

LOCAL VALVE LEADER BEATS THE WORLD

A South African valve manufacturer has emerged as the only company worldwide capable of developing an air release valve under tight time constraints to solve a pipeline problem specific to the United Arab Emirates.

While several manufacturers had designs theoretically capable of meeting the specifications, only Dynamic Fluid Control (DFC) offered a practical solution that would allow the air release valve to open at 3,4 bar and release air in the very high volumes demanded by the application.

The need for the special valve arose when increased flow requirements were imposed on an existing pipeline by the Abu Dhabi Water and Electricity Authority (ADWEA), which needed to increase by 60 percent the rate of water flow through the Shuweihat Water Transmission Scheme (SWTS) pipeline, without any change in the size of protective surge vessels already installed.

The SWTS originally involved the generation of 1500MW of power and transmission of 100-million gallons per day of desalinated water from Shuweihat to Mussaffah, a distance of 250 kilometres.

One of the biggest water pipeline projects ever undertaken using ductile iron pipes, it became the biggest combined power and desalination plant in the world when transmission was last year increased to 160-million gallons per day, or 25 000 m³/h.

After commissioning at the higher flow, surge vessels installed at the mid-way Mirfa Pump Station proved inadequate to prevent the entry of air from the vessels into the pipeline during conditions of pump trip, in spite of the PLC-controlled solenoid valves fitted to close the air inlets.

This air ingress lowered the pipeline pressure, raising the possibility of the pump motors running away and becoming damaged during start-up.

It also caused column oscillation within the pipeline.

After unsuccessful trials on alternative air inlet valves, ADWEA commissioned Dutch-based WL Delft Hydraulics to perform steady state verifications for different operating conditions and pressure surge analyses, and evaluate normal and emergency operations and the design of appropriate anti-surge devices and measures.

Valve manufacturing companies worldwide were approached for a solution that would allow the expensive surge vessels originally installed to remain in place, based on new vent pipe positions and hydraulic parameters specified by Delft Hydraulics.

These included minimum inflow and maximum outflow capacities under the combined conditions of pump trip and increased flow, and an exact pressure under which any proposed air release valve would need to immediately open.

If all specifications could be met, then the ingress of air into the pipeline would be prevented. All air would be contained within the vessel to meet its intended purpose of acting as a cushion against pipeline surge.

One difficulty lay in the size of the valve's air port.



Normally no larger than 2mm in diameter, it would have to increase more than twenty-five fold to 52mm to meet the Delft Technologies specifications.

A second problem was the float needed to seal the port when the water level within the vessel rose above the valve.

This float would need to fall away promptly at the specified pressure of

3,4 bar, and because of the very large size of the port, it would need to have a mass of around 80kg if it was to fall as soon as that pressure was reached.

DFC was the only valve manufacturer with an existing design, the Vent-O-Mat, that could accommodate a float of this very large size. According to product manager Hannes Erasmus, it was Vent-O-Mat's proven and patented design that made possible its successful adaptation to the Delft specifications.

"Vent-O-Mat became the only valve worldwide that could be successfully adapted, although the modifications to the original design were so substantial that the result is effectively a completely new product," Erasmus said.

"As an end design, the modified Vent-O-Mat emerged as a 200mm nominal bore air release valve housed in a cylinder of 450mm diameter to accommodate the necessary float and projected exhaust flow.

"The only other competitor valve type to be installed by ADWEA for trials was not up to the task," Erasmus claimed.

Developed during the third quarter of last year to successfully pass the necessary trials, DFC has subsequently delivered and commissioned 32 identical valves, two per manifold for each of the SWTS's 16 surge vessels. These 32 valves effectively replaced 240m³ of surge vessel volume and also saved more than 50% of the associated expenses.

All were manufactured under stringent quality controls that included die-penetrant testing, x-ray inspection of all welds, and witnessing by the customer of drop tests carried out on each completed valve.

"We expect these specially modified valves to continue the outstanding performance record of our Vent-O-Mat valve family," commented Erasmus.

"Vent-O-Mat was itself developed by DFC in 1982 as the most efficient and cost effective method of three-way pipeline protection.

"It has grown to become the market leader in many countries around the world," he concluded.

August 28, 2008

For more information contact:

Vent-O-Mat/Dynamic Fluid Control (Pty) Ltd
PO Box 5064
Benoni South, 1502, South Africa
Tel : +27 11 748-0200 Fax : +27 11 421-2749