



Verifying minimum flow velocity for hot tapping safety requirement

Problem

As part of a safety plan, plant operations personnel at an oil refinery were required to verify a minimum flow velocity in a pipe of 1.2 ft/sec (0.36 m/sec) prior to issuing a hot-work permit to perform a hot tap.

Plant personnel at an oil refinery, located on the banks of the Mississippi River, needed to complete over twenty hot taps on an operating unit. They needed to hot tap flare, off-gas and waste gas lines. The minimum velocity requirement is a safety precaution to ensure that the heat from the welding is dissipated by the flow.

Solution

Pipe sizes range from 14 to 30 in. (350 to 750 mm). Fuel gas will be diverted into the pipes to generate the needed flow and increase the pressure range from 30 to 45 psig.

Since many of the lines do not have flow metering devices, a clamp-on solution was sought. Clamp-on meters based on the transit-time method were ruled out because they require higher gas pressures in order to work on steel pipes.

Panametrics CTF878 clamp-on gas ultrasonic flowmeter uses the correlation tag method to determine flow and offered a convenient solution for steel pipes with gas pressures as low as 0 psig. A trial flow verification was performed on an 18 in. (450 mm) Schedule 40 carbon steel pipe. There was a large fuel gas demand that day; therefore, the maximum pressure range was between 20 to 25 psig (2.3 to 2.7 bar). The CTF878 easily measured flow velocities between 3.6 to 4 ft/sec (1 to 1.2 m/sec).



Equipment

CTF878 Tag Flowmeter with 2 pairs of C-RL-306 (200 kHz) transducers installed using a PI clamping fixture with DMP-1 applied.

Specifications

Pipe OD	18 in. (450 mm) Schedule 40
Pipe ID	17.25 in. (43.8 mm)
Pipe Wall	0.375 in. (9.5 mm)
Pipe Material	Carbon Steel
Pressure	20 to 25 psig (2.3 to 2.7 bar)
Temperature	130°F (54°C)
Transducers	C-RL-306 (200 kHz) clamp-on transducers with a PI clamping fixture and DMP-1 applied

Benefit

Panametrics CTF878 provided the only viable solution to the unique challenge of measuring flow in a low-pressure gas line on a steel pipe without cutting into the pipe or interrupting the process.