

ACID DILUTION SYSTEMS



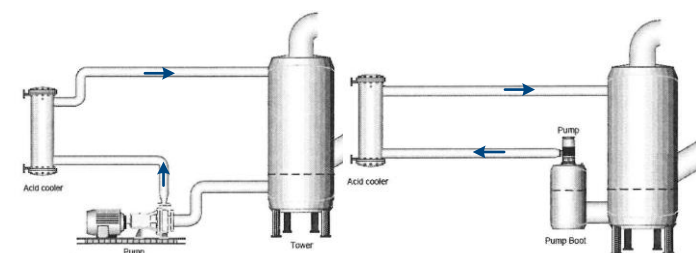
The external acid dilution system avoids many of the pitfalls of the conventional method of loading dilution water into the acid tank. Acid and water do not mix readily, potentially leading to corrosion and other safety concerns. The **NORAM Acid Dilution System**, including a static mixer designed and fabricated with proper materials of construction, addresses these issues.

Challenges

Acid and water are miscible in all preparations but do not necessarily mix readily due to their substantial difference in density. Layering may occur. This can potentially lead to corrosion and other safety concerns. A significant amount of heat is generated when the acid and water mix, reaching temperatures well above the boiling point of water. There have been incidents where alloy pump tanks have failed at the transition between the acid and water layers.

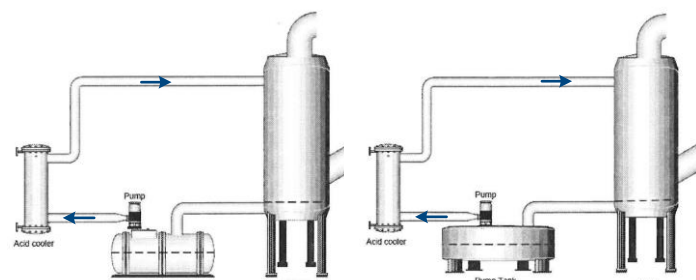
Different Types of Pump Tanks

Pump tanks in sulfuric acid plants can serve several purposes. They facilitate mounting of vertical pumps, allow for run back from towers, facilitate mixing of different process streams and provide residence time to accommodate process variations.



External Pump

Pump Boot Connected to Tower



External Vertical Tank

External Horizontal Tank

External Pump Tank

NORAM external pump tanks are made from silicon alloy NORAM SX[®] stainless steel or brick-lined, and can be either a horizontal or vertical tank.

Benefits of these pump tanks are:

- They can serve one or more towers
- Low maintenance and high reliability
- Less downtime



Horizontal External Pump Tank



Vertical External Pump Tank

Dilution System Options

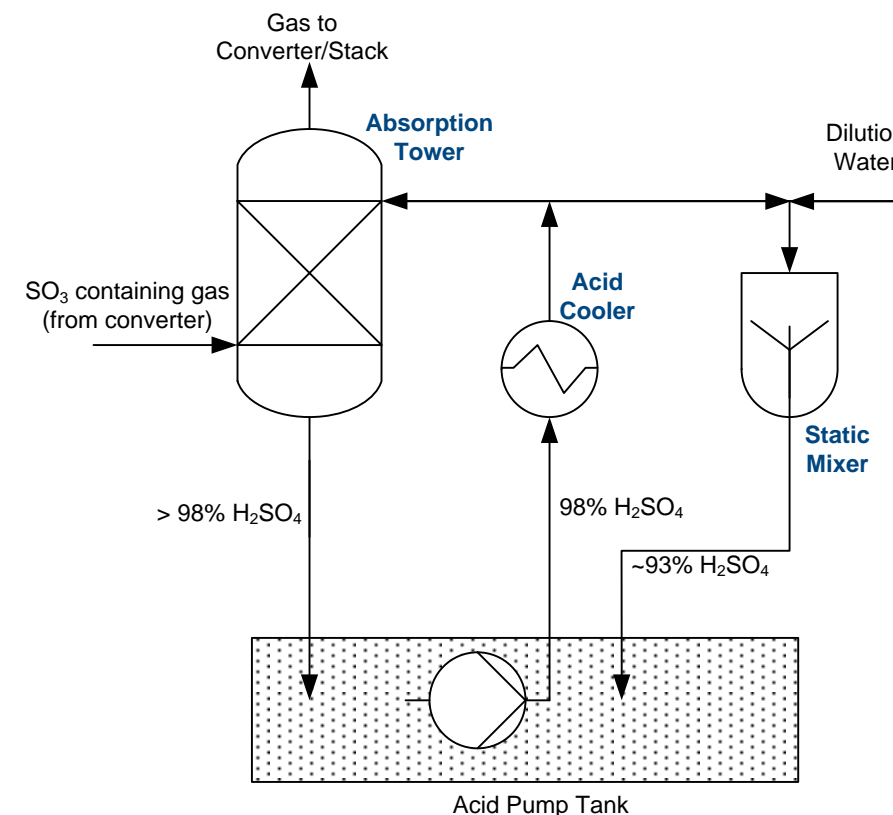
NORAM's acid dilution systems are designed with robust materials of construction to prevent corrosion issues caused by the mixing of sulfuric acid and water. NORAM acid dilution systems have been installed in multiple sulfuric acid plants.

External Dilution

In a typical acid plant, strong acid is returned to the absorption tower from the pump tank via an acid cooler. In the external acid dilution system, a slip stream of acid is diverted, passed through a static mixer and returned to the pump tank. Dilution water is injected into the acid stream ahead of the static mixer against sufficient backpressure to avoid flash evaporation. The dilution rate is controlled by a concentration analyzer in the feed pipe to the tower.

Benefits of the System

- Static mixer ensures complete mixing
- Reduced risk of corrosion in the acid system



Internal Dilution

Internal dilution can be achieved inside acid towers or pump tanks using special mechanical designs for dip-pipes and sparger systems.



Sparger Test at NORAM Laboratories



Internal Dip-pipe Diluters for Addition of Water into Towers or Pumptanks



External Diluter with Static Mixer

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NORAM ENTRAINMENT MITIGATION DEVICE (EMD)
NORAM ACID DILUTION SYSTEMS
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NORAM SX™ ACID DISTRIBUTORS
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