DA to DP Conversion – Performance Information

May 4, 2001

We have recently received questions regarding the differences in cycle life performance of the DP and DA series diaphragm valves as stated in the individual product Technical Reports. We would like to offer information regarding the differences between the two valve series and outline the benefits of the new DP series valve.

Benefits of the new DP series diaphragm valve:

- Competitively priced
- Integral locking handle
- Available in both low and high pressure models
- High purity VIM/VAR stainless steel raw material
- Improved Helium Leak Test (HLT) performance

In developing the DP series valve, Swagelok incorporated the use of two different computer aided engineering tools. The first is a 3-D modeling software called Computational Fluid Dynamics or CFD. CFD provides the designer the ability to measure the different flow characteristics of the valve. Second is Finite Element Analysis or FEA. FEA allows the designer to model a variety of different mechanical properties of the valve. It was through the use of these two computer aided engineering tools that Swagelok was able to achieve the dramatic improvement in flow and HLT performance in our new DP series valve.

HLT test results:

DA valve: Meets SEMI specification F1-96 requirement of helium leak rate of 1 x 10-9 std cc/sec for the manual valve. The DA valve averages 15 seconds before permeation is detected.

DP valve: Exceeds the F1-96 requirement. The DP valve averages 200 seconds before permeation is detected.

Cycle Life Performance:

The HLT performance enhancements of the DP valve outlined above required a seat design that is wider than the DA series. This wider seat requires additional shut-off force that results in higher stress on the diaphragms. This increase stress results in a DP series cycle life that is lower than the DA series valve under similar conditions.

While the DP series cycle life is lower than the DA series, the DP cycle life performance does exceed the requirements of SEMI E49.9 (1 million cycles). In addition, the cycle life performance of the DPH series high-pressure valve

exceeds the cycle life performance of our existing high pressure valves, the HB series bellows valve and the HD series springless diaphragm valve.

The DP series Technical Report was developed in order to show the performance of the DP with respect to the semiconductor industry testing standards. It is not intended to be used as a comparison with the DA series as the cycle life test methods are different.

If you have any additional questions regarding the DP series valve, please contact **Joe Bush** at (440) 473-1050 or e-mail at Joe.Bush@Swagelok.com.