
- Unsuitable extinguishing media : Do not use a heavy water stream.

5.2. Special hazards arising from the substance or mixture

No additional information available

5.3. Advice for firefighters

- Firefighting instructions : Use water spray or fog for cooling exposed containers. Exercise caution when fighting any chemical fire. Prevent fire-fighting water from entering environment.
- Protection during firefighting : Do not enter fire area without proper protective equipment, including respiratory protection.

SECTION 6: Accidental release measures

6.1. Personal precautions, protective equipment and emergency procedures

6.1.1. For non-emergency personnel

- Emergency procedures : Evacuate unnecessary personnel.

6.1.2. For emergency responders

- Protective equipment : Equip cleanup crew with proper protection.
- Emergency procedures : Ventilate area.

6.2. Environmental precautions

Prevent entry to sewers and public waters. Notify authorities if liquid enters sewers or public waters.

6.3. Methods and material for containment and cleaning up

- Methods for cleaning up : Soak up spills with inert solids, such as clay or diatomaceous earth as soon as possible. Collect spillage. Store away from other materials. Absorb spillage to prevent material damage.

Fluorosilicic Acid (FSA)

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

6.4. Reference to other sections

See Heading 8. Exposure controls and personal protection.

SECTION 7: Handling and storage

7.1. Precautions for safe handling

Additional hazards when processed : May be corrosive to metals.
Precautions for safe handling : Wash hands and other exposed areas with mild soap and water before eating, drinking or smoking and when leaving work. Provide good ventilation in process area to prevent formation of vapour. Do not breathe dust/fume/gas/mist/vapours/spray. Avoid contact during pregnancy/while nursing.
Hygiene measures : Do not eat, drink or smoke when using this product. Wash ... thoroughly after handling.

7.2. Conditions for safe storage, including any incompatibilities

Technical measures : Comply with applicable regulations.
Storage conditions : Keep only in the original container in a cool, well ventilated place away from : Keep container closed when not in use.
Incompatible products : Strong bases. Strong acids.
Incompatible materials : Sources of ignition. Direct sunlight.
Packaging materials : Store in corrosive resistant/... container with a resistant inner liner.

7.3. Specific end use(s)

No additional information available

SECTION 8: Exposure controls/personal protection

8.1. Control parameters

| Fluorosilicic Acid (FSA) | | |
|---|--------------------------------|-----------------------|
| ACGIH | Not applicable | |
| OSHA | Not applicable | |
| hexafluorosilicic acid, conc=25%, aqueous solution (16961-83-4) | | |
| ACGIH | ACGIH TWA (mg/m ³) | 2.5 mg/m ³ |
| OSHA | Not applicable | |

8.2. Exposure controls

Personal protective equipment : Avoid all unnecessary exposure.
Hand protection : Wear protective gloves.
Eye protection : Chemical goggles or face shield.
Skin and body protection : Wear suitable protective clothing.
Respiratory protection : Wear appropriate mask.
Other information : Do not eat, drink or smoke during use.

SECTION 9: Physical and chemical properties

9.1. Information on basic physical and chemical properties

Physical state : Liquid
Appearance : Clear, colorless to pale straw liquid.
Colour : Colourless
Odour : characteristic
Odour threshold : No data available
pH : 1
Melting point : No data available
Freezing point : No data available
Boiling point : 105 °C
Flash point : No data available
Relative evaporation rate (butylacetate=1) : No data available
Flammability (solid, gas) : No data available
Explosive limits : No data available

Fluorosilicic Acid (FSA)

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

| | |
|----------------------------------|---|
| Explosive properties | : No data available |
| Oxidising properties | : No data available |
| Vapour pressure | : No data available |
| Relative density | : No data available |
| Relative vapour density at 20 °C | : No data available |
| Solubility | : Soluble. Water: Solubility in water of component(s) of the mixture : • hexafluorosilicic acid, conc=25%, aqueous solution: Complete |
| Log Pow | : No data available |
| Log Kow | : No data available |
| Auto-ignition temperature | : No data available |
| Decomposition temperature | : No data available |
| Viscosity | : No data available |
| Viscosity, kinematic | : No data available |
| Viscosity, dynamic | : No data available |

9.2. Other information

No additional information available

SECTION 10: Stability and reactivity

10.1. Reactivity

No additional information available

10.2. Chemical stability

Stable.

10.3. Possibility of hazardous reactions

Not established.

10.4. Conditions to avoid

Extremely high temperatures. Direct sunlight. Extremely high or low temperatures.

10.5. Incompatible materials

Alkalis. Chlorites. Combustible solids and organic peroxides. Strong acids. Strong bases. metals. May be corrosive to metals.

10.6. Hazardous decomposition products

Corrosive fumes of fluorides. fume. Carbon monoxide. Carbon dioxide. Thermal decomposition generates : Corrosive vapours.

SECTION 11: Toxicological information

11.1. Information on toxicological effects

Acute toxicity : Oral: Harmful if swallowed.

| Fluorosilicic Acid (FSA) | |
|--------------------------|--------------------------|
| LD50 oral rat | 430 mg/kg |
| ATE US (oral) | 430.000 mg/kg bodyweight |

| | |
|-----------------------------------|--|
| Skin corrosion/irritation | : Causes severe skin burns and eye damage. pH: 1 |
| Serious eye damage/irritation | : Not classified pH: 1 |
| Respiratory or skin sensitisation | : Not classified |
| Germ cell mutagenicity | : Not classified Based on available data, the classification criteria are not met |
| Carcinogenicity | : Not classified |

| hexafluorosilicic acid, conc=25%, aqueous solution (16961-83-4) | |
|---|----------------------|
| IARC group | 3 - Not classifiable |

| | |
|--|--|
| Reproductive toxicity | : Not classified Based on available data, the classification criteria are not met |
| Specific target organ toxicity (single exposure) | : Not classified |

Fluorosilicic Acid (FSA)

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

| | |
|---|---|
| Specific target organ toxicity (repeated exposure) | : Not classified |
| Aspiration hazard | : Not classified |
| Potential adverse human health effects and symptoms | : Based on available data, the classification criteria are not met. Harmful if swallowed. |
| Symptoms/injuries after ingestion | : Swallowing a small quantity of this material will result in serious health hazard. |

SECTION 12: Ecological information

12.1. Toxicity

| hexafluorosilicic acid, conc=25%, aqueous solution (16961-83-4) | |
|---|---|
| LC50 fish 1 | > 10 mg/l (96 h; Brachydanio rerio) |
| Threshold limit algae 1 | 10 mg/l (96 h; Scenedesmus quadricauda; Cell numbers) |

12.2. Persistence and degradability

| Fluorosilicic Acid (FSA) | |
|-------------------------------|------------------|
| Persistence and degradability | Not established. |

| hexafluorosilicic acid, conc=25%, aqueous solution (16961-83-4) | |
|---|---|
| Persistence and degradability | Biodegradability: not applicable. Reacts with water: release of toxic/harmful substances. No (test)data on mobility of the components available. Not established. |
| Biochemical oxygen demand (BOD) | Not applicable |
| Chemical oxygen demand (COD) | Not applicable |
| ThOD | Not applicable |
| BOD (% of ThOD) | Not applicable |

12.3. Bioaccumulative potential

| Fluorosilicic Acid (FSA) | |
|---------------------------|------------------|
| Bioaccumulative potential | Not established. |

| hexafluorosilicic acid, conc=25%, aqueous solution (16961-83-4) | |
|---|---------------------------------------|
| Bioaccumulative potential | Not bioaccumulative. Not established. |

12.4. Mobility in soil

No additional information available

12.5. Other adverse effects

| | |
|------------------------------|--|
| Effect on the global warming | : No known ecological damage caused by this product. |
| Other information | : Avoid release to the environment. |

SECTION 13: Disposal considerations

13.1. Waste treatment methods

| | |
|--------------------------------|--|
| Waste disposal recommendations | : Dispose in a safe manner in accordance with local/national regulations. Dispose of contents/container to ... |
| Ecology - waste materials | : Avoid release to the environment. |

SECTION 14: Transport information

Department of Transportation (DOT)

| | |
|----------------------------------|---|
| In accordance with DOT | |
| Transport document description | : UN1778 Fluorosilicic acid, 8, II |
| UN-No.(DOT) | : UN1778 |
| Proper Shipping Name (DOT) | : Fluorosilicic acid |
| Transport hazard class(es) (DOT) | : 8 - Class 8 - Corrosive material 49 CFR 173.136 |

Fluorosilicic Acid (FSA)

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

Hazard labels (DOT) : 8 - Corrosive



Packing group (DOT) : II - Medium Danger

DOT Packaging Non Bulk (49 CFR 173.xxx) : 202

DOT Packaging Bulk (49 CFR 173.xxx) : 242

DOT Special Provisions (49 CFR 172.102) : A6 - For combination packagings, if plastic inner packagings are used, they must be packed in tightly closed metal receptacles before packing in outer packagings.
A7 - Steel packagings must be corrosion-resistant or have protection against corrosion.
B2 - MC 300, MC 301, MC 302, MC 303, MC 305, and MC 306 and DOT 406 cargo tanks are not authorized.
B15 - Packagings must be protected with non-metallic linings impervious to the lading or have a suitable corrosion allowance.
IB2 - Authorized IBCs: Metal (31A, 31B and 31N); Rigid plastics (31H1 and 31H2); Composite (31HZ1). Additional Requirement: Only liquids with a vapor pressure less than or equal to 110 kPa at 50 C (1.1 bar at 122 F), or 130 kPa at 55 C (1.3 bar at 131 F) are authorized.
N3 - Glass inner packagings are permitted in combination or composite packagings only if the hazardous material is free from hydrofluoric acid.
N34 - Aluminum construction materials are not authorized for any part of a packaging which is normally in contact with the hazardous material.
T8 - 4 178.274(d)(2) Normal..... Prohibited
TP2 - a. The maximum degree of filling must not exceed the degree of filling determined by the following: (image) Where: tr is the maximum mean bulk temperature during transport, tf is the temperature in degrees celsius of the liquid during filling, and a is the mean coefficient of cubical expansion of the liquid between the mean temperature of the liquid during filling (tf) and the maximum mean bulk temperature during transportation (tr) both in degrees celsius. b. For liquids transported under ambient conditions may be calculated using the formula: (image) Where: d15 and d50 are the densities (in units of mass per unit volume) of the liquid at 15 C (59 F) and 50 C (122 F), respectively.
TP12 - This material is considered highly corrosive to steel.

DOT Packaging Exceptions (49 CFR 173.xxx) : None

DOT Quantity Limitations Passenger aircraft/rail (49 CFR 173.27) : 1 L

DOT Quantity Limitations Cargo aircraft only (49 CFR 175.75) : 30 L

DOT Vessel Stowage Location : A - The material may be stowed "on deck" or "under deck" on a cargo vessel and on a passenger vessel.

Additional information

Other information : No supplementary information available.

ADR

No additional information available

Transport by sea

No additional information available

Air transport

No additional information available

SECTION 15: Regulatory information

15.1. US Federal regulations

Fluorosilicic Acid (FSA)

Not listed on the United States TSCA (Toxic Substances Control Act) inventory

hexafluorosilicic acid, conc=25%, aqueous solution (16961-83-4)

Listed on the United States TSCA (Toxic Substances Control Act) inventory

15.2. International regulations

CANADA

No additional information available

Fluorosilicic Acid (FSA)

Safety Data Sheet

according to Federal Register / Vol. 77, No. 58 / Monday, March 26, 2012 / Rules and Regulations

EU-Regulations

No additional information available

Classification according to Regulation (EC) No. 1272/2008 [CLP]

Not classified

Classification according to Directive 67/548/EEC [DSD] or 1999/45/EC [DPD]

Not classified

National regulations

No additional information available

15.3. US State regulations

hexafluorosilicic acid, conc=25%, aqueous solution (16961-83-4)

U.S. - New Jersey - Right to Know Hazardous Substance List

SECTION 16: Other information

Other information : None.

Full text of H-phrases:

| | |
|---------------------|---|
| Acute Tox. 4 (Oral) | Acute toxicity (oral), Category 4 |
| Met. Corr. 1 | Corrosive to metals, Category 1 |
| Skin Corr. 1A | Skin corrosion/irritation, Category 1A |
| Skin Corr. 1B | Skin corrosion/irritation, Category 1B |
| H290 | May be corrosive to metals |
| H302 | Harmful if swallowed |
| H314 | Causes severe skin burns and eye damage |

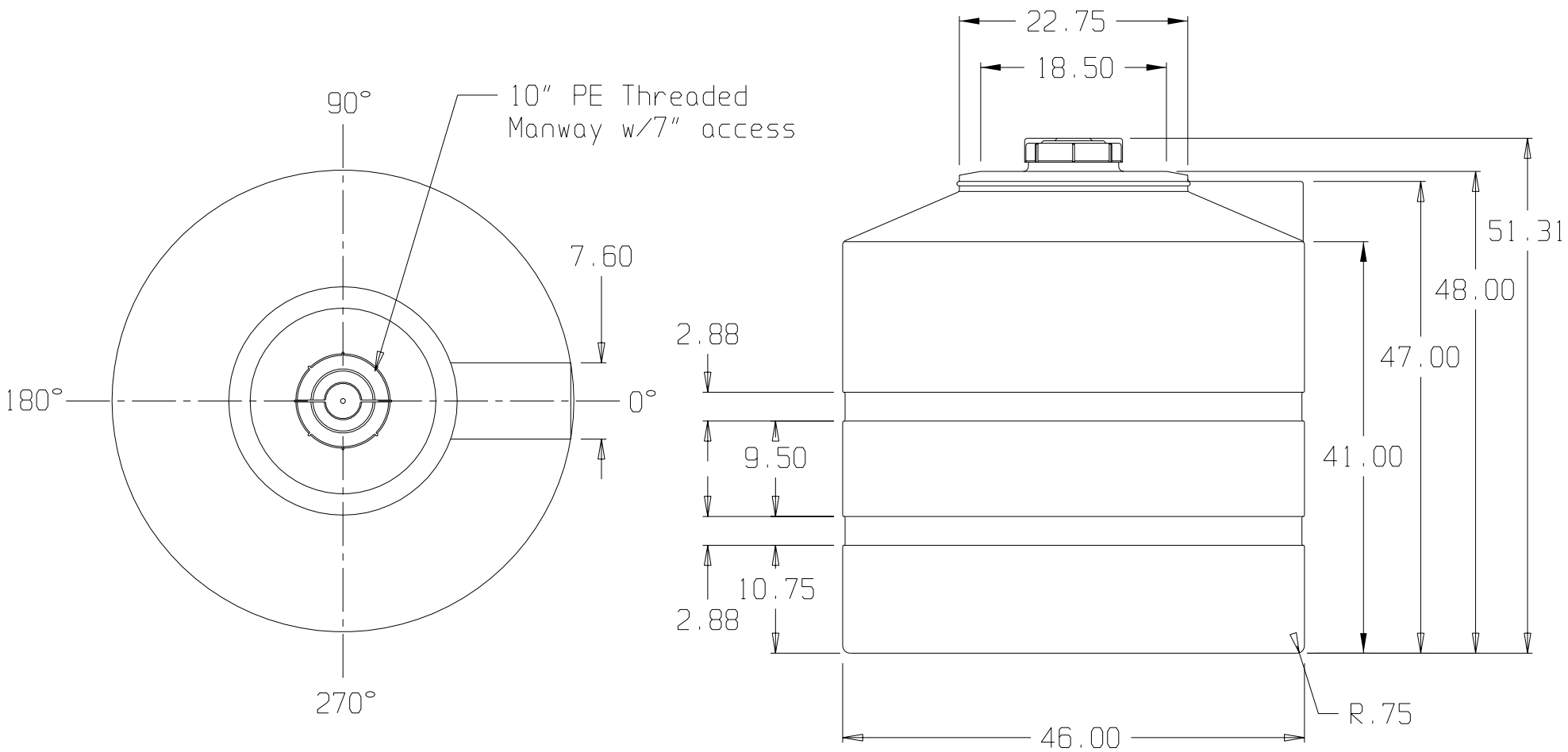
SDS US (GHS HazCom 2012)

Disclaimer: This information relates to the specific material designated and may not be valid for such material used in combination with any other materials or in any process. Such information is to the best of our knowledge and belief, accurate and reliable as of the date compiled. However, no representation, warranty or guarantee is made as to its accuracy, reliability or completeness. NO WARRANTY OF MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE, OR ANY OTHER WARRANTY, EXPRESS OR IMPLIED, IS MADE CONCERNING THE INFORMATION HEREIN PROVIDED. It is the user's responsibility to satisfy himself as to the suitability and completeness of such information for his own particular use. We do not accept liability for any loss or damage that may occur from the use of this information nor do we offer warranty against patent infringement.

APPENDIX C

Equipment Data Sheets and Information





BASE FITTINGS TO BE LEFT INSTALLED AT TIME OF SHIPMENT PER Sii PROCEDURE

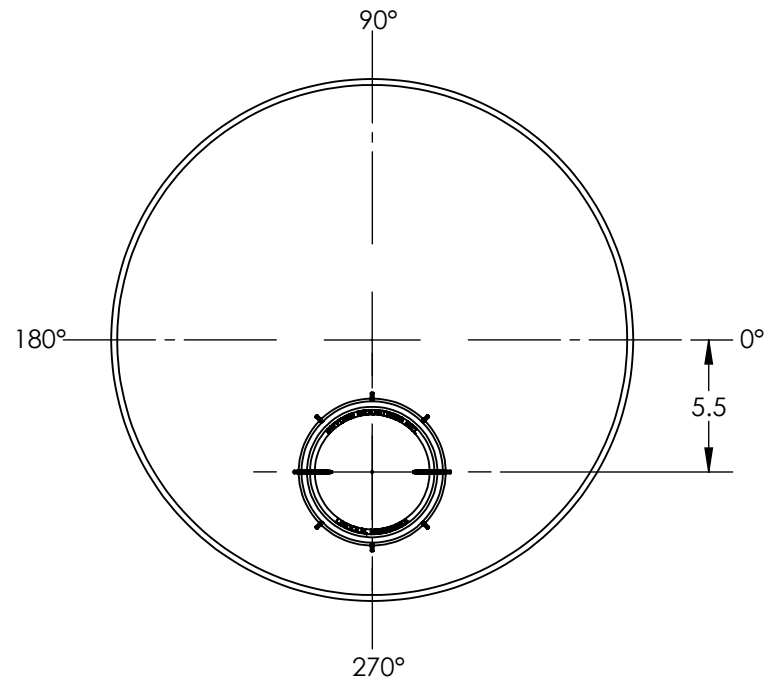
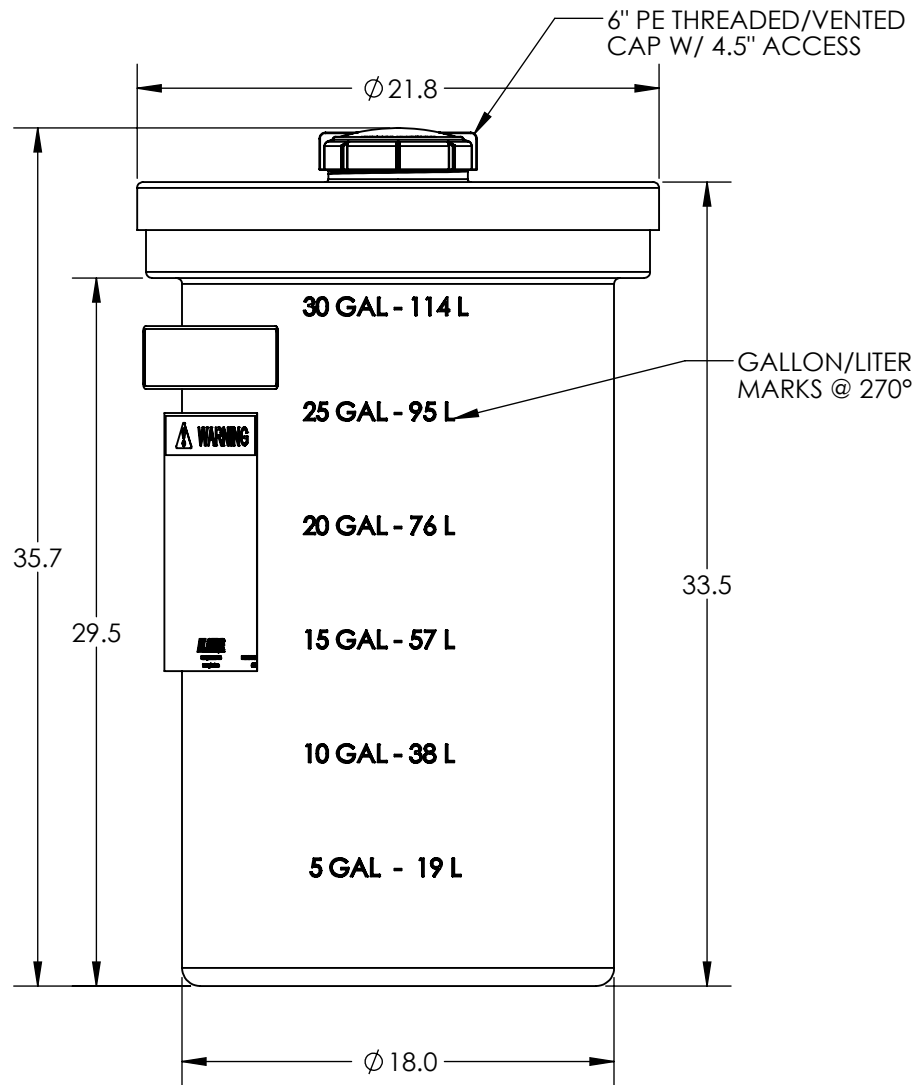
(all dimensions in inches)

PART # TANK: 8040--MT

300 GALLON VERTICAL TANK

REF#: 0000

06/26/02



NOTE:
GALLONAGE MARKS MAY BE REMOVED FOR FITTING PLACEMENT AS NEEDED.

***ALL EXTERNAL PIPING MUST BE INDEPENDENTLY SUPPORTED.**
***ONLY BASE FITTINGS TO BE LEFT INSTALLED AT TIME OF SHIPMENT PER SII PROCEDURE.**
***Consult Snyder's Guidelines for Use and Installation prior to delivery.**
 Available on-line at <http://www.snyderindustriestanks.com/Technical>
ALL DIMENSIONS ARE IN INCHES, NOMINAL, & SUBJECT TO CHANGE WITHOUT NOTICE.
ALL DIMENSIONS ON ROTATIONAL MOLDED PARTS ARE SUBJECT TO A ± 3% TOLERANCE.

| | | | | | | |
|---|--|----------|--|----------|-------------------------------|----------|
| DO NOT SCALE | | DRAWN BY | SII SNYDER INDUSTRIES, INC. | TITLE: | ASM TK 35VFT X 18 NECK | REVISION |
| STATUS: Released | | IGG | | ENG. ID. | | |
| © SNYDER INDUSTRIES, INC., 2019 | | | | PART NO. | 1000110N__01 | 1 OF 1 |
| ALL DIMENSIONS, DESIGNS, AND INFORMATION ON THIS PRINT MUST BE CONSIDERED PROPRIETARY TO SNYDER INDUSTRIES, INC. AND MAY NOT BE USED, COPIED, OR DISTRIBUTED WITHOUT WRITTEN PERMISSION OF AN OFFICER (OR HIS AGENT) OF THE FIRM. | | | | ENG. ID. | D004270 | A |
| www.snydernet.com | | | | | | |



Position Statement Hydrofluosilicic Acid (H₂SiF₆) ≤26% Storage Tanks

Tank:

HDLPE, 1.9 SpGr rating (ASTM D-1998 - 600 psi hoop stress design)

or

HDXLPE*, 1.9 SpGr rating (ASTM D-1998 - 600 psi hoop stress design)

* *Note: chemical may cause XLPE tank material to discolor*

Full Drain Option:

SUMO™ (Snyder Unitized Molded Outlet):

- Available on single wall vertical tanks 2000 to 12,500 gallons.
- Encapsulated Hastelloy threaded ring with PVC adapter.

Double Wall Tanks:

Mini-Captor™ and CAPTOR™ Containment Systems (CCS) – 35 to 12,500 gallons

- Primary Tank
 - HDLPE, 1.9 SpGr rating (ASTM D-1998 - 600 psi hoop stress design)
 - or
 - HDXLPE*, 1.9 SpGr rating (ASTM D-1998 - 600 psi hoop stress design)
- * *Note: chemical may cause XLPE tank material to discolor*
- Secondary Containment Tank
 - HDLPE, 1.5 SpGr, Natural color

Fittings:

Material of Construction:

- Fitting: PVC (schedule 80) or PP
- Gasket: Viton
- Bolt: Hastelloy

Plumbing to the tank:

Required use of **flexible connections** with fittings

- Allows for 4% lateral and vertical expansion and contraction of the tank
- Reduces pump and piping vibration stress on the tank, fittings, and gaskets
- Flexible connections, piping, and valves must have structural support independent of tank sidewall and dome

Venting:

Tanks are designed for use at atmospheric pressure. Pressure or vacuum situation can cause excessive deformation or damage to the tanks and void warranty. Venting equipment should be sized to limit pressure or vacuum in the tank to a maximum of ½" water column (0.018 PSI). If the tank will be pneumatically filled (through tanker discharge) additional pressure relief may be required.

Hydrofluosilicic acid is a volatile liquid and will start fuming at ambient temperatures. These fumes can be corrosive to the environment around the tank. For this reason a bolted and sealed (fume tight) manway should be considered for hydrofluosilicic acid tanks and special considerations should be taken for venting the tank to a scrubber system.

Foundation and Restraints:

Tanks should be positioned on a smooth concrete or asphalt pad providing adequate support. The pad should be clean, smooth and level so it fully supports the entire tank bottom with no deflection. If a seismic restraint system is used the pad must be adequate in size for anchor plate attachments per the seismic code.

Temperature:

Product should not exceed 100 degrees F at delivery or during storage.

Data Sheet

Series C

Electronic Metering Pumps

Configuration Data

Model **C92** **1** - **363SI**

Control & Output Code with Standard Liquid End

Manual Control

Speed (stroking frequency) and stroke length manually adjustable.

| | | | | | | |
|-----|----|-----|----------------|-------|-----|----------------|
| C10 | -- | 1.3 | GPH (4.9 l/h) | ... | 300 | psi (20.7 Bar) |
| C11 | -- | 2.5 | GPH (9.5 l/h) | ... | 150 | psi (10.3 Bar) |
| C12 | -- | 4.0 | GPH (15.1 l/h) | ... | 100 | psi (6.9 Bar) |
| C13 | -- | 8.0 | GPH (30 l/h) | | 60 | psi (4.1 Bar) |
| C14 | -- | 20 | GPH (76 l/h) | | 25 | psi (1.7 Bar) |

Instrument Responsive/Manual Control

Manual adjustment features of C1 Series plus switch conversion to external control for automatic systems.

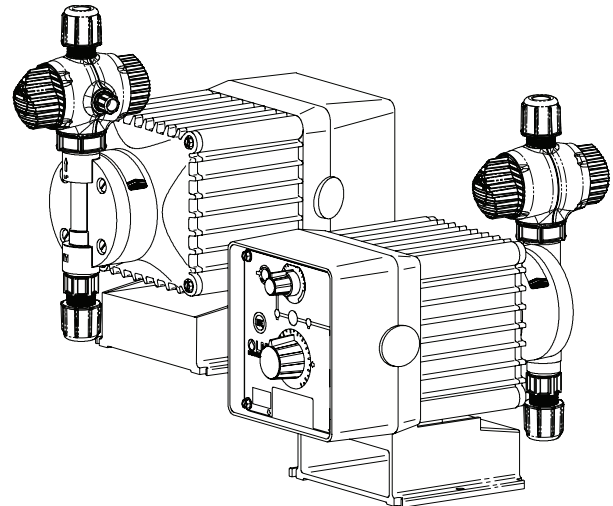
| | | | | | | |
|------------|----|------------|----------------------|-------|------------|-----------------------|
| C70 | -- | 1.3 | GPH (4.9 l/h) | ... | 300 | psi (20.7 Bar) |
| C71 | -- | 2.5 | GPH (9.5 l/h) | ... | 150 | psi (10.3 Bar) |
| C72 | -- | 4.0 | GPH (15.1 l/h) | ... | 100 | psi (6.9 Bar) |
| C73 | -- | 8.0 | GPH (30 l/h) | | 60 | psi (4.1 Bar) |
| C74 | -- | 20 | GPH (76 l/h) | | 25 | psi (1.7 Bar) |
| C76* | -- | 4.0 | GPH (15.1 l/h) | ... | 175 | psi (12.1 Bar) |
| C77* | -- | 10 | GPH (38 l/h) | | 80 | psi (5.5 Bar) |
| C78* | -- | 25 | GPH (95 l/h) | | 30 | psi (2.07 Bar) |
| C90 | -- | 1.3 | GPH (4.9 l/h) | ... | 300 | psi (20.7 Bar) |
| C91 | -- | 2.5 | GPH (9.5 l/h) | ... | 150 | psi (10.3 Bar) |
| C92 | -- | 4.0 | GPH (15.1 l/h) | ... | 100 | psi (6.9 Bar) |
| C93 | -- | 8.0 | GPH (30 l/h) | | 60 | psi (4.1 Bar) |
| C94 | -- | 20 | GPH (76 l/h) | | 25 | psi (1.7 Bar) |

Voltage Code

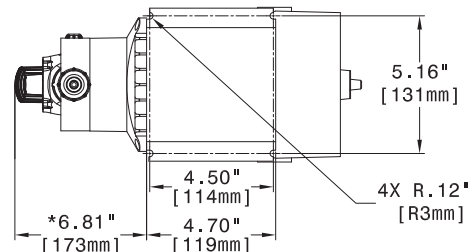
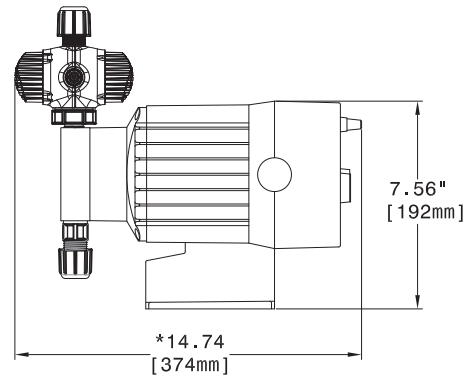
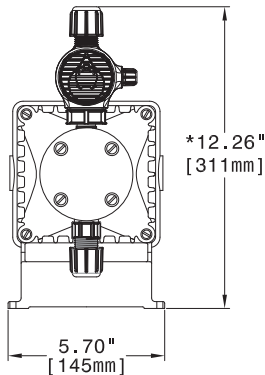
| | | |
|----------|-------|---------------------------|
| 1 | ----- | 120 VAC US Plug |
| 2 | ----- | 240 VAC US Plug |
| 3 | ----- | 220-240 VAC DIN Plug |
| 5 | ----- | 240-250 VAC, UK Plug |
| 6 | ----- | 240-250 VAC, AUST/NZ Plug |
| 7 | ----- | 220-240 VAC, SWISS Plug |

Liquid End

See next page for complete liquid end specifications and selection.



Dimensions



*Dimensions shown are maximum for largest available Liquid End.

Dimensions will vary depending on Liquid End selected.

Specifications

| Series | Strokes Per Minute (Adjustable) | | Stroke Length (Adjustable) Recommended Minimum | Average Input Power @Max Speed | Shipping Weight |
|--|---------------------------------|------------|--|--------------------------------|------------------------|
| | Min | Max | | | |
| C10, C70, C90 C11, C71, C91 C12, C72, C92 C13, C73, C93 C14, C74, C94 | 1 | 100 | 10% | 44 watts | 20 lbs (9.1 kg) |
| C76** C77** C78** | 1 | 100 | 10% | 87 watts | 28 lbs (12.7 kg) |

** Not UL or CUL Approved



201 Ivyland Road
Ivyland, PA 18974 USA
TEL: (215) 293-0401
FAX: (215) 293-0445
<http://www.lmipumps.com>

Standard Liquid End Configuration Data & Materials of Construction

| Drive Assembly | Liquid End No. | Size Code | Materials of Construction | | | | Accessory | Tubing & Connections | | |
|--|----------------------------------|-----------|---------------------------|---------------|-------------|----------------|-----------|----------------------------|----------------------------|------------------|
| | | | Head & Fittings | Balls | Liquifram™ | Check Valve | | Discharge | Suction | |
| C90, C70 - C10 - | 498SP | 0.9 | PVC | Ceramic | Fluorofilm™ | PVDF/PTFE | 4FV | Pipe 1/2" NPT M | | |
| | 297 | 0.9 | 316 S.S. | 316 S.S. | Fluorofilm™ | 316 S.S. | | Pipe 1/4" NPT M | | |
| C92 - C91 - C72 - C71 - C12 - C11 - | 468SI† | 1.8 | PVC/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .375" O.D. | | |
| | 460SI† | 1.8 | Acrylic/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .375" O.D. | | |
| | 469SI† | 1.8 | Acrylic/PVDF | PTFE | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .375" O.D. | | |
| | 368SI† | 1.8 | PVC/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .375" O.D. | | |
| | 362SI† | 1.8 | PVDF/PVDF | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .375" O.D. | | |
| | 363SI† | 1.8 | PVDF/PVDF | Ceramic | Fluorofilm™ | PVDF/PTFE | 4FV | PE .375" O.D. | | |
| | 465SI† | 1.8 | Polypropylene | Ceramic | Fluorofilm™ | PVDF/PTFE | 4FV | PE .375" O.D. | | |
| | 75HV | 1.8 | Polypropylene | 316 S.S. | Fluorofilm™ | PTFE | | PE .5" O.D. | Vinyl .938" O.D. | |
| | 76HV | 1.8 | Acrylic/PP | 316 S.S. | Fluorofilm™ | Viton® | | PE .5" O.D. | Vinyl .938" O.D. | |
| | 277 | 1.8 | 316 S.S. | 316 S.S. | Fluorofilm™ | 316 S.S. | | Pipe 1/4" NPT M | | |
| C93 - C73 - C13 - | 312SI† | 3.0 | PVDF/PVDF | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .5" O.D. | | |
| | 313SI† | 3.0 | PVDF/PVDF | Ceramic | Fluorofilm™ | PVDF/PTFE | 4FV | PE .5" O.D. | | |
| | 318SI† | 3.0 | PVC/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .5" O.D. | | |
| | 410SI† | 3.0 | Acrylic/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .5" O.D. | | |
| | 415SI† | 3.0 | Polypropylene | Ceramic | Fluorofilm™ | PVDF/PTFE | 4FV | PE .5" O.D. | | |
| | 418SI† | 3.0 | PVC/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .5" O.D. | | |
| | 419SI† | 3.0 | Acrylic/PVDF | PTFE | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .5" O.D. | | |
| | 20 | 3.0 | Acrylic/PVC | Ceramic | Fluorofilm™ | Viton® | | PE .5" O.D. | | |
| | 20HV | 3.0 | Acrylic/PP | 316 S.S. | Fluorofilm™ | Viton® | | PE .5" O.D. | Vinyl .938" O.D. | |
| | 20S | 3.0 | Acrylic/PVC | Ceramic | Fluorofilm™ | Viton® | 4FV | PE .5" O.D. Vinyl .5" O.D. | | |
| | 24 | 3.0 | PVC | Ceramic | Fluorofilm™ | PTFE | | Pipe 1/2" NPT M | | |
| | 25HV | 3.0 | Polypropylene | 316 S.S. | Fluorofilm™ | PTFE | | PE .5" O.D. | Vinyl .938" O.D. | |
| | 26 | 3.0 | PVC | Ceramic | Fluorofilm™ | Viton® | | PE .5" O.D. | | |
| | 26S | 3.0 | PVC | Ceramic | Fluorofilm™ | Viton® | 4FV | PE .5" O.D. | | |
| | 27 | 3.0 | 316 S.S. | 316 S.S. | Fluorofilm™ | PTFE | | Pipe 1/2" NPT M | | |
| | 29 | 3.0 | UHMW PE | Ceramic | Fluorofilm™ | Viton® | | PE .5" O.D. | | |
| | C94 - C78 - C74 - C14 - | 30 | 6.0 | Acrylic/PVC | Ceramic | Fluorofilm™ | PTFE | | PE .5" O.D. Vinyl .5" O.D. | |
| | | 34 | 6.0 | PVC | Ceramic | Fluorofilm™ | PTFE | | Pipe 1/2" NPT M | |
| 35P | | 6.0 | Polypropylene | Ceramic | Fluorofilm™ | PTFE | | Pipe 1/2" NPT M | | |
| 35T | | 6.0 | Polypropylene | Ceramic | Fluorofilm™ | PTFE | | PE .5" O.D. | | |
| C76 - | 36 | 6.0 | PVC | Ceramic | Fluorofilm™ | PTFE | | PE .5" O.D. | | |
| | 37 | 6.0 | 316 S.S. | 316 S.S. | Fluorofilm™ | PTFE | | Pipe 1/2" NPT M | | |
| | 468SP | 1.8 | PVC/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | Pipe 1/2" NPT M | | |
| | 74S | 1.8 | PVC | Ceramic | Fluorofilm™ | PTFE | 4FV | Pipe 1/4" NPT M | | |
| | 277 | 1.8 | 316 S.S. | 316 S.S. | Fluorofilm™ | 316 S.S. | | Pipe 1/4" NPT M | | |
| | C77 - | 20 | 3.0 | Acrylic/PVC | Ceramic | Fluorofilm™ | Viton® | | PE .5" O.D. | |
| | | 20HV | 3.0 | Acrylic/PP | 316 S.S. | Fluorofilm™ | Viton® | | PE .5" O.D. | Vinyl .938" O.D. |
| | | 20S** | 3.0 | Acrylic/PVC | Ceramic | Fluorofilm™ | Viton® | 4FV | PE .5" O.D. Vinyl .5" O.D. | |
| | | 24 | 3.0 | PVC | Ceramic | Fluorofilm™ | PTFE | | Pipe 1/2" NPT M | |
| | | 25HV | 3.0 | Polypropylene | 316 S.S. | Fluorofilm™ | PTFE | | PE .5" O.D. | Vinyl .938" O.D. |
| 25P | | 3.0 | Polypropylene | Ceramic | Fluorofilm™ | PTFE | | Pipe 1/2" NPT M | | |
| 25T | | 3.0 | Polypropylene | Ceramic | Fluorofilm™ | PTFE | | PE .5" O.D. | | |
| 26S** | | 3.0 | PVC | Ceramic | Fluorofilm™ | Viton® | 4FV | PE .5" O.D. | | |
| 27 | | 3.0 | 316 S.S. | 316 S.S. | Fluorofilm™ | PTFE | | Pipe 1/2" NPT M | | |
| 29 | | 3.0 | UHMW PE | Ceramic | Fluorofilm™ | Viton® | | PE .5" O.D. | | |

Output Information with Standard Liquid End

| Series | Gallons per Hour | | Liters per Hour | | mL/cc per Minute | | mL/cc per Stroke | | Maximum Injection Pressure |
|-----------------|------------------|------|-----------------|------|------------------|------|------------------|-------|----------------------------|
| | Min | Max | Min | Max | Min | Max | Min | Max | |
| C10, C70*, C90* | 0.001 | 1.3 | 0.005 | 4.9 | 0.08 | 82 | 0.08 | 0.82 | 300 psi (20.7 Bar) |
| C11, C71*, C91* | 0.003 | 2.5 | 0.010 | 9.5 | 0.16 | 158 | 0.16 | 1.58 | 150 psi (10.3 Bar) |
| C12, C72*, C92* | 0.004 | 4.0 | 0.015 | 15.1 | 0.25 | 252 | 0.25 | 2.52 | 100 psi (6.9 Bar) |
| C13, C73*, C93* | 0.008 | 8.0 | 0.030 | 30.0 | 0.51 | 505 | 0.51 | 5.05 | 60 psi (4.1 Bar) |
| C14, C74*, C94* | 0.020 | 20.0 | 0.076 | 76.0 | 1.26 | 1262 | 1.26 | 12.62 | 25 psi (1.7 Bar) |
| C76* | 0.004 | 4.0 | 0.015 | 15.1 | 0.25 | 252 | 0.25 | 2.52 | 175 psi (12.1 Bar) |
| C77* | 0.010 | 10.0 | 0.038 | 38.0 | 0.63 | 631 | 0.63 | 6.31 | 80psi (5.5 Bar) |
| C78* | 0.025 | 25.0 | 0.095 | 95.0 | 1.58 | 1577 | 1.58 | 15.77 | 30 psi (2.07 Bar) |

*Minimum output is based on 1 stroke per minute and 10% stroke setting, minimum output can be reduced further in external mode. Series C9 pumps may be programmed for strokes per hour for lower outputs.

AutoPrime™ Liquid End Configuration Data & Materials of Construction

| Drive Assembly | Liquid End No. | Size Code | Head & Fittings | Balls | Liquifram™ | Check Valve | Accessory | Tubing & Connections |
|----------------|----------------|-----------|-----------------|---------|-------------|----------------|-----------|----------------------|
| C11, C71, C91 | D60HI | 1.8 | Acrylic/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .375" O.D. |
| C12, C72, C92 | D68HI | 1.8 | PVC/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .375" O.D. |
| C13, C73, C93 | D10HI | 3.0 | Acrylic/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .5" O.D. |
| | D18HI | 3.0 | PVC/PVC | Ceramic | Fluorofilm™ | PVDF/Polyprel® | 4FV | PE .5" O.D. |

Output Information – AutoPrime™ Liquid Ends (Liquid end models beginning with “D”)

| Series | Maximum Output | | | | Maximum Pressure | |
|---------------|----------------|-----------|------------------|------------------|------------------|------|
| | GPH | Liters/hr | mL/cc per minute | mL/cc per stroke | PSI | Bar |
| C11, C71, C91 | 2.3 | 8.7 | 145.1 | 1.45 | 150 psi | 10.3 |
| C12, C72, C92 | 3.8 | 14.4 | 239.8 | 2.40 | 100 psi | 6.9 |
| C13, C73, C93 | 7.8 | 29.5 | 492.2 | 4.92 | 60 psi | 4.1 |

AutoPrime™ liquid ends have 3 check valves: suction on the bottom; discharge on the front; and autoprime bleed on the top. By design, a repeatable portion of the process fluid continuously bleeds through the top check valve to be returned to the chemical supply. The result is the assurance that any gas in the head is automatically relieved thus eliminating air-binding. The maximum output per the tables above is reduced to account for the continuous bleed.

■ See front page for voltage code specifications.

† Plastic heads with tubing connection include 1/2" NPT and 1/2" BSP.

** These Liquid Ends are available without a 4FV, simply drop the 'S' at the end of the Liquid End number to order the model without a 4FV.

These liquid ends use 3/8" diameter balls. Pump output may be reduced in some applications.

† To specify 1/4" NPT male, change 'I' to 'P'.

To specify black, UV resistant tubing, change 'I' to 'U'.

To specify 3FV, change 'S' to 'T'.

3FV indicates that the pump is equipped with an LMI Three Function Valve (pressure relief, priming aid, line drain).

4FV indicates that the pump is equipped with an LMI Four Function Valve. This diaphragm type, anti-syphon/pressure relief valve is installed on the pump head. It provides anti-syphon protection and aids priming, even under pressure.

Fluorofilm™ is a copolymer of PTFE and PFA.

Polyprel® is an elastomeric PTFE copolymer.

Polyprel is a registered trademark of Milton Roy, LLC.

Fluorofilm and Liquifram are trademarks of Milton Roy, LLC.

Viton® is a registered trademark of DuPont.



When pumping solutions, make certain that all tubing is securely attached to the fittings. It is recommended that tubing or pipe lines be shielded to prevent possible injury in case of rupture or accidental damage. Always wear protective clothing and face shield when working on or near your metering pump.

Note: See parts list for materials of construction

A. INSTALLING INJECTION CHECK VALVE (FIGURE 1)

1. The Injection Check Valve prevents backflow from a treated line. Install the injection check valve at the location where chemical is being injected into the system.
2. Any size Female NPT fitting or pipe tee with a reducing bushing to 1/2" Female NPT will accept the injection check valve. PTFE tape should only be used on threads that are connected with pipes.
3. When installing the Injection Check Valve, be sure to position it so that the valve enters the bottom of your pipe in a vertical position. Variations 40° left and right are acceptable.

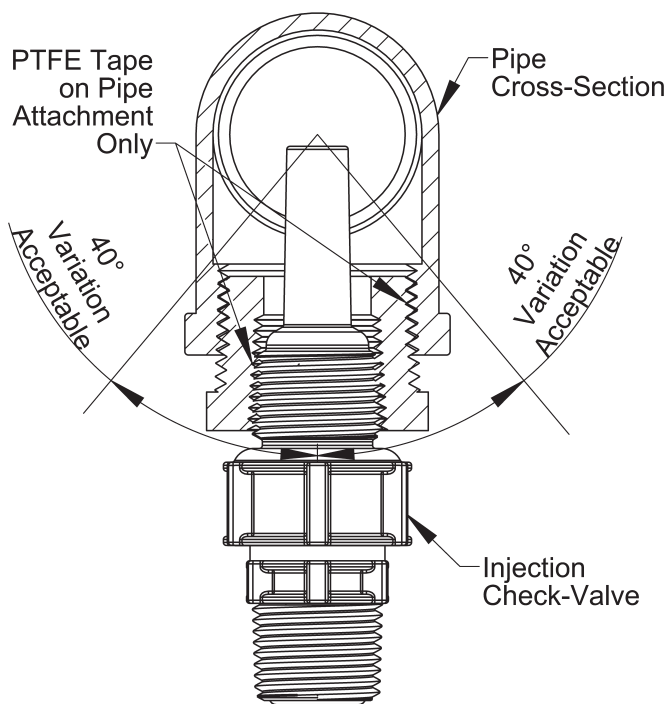


FIGURE 1

B. CONNECTING DISCHARGE TUBING (FIGURE 2)

Note: Cut tubing to length needed for discharge line.

1. Route tubing from the injection check valve to the metering pump, making sure it does not touch hot or sharp surfaces, or is bent so sharply that it kinks.
2. Put coupling nut over tubing.

3. Position female Ferrule about one inch (25 mm) from end of tubing.
4. For 1/4" or 6 mm OD tubing, cut tubing so that 1/4" to 3/8" (5-10 mm) protrudes from the female Ferrule. For all other tubing push the tube to the bottom of the groove in the male Ferrule. Then slide the female Ferrule down into the male Ferrule.
5. Firmly hand tighten the coupling nut onto the fitting.

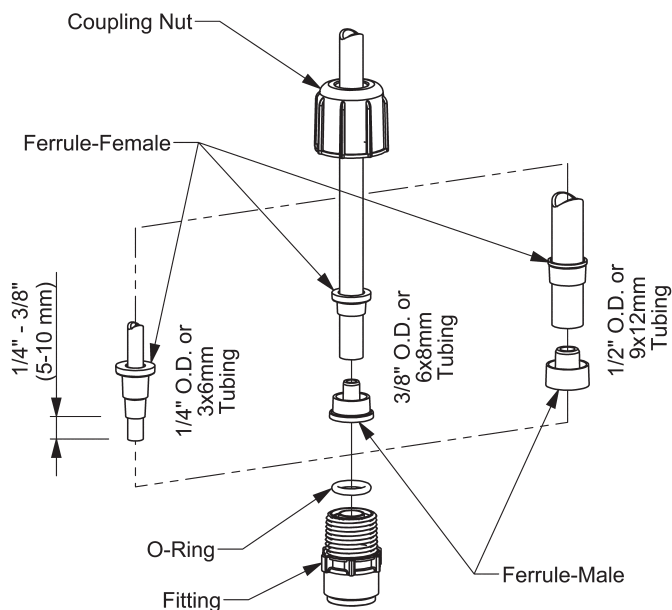


FIGURE 2

DO NOT USE CLEAR VINYL TUBING ON THE DISCHARGE SIDE OF THE PUMP. The pressure created by the pump can rupture vinyl tubing, which is only for suction connections on certain liquid ends.

DO NOT USE PLIERS OR PIPE WRENCH ON COUPLING NUTS OR FITTINGS. USE ONLY LMI TUBING—ALWAYS use LMI supplied tubing with your pump, as the tubing is specifically designed for use with the pump fittings.

C. CONNECTING SUCTION TUBING

1. Cut suction tubing to a length so that the foot valve hangs just above the bottom of the solution container. Maximum recommended vertical suction lift is 5 ft (1.5m).
2. Follow same procedure in connecting suction tubing to suction valve and foot valve (see **B. Connecting Discharge Tubing**).

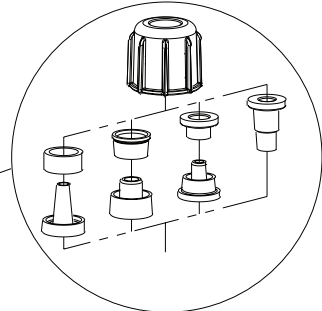
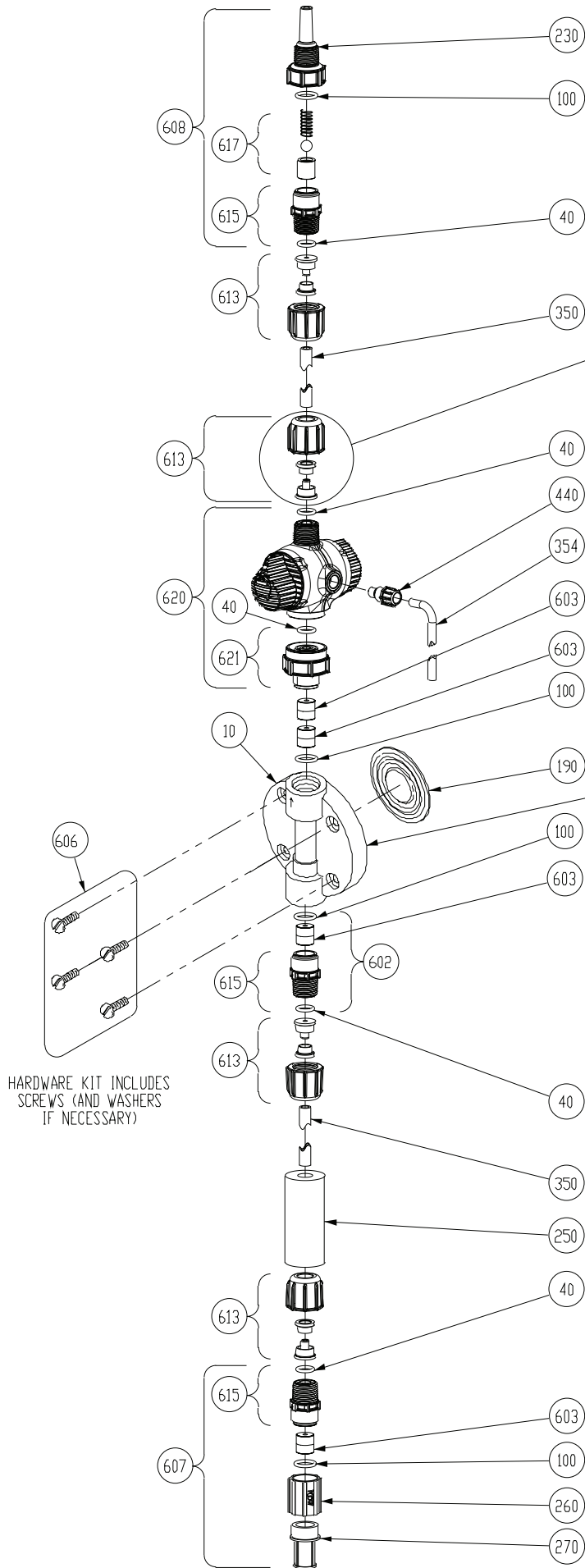


201 Ivyland Road
Ivyland, PA 18974 USA
TEL: (215) 293-0401
FAX: (215) 293-0445
<http://www.lmipumps.com>

LE-4X9SX

| Key Number | Description | Part Number | QUANTITY | | | |
|------------|--|-------------|----------|-------|-------|-------|
| | | | 419SX | 459SX | 469SX | 499SX |
| 10 | Pump Head | 38578 | | 1 | | |
| | | 38561 | | | | 1 |
| | | 38595 | | | 1 | |
| | | 36159 | 1 | | | |
| 40 | O-Ring | 48349 | 5 | 5 | 5 | 5 |
| 100 | O-Ring | 36103 | 4 | 4 | 4 | 4 |
| 190 | Liquifram™ | 30916 | | 1 | | |
| | | 30917 | | | | 1 |
| | | 31420 | | | 1 | |
| | | 31419 | 1 | | | |
| 230 | Injection Valve Body | 48618 | 1 | 1 | 1 | 1 |
| 250 | Tubing Straightener | 32293 | 1 | 1 | 1 | 1 |
| 260 | Foot Valve Coupling | 36204 | 1 | 1 | 1 | 1 |
| 270 | Foot Valve Strainer | 10123 | 1 | 1 | 1 | 1 |
| 350 | Tubing, Suction & Discharge 4XXSI ONLY | 25636-16 | | 1 | | |
| | | 10342-16 | | | 1 | 1 |
| | | 10142-16 | 1 | | | |
| | Tubing, Suction & Discharge 4XXSU ONLY | 28636-16 | | 1 | | |
| | | 27342-16 | | | 1 | 1 |
| | | 27142-16 | 1 | | | |
| 354 | Tubing, 4FV | 25636-06 | 1 | 1 | 1 | 1 |
| 440 | Bleed Nut | 48622 | 1 | 1 | 1 | 1 |
| 602 | Suction Check Valve | 49093 | | 1 | | |
| | | 49094 | 1 | | 1 | 1 |
| 603 | Cartridge Valve | 37858 | | 4 | | |
| | | 37859 | 4 | | 4 | 4 |
| 606 | Liquid End Hardware | 49109 | | 1 | 1 | 1 |
| | | 49110 | 1 | | | |
| 607 | Foot Valve | 49105 | | 1 | | |
| | | 49106 | 1 | | 1 | 1 |
| 608 | Injection Valve | 48730 | 1 | 1 | 1 | 1 |
| 613 | Tubing Connection Kit 4XXSI and 4XXSU | 77382 | | 4 | | |
| | | 77383 | | | 4 | 4 |
| | | 77384 | 4 | | | |
| | Tubing Connection Kit 4XXSM ONLY | 77378 | | 4 | | |
| | | 77379 | | | 4 | 4 |
| | | 77380 | 4 | | | |
| 615 | Check Valve Fitting | 48788 | 3 | 3 | 3 | 3 |
| 617 | Injection Valve Cartridge | 48796 | 1 | 1 | 1 | 1 |
| 620 | 4FV Assembly | 48799 | | 1 | | |
| | | 48754 | 1 | | 1 | 1 |
| 621 | 4FV Fitting Assembly | 49255 | 1 | 1 | 1 | 1 |

LE-4X9SX



DEPENDENT ON TUBING SIZE,
THE FERRULE GEOMETRY WILL BE DIFFERENT.

THE HEAD SHOWN HERE IS REPRESENTATIVE
OF ALL MACHINED AND MOLDED HEADS;
APPEARANCE MAY DIFFER

D. PRIMING WITH 4-FUNCTION VALVE

1. Connect pressure relief tubing to the pressure relief port (**FIGURE 3**). Route tubing to the solution tank. This tubing must not be submerged in the solution.

When all precautionary steps have been taken, the pump is mounted, and the tubing is securely attached, you may now start priming the pump.

2. Turn black knob about $\frac{1}{8}$ turn CCW to stop point to open bypass port.
3. Set pump at 100% speed and 100% stroke length. Start pump. When fluid has been flowing through the bypass port tubing for 10-20 seconds, the pump is primed.
4. Stop pump and return black knob to normal position.

Note: The pumps are normally self priming if suction lift is less than 5 feet (1.5 meters), check valves are wet (there is usually water in the pump head when shipped from the factory), and the steps above are followed. If the pump does not self prime, you can choose one of 2 ways to help prime:

1. Remove the 4-function valve and cartridges and slowly pour water or solution into the pump head until it is filled. Replace cartridges and 4-function valve and repeat steps above.
2. Temporarily improve suction conditions by pumping from a container closer to or above pump.

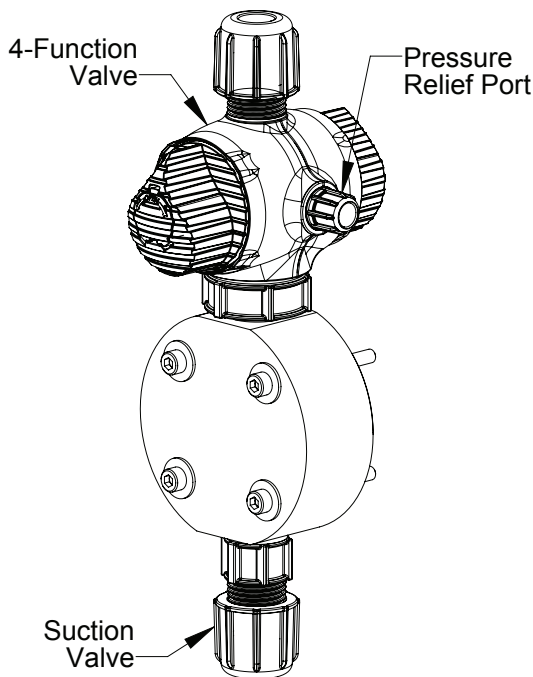


FIGURE 3

Note: The head drawing is for reference only; actual appearance may differ.

REFER TO YOUR ELECTRONIC METERING PUMP INSTRUCTION MANUAL FOR ADDITIONAL INSTRUCTIONS AND PRECAUTIONS. You may contact your local LMI Distributor for additional information or visit LMI on the web at www.lmipumps.com

E. DEPRESSURIZING THE DISCHARGE LINE

ALWAYS wear protective clothing, face shield, safety glasses and gloves when performing any maintenance or replacement on your pump.

When preparing to maintain the pump or any component in the discharge line, the 4-function valve is used to depressurize the line. Be sure an injection check valve is properly installed and is operating, and that all tubing connections on the 4-function valve are secure.

Be sure your relief tubing is connected to your pressure relief port on the 4-function valve and runs back to your solution drum or tank.

1. Turn off the pump.
2. If any valves have been installed downstream of the pump, close them.
3. If the supply tank for the pump is higher than the pump head, fluid will flow through unless a suction line valve is closed.
4. Turn the black knob on the 4-function valve about $\frac{1}{8}$ turn CCW to its open position. This relieves pressure between the pump and the 4-function valve.
5. To release line pressure, while the black knob is in the open position, turn the yellow knob and hold open until fluid flow through the bypass port stops.



When tubing connections are loosened, chemical will drain from the line. Use appropriate safety precautions to avoid contact with chemical.

CA610 Fluoride Analyzer

Fluoride

Features and Benefits

Reliable, Full-time Fluoride Monitoring

The CA610 Fluoride Analyzer uses advanced ion-selective electrode (ISE) technology for continuous monitoring of fluoride concentration in drinking water effluent. Accuracy is ensured with precise control of temperature, ionic strength, and pH. Interferences that can bias measurements are virtually eliminated with this electrode.

Patented Electrode Design with Replaceable Tip

The proven ISE technology of the electrode is enhanced by a patented* design and manufacturing process. The lanthanum crystal at the tip of the probe is molded into a one-piece, monolithic tip that is threaded for easy removal. This prevents errors and premature failures. Electrodes are equipped

with BNC connectors so that they can be independently checked with laboratory electrochemical meters.

Cost Effective Operation

The electrode of the CA610 analyzer is made with a molded fluoride crystal tip. The working life of the electrode is approximately one year. The specially designed tip of the electrode should be replaced every six months. Reagent consumption is very low and maintenance is simple.

Method of Analysis

The ISE system of the CA610 analyzer includes a reference pH electrode and a working electrode. Three reagents are used—Total Ionic Strength Adjustment Buffer (TISAB) solution and two fluoride standards. The TISAB is used for the following purposes.

- Ionic strength adjustment lets the electrode respond to concentration instead of activity.
- pH control ensures fluoride is present in its ionic state.
- Weak complexes formed by certain metals (for example, aluminum) are “broken up” by TISAB and chelates potential interferences for accurate fluoride measurement.



The Hach CA610 Fluoride Analyzer offers economical analysis using just 500 mL of reagent per month. Calibration is automatic and sample conditioning is built-in. Electrode maintenance is easy and economical—just replace the tip of the sensor.

DW

Automatic Calibration

Two calibration standards are fully enclosed in the CA610 analyzer's case. The instrument performs a 2-point calibration at 0.5 and 5.0 mg/L fluoride at user-selected time intervals. Automatic calibration intervals can be set for 1 day to 1 month. Readings and calculations of the most recent calibration is stored in the instrument.

IW

Applications

Drinking Water Plants—The CA610 analyzer accurately measures fluoride concentration regardless of the form in fluoride is added—liquid fluorosilicic acid (H_2SiF_6), sodium silicofluoride (Na_2SiF_6), or sodium fluoride (NaF).

Remote Locations—Because it produces only a small amount of waste and requires minimal maintenance, it is well-suited for remote locations.

Industrial Locations—Fluoride may occur naturally in water or it may be the result of fertilizer run-off or discharge from aluminum factories. The CA610 analyzer is an effective tool to monitor either influent or effluent stream.

*US patent number 5,393,402

DW = drinking water WW = wastewater municipal PW = pure water / power
IW = industrial water E = environmental C = collections FB = food and beverage



Be Right™

Specifications*

Range

0.1 to 10 mg/L fluoride

Accuracy

±10% or ±0.10 ppm whichever is greater

Precision

±7% or ±0.07 ppm whichever is greater

Minimum Detection Limit

0.10 mg/L

Cycle Time

4.2 minutes

Sample Conditioning Inlet Pressure

1 to 10 psig (use sample restriction device to reduce higher pressure samples)

Sample Flow Rate

200 to 500 mL/minute
(200 mL/min minimum required)

Sample Temperature

5 to 40°C (41 to 104°F)

Operating Temperature

5 to 40°C (41 to 104°F)

Operating Humidity

90% at 40°C (90% at 104°F) maximum

Storage Temperature

-40 to 60°C (-40 to 140°F)
(without reagents)

Sample Inlet Connection

1/4-inch OD polyethylene tubing,
quick-disconnect fitting

Drain Connection

1/2-inch ID flexible hose

Air Purge (optional)

0.1 cfm instrument quality air at 20 psig maximum, 1/4-inch OD tubing,
quick-disconnect fitting

Reagent/Standard Requirements

Maximum Reagent Usage: 500 mL/month for each of two standards and one reagent TISAB

Containers: High-density polyethylene (3) 500 mL bottles

Containment: Reagent bottle contained inside analyzer enclosure, vented externally

Calibration Method

Two-point log/linear using 0.5 mg/L and 5.0 mg/L fluoride standards

Display

LCD, 3-1/2-digit measurement readout and six-character alphanumeric scrolling text line

Alarms

Two SPDT relays (unpowered.), 5A resistive load at 240 Vac. Suitable for sample set point alarms (high or low) or system warning indicator or system alarm indicator.

Recorder Output

One isolated recorder output, 4–20 mA (can be adjusted to 0–20 mA); maximum impedance 500 ohm, 130 V isolation from earth ground. Output span is programmable over any portion of the measurement range.

Optional External Outputs

Hach AquaTrend® Network Interface

Power Requirement

100 to 115/230 Vac selectable, 90 VA maximum, 50/60 Hz, 2.5 Amp fuse

Power Connection

Three-wire barrier terminal block through 1/2-inch conduit hole in case; wire range: 12 to 18 AWG

Compliance/Certification

CE approved, ETL listed to UL 1262, ETL certified to CSA 22.2 No. 142

Enclosure

Molded ABS plastic, IP62-rated (dust and drip tight) with gasketed door latched. Suitable for indoor applications.

Mounting

Wall mount

Installation

Category II

Dimensions

34.3 x 41.9 x 19.1 cm
(13.5 x 16.5 x 7.5 in.)

Shipping Weight

11.3 kg (25 lb.)

*Specifications subject to change without notice.

Engineering Specifications

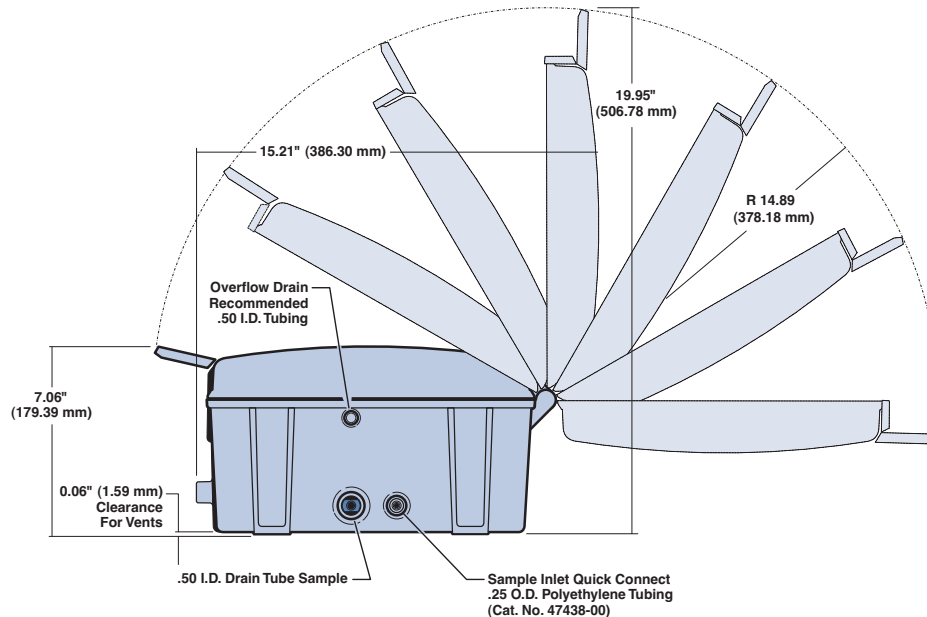
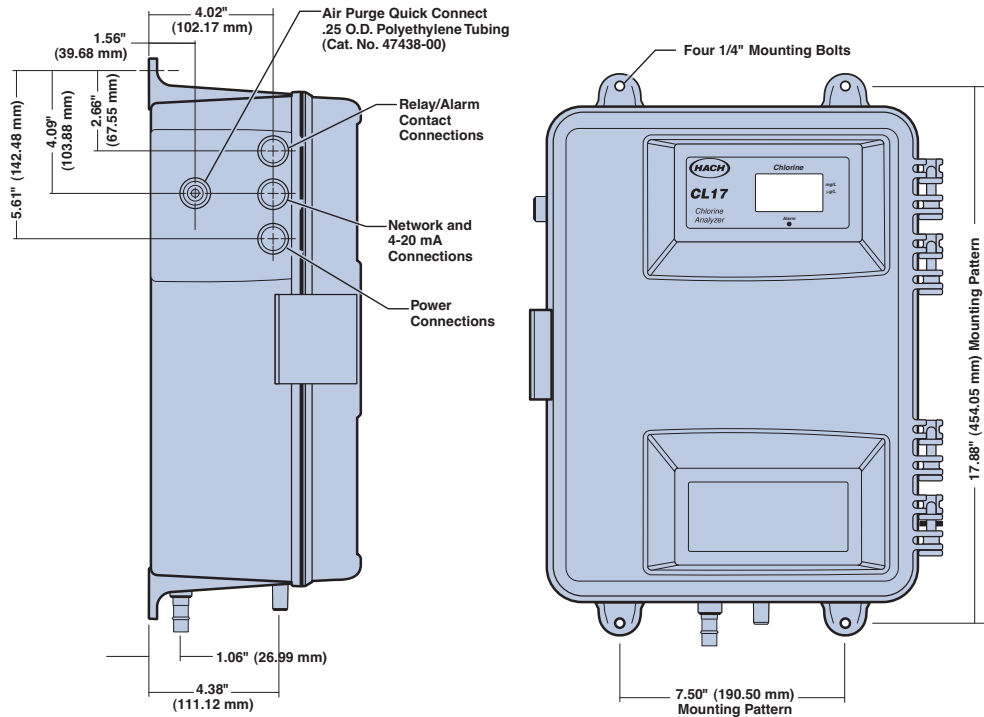
- The fluoride analyzer shall employ an ion-selective electrode method of measurement using TISAB reagent and be capable of measuring fluoride every 4.2 minutes.
- A three digit LCD readout in the range of 0.1 to 10 mg/L shall display the results.
- The analyzer shall be designed for 30 days unattended operation and use only 500 mL of each standard every two months when the calibration interval is set for 24 hours.
- Operating with a lanthanum fluoride crystal, the working electrode shall employ a removable sensor for easy replacement.
- The instrument shall be constructed with a temperature controlled, wall-jet flow cell to guide the sample directly toward the surface of the electrode to assure fast wash out.
- The instrument shall provide resolution of 0.1 mg/L, repeatability within ±0.07 mg/L, and accuracy better than ±10% of reading or ±0.10 mg/L, whichever is greater.
- The analyzer shall be microprocessor-controlled and provide a 4-20 mA recorder output as well as 2 alarms.
- Each alarm shall be user-selectable for sample concentration alarms (high or low), analyzer system warnings, or analyzer system errors.
- The sample concentration alarms shall be fully adjustable through the entire range.
- The system warning shall activate for minor variations in analyzer performance.
- The system alarm shall activate for major variations in analyzer performance and it shall shut down the analyzer until corrective action is taken.
- The microprocessor shall provide self-diagnostic functions accessible through an alphanumeric, menu-driven keyboard.
- Two SPDT normally open/normally closed dry contact relays rated at 5 A resistive load at 230 Vac shall be provided.

Engineering Specifications *continued*

11. Recorder outputs shall be 4-20 mA. Recorder span minimum and maximum values shall be operator programmable at the menu-driven keypad over the entire operating range.
12. The fluoride analyzer shall be housed in an IP62-rated, ABS plastic enclosure designed for wall mounting.
13. The enclosure shall have two clear polycarbonate windows for viewing the measurement readout and reagent levels.
14. Power requirements shall be 100 to 115/230 Vac, 50/60 Hz, switch selectable, 90 VA maximum.
15. The fluoride analyzer shall be Hach Company model CA610 Fluoride Analyzer.

Dimensions

The CA610 analyzer is designed to be wall-mounted with four 1/4-inch screws. Adequate clearance must be left at the sides and bottom of the case for plumbing and electrical connections. The sample inlet connection is 1/4-inch quick-disconnect fitting and the drain connection is 1/2-inch I.D. flexible hose. Electrical connections are inside the instrument case. Holes for three 1/2-inch conduit fittings are provided.



Ordering Information

CA610 Fluoride Analyzers are shipped with one-month supply of reagents, maintenance kit, wall mounting kit, and manual. Power cord is ordered separately.

- 5740001** Model CA610 Fluoride Analyzer
5740002 Model CA610 Fluoride Analyzer with AquaTrend Network

For European customers:

- 5740011** CA610 unit, Reagents Set, Installation & Maintenance Kits, EU Basic User Manual
5740005 CA610 unit, Installation & Maintenance Kits, EU Basic User Manual – NO REAGENTS

Accessories

- 5448800** Power Cord, 115V, 10A, 1.83 m (6 ft.), North American plug
5448900 Power Cord, 230V, 10A, 1.83 m (6 ft.), Continental European plug
4643600 Flow Meter with 1/4-inch OD tubing

Replacement Items

- 5742100** Maintenance Kit (See Note 1)
5744400 Pump Tubing Set
5742700 Instrument Tubing Set
5744800 Electrode Kit (See Note 2)
5528100 Electrode, pH reference
5527700 Electrode Body, ISE
5745100 Electrode Tip, fluoride lanthanum crystal, 2/pkg

Additional Reagents

One unit of each standard solution is sufficient for two months operation at a 24-hour calibration interval. One unit of Reagent 1 TISAB is sufficient for a 30-day operating period.

- 2816900** Reagent Set, CA610 fluoride analyzer (includes reagent 1 TISAB, standard 1, and standard 2)
2812811 Reagent 1 TISAB, 473 mL
2743811 Standard 1, 0.5 mg/L as F, 473 mL
2797111 Standard 2, 5.0 mg/L as F, 473 mL
4450126 Inner Fill Solution, fluoride, 50 mL

NOTES

- Kit includes instrument and pump tubing sets (1 year supply), replacement filter screen, and spare fittings.
- Kit includes ISE and pH electrodes, electrode tips, syringe, and inner fill solution.

LIT4540 Rev 2

F12 Printed in U.S.A.

©Hach Company, 2012. All rights reserved.

In the interest of improving and updating its equipment, Hach Company reserves the right to alter specifications to equipment at any time.



At Hach, it's about learning from our customers and providing the right answers. It's more than ensuring the quality of water—it's about ensuring the quality of life. When it comes to the things that touch our lives...

Keep it pure.

Make it simple.

Be right.

For current price information, technical support, and ordering assistance, contact the Hach office or distributor serving your area.

In the United States, contact:

HACH COMPANY World Headquarters
 P.O. Box 389
 Loveland, Colorado 80539-0389
 U.S.A.
 Telephone: 800-227-4224
 Fax: 970-669-2932
 E-mail: orders@hach.com
www.hach.com

U.S. exporters and customers in Canada, Latin America, sub-Saharan Africa, Asia, and Australia/New Zealand, contact:

HACH COMPANY World Headquarters
 P.O. Box 389
 Loveland, Colorado 80539-0389
 U.S.A.
 Telephone: 970-669-3050
 Fax: 970-461-3939
 E-mail: intl@hach.com
www.hach.com

In Europe, the Middle East, and Mediterranean Africa, contact:

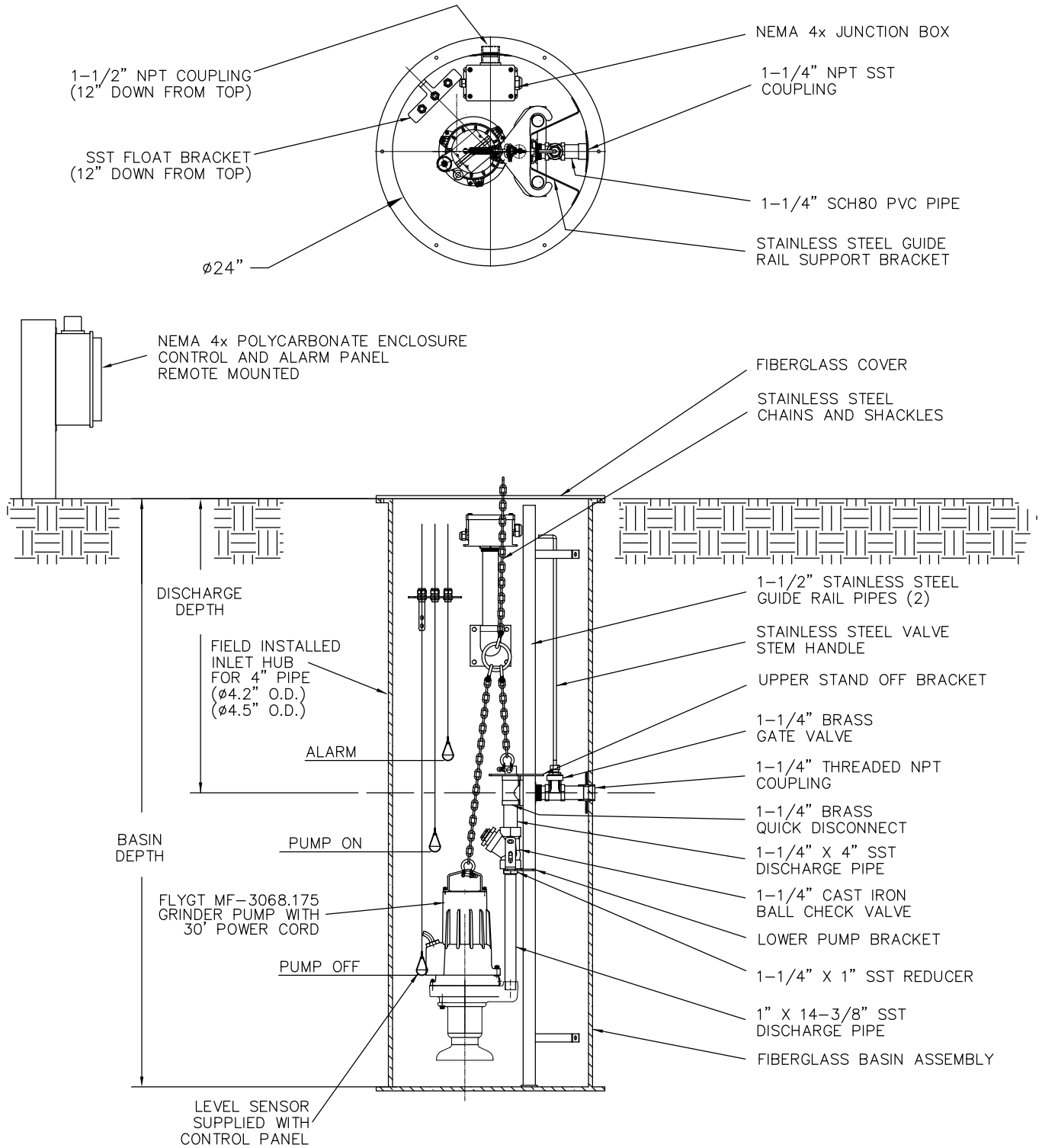
HACH LANGE GmbH
 Willstätterstraße 11
 D-40549 Düsseldorf
 GERMANY
 Tel: +49 (0) 211 5288-0
 Fax: +49 (0) 211 5288-143
 E-mail: info@hach-lange.de
www.hach-lange.com



Be Right™

PC MF-3068

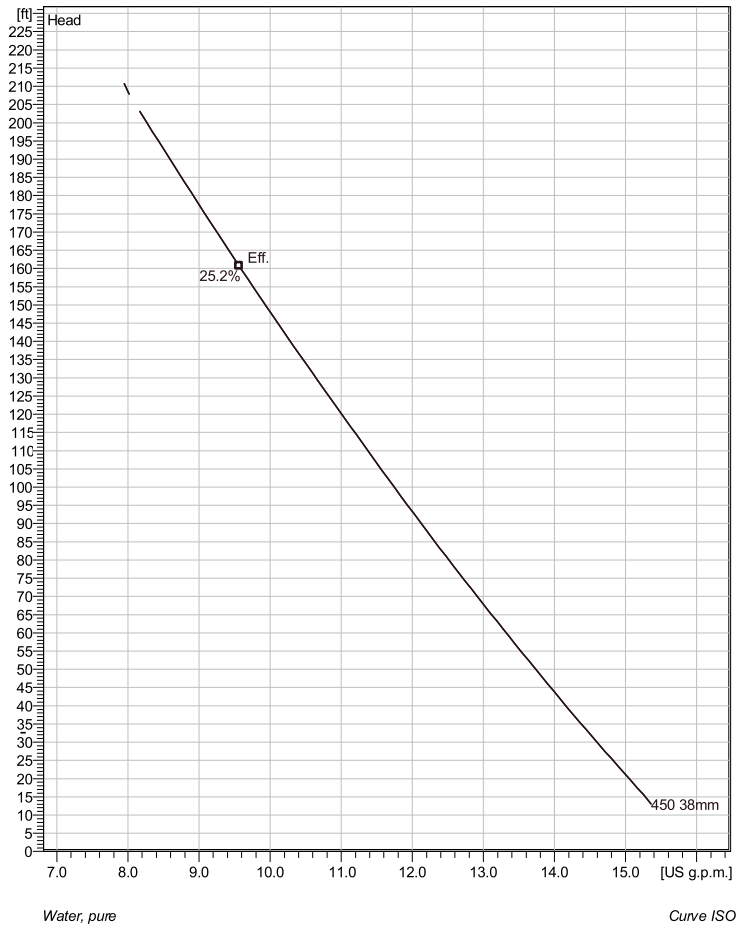
Ø24" Simplex



| BASIN | BASIN DEPTH | DISCHARGE DEPTH | WEIGHT (LESS PUMP) |
|-----------|-------------|-----------------|--------------------|
| 14-480704 | 6' | 3' | 232 lbs |
| 14-480705 | 7' | 4' | 259 lbs |
| 14-480706 | 8' | 4' | 268 lbs |

CONTACT FLYGT REP FOR MORE OPTIONS

MF 3068 HT 1~ 450 Technical specification



Note: Picture might not correspond to the current configuration.

General

Submersible progress cavity pump with grinder cutter device for liquids containing solids or fibres

Impeller

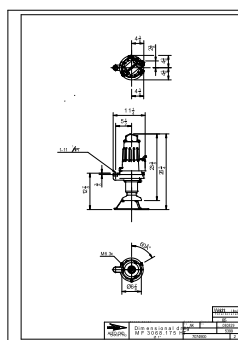
| | |
|---------------------------|--------|
| Impeller material | |
| Discharge Flange Diameter | 1 inch |
| Suction Flange Diameter | 1 inch |
| Impeller diameter | 38 mm |
| Number of blades | 1 |

Motor

| | |
|------------------|--------------------------------------|
| Motor # | M3068.175 13-10-4BB-W 1.7hp Standard |
| Stator variant | 3 |
| Frequency | 60 Hz |
| Rated voltage | 230 V |
| Number of poles | 4 |
| Phases | 1~ |
| Rated power | 1.7 hp |
| Rated current | 8.1 A |
| Starting current | 37 A |
| Rated speed | 1730 rpm |
| Power factor | |
| 1/1 Load | 0.99 |
| 3/4 Load | 0.99 |
| 1/2 Load | 0.98 |
| Motor efficiency | |
| 1/1 Load | 68.5 % |
| 3/4 Load | 63.8 % |
| 1/2 Load | 54.4 % |

Configuration

Installation: F - Free standing Semi permanent, Wet



| | | | | |
|---------|------------|------------|------------------------|-------------|
| Project | Project ID | Created by | Created on 3/8/2019 | Last update |
|---------|------------|------------|------------------------|-------------|

MF 3068 HT 1~ 450

Performance curve

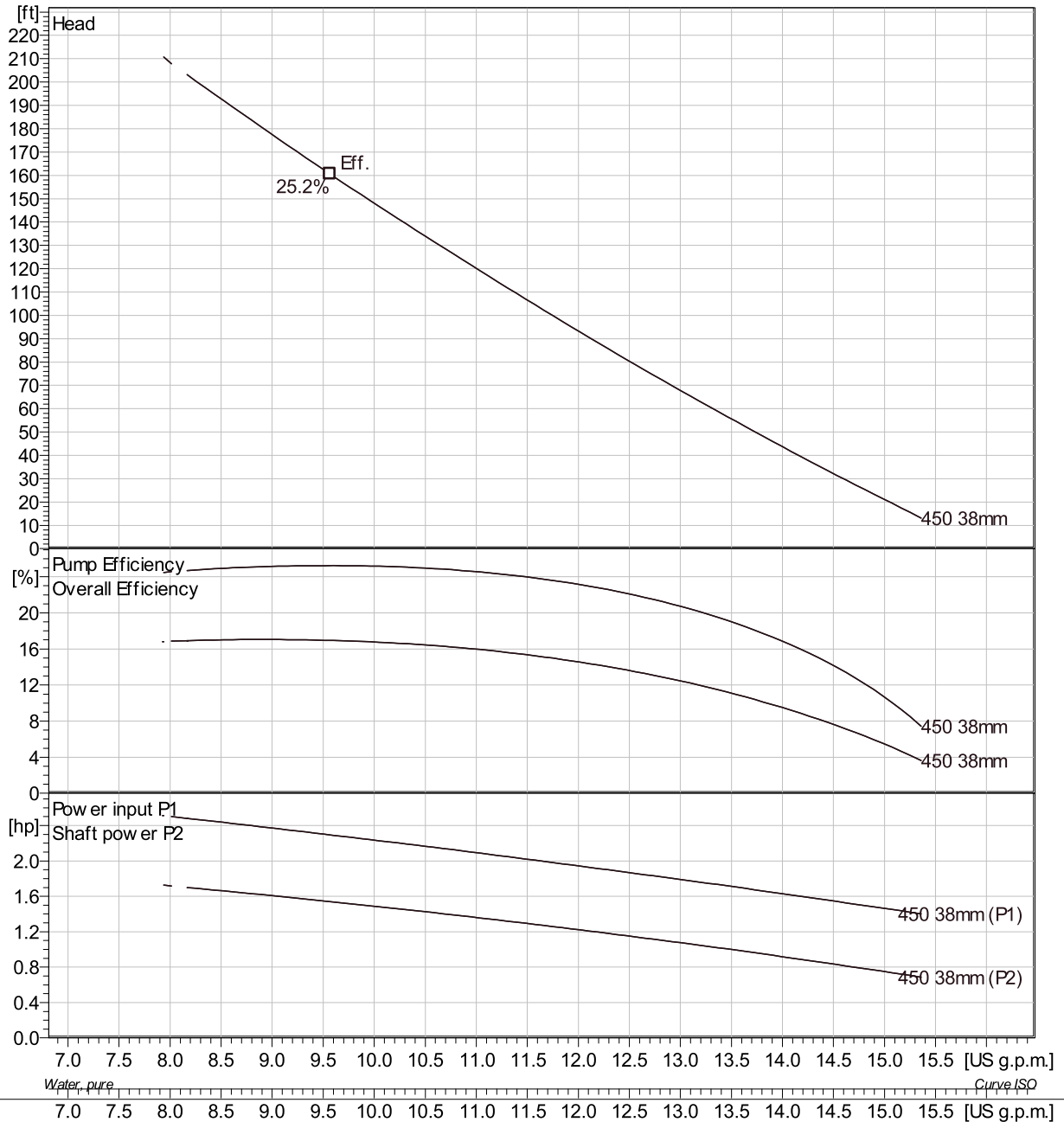
Pump

Discharge Flange Diameter 1 inch
 Suction Flange Diameter 25 mm
 Impeller diameter 1 1/2"
 Number of blades 1

Motor

Motor # M3068.175 13-10-4BB-W 1.7hp
 Stator variant 3
 Frequency 60 Hz
 Rated voltage 230 V
 Number of poles 4
 Phases 1~
 Rated power 1.7 hp
 Rated current 8.1 A
 Starting current 37 A
 Rated speed 1730 rpm

Power factor
 1/1 Load 0.99
 3/4 Load 0.99
 1/2 Load 0.98
 Motor efficiency
 1/1 Load 68.5 %
 3/4 Load 63.8 %
 1/2 Load 54.4 %



APPENDIX D

Material Compatibility Chart for Hydrofluorosilicic Acid



Chemical Compatibility Database

CHEMICAL SELECTED : Hydrofluosilicic Acid 20%

 [SHARE](#)  [PRINT](#)

| MATERIAL | COMPATIBILITY |
|------------------|-----------------------|
| ABS plastic | N/A |
| Acetal (Delrin®) | B - Good |
| Aluminum | D - Poor |
| Brass | N/A |
| Bronze | B ² - Good |
| Buna N (Nitrile) | A - Excellent |
| Carbon graphite | A - Excellent |
| Carbon Steel | D - Poor |
| Carpenter 20 | D - Poor |
| Cast iron | B - Good |
| Ceramic Al2O3 | N/A |
| Ceramic magnet | N/A |
| ChemRaz (FFKM) | A - Excellent |
| Copper | B - Good |

Ratings - Chemical Effect

A - Excellent

B - Good: Minor Effect, slight corrosion, or discoloration.

C - Fair: Moderate Effect, not recommended for continuous use.

Softening or loss of strength, and swelling may occur.

D - Severe Effect: Not recommended for any use.

E - Information not available.

Explanation of Footnotes

1-Satisfactory to 72oF (22oC)

2-Satisfactory to 120oF (48oC)

| | |
|------------------------------|-----------------------|
| CPVC | A - Excellent |
| EPDM | A - Excellent |
| Epoxy | C ¹ - Fair |
| Fluorocarbon (FKM) | A - Excellent |
| Hastelloy-C® | B - Good |
| Hypalon® | B - Good |
| Hytrel® | N/A |
| Kalrez | A - Excellent |
| Kel-F® | A - Excellent |
| LDPE | B ² - Good |
| Natural rubber | A - Excellent |
| Neoprene | B - Good |
| NORYL® | B ² - Good |
| Nylon | D - Poor |
| Polycarbonate | N/A |
| Polyetherether Ketone (PEEK) | N/A |
| Polypropylene | A - Excellent |
| Polyurethane | D - Poor |
| PPS (Ryton®) | A - Excellent |
| PTFE | A - Excellent |

| | |
|-----------------------|----------------------------|
| PVC | A ² - Excellent |
| PVDF (Kynar®) | A - Excellent |
| Silicone | D - Poor |
| stainless steel - 304 | C ² - Fair |
| stainless steel - 316 | B ¹ - Good |
| Titanium | D - Poor |
| Tygon® | A - Excellent |
| Viton® | A - Excellent |

WARNING

The information in this chart has been supplied to Cole-Parmer by other reputable sources and is to be used ONLY as a guide in selecting equipment for appropriate chemical compatibility. Before permanent installation, test the equipment with the chemicals and under the specific conditions of your application.

Ratings of chemical behavior listed in this chart apply at a 48-hr exposure period. Cole-Parmer has no knowledge of possible effects beyond this period. Cole-Parmer does not warrant (neither express nor implied) that the information in this chart is accurate or complete or that any material is suitable for any purpose.

DANGER

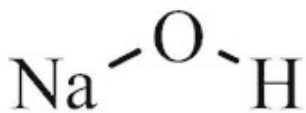
Variations in chemical behavior during handling due to factors such as temperature, pressure, and concentrations can cause equipment to fail, even though it passed an initial test.

SERIOUS INJURY MAY RESULT

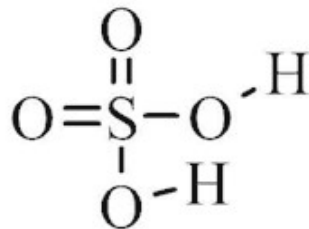
Use suitable guards and/or personal protections when handling chemicals.

Shop our Popular Chemicals

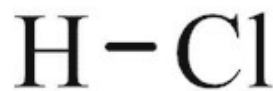
Sodium Hydroxide



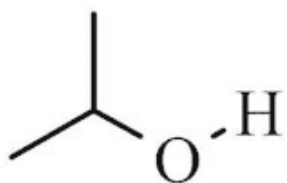
Sulfuric Acid



Hydrochloric Acid



Isopropanol



Cole-Parmer | 625 East Bunker Ct Vernon Hills, IL 60061 United States

Telephone: 1-800-323-4340, 1-847-549-7600 | Fax: 1-847-247-2929 | Email: sales@coleparmer.com

© 2017 Cole-Parmer Instrument Company, LLC. All Rights Reserved.

APPENDIX E

State Environmental Quality Review Act Type II Action Declaration



Diana L. Quast, Town Clerk
dqvast@yorktownny.org



Registrar of Vital Statistics
Telephone: (914) 962-5722 x 208
Fax: (914) 962 6591

TOWN OF YORKTOWN
363 Underhill Avenue, P.O. Box 703
Yorktown Heights, NY 10598

This is a resolution adopted by the Town Board of the Town of Yorktown at its regular meeting held on Tuesday, March 12, 2019.

WHEREAS,

1. This notice is issued pursuant to Part 617 of the implementing regulations pertaining to Article 8 of the State Environmental Quality Review Act (SEQRA) of the Environmental Conservation Law.
2. The Town of Yorktown desires to comply with SEQRA regulations adopted pursuant thereto by the Department of Environmental Conservation of the State of New York, being 6 NYCRR Part 617, as amended (the "Regulations") with respect to the Proposed Action;
3. Proposed Action: The Town is working on a project to install chemical feed equipment and chemical storage for the purposes of fluoridating the drinking water supply to the Yorktown Consolidated Water District. The new equipment and storage systems will be located within an existing Town structure located on Catherine Street, within property limits owned by the New York City Department of Environmental Protection (NYCDEP). The use and operation of the structure on NYCDEP-owned lands are covered under a land-use permit previously granted to the Town of Yorktown;
4. Under SEQRA regulations, a Type II Action may be declared where "(2) replacement, rehabilitation or reconstruction of a structure or facility, in kind, on the same site, including upgrading buildings to meet building, energy, or fire codes unless such action meets or exceeds any of the thresholds in section 617.4 of this Part";
5. The Project is not subject to further review under SEQRA since this is a "Type II Action" under 6 NYCRR § 617.5(c)(25).

NOW, THEREFORE, BE IT, RESOLVED that the Town Board of the Town of Yorktown declares that the Project constitutes a "Type II Action" under 6 NYCRR § 617.5(c)(25) and that no further action under the SEQR Act and the Regulations is required; and BE IT FURTHER RESOLVED, that this resolution shall take effect immediately.

Diana L. Quast, RMC, CMC
Town Clerk

Date: March 13, 2019

To: Ilan D. Gilbert, Town Supervisor

cc: Richard Abbate, Town Attorney
Michael Quinn, Town Engineer
file

Arcadis of New York, Inc.

44 South Broadway

9th Floor

White Plains, New York 10601

Tel 914 694 2100

Fax 914 694 9286

www.arcadis.com

A decorative graphic consisting of three thin orange lines. One line is horizontal, extending across the width of the page. Two other lines are diagonal, starting from the bottom left and extending towards the top right, crossing the horizontal line.