



# Glass-Lined Flush Valves

## Data Sheet DS97-102-2



Figure 1: Manual glass-lined flush valve is simple, reliable and economical

### Pfaudler Glass-Lined Flush Valves

Installed on the bottom outlet nozzle of a glass-lined reactor or other vessel, the basic function of any glassed flush valve is simply to open and close the outlet to drain or retain the contents of the vessel. A manual flush valve is opened and closed by turning a handwheel. The two models of air-actuated flush valves employ air pressure to open the valve, spring action to close it.

### Reliable Product Protection

Pfaudler flush valves, manual as well as air-actuated, are lined with corrosion-resistant glass fused to a rigid, strong metal substrate on the process side. A one-piece, glassed valve head and stem closes against a self-sealing seat of glass-filled PTFE. Chevron-shaped packing rings seal the valve stem area.

Pfaudler glass is durable, impermeable and inert to a broad spectrum of acids and alkalis. Since there is no exposed metal inside the valve, most powerful corrosives have no effect. There is no possibility of metallic contamination or catalytic side reaction to affect the purity of your product. In addition, the smooth glass surfaces resist product adherence to minimize build-up and reduce your maintenance requirements.

Even when you change the process or process conditions, there is no need to change the flush valve because of its remarkably broad range of resistance to corrosion. In fact, these valves can be specified to withstand the same service conditions of pressure, temperature and chemical exposure as your Glasteel® process equipment, except for full vacuum service. Therefore, you are assured a continuous return on your investment.

### Key Features

- Complete selection of glass-lined flush valves for use on the bottom outlet nozzles of glass-lined vessels. You can choose from a manual design or two models of air-actuated flush valves that also permit diffusion, if desired.
- Glass-lined flush valves are lined with Pfaudler's virtually inert, acid- and alkali-resistant glass to protect product purity. A Glasteel, one-piece valve head and stem seals reliably against a glass-filled PTFE seat, completing the internal protection.
- Air-actuated, glass-lined flush valves help prevent corrosion

and product contamination and promote personnel safety, operational speed and efficiency.

- Air-actuated valves are opened by air pressure, closed by spring action when pressure is removed, thus allowing convenient, remote control of the flush valve.
- Remotely controlled valves permit safer operation of reactors by eliminating the need to crawl underneath to operate a manual flush valve.
- Quicker shutdown, easier operation and a choice of operational options are facilitated by air-actuated flush valves. You can control valve operation from a local or remote panel or a control room.
- You can back-charge either model air-actuated flush valve to allow diffusion or sparging of gas into the reactor.
- Failure of the air actuator or loss of air pressure in either model results in the flush valve returning to the closed position. Manual override to drain the reactor is possible with either model.

### Economical, Proven, Manual Flush Valve

The manual glass-lined flush valve (refer to Figure 1 and Table 1) provides long life and reliable operation on small glass-lined reactors or other vessels where speed of operation is not an important factor.

This valve employs a smooth-rimmed handwheel to prevent overtightening when opening or closing the valve. The valve is opened by turning the handwheel counterclockwise (viewed from below) and closed by clockwise rotation.



Figure 2: Low-profile, air-actuated flush valve mounts on reactor's bottom outlet nozzle; requires minimal clearance beneath the vessel.

### Faster, Safer Operations with Air-Actuated Flush Valves

A manual flush valve serves its purpose well on a small reactor, where it can easily be reached from the side. On a larger reactor, however, a manual flush valve may offer some disadvantages.

- It could pose a potential safety hazard, since someone must crawl into the normally tight space beneath the reactor whenever the valve has to be opened or closed.
- The manual valve slows operations, since it requires several revolutions of the handwheel to open or close it completely.
- On reactors where the valve is more accessible, manual operation can delay the start of reactor shutdown and reloading.

Contrast these drawbacks to safe, convenient operation with Pfaudler air-actuated flush valves, which you control by the touch of a remotely located button, or even by a signal from a central control system.

The spring-to-close design provides a continuous seating force when the valve is in the closed position, not found on manual valves.

### Choose from Two Air-Actuated Models

Two models of air-actuated glass-lined flush valves are available. Both are designed to mount on the bottom outlet nozzle of a glass-lined reactor and may be ordered with your choice of ANSI drillings as shown under the Flush Valve Operational Features section.

The low-profile air-actuated flush valve (see Figure 2, Tables 2 and 3) achieves its compactness by offsetting the air actuator and return spring from the valve centerline.

A pivoting lever transmits the actuating forces that operate the flush valve. The overall depth of this model below the bottom outlet nozzle is shown for each valve size in Table 2.

The vertically mounted, air-actuated flush valve (see Figure 3, Tables 2 and 3) has its air actuator and return spring located below the valve stem and linked directly to it for straight-through actuation. The overall depth below the bottom outlet nozzle appears in Table 2, but note that additional clearance is required for connection of the air line.

In both models, the valve is opened when sufficient air pressure is applied to the actuator to overcome the spring plus the effect of reactor pressure on the valve head. The required air pressure for each design is shown in Table 3.

Upon removal of air pressure from the actuator, the valve is closed by action of the return spring. Thus, the failure mode of either model is with the flush valve closed.

If desired, either air-actuated valve can be used to sparge gas through the flush valve into the bottom of the vessel. Sparging takes place when enough back-charge pressure is applied on the outlet side of the flush valve to overcome the return spring and lift the valve head away from the seat.

### Flush Valve Operational Features

With the flush valve bolted to the bottom outlet nozzle of the reactor, the valve head and seat project up into the outlet opening. When the valve is opened, the head and stem push upward, tending to break up and free any layer of residue that might have collected in the vessel bottom.



Figure 3: Vertically mounted, air-actuated flush valve with straight-through actuation, suitable for reactors with adequate clearance below the bottom outlet.

With the valve closed, the hydraulic head of liquid in the vessel plus vessel pressure (if any) act on top of the valve head to help maintain a tight seal. However, the seal may not be completely tight if the vessel is operated under vacuum or if there is pressure on the outlet side of the valve.

Every Pfaudler flush valve is air-tested and hydro-tested for leakage through the head to seat, body to seat, and valve stem packing area. This testing assures that the valve you buy will function properly, right out of the box.

Valve Size A x B	Class 150		Class 300	
	Height (H)	Weight	Height (H)	Weight
2 x 1½	11	18	11½	25
3 x 2	12¾	28	13¾	45
4 x 3	13⅞	42	15¾	60
6 x 4	20¾	100	20¾	115
8 x 6	20¾	135	22¾	150

**Table 1: Manual Flush Valves**

(Dimensions in inches; weights in pounds)

Valve Size A x B	Low-Profile Model		Vertically Mounted Model	
	Height (H)	Weight	Height (H)	Weight
2 x 1½	13⅞	40	24	42
3 x 2	13¾	47	24¾	52
4 x 3	14¾	61	24¾	66
6 x 4	22¾	150	33¾	160
8 x 6	23¾	185	34¾	195

**Table 2: Air-Actuated Flush Valves**

(Dimensions in inches; weights in pounds)

Valve Size A x B	Low-Profile Model		Vertically Mounted Model	
	Min	Max	Min	Max
2 x 1½	60	100	25	100
3 x 2	60	100	40	100
4 x 3	60	100	45	100
6 x 4	30	100	25	50
8 x 6	30	100	35	50

**Table 3: Actuator Air Pressure Requirements**

(Minimum and maximum air pressure limits in psig to fully open valve against 0-100 psig vessel pressure)

Pfaudler flush valve bodies are available in the following drillings and pressure and temperature ratings:

Steel: Class 150 – 150 psig  
 -29°C to +232°C (-20°F to +450°F)  
 Class 300 – 300 psig  
 -29°C to +232°C (-20°F to +450°F)

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