

INDUSTRIAL  
CHEMICALS  
DIVISION



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PQ Corporation is a leading producer of silicate, zeolite, and other performance materials serving the detergent, pulp and paper, chemical, petroleum, catalyst, water treatment, construction, and beverage markets. It is a global enterprise, operating in 19 countries on five continents, and along with its chemical businesses, includes Potters Industries, a wholly owned subsidiary, which is a leading producer of engineered glass materials serving the highway safety, polymer additive, metal finishing, and conductive particle markets.

Bulletin REP20

# Storing PQ Liquid Silicates, Small Storage Tank Recommendations

These recommendations are provided to help liquid silicate users source and install small (less than 16,000 gallons) storage tanks for PQ liquid sodium and potassium silicates.

## Materials of Construction


Liquid silicates range from moderately to strongly alkaline and are defined by their silica-to-alkali ratios. PQ sodium silicates range from pH 11.3 for 3.22 ratio to 12.7 for 2.0 ratio products. PQ potassium silicates range in pH from 11.3 to 11.9 for 2.5 to 2.1 ratio products. High density polyethylene rotationally molded thermo-plastic tanks are satisfactory for storage of these materials.

PQ recommends vertical bulk storage tanks such as those manufactured by Snyder Industries, Inc., Lincoln, Nebraska (402-467-5221), although similarly constructed tanks of other manufacturers are also satisfactory.

## Storage Equipment Specifications

For proper performance and to facilitate maintenance, liquid silicate storage tanks should be fitted with the following:

- Storage tanks should be designed to a specific gravity of 1.9 and meet ASTM D-1998 standards.
- Wash-out line diameter is dependent upon the tank diameter (and thickness). Snyder recommends a maximum of 10" wash-out lines for 142" diameter tanks, 8" for 120" to 142", and 6" lines for 90" to 120" diameter tanks.
- Tank manufacturer recommendations for minimum height requirements from the bottom of the tank for wash-out lines should be followed. Use of flex couplings to allow for expansion and contraction of the tank is strongly recommended.
- Neoprene or EPDM gaskets.
- An 18" to 24" diameter threaded manway to permit access for inspection and cleaning.
- 2 1/2 or 3" female Camlock feed line connection (check with local PQ plant for sizing) for off-loading tank trucks, no more than 3 feet above ground level, with a plug to prevent entry of foreign material and a valve above connection.
- Silicate feed line to the top of the tank.
- Short air line connection with valve and quick disconnect just above feed line valve. When silicate loading is completed, close feed line valve, connect air line, open air line valve, and blow out feed line. Close air line valve and disconnect air line. Do not leave air line connected to avoid accidental contamination of air compressor.
- Carbon steel feed lines with flex couplers. Do not use brass, copper or aluminum.
- Overflow line for spill control.
- Flowline flow controllers to prevent spills of product.
- Vent one size larger than inlet.



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- Silicate removal line 18" above bottom of tank, sized to system feed requirements.
- Line isolation valves and clean-out-solution introduction and discharge points at tank outlet and after the system pump.
- Tees or siphon tube assemblies should be installed in place of elbows at key locations to permit easy cleaning.
- Insulation installed on any piping subject to freezing conditions.
- Rising stem gate valves or sleeved plug valves, carbon steel or iron construction.
- Molded-in or adhesive backed gallonage strips for liquid level control.

**Tank Location**

Whenever possible it is desirable to locate liquid silicate storage tanks in a heated building to minimize the possibility of the silicate freezing and to avoid pumping problems in cold weather due to the products' increased viscosities.

Note: The freezing point of liquid silicates is nearly the same as water, and if they freeze, a separation of the silicate constituents can occur. Remixing by normal procedures may not be sufficient to reconstitute the solution to its original properties. Do not use plastic tanks for products that will be stored outdoors where freezing can occur, unless the tank is heat traced and insulated.

It is desirable for bulk liquid silicate storage tanks to be located near the delivery point and preferably not far from the point where silicate is used.

Tank trucks typically carry 30 feet of hose or less, so the distance from the inlet pipe to the location at which the tank truck is unloaded should not exceed 30 feet. Longer distances should be spanned by a feed line that is insulated against freezing.


**Spill Containment**

Provisions should be made to provide secondary containment of storage tanks and loading areas, whether or not required by local environmental regulations, to avoid risk of loss of product and/or environmental contamination due to spills or leakage. Generally, the secondary containment should be sized to hold the contents of the storage tank plus 10% excess. All valves that penetrate the dike walls of the secondary containment should be closed and locked when not in use.

**Pump Recommendations**

Centrifugal pumps (Goulds, Durco) with double mechanical seals (Five Star #86 or 87, Chesterton 241 or 255) can be used.

To avoid seal pumps, magnetic drive pumps from Micropump (360-253-2008) can be used with delivery rates up to 5 gal/min. Electronic-controlled models are available. Strainers (Hayward) could be installed upstream of the pump to prevent solids from entering.



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However, the strainer should be kept clear to prevent starving the pump and possible burn-up.

**Inspection and Maintenance**

New tanks should be rinsed before filling to insure no residual materials of construction are present. Thereafter, they should be inspected periodically for structural defects and other potential hazards or contamination. At least annually tanks in service should be visually inspected and, if necessary, emptied and cleaned to remove buildup of "bottoms" (sediment).

**General Recommendations**

Quality checks should be run on delivered product before it is off-loaded into storage tank.

Valves and lines should be purged with warm alkaline water prior to periods of extended disuse.

Refer to stored chemical's Material Safety Data Sheet for specific personal protection equipment recommendations and precautionary handling information. Instruct all persons involved in handling the products in their proper handling, safety precautions and first aid procedures in case of skin or eye contact or ingestion.

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