Flare Gas Flow Measurement: Challenges and Solutions

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Flare systems are primarily installed for safety purposes at any processing plants. These flare systems are used to vent and burn off hydrocarbons and other unwanted gases under routine and emergency conditions, such as an unexpected shutdown. Today, there is much international awareness to measure and monitor flare gas flow for both environmental and economic reasons. The measurement of flare gas helps to comply with environmental regulations, identify points of leakage, optimize steam usage, help with flare gas recovery and reconcile plant mass balance.

Regardless of its importance and high demand, flare gas flow measurement itself is challenging mainly due to factors such as: unsteady flow velocity, extreme low flaring conditions, pressure fluctuations, very low operational pressure (near atmospheric pressure) most of the time, aggressive chemicals in the gas, potential high or low operational temperature, wide range of flare line sizes (2" – 100") and a wide-range of flow rates encountered (turndown ratio 1:4000 required). In particular, flare flow measurement requires instrumentation to be capable of measuring gas flow over a wide range of velocities: *from 0.03 m/s under lowest flow conditions, through 0.15-0.5 m/s for most normal operations, up to 80 m/s or above during emergency flaring.*

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Traditional flow meters based on differential pressure, thermal-mass, optical and vortex shedding have been explored for the flare gas application, but their individual success has been very limited due to many reasons such as, restricted rangeability (turndown ratio), inability to handle unsteady flows, buildups, condensates, corrosion, and sensitivity to changes in gas composition.

In the early 1980s, a flare gas ultrasonic flowmeter was first jointly developed by Panametrics (now GE) and Exxon (now Exxon Mobil) in Baytown, Texas, USA, demonstrating great success. Since then, ultrasonic flowmeters have been gaining more and more popularity for flare gas measurement, mainly because of high turndown ratio, relatively low installation and maintenance costs, capability of handling unsteady flows, and independence on gas composition. Today, ultrasonic flow metering is the accepted technology for monitoring flare gas, with thousands of installations worldwide.

In my role as Flow Meter Product Specialist at GE O&G , I am working currently with my colleagues in GE on several flow measurement solutions to overcome flow measurement challenges in O&G Applications

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

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