Disc Bottom Outlet Valve – General Overview

SchuF has delivered over one million valves during its almost 100 year history to a wide variety of industries in over 50 countries worldwide. Headquartered near Frankfurt in Germany, the company has additional design and manufacturing centres in Brazil, India, Ireland and the United States.

The SchuF group has sales and agent offices covering almost every country in the world. We manufacture valve products that control, isolate, divert, and sample liquids, gases, powders, and slurries. Our product range of engineered, customised valves includes:

- **Bottom Outlet Valves**
  - Piston / Ram Bottom Outlet
  - Disc Bottom Outlet
  - Wafer Control Valve
  - Disc Rising Bottom Outlet
  - Wafer Control Plug
  - Backpressure Control Valve
  - Automatic Recirculation Valve

- **Control Valves**
  - Angle Control Valve
  - Globe Control Valve
  - Disc Lowering Valve
  - Coker Control Plug

- **Coker Valves**
  - Coker IsoPlug
  - Coker SwitchPlug
  - Coker Quench Valve
  - Coker Combination Valve

- **Diverter & Changeover Valves**
  - Mullport Diverter Valve
  - Lift Plug Diverter Valve
  - Lift Plug Switching
  - Changeover Valve

- **In-Line Valves**
  - Lift Plug On-Off Isolation
  - Lift Plug Switching
  - Lift Plug Bypass
  - Y-Globe Valve

- **Sampling Valves**
  - Line Sampling Valve
  - Screw-In Sampling Valve
  - Submerged Sampling Valve
  - High Pressure Angle Valve
  - Wafer Sampling Valve
  - Sampling Systems
  - Steel Injection Valve

- **Other Products**
  - Line Blinds Cam Set & Stacey
  - Spray Rinse Valve

Sample Bottom Outlet Valve Client List:

- Aker Kvaerner
- Astra Zeneca
- BASF
- BAYER
- Boehringer Ingelheim
- Novartis
- Degussa
- Du Pont
- Formosa Plastics
- GE
- GlaxoSmithKline
- Honeywell
- Indorama
- Ineos
- Lurgi
- Merck
- Mitsubishi
- Petrobras
- Pfizer
- Reliance
- Roche
- Samsung
- Sandoz
- Sanofi Aventis
- Schering
- Shell
- Shenhua
- Sinopec
- Solvay
- Yisheng
- Uhde Inventa Fischer
Industry Application Case Studies for Disc Valves

PTA Application Case Study
A major North American producer of PTA faced a problem, which had caused a critical PTA process line to run inefficiently. The customer had installed ball valves at the entrance to transfer lines between crystallisers which regularly got stuck due to build up of slurry around and in the ball itself. SchuF resolved the problem by providing a self draining Disc BOV with integrated flushing and no dead space. The combination of a dead space free connection and flushing eliminated the build up of the slurry. Plant efficiency increased significantly thereafter.

Alumina Service Case Study
The production of alumina requires valves that can withstand significant abrasion and scaling. One important producer of Alumina in Brazil was faced with the problem that their existing feed valve seats would regularly get stuck and consequently not close. This led to equipment damage and production down time. SchuF resolved the problem by designing a special disk grinding mechanism specifically suited to Alumina slurry. With the new design SchuF Disc BOV the alumina producer now has no issues with valve closure.

Development of Bottom Outlet Valves
Bottom Outlet or Drain Valves have been extensively used in the chemical and related industries for almost 100 years. Invented by SchuF in 1923, their initial application was to replace the very simple wooden plug used to close or drain tanks, vessels or pipelines. Their introduction made it possible to drain vessels containing dangerous substances, and handle media under high pressure or temperature safely. The other key benefit for early users of Bottom Outlet Valves was the ability to ensure dead space free draining of vessels or reactors.

Polymer Service Case Study
SchuF disc valves are used extensively in the Polymer industry as they are ideal for injecting low viscosity feedstocks. For one particular Asian customer where Vinyl Chloride is used as a feedstock, the disc and seat were contoured to exactly match the vessel wall and a special bellow seal was supplied. This ensured that no atmospheric pollution would take place. The customer reported excellent valve sealing performance.

Mining Application Case Study
A European Tungsten Carbide mining company faced the problem that an on-off valve installed after a depressurization vessel leaked, and had to be maintained weekly. In this secondary process, tungsten is mixed with caustic soda at high pressure and a highly abrasive slurry results. By replacing the on-off valve with a SchuF Disc BOV the company was able to reduce maintenance to annual checks. According to the plant manager “The valve has worked so well, that I can’t even remember when we last had to do any maintenance”

Alumina Service Case Study

Polymer Service Case Study

Mining Application Case Study

Development of Bottom Outlet Valves

Bottom Outlet Valve Types
SchuF has developed a diverse range of Bottom Outlet Valves which include both Disc and Piston (or Ram) categories. The fundamental difference between the two are:
- Disc valves have a shorter length and are therefore ideal where space is limited or weight is a concern. The shorter stroke means that smaller, lighter and faster actuators can be used, saving cost and weight.
- Ram Piston valves have full bore unimpeded flow and are more suitable for vessels that need to be drained or flushed quickly, for highly viscous media or where large samples need to be taken.

Industry Application
Today, Bottom Outlet Valves (BOV) have found applications beyond the chemical and petrochemical industry. They are suitable for pharmaceutical and biotech applications where cross contamination must be avoided. They have also found a place in abrasive slurry and high temperature environments such as in the coal liquefaction and alumina industries.

Disc Bottom Outlet Valve Models
Disc Bottom Outlet Valves can be supplied as a disc rising or disc lowering model. The disc rising valve models 19 (same size inlet/outlet) and 25 (bigger size inlet than outlet) are most suitable for media where solid materials or crystals can form at the exit point of the vessel. As the disc opens into the vessel automatic crust breaking takes place. The disc rising valve is also normally a flow to close design, which aids sealing performance.
Disc Bottom Outlet Valve – General Overview

The disc lowering valve models 18 (different size inlet/outlet) and 24 (bigger size inlet than outlet) can be used on vessels with low mounted agitators, as it is non intrusive. Disc lowering valves can also be combined with sampling valves.

Valve Bodies
The valve bodies for all models would usually be in various stainless steel grades, but can also be provided in any available castable or weldable material.

Disc Bottom Outlet Valve – Sealing Arrangements
Disc valves are available with a number of different sealing options:
- Model 25BS is typically a Hastelloy or stainless steel valve with a stuffing box seal to the outside.
- Model 25BH is usually a metal or stainless steel valve with a Hastelloy or metal bellows and a back up stuffing box seal.
- Model 25BF is a Teflon or glass lined valve with bellows and back up stuffing box seal.
- Model 25BM features a Teflon or rubber diaphragm seal.

All disc valves can be provided with a “TA Luft” (exacting German environmental emissions standard) compatible stuffing box seal. Sealing to process options include metal to metal, hard faced material options and PTFE sealing ring.

Features of Disc Bottom Outlet Valves
Core features of Disc Bottom Outlet Valves include a robust design and construction, high adaptability, and no dead space. Each SchuF Bottom Outlet Valve is adapted to fit the requirements of the proposed application, whether it be a non standard size connection, highly abrasive material, or low contamination requirements.

Disc Bottom Outlet Valve Specifications

<table>
<thead>
<tr>
<th>Standard</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>1” to 18” as standard Larger on request</td>
</tr>
<tr>
<td>Body</td>
<td>Stainless steel 1.4408 (CF-8M) 304, 316L, Duplex, Hastelloy, Monel, Titanium, Nickel, Inconel, Incoloy, etc.</td>
</tr>
<tr>
<td>Valve lining</td>
<td>n/a PTFE, glass, ceramic or rubber</td>
</tr>
<tr>
<td>Disc</td>
<td>45° or 60° 90°</td>
</tr>
<tr>
<td>Outlet</td>
<td>n/a Glass lined, hard faced, tantalum clad, PTFE and all materials under “Body-Optional”</td>
</tr>
<tr>
<td>Spindle</td>
<td>Stainless steel 1.4571 (316 Ti) Hast C276 and all materials under “Body-Optional”</td>
</tr>
<tr>
<td>Seat</td>
<td>Stainless steel, replaceable PTFE lined and all materials under “Body-Optional”</td>
</tr>
<tr>
<td>Temperature</td>
<td>minus 10° to 230° C Higher or lower on request</td>
</tr>
<tr>
<td>Actuators</td>
<td>2 x PT 100 sensors with tantalum cap on disc, or stainless steel rod in disc</td>
</tr>
<tr>
<td>Fire safe</td>
<td>Manual, pneumatic, hydraulic or electric Side mounting is available</td>
</tr>
<tr>
<td>Heating Jacket</td>
<td>n/a Fire safe to BS 6755 Pt. 2 *</td>
</tr>
<tr>
<td>Surface coating</td>
<td>n/a Anodising, Canadising, Titanium Nitriding, Ceramic and Tungsten</td>
</tr>
</tbody>
</table>

Atmospheric Sealing Options:
- Type BS stuffing box with packing rings for all models
- Type BH metal bellows, zero emissions to atmosphere, and emergency stuffing box
- Type BF PTFE bellows, zero emissions to atmosphere, and emergency stuffing box
- Type BM diaphragm sealed, zero emissions to atmosphere, and emergency stuffing box

Process and Seat Sealing Options:
Process: PTFE sealing ring, metal to metal and hard faced material options
Seat: O-ring, lip seal and expandable seat

Additional Options:
- Flushing/Purging connections
- FDA compliant materials
- Internal/External polishing
- Limit switches
- CIP / GMP
- Manual over-ride
- T or spool piece
- Leak detection
- Disc grinding
- Solenoid valves
- Lacking bolts
- Disc contouring
- Tapered seats
- Live loaded packing
- Wipers
- Positioners

Model 24BC
Choosing the appropriate Disc Bottom Outlet Valve

- Are lower stem sealing forces required?
- Are there space restrictions?
- Is absolute tight shut-off to atmosphere necessary (bellows seal)?
- Is short travel advantageous?
- Are low initial and maintenance costs a factor?
- Is the valve size above 4"?
- Is flushing of the valve body cavity during reaction desireable?
- Is the valve for lethal service?
- Is pressure helping to close valve?
- Is crust-breaking needed at the bottom of the reactor?
- Is the best possible flow required?

Disc Type Bottom Outlet Valve

- Disc Rising BOV
  - Better flow
  - Bigger size inlet than outlet
  - PTFE lining possible

- Disc Lowering BOV
  - Same size inlet and outlet
  - Usually for existing valve replacement

Feature Overview

- Crust Breaking
  - Disc rising valves (Models 19 or 25) automatically break any crust that may have formed at the bottom of the reactor as they open. They are therefore suited to media containing solids or crystals.

- Dead Space Free
  - All valves are fitted exactly to the reactor nozzle to ensure that there is no dead space at the bottom of the reactor. The valves are designed to allow the vessel and themselves to drain completely.

- Sealing to Atmosphere
  - To eliminate leakage to the outside, all disc valves can be fitted with a PTFE extruded bellows (Type 25BF), a metal bellows (Type 25BH), or a PTFE diaphragm (25BM). A “TA Luft” compatible stuffing box is also available.

- Clean-in-place (CIP)
  - All valves can be fitted with flushing ports (standard with lined valves Type 25BF) allowing cleaning of the valve while a reaction is taking place in the vessel.

- Temperature Sensing
  - Placing a temperature sensor in the valve disc ensures that the reactor’s contents can be measured even when the batches are very small. The sensor can be removed for calibration whilst the valve is still in service.

Multi Purpose
- Stainless steel valves are usually sufficient for the food and biochemical industry. For multipurpose batch plants, producing a variety of chemicals and active ingredients including acids and bases, valves with a higher chemical resistance may be required. SchuF can supply valves in Hastelloy, Titanium and Zirconium or with linings in glass-, rubber-, PTFE- and Tantalum.

Contamination Free
- To avoid the possibility of cross contamination and remnants in gaps, stationary FDA approved solutions such as an o-ring seal, lip seal or expandable seat can be provided. Model 24AV “Sterile Valve” has a single part seat body and disc spindle construction, which ensures that all parts of the valve’s interior can be cleaned and sterilised.

Fire-safety
- To limit the damage a fire may cause it is vital that reactors, storage vessels and their outlet valves remain intact to prevent feeding the fire or polluting the extinguishing agents. All our valves can be offered in a fire-safe version.

Integrated Sampling and Flushing
- Often space and process consideration prohibit the use of an extra sampling system, especially when there is the danger that the submerged sampling pipe can become blocked, or if there are pollution or cost reasons, not to discard the whole sample.
- If space is at a premium, it is possible to combine a wafer type sampling valve with a disc valve in a SchuF patented combination.
SchuF disc valves have seen extensive service in the bulk pharmaceutical and fine chemical industries. They are often used in the production of core active ingredient acids and vitamins.

Over the past 15 years the dual pressure of rationalisation and safety & environment regulation have led to many valve developments. SchuF is at the forefront of these developments with a number of innovations:

- Expandable blow up seat (to fill potential dead spaces)
- GMP compliant disc valves
- Fully cleanable and flushable in place features
- Seat-less disc valves

**Sterile Valve (Model 24AV)**

Sterile valves are widely used in the Pharmaceutical industry and can be supplied to 4 inches as standard or larger sizes as required. The SchuF 24AV sterile valve is a highly versatile valve that can be used as a drain, angle or sampling valve. They are fitted at the bottom of stainless steel, Hastelloy, or glass lined fermentors and reactors. The disc opens into the valve and can seal directly against the reactor flange, thereby eliminating the possibility of a gap between the seat and reactor. Additionally the disc can be contoured to suit the medium drainage properties.

**Good Manufacturing Practice (GMP) Valves**

SchuF offers a complete range of valves which conform to GMP standards. The valves open into the vessel or valve, with a stuffing box seal, bellows seal or a diaphragm seal.

The valves have the following characteristics:

- Completely dead space free
- Easily flushable
- Surfaces can be polished to $\text{Ra} < 0.2\ \mu$
- Crevice free

These valves are ideal for batch processes, where even the smallest contamination from the previous batch could be fatal. There are a variety of sealing options for GMP compliance as listed below.

The gap between seat and vessel can be designed CIP conform to be flushed out between different batches (1), or else can be closed off from the process in the vessel using either an O-ring (2), a lip seal (3) or an expandable seat (4).

### Dimensions Example for GMP Compliant 25BF

<table>
<thead>
<tr>
<th>Size (Inch)</th>
<th>80/50</th>
<th>100/80</th>
<th>150/100</th>
<th>200/150</th>
<th>80/50</th>
<th>100/80</th>
<th>150/100</th>
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<tbody>
<tr>
<td>x Standard</td>
<td>52</td>
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<td>81</td>
<td>min 40</td>
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<tr>
<td>d1 Standard</td>
<td>79</td>
<td>99</td>
<td>148</td>
<td>min 190</td>
<td>79</td>
<td>99</td>
<td>148</td>
</tr>
<tr>
<td>x min-max</td>
<td>52 - 100</td>
<td>66 - 150</td>
<td>81 - 180</td>
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<tr>
<td>H (PM)</td>
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<td>875</td>
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<tr>
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<td>115</td>
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<td>0</td>
<td>50</td>
<td>70</td>
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<tr>
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<td>315</td>
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<td>40</td>
<td>51</td>
<td>38</td>
<td>38</td>
<td>40</td>
</tr>
</tbody>
</table>

All dimensions are in mm unless otherwise stated. Dimensions for other BOV models are available on request.
Pharmaceutical and Fine Chemical Industry

SchuF disc valves have seen extensive service in the bulk pharmaceutical and fine chemical industries. They are often used in the production of core active ingredient acids and vitamins. Over the past 15 years the dual pressure of rationalisation and safety & environment regulation have led to many valve developments. SchuF is at the forefront of these developments with a number of innovations:

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- Completely dead space free
- Easily flushable
- Surfaces can be polished to Ra < 0.2 µ
- Crevice free

These valves are ideal for batch processes, where even the smallest contamination from the previous batch could be fatal. There are a variety of sealing options for GMP compliance as listed below.

The gap between seat and vessel can be designed CIP conform to be flushed out between different batches (1), or else can be closed off from the process in the vessel using either an O-ring (2), a lip seal (3) or an expandable seat (4).

Dimensions Example for GMP Compliant 25BF

SchuF offers a complete range of valves which conform to GMP standards. The valves open into the vessel or valve, with a stuffing box seal, bellows seal or a diaphragm seal. The valves have the following characteristics:

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- Surfaces can be polished to Ra < 0.2 µ
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These valves are ideal for batch processes, where even the smallest contamination from the previous batch could be fatal. There are a variety of sealing options for GMP compliance as listed below.

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Valve dimension table for Disc BOV model 25BF (PTFE / glass lined)

<table>
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<tr>
<th>Size (Inch)</th>
<th>80/50</th>
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- Are lower stem sealing forces required?
- Are there space restrictions?
- Is absolute tight shut-off to atmosphere necessary (bellows seal)?
- Is short travel advantageous?
- Are low initial and maintenance costs a factor?
- Is the valve size above 4”?
- Is flushing of the valve body cavity during reaction desireable?
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Disc Rising BOV

- Better flow
- Bigger size inlet than outlet
- PTFE lining possible

Disc Lowering BOV

- Same size inlet and outlet
- Usually for existing valve replacement

Feature Overview

- Crust Breaking
  Disc rising valves (Models 19 or 25) automatically break any crust that may have formed at the bottom of the reactor as they open. They are therefore suited to media containing solids or crystals.

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  Often space and process consideration prohibit the use of an extra sampling system, especially when there is the danger that the submerged sampling pipe can become blocked, or if there are pollution or cost reasons, not to discard the whole sample. If space is at a premium, it is possible to combine a wafer type sampling valve with a disc valve in a SchuF patented combination.
Disc Bottom Outlet Valve – General Overview

The disc lowering valve models 18 (different size inlet/outlet) and 24 (bigger size inlet than outlet) can be used on vessels with low mounted agitators, as it is non intrusive. Disc lowering valves can also be combined with sampling valves.

Valve Bodies
The valve bodies for all models would usually be in various stainless steel grades, but can also be provided in any available castable or weldable material.

Disc Bottom Outlet Valve – Sealing Arrangements
Disc valves are available with a number of different sealing options:
- Model 25BS is typically a Hastelloy or stainless steel valve with a stuffing box seal to the outside.
- Model 25BH is usually a metal or stainless steel valve with a Hastelloy or metal bellows and a back up stuffing box seal.
- Model 25BF is a Teflon or glass lined valve with bellows and back up stuffing box seal.
- Model 25BM features a Teflon or rubber diaphragm seal.

All disc valves can be provided with a “TA Luft” (exacting German environmental emissions standard) compatible stuffing box seal. Sealing to process options include metal to metal, hard faced material options and PTFE sealing ring.

Features of Disc Bottom Outlet Valves
Core features of Disc Bottom Outlet Valves include a robust design and construction, high adaptability, and no dead space. Each SchuF Bottom Outlet Valve is adapted to fit the requirements of the proposed application, whether it be a non standard size connection, highly abrasive material, or low contamination requirements.

Disc Bottom Outlet Valve Specifications

<table>
<thead>
<tr>
<th>Standard</th>
<th>Optional</th>
</tr>
</thead>
<tbody>
<tr>
<td>Size</td>
<td>1” to 18” as standard Larger on request</td>
</tr>
<tr>
<td>Body</td>
<td>Stainless steel 1.4408 (CF-8M) 304, 316L, Duplex, Hastelloy, Monel, Titanium, Nickel, Inconel, Incoloy, etc.</td>
</tr>
<tr>
<td>Valve lining</td>
<td>PTFE, glass, ceramic or rubber</td>
</tr>
<tr>
<td>Disc</td>
<td>Stainless steel 1.4571 (316 Ti) Glass lined, hard faced, tantalum clad, PTFE and all materials under “Body-Optional”</td>
</tr>
<tr>
<td>Spindle</td>
<td>Stainless steel 1.4571 (316 Ti) Hast C276 and all materials under “Body-Optional”</td>
</tr>
<tr>
<td>Seat</td>
<td>Stainless steel, replaceable PTFE lined and all materials under “Body-Optional”</td>
</tr>
<tr>
<td>Temperature</td>
<td>minus 10° to 230° C Higher or lower on request</td>
</tr>
<tr>
<td>Pressure</td>
<td>ASME 150, PN16 &amp; PN40 Up to ASME 2500, PN320 or higher on request</td>
</tr>
<tr>
<td>Sensors</td>
<td>2 x PT 100 sensors with tantalum cap on disc, or stainless steel rod in disc</td>
</tr>
<tr>
<td>Actuators</td>
<td>Manual, pneumatic, hydraulic or electric Side mounting is available Actuation speed down to 0,1 sec.</td>
</tr>
<tr>
<td>Fire safe</td>
<td>Fire safe to BS 6755 Pt. 2 *</td>
</tr>
<tr>
<td>Heating Jacket</td>
<td>On request</td>
</tr>
<tr>
<td>Surface coating</td>
<td>Anodising, Canadising, Titanium Nitriding, Ceramic and Tungsten</td>
</tr>
<tr>
<td>Atmospheric Sealing Options:</td>
<td></td>
</tr>
<tr>
<td>Type BS</td>
<td>stuffing box with packing rings for all models</td>
</tr>
<tr>
<td>Type BH</td>
<td>metal bellows, zero emissions to atmosphere, and emergency stuffing box</td>
</tr>
<tr>
<td>Type BF</td>
<td>PTFE bellows, zero emissions to atmosphere, and emergency stuffing box</td>
</tr>
<tr>
<td>Type BM</td>
<td>diaphragm sealed, zero emissions to atmosphere, and emergency stuffing box</td>
</tr>
</tbody>
</table>

For the pharmaceutical industry for example, stainless steel grades such as 1.4435 (BN2) and easily polished 316L, 1.4439 or 1.4539 are used. For higher corrosion resistance we can provide Duplex, Alloy 59, Hastelloy C22, C276, B2, B3, Titanium, Zirconium and many others.

Alternatively, cast steel or stainless steel valves can be delivered with isostatically sintered PTFE or glass lined bodies.

Additional Options:
- Flushing/Purging connections
- FDA compliant materials
- Internal/External polishing
- Limit switches
- CIP / GMP
- Manual over-ride
- T or spool piece
- Leak detection
- Disc grinding
- Solenoid valves
- Lacking bolts
- Disc contouring
- Tapered seats
- Live loaded packing
- Wipers
- Positioners

Model 18BS disc lowering valve with stuffing box seal
Model 24BS disc lowering valve with stuffing box seal
Model 24BC disc lowering valve with stuffing box seal
Model 24BC disc lowering valve with stuffing box seal
Model 24BC disc lowering valve with stuffing box seal
Industry Application Case Studies for Disc Valves

PTA Application Case Study
A major North American producer of PTA faced a problem which had caused a critical PTA process line to run inefficiently. The customer had installed ball valves at the entrance to transfer lines between crystallisers which regularly got stuck due to build up of slurry around and in the ball itself. SchuF resolved the problem by providing a self draining Disc BOV with integrated flushing and no dead space. The combination of a dead space free connection and flushing eliminated the build up of the slurry. Plant efficiency increased significantly thereafter.

Mining Application Case Study
A European Tungsten Carbide mining company faced the problem that an on-off valve installed after a depressurization vessel leaked, and had to be maintained weekly. In this secondary process, tungsten is mixed with caustic soda at high pressure and a highly abrasive slurry results. By replacing the on-off valve with a SchuF Disc BOV, the company was able to reduce maintenance to annual checks. According to the plant manager “The valve has worked so well, that I can’t even remember when we last had to do any maintenance.”

Alumina Service Case Study
The production of alumina requires valves that can withstand significant abrasion and scaling. One important producer of Alumina in Brazil was faced with the problem that their existing feed valve seats would regularly get stuck and consequently not close. This led to equipment damage and production down time. SchuF resolved the problem by designing a special disk grinding mechanism specifically suited to Alumina slurry. With the new design SchuF Disc BOV the alumina producer now has no issues with valve closure.

Polymer Service Case Study
SchuF disc valves are used extensively in the Polymer industry as they are ideal for injecting low viscosity feedstocks. For one particular Asian customer where Vinyl Chloride is used as a feedstock, the disc and seat were contoured to exactly match the vessel wall and a special bellow seal was supplied. This ensured that no atmospheric pollution would take place. The customer reported excellent valve sealing performance.

Development of Bottom Outlet Valves
Bottom Outlet or Drain Valves have been extensively used in the chemical and related industries for almost 100 years. Invented by SchuF in 1923, their initial application was to replace the very simple wooden plug used to close or drain tanks, vessels or pipelines. Their introduction made it possible to drain vessels containing dangerous substances, and handle media under high pressure or temperature safely. The other key benefit for early users of Bottom Outlet Valves was the ability to ensure dead space free draining of vessels or reactors.

Industry Application
Today, Bottom Outlet Valves (BOV) have found applications beyond the chemical and petrochemical industry. They are suitable for pharmaceutical and biotech applications where cross contamination must be avoided. They have also found a place in abrasive slurry and high temperature environments such as in the coal liquefaction and alumina industries.

Bottom Outlet Valve Types
SchuF has developed a diverse range of Bottom Outlet Valves which include both Disc and Piston (or Ram) categories. The fundamental difference between the two are:

- Disc valves have a shorter length and are therefore ideal where space is limited or weight is a concern. The shorter stroke means that smaller, lighter and faster actuators can be used, saving cost and weight.
- Ram Piston valves have full bore unimpeded flow and are more suitable for vessels that need to be drained or flushed quickly, for highly viscous media or where large samples need to be taken.

Disc Bottom Outlet Valve Models
Disc Bottom Outlet Valves can be supplied as a disc rising or disc lowering model. The disc rising valve models 19 (same size inlet/outlet) and 25 (bigger size inlet than outlet) are most suitable for media where solid materials or crystals can form at the exit point of the vessel. As the disc opens into the vessel automatic crust breaking takes place. The disc rising valve is also normally a flow to close design, which aids sealing performance.
SchuF has delivered over one million valves during its almost 100 year history to a wide variety of industries in over 50 countries worldwide. Headquartered near Frankfurt in Germany, the company has additional design and manufacturing centres in Brazil, India, Ireland and the United States. The SchuF group has sales and agent offices covering almost every country in the world. We manufacture valve products that control, isolate, divert, and sample liquids, gases, powders, and slurries. Our product range of engineered, customised valves includes:

### Disc Bottom Outlet Valve – General Overview

- **Disc**
- **Outlet angle** – 90°, 60°, or 45°
- **Vessel Flange** – ASME, DIN or custom
- **Packing rings**
- **Yoke or columns construction**
- **Manual non rising handwheel**

### SchuF Valve Portfolio

<table>
<thead>
<tr>
<th>Bottom Outlet Valves</th>
<th>Control Valves</th>
<th>Coker Valves</th>
<th>Diverter &amp; Changeover Valves</th>
<th>In-Line Valves</th>
<th>Sampling Valves</th>
<th>Other Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Piston / Ram Bottom Outlet</td>
<td>Angle Control Valve</td>
<td>Coker IsoPlug</td>
<td>Multiport Diverter Valve</td>
<td>Lift Plug On-Off Isolation</td>
<td>Line Sampling Valve</td>
<td>Line Blinds Cam Set &amp; Stacey</td>
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<tr>
<td>Disc Lowering Bottom Outlet</td>
<td>Globe Control Valve</td>
<td>Coker SwitchPlug</td>
<td>Lift Plug Diverter Valve</td>
<td>Lift Plug Switching</td>
<td>Screw-In Sampling Valve</td>
<td>Spray Rinse Valve</td>
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<tr>
<td>Disc Rising Bottom Outlet</td>
<td>Wafer Control Valve</td>
<td>Coker ControlPlug</td>
<td>Changeover Valve</td>
<td>Lift Plug Bypass</td>
<td>Submersed Sampling Valve</td>
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<td>Changeover Combination Valve</td>
<td>Y-Globe Valve</td>
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<tr>
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<td></td>
<td>Y-Globe Valve</td>
<td>Wafer Sampling Valve</td>
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<td>Distributor Valve</td>
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<td>Steam Injection Valve</td>
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<tr>
<td>Automatic Recirculation Valve</td>
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</tbody>
</table>

### Sample Bottom Outlet Valve Client List:

- Aker Kvaerner
- Astra Zeneca
- BASF
- BAYER
- Boehringer Ingelheim
- Novartis
- Degussa
- Du Pont
- Formosa Plastics
- GE
- GlaxoSmithKline
- Honeywell
- Indorama
- Ineos
- Lurgi
- Merck
- Mitsui
- Petrobras
- Pfizer
- Reliance
- Roche
- Samsung
- Sandoz
- Sanofi Aventis
- Schering
- Shell
- Shenhua
- Sinopec
- Solvay
- Yisheng
- Uhde Inventa Fischer

Model 2181