LaBour Taber

PUMPS THAT EXPERTS SELECT.

Molten Sulfur Pumps

Elemental sulfur is an amorphous yellow solid used as a raw material for manufacture of sulfur dioxide, sulfuric acid, and related products. It is also used to formulate a sulfur cement for some corrosive services.

It occurs in nature both in the free state and as a sulfide ores of iron, zinc, and copper/iron ore. Although about 90% of sulfur production is used to manufacture sulfuric acid, it also finds process applications in the rubber, chemical, paper, and pharmaceutical industries.

The two main processes are the Frasch process, in which sulfur is produced by "mining" with hot water (320 degF) down a concentric pipe arrangement to melt the sulfur, which is then forced up to the surface by hydraulic pressure. The other process is the "by-product sulfur" that is recovered from gas, petroleum, coal, and sulfide ores.

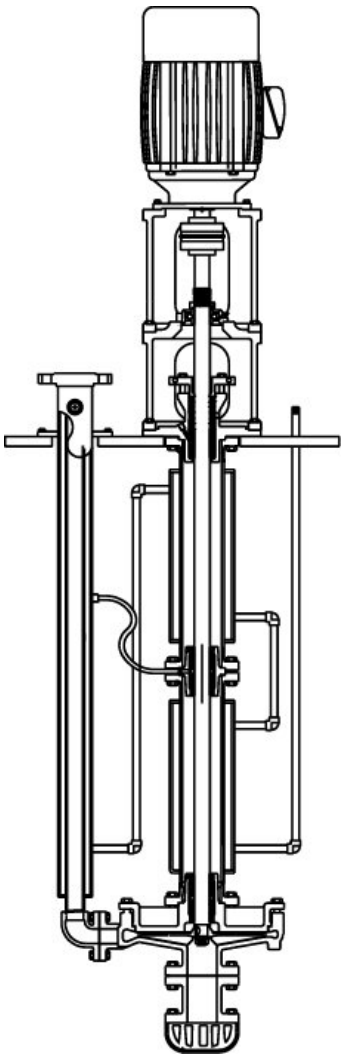
Pump Model

Horizontal ANSI pumps have been used for this service but the success rate has been limited because of problems keeping the Sulfur in the stuffing box in the molten state. Vertical sump pumps with steam jacketing or heat tracing are ideally suited for this difficult application.

Taber Series 1000 is the pump of choice. Speeds of 1150, 1750, or 3600 rpm are available depending upon the service conditions. Remember that a slower speed pump can be more competitive in this service because of the lesser intermediate bearings. The Taber has hundreds of installations on this demanding service and a wealth of experience and success that we should leverage.

Pump Selection and Application

- **Materials of Construction:** Wetted end parts constructed of ductile iron with steel support column and discharge pipe, along with a cold rolled steel pump shaft.
- **Bearing Materials**: Graphitar and Carbon Graphite bearings up to 500degF. Also recommend ductile iron or Ni-resist #2 bearings. All compatible with the cold rolled steel shaft. Bearings are lubricated by the product.
- **Steam Jacketed Support Column and Discharge Pipe**: See attached drawing. Steam jacketed support column and discharge pipe below as well as above the support plate is a Must!! Steam inlet and outlet provided above the support plate.
- **Stuffing Box and Sealing:** A packed stuffing box is highly recommended to contain the fumes and keep the heat away from the motor. Grease lube is used to seal the product from moisture laden air. The packing type that we recommend is either a grease lubricated Graphite or a non lubricated Grafoil.
- **Couplings:** Flexible all metal non-spacer couplings, such as Falk Steelflex T20 or Thomas DBZ are preferred because of the relatively high service temperature.
- **Motors:** Standard TEFC or TEFC Chem Duty are generally used. Any enclosure can be considered. Make sure that the motor insulation is sufficient for heat resistance. We recommend "F or H" insulation. Make sure that you account for the high specific gravity.



Application Considerations

- ✓ 95% of all the sulfur handling in North America is in the molten state
- ✓ Most customers are using sulfur in its molten state so it is more economical to receive sulfur in the molten form and pump it directly into a storage tank or pit
- ✓ Sulfur solidifies at about 238degF, and become very viscous above 320degF. The successful handling of molten sulfur in the molten state depends upon restricting the temperature to 260-300degF
- ✓ For economical reasons, most pipelines and pumps handling sulfur are heated with steam at pressures between 35 and 85 psig. Either steam jacketing or steam tracing is used.
- ✓ Sulfur is a very poor conductor of heat, and is very difficult to reheat in piping once the temperature has dropped below 240 deg F. So temperature above that **must** be maintained.
- ✓ The most common material of construction for pipe, valves and pumps in sulfur service is steel or ductile iron.
- ✓ Pumps moving molten sulfur must be steam jacketed. Also, as a result of the high specific gravity (1.78), larger motors are required.
- ✓ Large quantities of molten sulfur are stored in tanks, which are usually made of steel. For small quantities, pits are used which are generally rectangular. A steam jacketed sump pump should pump the molten sulfur out of the tanks or pits.

Competition

Lewis; Lawrence; Goulds

Reference List and Installation List

The following are the companies that have successfully applied these pumps

BASF	Chevron	BF Goodrich
Texas Gulf	Unocal	Exxon
Georgia Gulf Sulfur	Monsanto	Witco
Freeport Sulfur	Haifa Refining	Parker Fertilizer
Ethyl Dow	Tennessee Valley	Westvaco
Technicas Reunidas	Chemithon	Akzo Nobel

LaBour Pump Company – 901 Ravenwood Drive, Selma, Alabama 36701

Ph: (317) 924-7384 - Fax: (317) 920-6605 - www.labourtaber.com