



Sentinel™ Seats

FOR DURCO BTV-2000 HPBV



Quality
System
Certificate

The Best Choice For Corrosion And Permeation Problems

Bulletin V-21a

New Durco Sentinel Seat Takes Fluoropolymers To A Higher Level Of Performance

Permeation Resistance Superior To PFA

Fully-fluorinated polymers have always been highly regarded for their nearly universal corrosion resistance. And since Flowserve introduced the CPI's first fluoropolymer lined butterfly valve in 1965, we've become the world's largest manufacturer of lined valves, building a virtual warehouse of applications information along the way.

A recurring concern, however, among lined valve users has been the perception that fluoropolymers are prone to permeation. To answer that concern, Flowserve has developed the proprietary fluoropolymer Sentinel seat for its BTV-2000 HPBV. When compared with PFA, Sentinel provides not only better permeation resistance but a host of other important performance benefits.

Superior Permeation Resistance to PFA

It's a fact that the more crystalline a fluoropolymer, the more permeation resistant it is. Conversely the more amorphous the structure, the more permeable it becomes. Sentinel seat material is considerably less permeable than PFA due to its greater crystalline phase.

Exhibit A

Amorphous Structure
PFA Seat Material

Crystalline Structure
Sentinel Seat Material



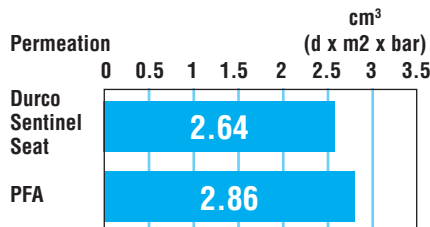
- Low Density
- High Permeation
- More Leak Paths

- High Density
- Low Permeation
- Few Leak Paths

Exhibit B

Permeation of Fluoropolymers

Thickness: 1 mm • Test medium: Helium Gas



The Sentinel seat has less permeation than PFA due to the increased crystalline phase of the Sentinel's proprietary fluoropolymer.

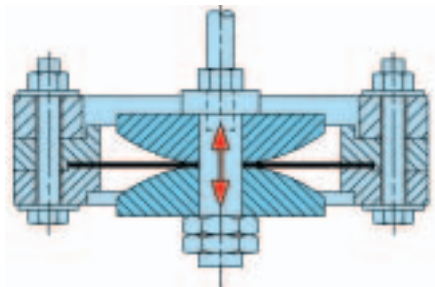
Higher Cycle Life Than PFA

Sentinel provides a much higher cycle life than PFA due to its superior flexibility. Independent testing proves Sentinel cycles more than 80% longer than PFA before experiencing flex failure. PFA's relative lack in flexibility is the reason competitive PFA seats must be considerably thinner than the minimum 1/8 in thick liner used in a Durco BTV-2000 HPBV.

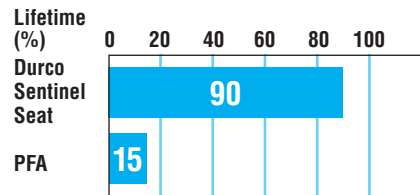
Exhibit C

Flex Fatigue Properties

To test the Flex Fatigue Properties of different materials, a flat fluoropolymer membrane without any structure is put into a testing rig and moved up and down until the material fails.



Membrane: diameter – 10 cm; thickness – 1 mm



The Results:

With this test method, the Durco Sentinel seat completed 90% of the flex cycles of the control material while the PFA could attain only 15% of the flex cycles before failure.

Your Best Choice For Superior Permeation Resistance And Overall Performance

Better Sealing Properties Than PFA

Sentinel's greater flexibility also results in better sealing as the seat more accurately conforms to the interference fit of the disc. This dynamic plus the machined spherical ball and socket disc/liner seal design contributes to the BTV's bubble tight shutoff.

Lower Valve Turning Torque Than PFA

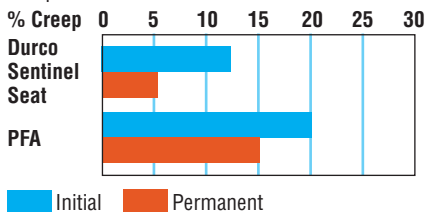
The Sentinel proprietary fluoropolymer seat features lower coefficient of friction than PFA with equally low absorption and swelling. These characteristics result in consistently lower seating/unseating torques which are critical to automated installations.

Better Thermal Cycling Capabilities Than PFA

Exhibit D

Creep Resistance Chart

750 psi x 500°F for 24 hours



Creep resistance is crucial to fluoropolymer seat cycling, especially at elevated temperatures. Generally, the less initial creep, the better the seal. Moreover, the less permanent creep, the less seat deformation over time and, consequently, better shutoff. The less initial and permanent creep at elevated temperatures, the better the thermal cycling capabilities of the material. Testing showed that PFA suffered almost 2x the initial creep and over 3x the permanent creep vis-a-vis proprietary Sentinel seal material.

Longer Seat Life Than PFA

Sentinel seats are thicker with a higher specific gravity than competitive PFA parts. This not only substantially improves resistance to permeation but results in a stronger, more rugged and longer-lived seat.

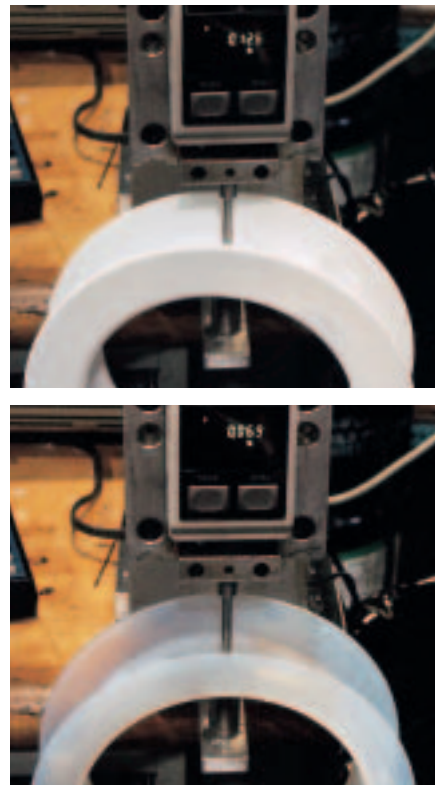
Corrosion Resistance Equal To Or Superior Than PFA Over A Wide Spectrum Of Chemical Processes

Conclusion:

BTV-2000 HPBVs With Proprietary Fluoropolymer Sentinel Seats Are Your Best Choice For Superior Permeation Resistance And Overall Performance

Sentinel's crystalline structure, thicker construction and greater flexibility add up to a clearly superior seat material for the best HPBV on the market today, the Durco BTV-2000. You can learn more about the outstanding quality and design features of the BTV-2000, the variety and superiority of the available materials and its performance benefits by requesting Bulletin V-20 from your local Flowserve sales representative or authorized stocking distributor.

The test results presented in this publication were conducted by an independent third party testing laboratory. Flowserve Corporation had no part in designing the tests, monitoring and collecting the data or concluding the results.



The top photo shows a Durco Sentinel fluoropolymer liner while the bottom photo shows a competitive PFA liner. It can be easily observed that the Durco liner is almost twice as thick and, thus, is more permeation resistant.

Sentinel



Flowserve has the answer to your corrosion resistant, quarter-turn valving needs.

Clockwise from top right.

BTV-2000

PTFE or UHMWPE lined
chemical service valve

Atomac[®] Lined ball valves

- AKH2 full port
- AKH2A ANSI dimensional
- AKH2.2 DIN dimensional
- AKH3 ANSI dimensional
- AMP3 3-way
- AKH5 ceramic lined
- AKH6 tank drain
- AKH7 (for glass pipe fitting)
- ARV2 check valve
- ASG sight glass
- ARV/SG check valve/
sight glass
- ASF strainer

Sleeveline[®]

Non-lubricated, PTFE-sleeved
plug valves

- G4 Isolation
- G4E – DIN Mounting Pad
- G4 Marathon™
- TSG4 Severe Service

T-Line[®]

Non-lubricated, PTFE-lined
plug valves

- T-41
(ANSI Class 150)
- T-43
(ANSI Class 300)

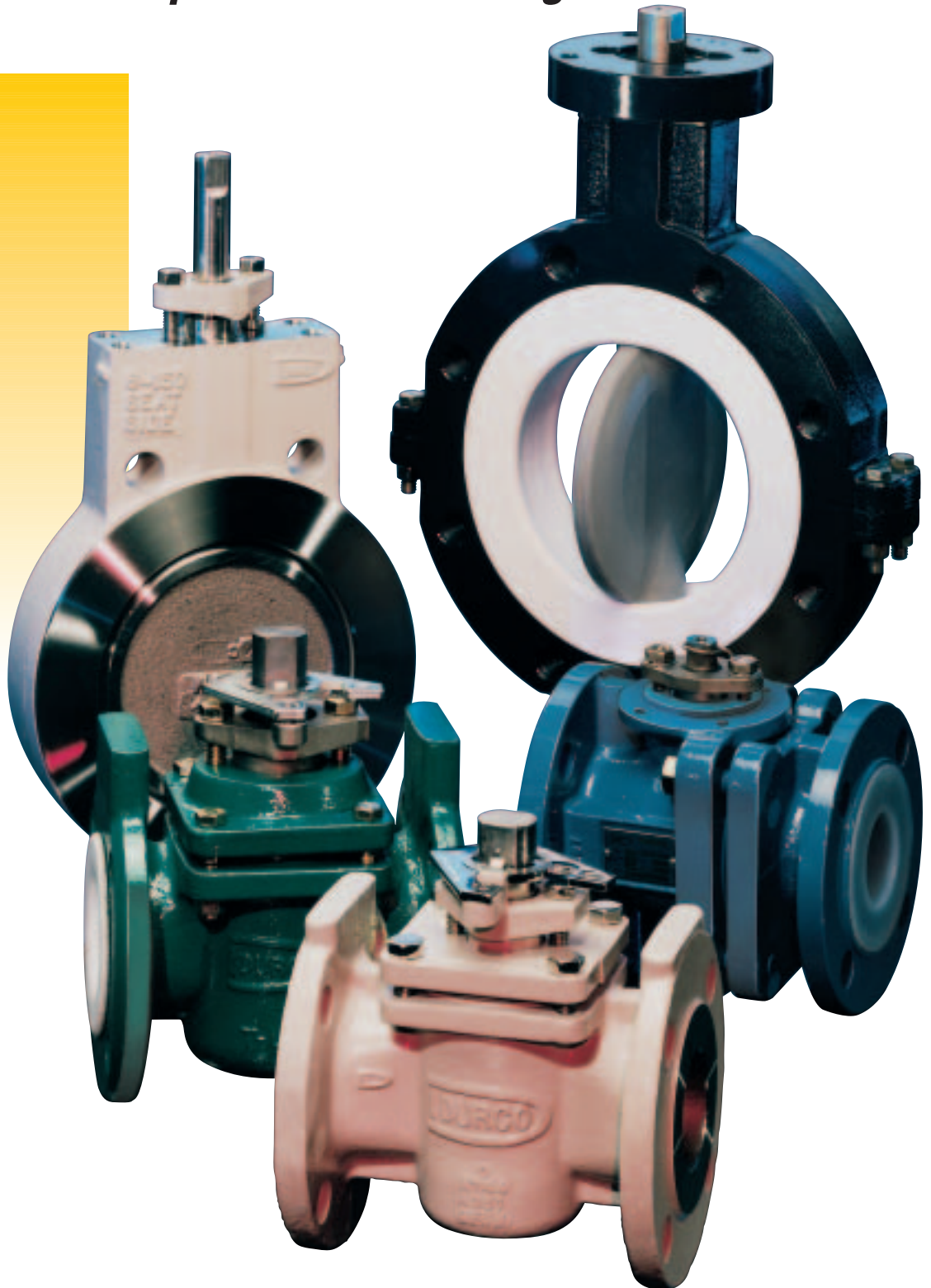
Big Max[®]

High performance valves

- BX2001 (ANSI Class 150)
- MX (ANSI Class 300)

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Printed in U.S.A.
September 1998
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