Riboflavin Tests

Demonstrate Swagelok® DR Series Valve Design is Cleaner

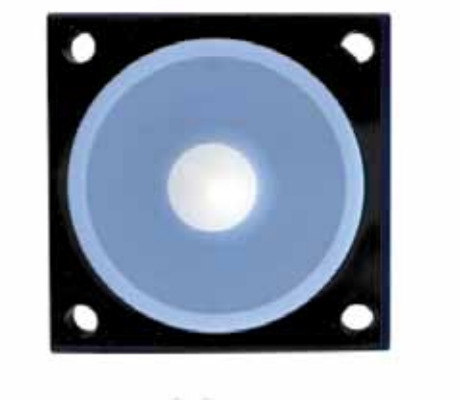
An independent testing and validation service performed a comparison test of weir-style valves and Swagelok DR series radial diaphragm valves to determine susceptibility to entrapment and to compare the relative cleanability of the two valve styles. Powdered riboflavin was cycled through the valve, coating the internal surface of the flow path. After cleaning, the valves were disassembled and inspected for riboflavin residue.

Results indicate that weir-style valves have a potential entrapment area at the valve bowl edge, between the body and the diaphragm. The boreline seal in the DR series radial diaphragm valve virtually eliminates this entrapment area, thereby enhancing system drainability and cleanability. For complete results of this riboflavin cleanability comparison test, contact your authorized Swagelok sales and service representative.

Weir-Style Valve Body

Swagelok DR Series Valve Body

Weir-Style Valve Diaphragm



Swagelok DR Series Valve Diaphragm

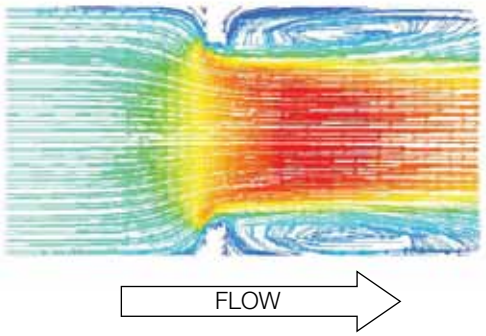
Computational Fluid Dynamics

Demonstrate Swagelok TS Series Fitting Design Minimizes Fluid Holdup

Computational fluid dynamics (CFD) analysis was used to show predicted flow paths and predicted velocity fields in both ISO 2852-type and Swagelok TS series fittings. The gasket intrusion values used in this analysis were derived from performance testing, which measured significantly higher gasket intrusion in ISO 2852-type fittings compared to TS series fittings. The analysis used water at ambient temperature, with an inlet velocity of 5.5 ft/s (1.67 m/s).

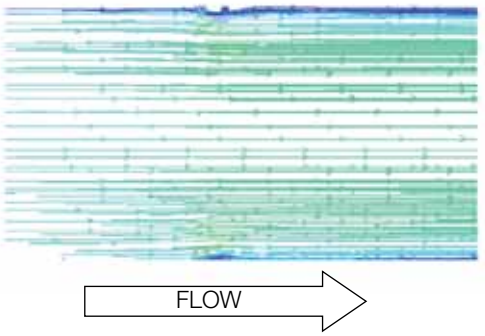
The resultant flow stream graphics show that flow through the ISO 2852-type fitting becomes turbulent as it passes through the gasket. Eddies created on the downstream side become potential entrapment areas, which may be difficult to clean. The Swagelok TS series fitting flow stream graphic indicates good laminar flow through the connection, with no concern for deposits or dead spaces.

ISO 2852-Type Fitting



Predicted Flow Paths
0.120 in. (3.05 mm) intrusion
5.5 inlet ft/s (1.67 m/s) velocity

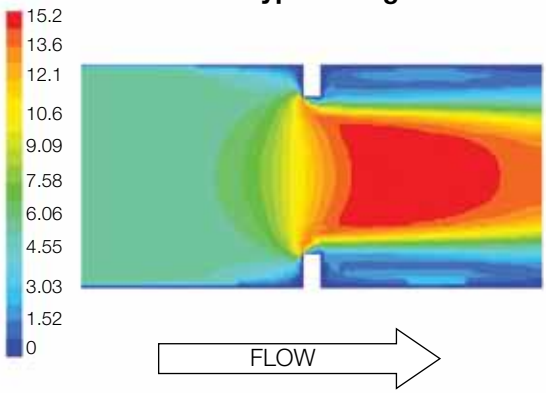
Swagelok TS Series Fitting



Predicted Flow Paths
0.015 in. (0.38 mm) intrusion
5.5 inlet ft/s (1.67 m/s) velocity

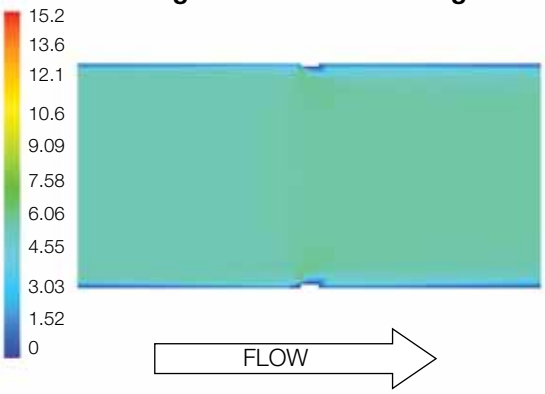
The resultant velocity graphics show that as water moves through the smaller orifice of the ISO 2852-type fitting, velocity increases—as shown by the yellow and red areas. Such velocity increases are often associated with cell shear. The dark blue areas on the downstream side indicate low flows of 1.5 ft/s (0.45 m/s). These low flow areas or dead spots are far below the flow recommended for good sweeping action associated with proper cleaning. The TS series fitting maintains desired flow through a large percentage of the flow path. Velocity increases are minimized, and the velocity quickly returns to within target range for a large area downstream of the gasket. There are no dead spots.

ISO 2852-Type Fitting



Predicted Velocity Fields
0.120 in. (3.05 mm) intrusion
5.5 inlet ft/s (1.67 m/s) velocity

Swagelok TS Series Fitting



Predicted Velocity Fields
0.015 in. (0.38 mm) intrusion
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