FAQ

Ultrasonic, Coriolis
Sonic 1000, Coriolis 200, Krohne Optimass 8000
Application – Molten Sulfur

Molten Sulfur in 6 or 8 inch line size

Question:

We have a chance to sell some flow meters if you have any references for Molten Sulfur, 250 degrees F. I know that Krohne has done this with Ultrasonic at Honeywell Specialty Materials in Hopewell, Va. Can you get some references, even if it is Krohne.

Answer:

You specifically want Ultrasonic, or Molten sulfur in general?

Question:

This will be six or eight inch line, and will need to be jacketed. They are looking for the best solution.

Answer:

We sold several jacketed single straight tube meter into molten sulfur applications, operating temperature between 142 and 147 degrees C, but I also know that some customers used the Krohne Optimass 8000.

The operating temperature you mentioned looks rather low. At this temperature you could even use the Coriolis 200 with heating jacket. But ultrasonic flow meters will most probably do it as well.

See pages 2 and 3 for Krohne reference. Note that the Krohne Optisonic 6300 is the same as the Honeywell Sonic 1000 (SM10).
OPTISONIC 6300 XT Ideally Suited for Liquid (Molten) Sulphur Applications

Industries:  Petrochemical & Chemical plants
Medium:  Liquid (Molten) sulphur

Introduction: Sulphur production
Sulphur, a non-metal and a yellow crystalline solid in its native form, can be found in many places around the world, but usually in too low concentrations for an economical exploitation. Crude oil and natural gas from certain wells can also contain significant amounts of sulfur. Sour oil and gas smell like rotten eggs at low concentrations and the inhalation of hydrogen sulfide can even be fatal at high concentrations. The Claus process recovers sulfur from the gaseous hydrogen sulfide found in raw natural gas and from the by-product gases containing hydrogen sulfide derived from refining crude oil and other industrial processes. Sulfur is usually transported as a liquid.

Because of the increased energy demands and higher energy costs, liquid sulphur is produced in ever increasing amounts, making the processing of sour crudes and natural gas more feasible. Next to that environmental concerns require fuels with lower sulphur contents.

Users of Liquid Sulphur
Liquid sulphur is present in many industries. Users of sulphur include sulphuric acid plants and fertilizer producers. Liquid sulphur is one of the key ingredients in the production of phosphate that in turn creates fertilizers. Sulphur is also used for manufacturing rubber products, dye and paints, batteries, medicine, cosmetics and in polymer production.

Measurement of Liquid (Molten) Sulphur
Sulphur is not an easy product to handle as it occurs in different shapes dependent on its temperature. At room temperature it is a crystalline bright-yellow substance. At temperatures above 96 °C it starts to liquefy and at 119 °C it is completely melted. Above 150 °C sulphur becomes highly viscous. The light yellow liquid has an extreme low electrical conductivity.
Unlike most other liquids, its viscosity increases above temperatures of 190 °C due to the formation of polymers.
To keep sulphur moving through a pipeline, sulphur is usually transported at 1400°C. The temperature needs to be kept stable and it requires constant line tracing and accurate metering. Temperature maintenance problems can lead to a shut down of an entire unit or bring a marine terminal’s discharge operations to a standstill.
Many benefits of OPTISONIC 6300 for Measuring Liquid (Molten) Sulphur

KROHNE has a special XT version of the OPTISONIC 6300, applicable for a liquid temperature range up to 200°C, which covers the temperature range required for liquid sulphur. Orifice plates or other mechanical flowmeters are far from ideal because their internal parts can block the flow line, which customers try to prevent at all costs. Rocks and gravel from mined sulphur plug the lines (particularly small sizes) and result in erroneously high flow rate readings. Orifice plates require a lot of maintenance and would typically need replacement every 4 to 6 months. Replacing an orifice meter is not easy task because operators do not like to let the line get cold, as it is difficult to get the sulphur flowing again.

Obviously the non intrusive OPTISONIC 6300, which can be installed under operating conditions, offers substantial benefits. Next to the fact that there is no risk of plugged flow lines, the clamp-on ultrasonic flowmeter reduces the number of potential leakage points, very important for a process where safety and environment forms a major issue. In addition, contrary to for example electromagnetic flowmeters, ultrasonic flowmeters have no problems with measuring liquid such as liquid sulphur with low conductivities.

Solution: OPTISONIC 6300 XT

- Temperature range up to 200°C
- No need for cooling down or a process shutdown of a flow line for the installation or maintenance
- Increased safety with the reduction of potential leakage points
- No obstructions in the flow, no risk of pipe blockage
- Good performance in case of low electrical conductivity
- Inbuilt installation wizard for fast and easy installation
- Its smart construction makes it easy to replace the transducers at the exact same position after re-greasing
- Robust solution in harsh environment