Differential Pressure Flow Meters

Fluid:	Natural Gas
Industry:	Gas Distribution
Application:	Vaporized Liquid Natural Gas
Specifications:	No straight run Turndown 60:1

Application

A liquid natural gas plant in the Midwest needed to measure gas flow to heaters that vaporize LNG to gaseous natural gas for use during peak periods in the winter season. The company stores LNG in two 12,000,000-gallon tanks and uses gas-fired heaters to vaporize it as required to meet customer demand. For most of the year demand is low (1,000 SCFH); however, during the coldest winter months gas consumption jumps to 60,000 standard cubic feet per hour (SCFH) in a 3" sch 40 line at 80 psig/70° F.

Problem

The plant must account for the gas usage over the entire range as it is part of the operating cost during LNG vaporization, as well as when it is used for plant heating. The customer could not find one meter to accommodate the entire range accurately. The plant had attempted to measure the flow rate with a Roots turbine meter sized for the maximum flow rate, but could not get accurate flow readings at the low end of the measurement range, making it impossible to determine actual usage during the off-peak periods. In addition to accuracy limitations, turbine meters have moving parts that wear and require expensive maintenance. The customer's operating cost was estimated and charged against the bottom line. In addition, as you can see from the photo, there was no straight run available which hindered a conventional meter's ability to perform accurately.

Solution

A Model AF 3" 150-H-M Accelabar was installed immediately downstream of a pipe reduction, control valve and pressure regulator. The Accelabar had two Foxboro IDP50 high accuracy DP transmitters directly mounted to the top works of the Accelabar. Stacked outputs were required to accommodate the wide turndown in DP of 308.2" w.c. at max and 0.08" DP at min.

Result

The Accelabar performed as advertised with ±0.75% accuracy over the entire range of 1,000 to 60,000 SCFH – a flow turndown of 60:1. Because the Accelabar and transmitters have no moving parts to wear or seize, maintenance is minimal. The LNG supplier has found that the flow metering system is user friendly and easy to operate, especially since DP flow measurement is one of the most easily understood of any technology available. To the LNG provider, this translates into improved material accountability and lower operating costs to increase profitability.

Application: 3" Sch 40 Natural Gas
Operating Pressure/Temperature: 80 psig/70° F
Max/Min Flow Rate: 60,000 SCFH/1,000 SCFH
Flow Turndown: 60:1