



SULFURIC ACID STORAGE GUIDE



POLYPROCESSING
SOLUTIONS, SIMPLIFIED.

If you're one of the many manufacturers who handle [sulfuric acid](#), you know how important it is to store it safely. Mishandling this highly corrosive chemical could cause severe damage to your workforce and to your surrounding environment. But with so many variables to consider, where do you even begin to research sulfuric acid storage solutions? Whether you're already familiar with storing sulfuric acid or you're just getting acquainted with the chemical, you'll save yourself hundreds of hours and thousands of dollars in sulfuric acid storage mistakes by reading this guide.

Let's take a closer look at what sulfuric acid is, how it's used, and how you can overcome its corrosive challenges with the right storage tanks.



WHAT IS SULFURIC ACID?

Sulfuric acid is a highly corrosive mineral acid that challenges traditional chemical storage options. This pungent, colorless to slightly yellow viscous liquid is dyed dark brown during production to alert people to its hazards. The biggest challenge in working with sulfuric acid is that it is an aggressive oxidizer. This challenges the strength and design of many storage tanks. Poly Processing Company's tanks and fittings can be combined specifically to store sulfuric acid and reduce the risks.

CHALLENGES

Any company that stores sulfuric acid needs to be acutely aware of the dangers that the chemical presents to your equipment and your personnel.



Sulfuric acid poses the following serious storage challenges:

- Sulfuric acid is extremely heavy and will test the mechanical integrity of your storage tank. The inherent weight of sulfuric acid requires a strong material that can withstand the static load pressure constantly pressing against the bottom third of the storage tank.
- Sulfuric acid is an aggressive oxidizer. You must take appropriate safeguards to prevent the tank's material from degrading, becoming brittle, and cracking—which could result in leaks or tank failure.
- If sulfuric acid makes contact with water, it creates a toxic sulfuric acid aerosol fume or a potential explosion.
- Sulfuric acid can create a highly flammable hydrogen gas if it is spilled on metals.
- Skin and other bodily burns from sulfuric acid can be more serious than burns from other strong acids. Sulfuric acid dehydrates whatever it touches, and the heat caused by that reaction with water can create secondary thermal damage.

Additional Resources

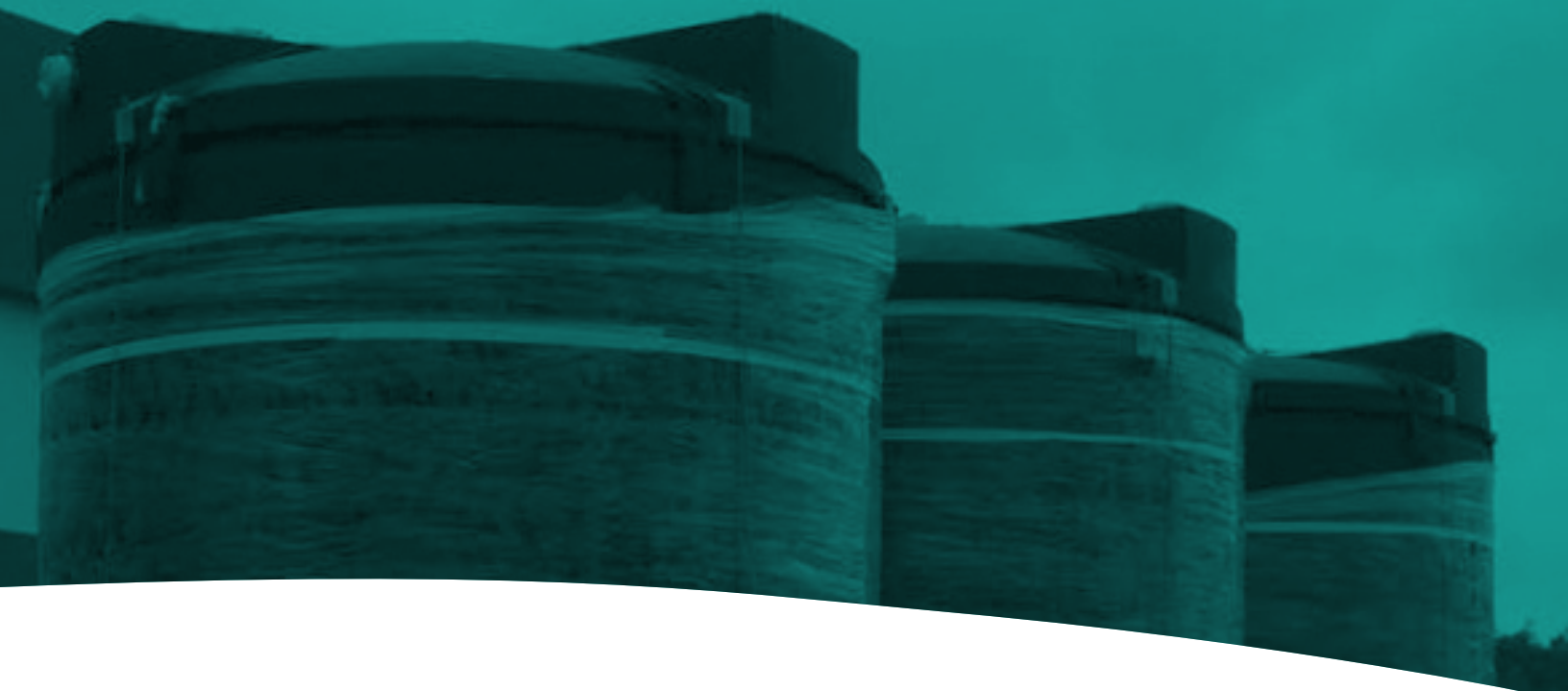
- [HOW TO SAFELY STORE SULFURIC ACID](#)
- [A COMMON CHEMICAL WITH MAJOR STORAGE CHALLENGES](#)

OPTIONS

When considering storage solutions for chemicals like sulfuric acid, three available options are:

- Steel
- Fiberglass reinforced plastic (FRP)
- Polyethylene or cross-linked polyethylene.

Steel tanks are good for storing 98% sulfuric acid. At any other concentrations, it will need to be protected with some form of internal lining/liner. A rotationally molded



[polyethylene lining system](#) is designed to protect your steel tank against the harshest chemicals to give you broad chemical resistance alongside the durability and strength of a steel tank.

FRP tanks are available with numerous interior coatings and a structural layer comprised of chopped glass fiber and resin.

Polyethylene or plastic storage tanks are either [linear polyethylene or high-density crosslinked polyethylene](#). High-density crosslinked polyethylene, or XLPE, is a thermoset resin. It's specifically engineered for critical applications like chemical storage.

Additional Resources

- [POLYETHYLENE VS. FRP TANKS](#)
- [READ THIS BEFORE PURCHASING A SULFURIC ACID TANK](#)

CONSIDERATIONS

Some storage tank manufacturers are willing to provide 12,000-gallon linear sulfuric acid tanks. But time and experience have taught us that this isn't the safest or most durable solution.



Some chemical companies will install large fiberglass tanks because they want to hold a railcar of sulfuric acid. While this may seem to be a convenient or cost-efficient solution, oftentimes it is the polar opposite. After losing 40,000 gallons of sulfuric acid in an instant, one manufacturer came to us to make the switch from a large fiberglass tank to a smaller one. Under certain circumstances, you may be able to safely use larger tanks, but you should talk to your storage providers before making any commitments. At Poly Processing, we help you think through your chemical storage plans and make the best choice for your specific needs. Here are some things to consider when exploring different sulfuric acid storage tanks:

1. Chemical Compatibility

Because it is an aggressive oxidizer, and reacts differently with various materials, choosing the right tank material is critical. You also have to consider its concentration since it displays different properties depending upon the concentration being used. For example, at 80% the nature of the chemical in this concentration does not have the same oxidizing effects. The three main concentrations are 93-98%, 80- 92%, and 80%.

2. Molecular Weight

At different concentrations, molecular weight also becomes a factor. At its highest concentration, its molecular weight is up to 16 pounds per gallon, nearly twice the weight of water. This should be stored in a tank that has a 2.2 specific gravity wall thickness and will test the mechanical integrity of any material.

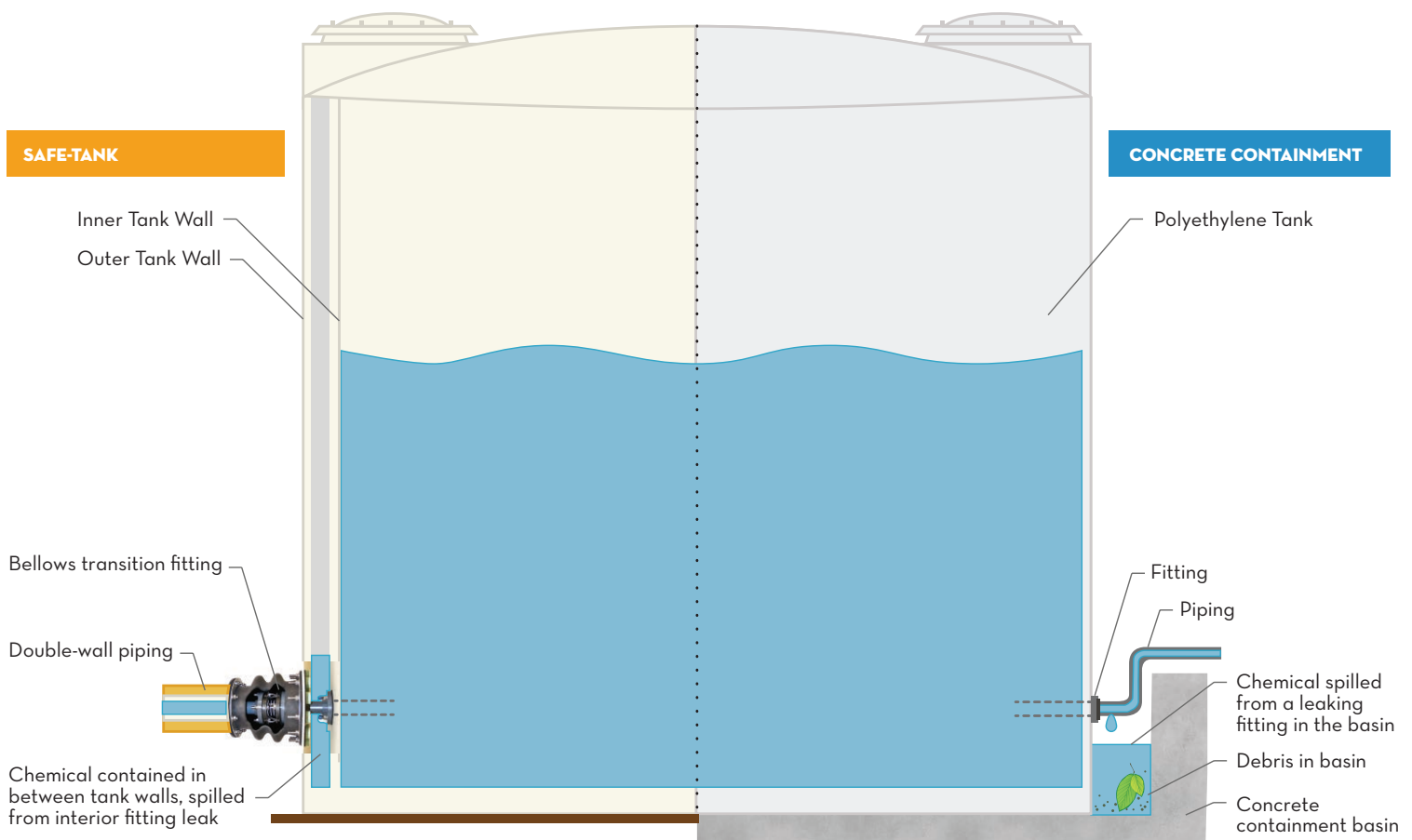
3. What's the Antioxidant System Like?

When storing sulfuric acid, it's important to verify the hoop stress rating and understand the specific gravity ratings to make sure the resins used in the storage tank provide a margin

of safety. Poly Processing Company's next generation OR-1000™ system bonds the XLPE with an antioxidant inner surface, minimizing oxidation, reducing the potential for fault and maximizing lifespan.

4. Secondary Containment

Secondary containment is that helps mitigate the risks and hazards associated with chemical spills and leaks. In this system, a secondary container or wall encompasses the primary container. Should the primary container fail and cause a chemical leak, the secondary container prevents the chemical from spilling outside the system. If secondary containment is needed, the [Poly Processing Company's SAFE-Tank®](#) is a smart choice. If secondary containment is already present, [the IMFO® tank](#) is recommended because the tank's structural integrity is maximized while providing a molded-in full drain fitting at the lowest point of the tank sidewall. When combining this tank design with the OR-1000™ system, oxidation is reduced dramatically.



Additional Resources

- [SULFURIC ACID STORAGE POLICY](#)
- [GUIDELINES: PROPER TANK DESIGN](#)
- [WHAT'S THE BEST TYPE OF TANK?](#)



INSTALLATION

Proper installation is one of the first steps to a successful and long-lasting operation. The first thing our customer service team does is examine the tank site. The installation site is inspected to ensure the tank is properly installed according to industry standards. Sidewall fittings, venting, and proper bracketing are inspected to make sure the risk of tank failure is minimized, and the tank's useful life is optimized. Many customers wish to avoid pipe support sidewall penetrations and design their own supports, which require inspection.

Special Considerations for Sulfuric Acid Tank Installations

Make sure you have smooth concrete, asphalt or steel foundation to accommodate IMFO®, SAFE-Tank® or vertical tank. No restraint or ladder attachment bands circumscribing the tank are allowed. Cable restraint systems must pass cables over the top of the tank.

Additional Resources

- [COMMON INSTALLATION QUESTIONS](#)
- [WHAT TO KNOW BEFORE TANK INSTALLATION](#)
- [TANK INSTALLATION GUIDE](#)

MAINTENANCE

Temperature

The storing temperature of the chemicals in your tank is very important. Check the temperature of your polyethylene tank regularly to verify that it never exceeds 100 degrees Fahrenheit. If you know that your tank will be subject to [extreme temperatures](#), a specially-designed tank with a thicker construction is required. Avoid mixing or cutting chemicals in the same tank if the temperature will be negatively affected as part of the process. If you do mix chemicals that will affect the temperature, make sure the mixture is handled correctly (especially when dealing with higher concentrations and dilutions) and always check that the proper storing temperatures are met afterward.

Inspections

Certain annual inspections should be performed to ensure that your tank is maintained properly. Make sure you're cleaning your tank annually and inspecting it visually with a flashlight, looking for any abnormalities.

If you're not sure what to look for when inspecting your polyethylene tank, we can help. Our field service specialists have cameras and other specialized equipment—as well as the expertise—to make sure everything is functioning the way it should.

Performing inspections on the original installation, checking the chemical storage temperature, and conducting regular annual inspections will help your polyethylene tank reach its maximum lifespan and ensure that it is properly maintained at all times. Tank Maintenance and Annual Inspection checklists can be found in the back of the Installation and Operation Guide

Regular tank inspections can reduce the expenses the tank owner may encounter on extending the life of the tank beyond 15+ years. Contact the Field Service team to learn more about [our tank inspection service](#).

Additional Resources

- [**ANNUAL CHEMICAL STORAGE TANK INSPECTION CHECKLIST**](#)
- [**4 MISTAKES TO AVOID WHEN PURCHASING OR MAINTAINING A TANK**](#)



BUILD YOUR SOLUTION

Proper tank design is crucial to successful and safe sulfuric acid storage. There are many storage solutions out there which is why it is vital to choose the proper tank configuration. Selecting the right tank configuration can impact the safety of your employees, the protection of your environment, and the cost of protecting your investment.

Many people think that if a tank can store water, it can store a chemical. Although a water tank could potentially store a chemical for a limited amount of time, its design falls short of preventing leaks and other dangerous situations.

Don't rely on your water tank to do the job of a tank designed for sulfuric acid storage. This is unwise and could cost you irreparable damage to your business. Instead, work with tank experts that can help you choose or design the right solution for your business.

Poly Processing's tank experts are available to answer your questions and help you build the right storage solution.

CONTACT A TANK EXPERT

Sulfuric Acid Storage Tanks

Tank Specifications

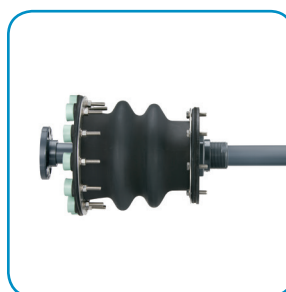


- **11/15 Rule** Sulfuric Acid can be stored in tanks up to 11,000 gallons and less than 15 feet tall.
- **High-density cross-linked polyethylene (XLPE)** accommodates the heavy weight of sulfuric acid
- **OR-1000™** bonds the XLPE with an antioxidant inner surface, minimizing oxidation, reducing the potential for fault and maximizing life span
- **SAFE-Tank® design** creates a tank-within-a-tank, ensuring that water will not enter the containment area. (Recommended where secondary containment is not available.)
- **IMFO® tank** is molded as a single unit. This maintains hoop stress rating, adding to the strength of the tank. (Recommended for situations with existing secondary containment.)
- **B.O.S.S. Fitting®** provides bolted one-piece sure-seal design, limiting the seal point to a single gasket for major leak prevention

Recommended System Components



Venting:
SAFE-Surge® manway cover is recommended on pneumatically loaded systems to support tank longevity



Fittings:
Recommend bellows transition fitting for bottom sidewall discharge



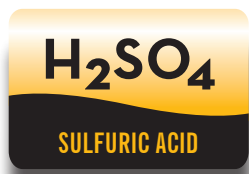
Fittings:
B.O.S.S. Fitting® recommended to prevent leaks and over tightening

NOTE: For concentrations less than 93%, DO NOT use stainless steel



Plumbing:
Reverse float level gauge recommended to know proper chemical level

SULFURIC ACID SYSTEM REQUIREMENTS



TANKS

11/15 Rule :

Less Than 11,000 Gallons and Less Than 15' Tall

- Sulfuric Acid may be stored in any tank less than 11,000 gallons and less than 15 feet tall. This includes the Vertical, IMFO®, Sloped IMFO®, And SAFE-Tank®

SECONDARY CONTAINMENT

✓ SAFE-Tank® (recommended)

Non-SAFE-Tank® alternatives:

- PPC secondary containment basin
- Other secondary containment suitable for sulfuric acid, of adequate size for use

FITTINGS

SAFE-Tank® sidewall: Recommend Transition Fitting®

Single Wall Sidewall: Recommend BOSS Fitting®

Dome: No restrictions

PLUMBING TO THE TANK

- Required use of **flexible connections** with fittings on lower one-third of sidewall
 - Allows for lateral and vertical expansion and contraction of the tank. Reduces pump and piping vibration stress on the tank.
 - Flexible connections, piping, and valves must have structural support independent of the tank sidewall or dome.
- Expansion joints must meet the following minimum requirements:
 - Axial Compression $\geq 0.67"$
 - Axial Extension $\geq 0.67"$
 - Lateral Deflection $\geq 0.51"$
 - Angular Deflection $\geq 14^\circ$
 - Torsional Rotation $\geq 4^\circ$

TEMPERATURE

Product should not exceed 100°F at delivery or during storage to maintain ASTM D 1998 design parameters.

VENTING

polyprocessing.com/venting or see chart in catalog

FOUNDATION AND RESTRAINTS

- Poly Processing structural acid pad or concrete rated to accommodate weight of acid in IMFO®, SAFE-Tank® or vertical tank. All foundations must have an appropriate chemical resistant coating.
- Cable restraint systems (when called for) must pass over the top of the tank.

LID

SAFE-Surge® manway cover for pneumatically loaded tanks; bolted manway cover for all other applications.

OPTIONS

- Restraint systems for wind and seismic
- Reverse Float Level Gauge
- Ladders
- Heating pads and insulation
- Fume-tight manway cover
- NSF-61 chemical certification
- Third party engineering stamp for seismic

CHEMICAL	RESIN TYPE	SPECIFIC GRAVITY RATING	FITTING MATERIAL	GASKET MATERIAL	BOLT MATERIAL
Sulfuric Acid $\geq 93\%$	XLPE with OR-1000™	2.2	PVC	Viton®	316SS
Sulfuric Acid 80%–92%	XLPE with OR-1000™	2.2	PVC	Viton®	C-276
Sulfuric Acid $< 80\%$	XLPE with OR-1000™	2.2	PVC	Viton®	C-276

» See our website for a complete Chemical Resistance Chart

NOTE: To meet NSF-61 certification, use Viton® GF.

ABOUT POLY PROCESSING

Known as a leader in crosslinked polyethylene chemical tanks, Poly Processing is dedicated to storage safety, as well as operational- and cost-effectiveness. We have worked to raise the standards of the industry nationwide, and we continually develop new and better storage concepts based on client feedback.

Poly was founded as the Abell Company in 1955 as an agricultural distribution service. In 1970, the Abell family recognized a need for better storage solutions for corrosive chemicals. They developed a process for rotomolded, crosslinked plastic storage as an alternative to FRP, stainless steel, and lined steel. Today, Poly Processing has manufacturing facilities in Louisiana, California, and Virginia.

Questions about the SAFE-Tank system or other Poly Processing products? Contact us today at **866-765-9957 (866-PolyXLPE)** or email sales@polyprocessing.com.