

# Bulk Chemical Storage and Feed Systems

Hydrated Lime, Powered Activated Carbon (PAC), and Soda Ash

# Packaged Chemical Feed Systems

Ammonia, Fluoride, and Sodium Hypochlorite



Aqueous Ammonia Feed System



Bulk Chemical Storage and Feed  
System



Fluoride Saturator and Feed  
System

# Bulk Chemical Storage and Feed Systems

Integrity Municipal Systems LLC (IMS) Bulk Chemical Storage and Feed System is used to store and feed dry Hydrated Lime, Quicklime, Powdered Activated Carbon (PAC), or Soda Ash in a silo, dissolve it in a tank, and pump the chemical solution to the point of application. Each system's design is tailored to the project's needs. Systems typically include a storage silo with accessories and an integral chemical feed equipment room with instrumentation and controls to make a complete and functional system.

## Silo Storage Benefits

- Pre-Assembled, Piped, Wired and Factory Tested
- Fully Engineered and Integrated Systems
- Single-Piece Welded Silo Construction (up to 14'-0" in diameter)
- Skirted Interior with Insulation, Lighting, Fans, Dampers, Louvers, and Heaters
- Completely Automatic Control System with PLC
- Flexible Configurations and Options for Differing Installation Requirements



## Basic Silo Components

- SIZES UP TO 14' DIAMETER
  - Painted Carbon Steel
  - Single-Piece Welded Construction
- LADDER, CLIMBING PROTECTION SYSTEM AND TOP RAILS
  - Galvanized Carbon Steel or Aluminum
  - Per Current OSHA Standards
- TRUCK UNLOADING OPERATOR STATION CONTROL PANEL
- FILL LINE
  - 4" SCH. 40 C/S with Quick Connect and Limit Switch
- TARGET BOX WITH CLEANOUT PORT (ON ROOF)
- MANWAY WITH INTEGRAL PRESSURE & VACUUM RELIEF VALVE (ON ROOF)
- DUST COLLECTOR, AIR PULSE OR MECHANICAL SHAKER (ON ROOF)
- LEVEL SWITCHES
  - High, Re-Order, Low - Rotating Paddle Type
- DEHUMIDIFIER (ON ROOF) - Soda Ash Only

## Silo Skirt Interior

- SILO DISCHARGE
  - Bin Activator
  - Solid Cone with Vibrator
- KNIFE GATE SHUTOFF VALVE
- GRINDER/LUMP BREAKER - Soda Ash Only
- ROTARY AIRLOCK FEEDER - PAC Only
- FLEXIBLE FEEDER CONNECTOR
- FEEDER
- SLAKER, GRIT REMOVER AND SLAKER CONTROL PANEL
  - Quicklime Only
- SLURRY TANK WITH MIXER & LEVEL CONTROL
  - Optional for Quicklime System
- FEED PUMP
- WATER SUPPLY PANEL
- MAIN SYSTEM CONTROL PANEL
- SILO SKIRT ACCESSORIES INCLUDING:
  - Double-Doors, Heater, Lights, Convenience Outlet, Vent Fan and Louver

## Options

- ANCHOR TEMPLATE
- METAL FLOOR
  - In-floor drain
- INTERIOR INSULATION
- RADAR CONTINUOUS LEVEL DETECTION
- TRANSFER PACKAGE TO REMOTE DAY TANK
  - Surge Hopper, Rotary Feeder, Blower, and Day Tank
- PLC CONTROL
  - Ethernet Communication With Plant Control System - Single Pushbutton System Start and Stop
- STRUCTURAL LEG SUPPORT OPTION

# How It Works

The typical operation of the storage silo and solution feed system involves several basic steps:

1. Dry chemical is fed by pneumatic transfer into the silo.
2. Dry chemical is then fed to a solution tank.
3. Water is added to the solution tank for mixing and conversion of the dry chemical into a solution.
4. Chemical solution is pumped to the process as required by the site operating conditions.

\*Steps 2-4 are concurrent, and in the case of quicklime, Step 2 includes feeding dry quicklime to a paste-type lime slaking system. There, lime slurry is produced after slaking, then fed to a solution tank for storage.

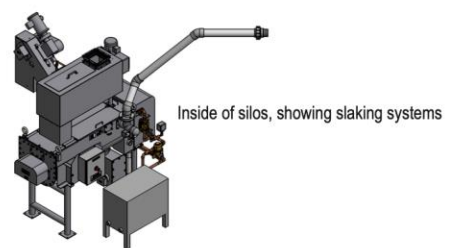
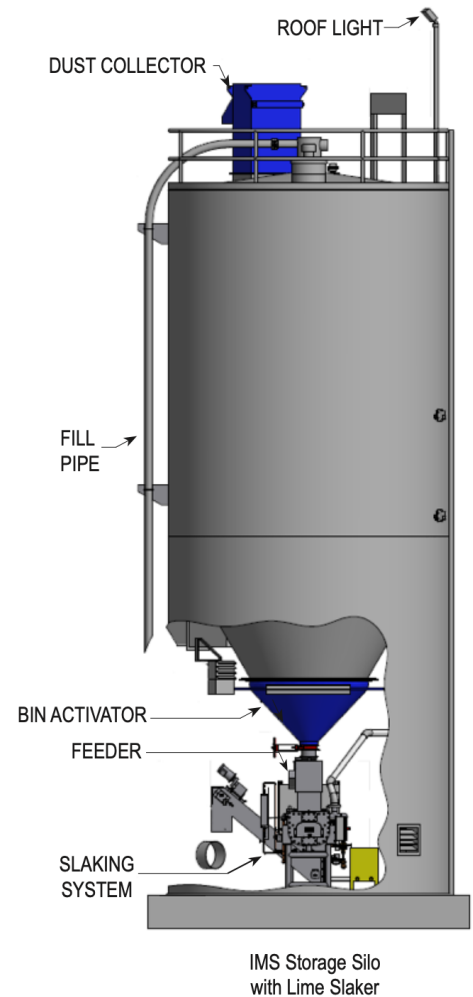
The dry chemical is delivered to the jobsite by self-unloading, pneumatic bulk trucks. The truck connects to the inlet adapter on the silo fill pipe. The chemical is pushed up through the silo fill line by a pneumatic truck to the target box at the top of the silo to ensure even filling. The dust collector runs continuously to discharge the air and filter the dust to prevent dust emissions from leaving the silo.

Rotating paddle-type level switches monitor the chemical material level in the silo (High, Re-Order, Low). A truck unloading operator panel on the exterior of the silo provides controls for the silo fill operation.

The dry chemical is discharged by gravity through the silo. A bin activator at the bottom cone of the silo aids material flow and transfers vibrations to the material column without shaking the silo structure. A knife gate valve on the outlet of the bin activator allows positive cut-off of material flow between the bin activator outlet and the chemical feed equipment.

The feeder meters the dry chemical to the solution tank. The water addition is initiated by the system start signal: the water supply solenoid valve on a water panel opens, the feeder starts operating, and the solution tank mixer starts.

Solution production is controlled by a PLC with operator controls, a touch-panel mounted in the door of the chemical feed system control panel. After the solution has been completely mixed, a feed pump draws solution from the solution tank and meters the solution to the process.



# Packaged Chemical Feed Systems

IMS chemical feed systems are pre-assembled, fully-functional chemical delivery systems for water treatment applications. These compact, user-friendly chemical skids include local storage tanks, full secondary containment, dosing pumps, instrumentation and controls. Systems are piped and wired at the factory for easy and quick hook-up.

## Aqueous Ammonia Feed System

IMS packaged Aqueous Ammonia feed systems are used in the formation of chloramines for disinfection within the treated water pipelines and distribution system. They include a heavy-duty pressure rated & Chemical Feed Systems aqueous ammonia storage tank, integral ammonia fume scrubber, peristaltic dosing pump, instrumentation and controls in a fully contained, pre-assembled skid.



## Fluoride Saturator and Feed System

IMS packaged Fluoride Feed Systems are used for community water fluoridation. They are designed with separate saturator and solution tanks to assure complete saturation, high reliability, low maintenance, and ease of use. Systems are sized to meet customer requirements.



## Hydrofluosilicic Acid Feed System

IMS packaged Hydrofluosilicic Acid Feed Systems are used for community water fluoridation. They provide safe storage and accurate dosing of Hydrofluosilicic Acid, in a fully contained, pre-assembled skid. Packaged systems are pre-wired and piped with local instrumentation and controls.



## Sodium Hypochlorite Feed System

IMS packaged Sodium Hypochlorite Feed Systems are used as an alternative to gaseous chlorine to provide disinfection of the water at the water treatment plant and distribution system. They provide safe storage and controlled, accurate delivery of sodium hypochlorite solution, in a fully contained, pre-assembled skid. Systems may be customized to meet user needs.



# Fluoride Saturator Feed System

The IMS packaged Aqueous Ammonia Feed System includes a heavy-duty, pressure-rated, aqueous ammonia storage tank, integral ammonia fume adsorber, peristaltic dosing pump, instrumentation and controls in a fully contained, pre-assembled skid. Optional enclosure, shown below, is ideal for outdoor or remote locations. The FRP shelter houses the equipment in an air conditioned environment and comes complete with lighting, ventilation fan, and breaker panel.



## Aqueous Ammonia Feed System Benefits



- DOT authorized 428 kPa (62 psi) pressure rating
- Heavy-duty cylindrical tank for superior structural integrity
- Built-in ammonia fume adsorber prevents release of ammonia fumes to the atmosphere (no odor complaints)
- Pre-piped and wired for easy, low-cost installation
- Modular, portable design for easy relocation
- Compact small footprint (7 ft x 4 ft x 5 ft ht)
- Meets site specific requirements and provides desired features
- Metering pump capable of receiving and sending remote signals (4 to 20 mA input/output, remote start-stop, alarms)
- Robust design (with very low maintenance requirement)
- Fully contained to minimize risk of ammonium hydroxide solution entering floor drains
- High level switch in containment structure for local and remote alarm
- Equipped with ultrasonic level sensor with local display and remote transmission capability
- Integrated control panel with single point of connection by installer

# Fluoride Saturator Feed System

The IMS packaged Fluoride Feed System is designed with separate saturator and solution tanks to ensure complete saturation, high reliability, low maintenance, and ease of use. All systems are custom designed, with modular systems pre-assembled, factory-piped, -wired, and -tested in a compact design to meet customer requirements. Systems are fully contained with automated saturator operation and integrated control panel.

Optional enclosure, shown below, is ideal for outdoor or remote locations. The FRP shelter houses the equipment in an air conditioned environment and comes complete with lighting, ventilation fan, and breaker panel.



## Fluoride Feed System Benefits



- Reduces or eliminates suspended solids in the solution tank and prevents dosing pump from plugging
- Very short installation time and low installation cost
- Reduces capital investment because of easy relocation, if desired
- Requires small footprint for installation
- Factory tested before delivery, significantly reducing system start-up time (~2 hrs)
- Meets site specific requirement and provides desired features
- Minimizes risk of sodium fluoride solution entering floor drains
- Level controls are pre-set for smooth saturator operation
- Single point of connection by installer

# Hydrofluosilicic Acid Feed System

The packaged IMS Hydrofluosilicic Acid Feed System is used for community water fluoridation. They provide safe storage and accurate dosing of hydrofluosilicic acid, in a fully contained, pre-assembled skid. Packaged systems are pre-wired and piped with local instrumentation and controls.

Optional enclosure is ideal for outdoor or remote locations. The FRP shelter houses the equipment in an air-conditioned environment and comes complete with lighting, ventilation fan, and breaker panel.



## Hydrofluosilicic Acid Feed System Benefits



- Hydrofluosilicic acid FRP storage tank provides safe storage of hydrofluosilicic acid solution and is durable and corrosion resistant
- Pre-piped and wired for easy, low-cost installation
- Modular, portable design for easy relocation
- Compact small footprint
- Meets site specific requirements and provides desired features
- Factory tested before delivery, significantly reducing system start-up time (~2 hrs)
- Robust design (with very low maintenance requirement)
- Fully contained to minimize risk of hydrofluosilicic acid solution entering floor drains
- High level switch in containment structure for local and remote alarm
- Integrated control panel with single point of connection by installer
- Metering pump capable of receiving and sending remote signals
- (4 to 20 mA input, remote start-stop, alarms)
- Equipped with ultrasonic level sensor with local display and remote transmission capability

# Liquid Ammonium Sulfate (LAS) Saturator and Feed System

The IMS packaged Liquid Ammonium Sulfate (LAS) Saturator and Feed System is used in the formation of chloramines for disinfection within the treated water pipeline sand distribution system. IMS LAS Saturator and Feed System technology can reliably produce liquid ammonium sulfate solution from solid ammonium sulfate, decreasing chloramination chemical costs. The system is fully contained in a pre-assembled skid.

Optional enclosure, shown below, is ideal for outdoor or remote locations. The FRP shelter houses the equipment in an air-conditioned environment and comes complete with lighting, ventilation fan, and breaker panel.



## LAS Saturator and Feed System Benefits



- Superior up flow saturator design ensures complete saturation, high degree of reliability, and very low maintenance requirements
- Separate saturator and solution tanks reduces or eliminates suspended solids in the solution tank and prevents dosing pump from plugging
- Very short installation time and low installation cost
- Modular, portable design for easy relocation
- Compact small footprint (5.5' ft x 2.5' ft x 5.75' ft ht)
- Meets site specific requirements and provides desired features
- Factory tested before delivery, significantly reducing system start-up time (~2 hrs)
- Robust design (with very low maintenance requirement)
- Fully contained to minimize risk of liquid ammonium sulfate solution entering floor drains
- Level controls are pre-set to allow smooth saturator operation
- Integrated control panel with single point of connection by installer

# Sodium Hypochlorite Feed System

The IMS packaged Sodium Hypochlorite Feed System is used as an alternative to gaseous chlorine to provide disinfection of the water at the water treatment plant and distribution system. IMS packaged sodium hypochlorite feed system provides safe storage and controlled, accurate delivery of sodium hypochlorite solution, in a fully contained, pre-assembled skid. Systems may be customized to meet user needs.

Optional enclosure is ideal for outdoor or remote locations. The FRP shelter houses the equipment in an air-conditioned environment and comes complete with lighting, ventilation fan, and breaker panel.



## Sodium Hypochlorite Feed System Benefits

### Customer Requirements

- 110V, single phase, 15 amp power to control panel
- 4 to 20 mA signal for Sodium Hypochlorite metering pump
- Sodium Hypochlorite solution to injection point

- Sodium hypochlorite storage tank provides safe storage of sodium hypochlorite solution and is durable and corrosion resistant (in HDPE or FRP)
- Pre-piped and wired for easy, low-cost installation
- Modular, portable design for easy relocation
- Compact small footprint
- Meets site specific requirements and provides desired features
- Factory tested before delivery, significantly reducing system start-up time (~2 hrs)
- Robust design (with very low maintenance requirement)
- Fully contained to minimize risk of sodium hypochlorite solution entering floor drains
- High level switch in containment structure for local and remote alarm
- Integrated control panel with single point of connection by installer
- Metering pump capable of receiving and sending remote signals
- (4 to 20 mA input, remote start-stop, alarms)
- Equipped with ultrasonic level sensor with local display and remote transmission capability

# Fluoride Feed System Case Study

## Safe, Proven Reliability in a Compact Fluoride Saturator and Feed System from Integrity Municipal Systems

For the past 70 years, active fluoridation of public potable drinking water systems has provided protection against tooth decay in the United States. Today, the nearly 75% of Americans served by public water systems are provided with significantly improved oral health through fluoridation.<sup>1</sup>

Integrity Municipal Systems' (IMS) Fluoride Feed System makes potable water fluoridation safer, more effective, and less costly to operate than any other packaged fluoridation products. The IMS design – which includes an up-flow saturator and a separate solution storage tank–sets the IMS Fluoride Feed System apart from the competition. Water is introduced and distributed at the bottom of the up-flow saturator and passes through the sodium fluoride salt resulting in a saturated sodium fluoride solution at the top. This solution passes through an overflow to the separate solution storage tank and is then metered from there to an injection point.

The IMS Fluoride Feed System is a completely packaged system, enabling low-cost, simple plug-and-play installation. The IMS Fluoride Feed System's proven up-flow saturator and separate solution storage tank design is easier to operate and requires less maintenance than downflow saturators. The entire system is fully contained within a fiberglass-reinforced plastic structure. This secondary containment supplemented with a high-water alarm eliminates the need for separate system containment. Finally, the IMS Fluoride Feed System's chemical metering pump can integrate with facility SCADA control and operation.



The IMS Fluoride Feed System is backed by IMS' technical support and enhanced parts and service delivery system.

<sup>1</sup> United States Department of Human Health Services press release, April 27, 2015. <http://www.hhs.gov/news/press/2015pres/04/20150427a.html>

## IMS Fluoride Feed System

### Completely Packaged System

- factory plumbed, wired, assembled, and tested

### Plug-and-Play Installation

- compact, known footprint and input requirements

### Up-flow Saturator and Solution Storage Tank

- reduces plugging of metering pump, cleaning requirements, and maintenance

### Fully-Contained

- the entire packaged system resides in a secondary, alarmed containment vessel.



Park Water Company, CA



Sacramento, CA-I



Liberty, MO



Grand Prairie Bayou, AR-II



Golden State Water, CA-I



Golden State Water, CA-II



Sacramento, CA-II



Roseville, CA



Sacramento, CA-III



Sacramento, CA-IV



Poway Facility

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