Panametrics
a Baker Hughes business

Application note

Coke oven gas flow measurement

Equipment:

- 1 ea GM868-2-11-1002-4FM
- 2 ea PRE868-2-20
- 2 pr T5-90-10-41-NT-TI-A0-0
- Cables installed - 200 ft between preamp and console

Process isolation provided locally with ball valves, PFTE packing and flanged connection for acoustic isolation.

Contoured flange plate with threaded nozzles welded to pipe - bias 90 configuration, 9" spacing.

Summary

Coke oven gas is a by-product of the steel industry produced by the degassing of coal. Once the gas is used in the process it is typically recovered and used as fuel. In this case the areas that use the gas are billed by the utility department for their usage. The main gas line is presently measured and each plant is billed equally for usage. The problem is that the amount of flow to each plant is only an estimate and the plants want to know the actual amount of the flow.

Gas composition

A typical gas composition is 58% hydrogen, 26% methane, 5.5% nitrogen, 2.25% acetylene, 2% carbon dioxide, 6% carbon monoxide and 0.25% oxygen.

Previous measurement

The plant attempted to measure the flow using a velocity pressure device. The problem at the point of measurement is that the gas is very dirty and "tarry" and the primary device plugged easily. Orifice plates could not be used because the total line pressure is under 100" of water.

Equipment used

A GM868 with preamp and T5 transducers were used. A plate was manufactured with nozzles that were welded to the 30" pipe. The configuration was mid-radius bias 90 with 9" spacing (due to high hydrogen in gas).

Parameters

With help from the factory we estimated the sonic velocity around 1900 fps. The unit was programmed and put into operation. Diagnostics showed the sonic velocity to actually be around 1725 fps. The unit was reprogrammed for this value.

The following values were measured.

Flow: 0.430 MMSCFH, Velocity: 27.9 fps, signal strengths: 65-66.

The customer was very happy with the readings. The operating unit gave a estimate of about 0.400 MMSCFH (plus or minus 10%). This value is significantly lower than the amount being billed.

The installation of the device caused minimal disruption in the plant operations, given it was directly tapped in the line, it now also ensures the ease of cleaning and maintenance when required without process interruption.

Conclusions

The unit was ordered as a two channel and the second line (42") will be commissioned in October. Other plants using this fuel will also look at the technology.

Other applications

Steel mills typically use both coke oven gas and blast furnace gas as fuel. Blast furnace gas has lower hydrogen content making the measurement easier than the coke oven gas. This plant initially installed a GP68 and then a GM868 – on blast furnace gas .a number of years ago. These units have yet to be out of service.