
Improving Sulfur Recovery With The Use of Ultrasonic Flow Metering

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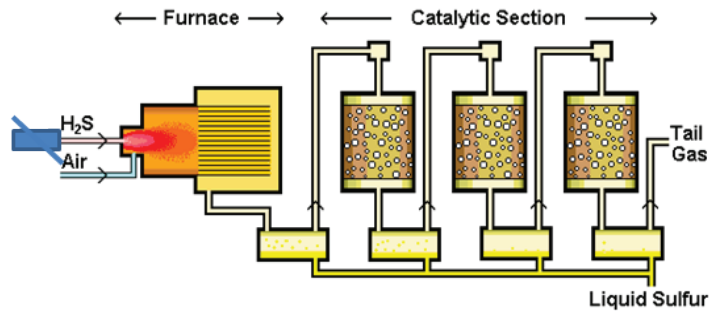
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SULFUR RECOVERY VENTS

Hydrogen sulfide (H₂S) is removed from the refinery fuel gas system through the use of amine scrubbers. The concentrated sour gas is then processed in a sulfur recovery plant to convert the H₂S into elemental sulfur or sulfuric acid. The most common type of sulfur recovery plant is the Claus unit, which produces elemental sulfur. The first step in a Claus unit is a burner to convert one-third of the sour gas into sulfur dioxide (SO₂) prior to the Claus catalytic reactors. The sulfur dioxide and unburned H₂S are reacted in the presence of a bauxite catalyst to produce elemental sulfur. There are an EPA estimated 195 sulfur recovery trains in the petroleum refining industry.

Control of combustion air feed to the furnace is the most critical for efficient, reliable operation. Using an ultrasonic flowmeter (USFM) to measure the acid gas flow rate through a feedback controller to secondarily measure the air flow rate greatly enhances the efficiency of an SVR. Air demand is calculated from the acid gas flows. Both of these lines need a USFM flow meter. The main air loop supplies about 90% of the total air to the burner. Conventional orifice plates or low pressure drop venturi meters have been used traditionally, however, plugging with ammonium salts is a continual problem, and in many cases due to the limited turn-down offered with an orifice meter the sulfur unit may not operate throughout its entire range of operation, limiting operation options in feedstock quality. If the air ratios are incorrect, inadequate impurity destruction and/or equipment corrosion may occur.



Tail gas generally will get routed to the flare. This is an application very familiar to a USFM and is the chosen technology in this application. Again, the wide turn-down ratio, and reliability make USFM the universal choice for sulfur tail gas monitoring. Be sure to verify that the temperature range of the tail gas is within the specification of the USFM, in this case less than 250 deg C. Increasingly operators use the unique MW measurement capability of USFM meters as an early warning detector that the treater may not be operating as efficiently as desired. If the Molecular Weight reading of the flare meter goes much above 29.5, then this can indicate a process that is not oxidizing Sulfur as well as desired and system checks or preventative maintenance may need to be performed.

You can find more details about GE flow measurement solutions & products here:
<https://www.gemeasurement.com/flow-meter>

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