Control Valves
In line & Angle Valves

SchuFII
# Table of Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>SchuF Control Valves Introduction</td>
<td>3</td>
</tr>
<tr>
<td><strong>Control Valve Types</strong></td>
<td></td>
</tr>
<tr>
<td>In line Control Valves (Globe &amp; Ball Type)</td>
<td>4</td>
</tr>
<tr>
<td>Angle Control Valves</td>
<td>6</td>
</tr>
<tr>
<td><strong>Control Globe Valve Bonnet Selection</strong></td>
<td>7</td>
</tr>
<tr>
<td>Control Valve Actuators</td>
<td>7</td>
</tr>
<tr>
<td>SchuF Flashing and Cavitation Solutions</td>
<td>8</td>
</tr>
<tr>
<td>Standard Control Trims Types</td>
<td>8</td>
</tr>
<tr>
<td>Special Trims Types</td>
<td>9</td>
</tr>
<tr>
<td><strong>Standard Materials</strong></td>
<td>11</td>
</tr>
<tr>
<td>Globe Control Valve Standard Dimensions</td>
<td>12</td>
</tr>
<tr>
<td>Angle Control Valve Standard Dimensions</td>
<td>13</td>
</tr>
<tr>
<td>Control Globe Standards</td>
<td>14</td>
</tr>
<tr>
<td><strong>Product Portfolio Overview</strong></td>
<td>15</td>
</tr>
</tbody>
</table>

*SchuF is fully registered, accredited and certified worldwide*
SchuF Control Valves

Control valves work to keep a process variable such as flow or pressure within a predefined operating range. They are often the last piece of equipment in a process loop that can compensate a load disturbance and are therefore considered critical valves.

Why choose SchuF?

The SchuF Group is an industry-renowned valve supplier with over 100 years’ experience designing and manufacturing application-specific valve solutions.

SchuF has developed over 20,000 control valve variations in its hundred-year history. Each has its own specific characteristics tailored to the process control elements that are most important for it – pressure, level, flow or temperature.

SchuF has the capability to ship our unique and highly-praised valve solutions worldwide from production facilities located in Germany, India, Ireland, Italy, the United Kingdom and the United States.

SchuF has an extensive product selection with a vast and diverse range of applications, from oil production to concrete manufacture. SchuF’s skilled team of engineers and product specialists design each valve from the ground up to meet specific application requirements and provide optimal service life and performance.

Where does SchuF use its expertise?

- Discharge and feed flow-control valve in PET, PVC, PP & PE reactors
- Level, pressure & steam injection control valves in PTA processes
- Level control of flashing fluid in coal liquefaction or heavy oil upgrading
- Feed and level control for gasification according to the Siemens, Lurgi, GE and Shell process licenses
- Flow control of powder in fine chemical & pharmaceutical processes
- Resurge and flare control for gas
- High-precision multi-port flow control of highly viscous, non linear, non-Newtonian polymer fluids
- Discharge flow control valves for urea reactors where urea-grade stainless steel is mandatory
- Fully-jacketed short-body wafer control valves, for Nylon and PC production
- Mineral processing applications such as high-pressure acid leaching (HPAL)
- Sour water and Amine letdown in several refinery processes
- Bio - Fuels (Renmatix)
Control Valve Types

In line Control Valves

Straight Globe Valve – Type 72

Straight Globe control valves combine the protection of a bellows seal with the controllability and leak-tightness of a SchuF control valve. They are used in arduous and lethal services with critical media such as chlorine, phosgene, hydrofluoric acid, NH₃, CO₂, urea etc. They are Eurochlor compliant.

- Designed for at least 20,000 operations
- Emergency stuffing boxes as standard
- Linear, equal % or on/off control
- Optional bellows fitted in bonnet to protect against erosion
- Wide variety of control trims available (see page 8-10)
- Loose self-aligning disc for absolute shut-off, (ASME Class VI)
- Metallic sealing surfaces with different hardness (Stellite®...)

Y - Globe Valve – Type 50

The Y-globe control valve can be installed in process lines from 1 inch to 24 inches and is ideal to control flow or to reduce pressure. It has a sturdy design, superior flow and control characteristics (compared to globe or ball control valves) and zero-leakage sealing performance.

- High throughput (e.g. 4” (DN 100) – Cv min 140 to max 300)
- Flow optimized – low pressure drop
- Equal %, linear or custom control characteristics
- Class VI process shut-off and zero leakage to atmosphere performance
- Dead-and slow-space-free options

Wafer Valve – Type 76

Ideal for limited-space control applications

- Space-saving design
- Cost-optimised
- Linear or equal %
- ½ inch to 3 inch
- Up to ASME 2500#
Control Valve Types

In line Control Valves

V-notch Ball Valve

By choosing the SchuF line of characterized V-Control ball valves, a full range of control applications is available with superior flow control. These quarter-turn-control ball valves are more compact, lighter weight and much less expensive than comparably sized globe valves and segmented control valves currently available in the market.

- Superior rangeability and repeatability
- High flow capacity
- Ability to function with fluids containing solids and fibers
- Ease of maintenance
- Exceptional interface with PLCs and computer command signals
- SchuF high-quality pneumatic and electric control actuators
- Accurate positioning

Segmented Ball Valve

The SchuF Segmented Ball Valve offers an accurate control with a clogging free design. High capacity and superior sealing properties make this valve type a perfect In-Line valve for control purposes, even with high solid content mediums.

- Superior rangeability and repeatability
- High flow capacity
- Ability to function with fluids containing solids and fibers
- Flow optimized – low pressure drop
- Erosive medium control
- Ease of maintenance and seal replacement
- Accurate positioning
Control Valve Types

Angle Control Valves – Model 74

The SchuF Model 74 Angle Control Valve is designed for critical or severe applications involving level control and pressure let-down in High Pressure Acid Leach (HPAL), Hydrocracking, Coal Liquefaction, PTA and other demanding processes.

The SchuF Angle Control Valve is often custom-made to suit process requirements in order to optimise field performance. Valve bodies are designed to help extend service life, by preventing impingement of particles on internal surfaces. Stagnant areas are minimized to prevent build-up of slurry or scale.

X-Flash – Type 74BS

These valves open into the downstream vessel to eliminate choking and cavitation. The “accelerating body” design prevents in-body flashing.

- High CV values (1 to 3000)
- Low wear and tear
- Disc opening eliminates plugging by sediments
- Best suited for vessel installation

Tough Flash – Type 74CS

If piping considerations prohibit a disc-opening valve, the 74CS accommodates flashing in the valve while opening the disc into the body. The effects of cavitation are minimised by the use of suitable trims.

- Hard material trim
- Flashing occurs in the protected seat / choke tube area
- Up to 180 bar let-down is possible in a single stage
- Customised and replaceable choke tube
- Suitable for pipeline or vessel installation
Control Globe Valve Bonnet Selection

- Standard Bonnet
  - Usually constructed of the same material as the body.
  - Operating ΔT: -30°C to 400°C

- Bellows Bonnet
  - Easily replaceable bellows assembly
  - Commonly used for lethal and hazardous service
  - Operating ΔT: -163°C to 400°C

- Cryogenic Bonnet
  - Positive and Hermetic seal
  - Packing protected from excessive cold
  - Length of the bonnet meticulously calibrated
  - Operating ΔT: -163°C to 400°C

Control Valve Actuators

Pneumatic Actuators
- PM Series
  - Single-acting
  - Springreturned
- PKD Series
  - Double-acting
  - Air tank for fail position

Hydraulic Actuators
- PKE Series
  - Single-acting
  - Springreturned
- HY Series
  - Double-acting
  - Accumulator for fail position
- RP Series
  - Single/Double-acting
  - Quarter-Turn

Electric Actuators
- EMH Series
  - Electro-Hydraulic actuator
- EM Series
SchuF Flashing and Cavitations Solutions
Trim Types and Standard Materials

Standard Control Trim Types

- **Linear**
  Linear flow characteristics are those where, for example, a 1% change of the total valve stroke will result in a flow rate change of 1% of the total flow. This ensures that, for a constant pressure drop, the valve gain is more or less constant at all flows. Linear characteristics are suitable for most straightforward applications.

- **Equal Percentage**
  Equal Percentage flow characteristics are commonly used where pressure differential across the valve goes down as the flow rate increases, and are ideal for more complex process control. Equal percentage valves open progressively more area as the valve is stroked open, so, for example, every 10% increase in stroke would result in a fixed percentage increase in the flow rate prior to adjustment— all across the stroke range.

- **Quick Opening**
  Quick-Opening flow characteristics, as implied by the title, allow maximum changes in flow rate following small initial changes in valve stroke. As the valve travel approaches the fully open position, valve flow-rate changes approach zero. This characteristic is commonly used for on-off service.

- **SchuF x³ Bell Curve**
  SchuF’s patented $x^3$ bell curve is available as an alternative to the above characteristics. The hybrid qualities of the $x^3$ bell curve offer considerably improved controllability of the process.

![Control Globe Flow Curves](image)
Special Trim Types

Cage

- Ideal for **energy dispersion** and **noise** control
- Multi-hole cage design – to achieve accurate flow characteristics and noise attenuation
- **Class VI** (API 598) shut-off is achieved, eliminating unacceptable leakage
- Linear or **Equal %** control characteristics
- Available with fast-opening actuators, and smart positioners

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Available trim Cv for Cage Trims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.5</td>
<td>60</td>
</tr>
<tr>
<td>2</td>
<td>90</td>
</tr>
<tr>
<td>3</td>
<td>150</td>
</tr>
<tr>
<td>4</td>
<td>200</td>
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<tr>
<td>5</td>
<td>300</td>
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<td>6</td>
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<td>8</td>
<td>600</td>
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<td>10</td>
<td>900</td>
</tr>
<tr>
<td>12</td>
<td>1200</td>
</tr>
<tr>
<td>14</td>
<td>1500</td>
</tr>
<tr>
<td>16</td>
<td>2000</td>
</tr>
</tbody>
</table>

Needle Spline

- Ideal for **micro flow** applications from **CV values up to 5**.
- The needle spline provides optimum rangeability and accurate flow control.
- Excellent performance with high solid content media for severe applications
- Provides optimum guidance of the control head to prevent fracture when using hard metals
- Bigger CV values are also available on request

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Available trim Cv for Needle Spline Trims</th>
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<tbody>
<tr>
<td>1.5</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>80</td>
</tr>
</tbody>
</table>

SchuFII
Trim Types and Standard Materials

Special Trim Types

Stacker

By forcing the process through a series of **sharp turns and splitting channels**, the **exit velocity is reduced** to a less aggressive level. Specially designed scrapers **prevent** solids building up and **reduce** the need for servicing and production downtime:

- Greatly reducing wear
- Noise and vibration reduction
- Up to six stages available

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Available trim Cv for Stacker Trims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
</tr>
<tr>
<td>1.5</td>
<td>40</td>
</tr>
<tr>
<td>2</td>
<td>50</td>
</tr>
<tr>
<td>3</td>
<td>70</td>
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<td>4</td>
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<td>350</td>
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<td>16</td>
<td>400</td>
</tr>
<tr>
<td>18</td>
<td>450</td>
</tr>
<tr>
<td>20</td>
<td>500</td>
</tr>
</tbody>
</table>

Multi Stage

Ideal to let down high pressure over several stages and avoid cavitation:

- **2, 3 or up to 6 staged** pressure - reduction disc design
- **Up to ASME 2500# as standard**
- **True Equal % characteristics**
- **High CV values (1 to 3000)**
- **Large outlet chamber** to reduce velocities
- **Disc opening** direction eliminates plugging by catalyst fines or other sediments

<table>
<thead>
<tr>
<th>Valve Size</th>
<th>Available trim Cv for Multi Stage Trims</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>25</td>
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<td>16</td>
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<td>18</td>
<td>450</td>
</tr>
<tr>
<td>20</td>
<td>500</td>
</tr>
</tbody>
</table>

10
# Standard Materials

## Globe and Angle Control Body & Bonnet Materials

| PRESSURE RATING          | Standard ASME 150 to ASME 2500  
|                         | Other pressure applications are possible |
| TEMPERATURE RATING       | Standard -29°C to 260°C  
|                         | Other temperature applications are possible. |
| SHUT-OFF CLASS           | ANSI/FCI 70-2 Class V / Class VI Available  
|                         | API 598 / EN 1022-1 |

### TRIM MATERIAL

<table>
<thead>
<tr>
<th>RECOMMENDED SERVICE</th>
<th>STANDARD</th>
<th>STAINLESS</th>
<th>TITANIUM</th>
<th>ALLOYS</th>
<th>SPECIALS</th>
</tr>
</thead>
</table>
| BODY                | Carbon Steel  
|                     | • DIN 1.0619  
|                     | • A216 (WCB) |
|                     | Duplex  
|                     | • DIN 1.4462 / A 479 (S31803) |
|                     | Stainless Steel  
|                     | • DIN 1.4401 / A 182 (316)  
|                     | • DIN 1.4404 / A 182 (316L)  
|                     | • DIN 1.4552 / A 351 (CF8C) |
|                     | Titanium Grade 2 |
|                     | • Hastelloy(R)  
|                     | • Incolloy®  
|                     | • Inconel®  
|                     | • Monel®  
|                     | Cladded with Alloy Steel |

| TRIM                | Carbon Steel  
|                     | • DIN 1.0619  
|                     | • A216 (WCB) |
|                     | Stainless Steel  
|                     | • DIN 1.4401 / A 182 (316)  
|                     | • DIN 1.4404 / A 182 (316L)  
|                     | • DIN 1.4541 / A 182 (321)  
|                     | • DIN 1.4550 / A 182 (347) |
|                     | Duplex  
|                     | • DIN 1.4462 / A 479 (S31803) |
|                     | Stainless Steel  
|                     | • DIN 1.4401 / A 182 (316)  
|                     | • DIN 1.4404 / A 182 (316L)  
|                     | • DIN 1.4541 / A 182 (321)  
|                     | • DIN 1.4550 / A 182 (347)  
|                     | • Nitronic |
|                     | Titanium Grade 2 or 5  
|                     | • Hastelloy®  
|                     | • Incolloy®  
|                     | • Monel®  
|                     | Cladded with Alloy Steel  
|                     | Ceramic  
|                     | Tungsten Carbide  
|                     | Proprietary coatings |
Globe Control Valve
Standard Dimensions

¹ Additional sizes, connections, and configurations are available upon request; dimensions are subject to change.
² Threaded, BWE, RF, RTJ, API, BX, and PE connections are available for all sizes and configurations.
³ ASME RF flanged dimensions are shown. Threaded, BWE, RTJ and ISO flanged dimensions are available upon request.

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<table>
<thead>
<tr>
<th>Body Size (Din)</th>
<th>A/B (mm)³</th>
<th>H (mm)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Integral Flange</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Class 150 PN10/16</td>
<td>Class 300 PN25/40</td>
</tr>
<tr>
<td>½&quot; (15)</td>
<td>108</td>
<td>140</td>
</tr>
<tr>
<td>¾&quot; (20)</td>
<td>117</td>
<td>152</td>
</tr>
<tr>
<td>1&quot; (25)</td>
<td>127</td>
<td>165</td>
</tr>
<tr>
<td>1½&quot; (40)</td>
<td>165</td>
<td>190</td>
</tr>
<tr>
<td>2&quot; (50)</td>
<td>203</td>
<td>216</td>
</tr>
<tr>
<td>3&quot; (80)</td>
<td>241</td>
<td>282</td>
</tr>
<tr>
<td>4&quot; (100)</td>
<td>292</td>
<td>305</td>
</tr>
<tr>
<td>6&quot; (150)</td>
<td>406</td>
<td>403</td>
</tr>
<tr>
<td>8&quot; (200)</td>
<td>495</td>
<td>419</td>
</tr>
<tr>
<td>10&quot; (250)</td>
<td>622</td>
<td>457</td>
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<tr>
<td>12&quot; (300)</td>
<td>698</td>
<td>502</td>
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<td>14&quot; (350)</td>
<td>787</td>
<td>762</td>
</tr>
<tr>
<td>16&quot; (400)</td>
<td>914</td>
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</tr>
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<td>18&quot; (450)</td>
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<tr>
<td>20&quot; (500)</td>
<td>978</td>
<td>991</td>
</tr>
<tr>
<td>24&quot; (600)</td>
<td>1295</td>
<td>1143</td>
</tr>
</tbody>
</table>
## Angle Control Valve Standard Dimensions

1 Additional sizes, connections, and configurations are available upon request; dimensions are subject to change.

2 Threaded, BWE, RF, RTJ, API, BX, and PE connections are available for all sizes and configurations.

3 ASME RF flanged dimensions are shown. Threaded, BWE, RTJ and ISO flanged dimensions are available upon request.

### ASME/ANSI RF Flanged Angle Control Valve Dimensions

<table>
<thead>
<tr>
<th>Body Size (Din)</th>
<th>A/B (mm)</th>
<th>Integral Flange</th>
<th>H (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Class 150 PN10/16</td>
<td>Class 300 PN25/40</td>
<td>Class 600 PN100</td>
</tr>
<tr>
<td>½” (15)</td>
<td>51</td>
<td>76</td>
<td>83</td>
</tr>
<tr>
<td>¾” (20)</td>
<td>57</td>
<td>89</td>
<td>95</td>
</tr>
<tr>
<td>1” (25)</td>
<td>70</td>
<td>102</td>
<td>108</td>
</tr>
<tr>
<td>1½” (40)</td>
<td>83</td>
<td>114</td>
<td>121</td>
</tr>
<tr>
<td>2” (50)</td>
<td>102</td>
<td>133</td>
<td>146</td>
</tr>
<tr>
<td>3” (80)</td>
<td>121</td>
<td>159</td>
<td>178</td>
</tr>
<tr>
<td>4” (100)</td>
<td>146</td>
<td>178</td>
<td>216</td>
</tr>
<tr>
<td>6” (150)</td>
<td>203</td>
<td>222</td>
<td>279</td>
</tr>
<tr>
<td>8” (200)</td>
<td>248</td>
<td>279</td>
<td>330</td>
</tr>
<tr>
<td>10” (250)</td>
<td>311</td>
<td>311</td>
<td>394</td>
</tr>
<tr>
<td>12” (300)</td>
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<td>356</td>
<td>419</td>
</tr>
<tr>
<td>14” (350)</td>
<td>394</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>16” (400)</td>
<td>457</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>18” (450)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>20” (500)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>24” (600)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Control Globe Standards

### Design Standards
- ASME B16.10
- ASME B16.34
- ASME Boiler Pressure Vessel Code Sec. VIII Pressure Equipment Directive (PED)

### Testing Standards
- API 6A PR2
- API 17D
- EN 10204
- ASME B16.34
- ISO 15848-1
- ASME FCI 70-2

### Quality Standards
- Pressure Equipment Directive (PED)
  - API Q1
  - API PSL 1, 2, 3 & 3G
  - ISO 10423-API 6A
  - EN ISO 9001

### Flange Standards
- ASME B16.5
- ASME B16.47
- EN 1092-1
- ISO 10423-API 6A
- API 17D
- ASME B16.5

### Additional Testing Standards
- ANSI/ISA 575.02
- ANSI/ISA 575.07
- ANSI B16.104
- Class IV & V

### Sour Service Standards
- Nace MR-01-75
- Nace MR0103
- ISO 15156

### Add. Standards
- ISO 4406
- EN ISO 9001
- ATEX 96/9/EC
- TR-CU
- NORSOK

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*SchuF*
Product Portfolio Overview

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

The SchuF Group has sales and agent offices servicing virtually every country in the world. We manufacture valve products that control, isolate, divert, and sample liquids, gases, powders, and slurries. Our extensive product range of engineered, customized valves includes:

- Aluminium Pechiney
- Auriga Polymers
- BASF
- CEPSA
- Chang Chun Petrochemical
- China Textile
- CTCI Corp.
- Formosa Chemicals & Fibre Corp.
- Far Eastern New Century Corp.
- Hengli Petrochemical
- Hebi Huashi United Energy
- Ignite Energy Resources
- Jiangsu HAILUN Petrochemical
- KBR Technology
- Lenzing AG
- Lurgi GmbH
- Nanjing Chemical
- OPTC
- Reliance Industries
- Renmatix
- SABIC Innovative Plastics
- Samsung Petrochemical
- Technip
- Uhde-Inventa-Fischer GmbH

Control Valve Client List:

- Drain & Sampling Valves
- Isolation Valves
- Control Valves
- Switching Valves
- Safety Related Valves
- Spray Rinse & Injection Valves

- Piston Bottom Outlet Valves
- Disc Bottom Outlet Valves
- Bottom Outlet Ball Valves
- Screw-in, Line & Wafer Sampling Valves
- Sampling Systems
- Standard & IsoPlug Lift Plug Valves
- TruePlug Soft Sealing Lift Plug Valves
- Y- / P- Globe & Straightway Valves
- High Pressure Angle Valves
- Special Ball Valves
- Special Gate Valves
- Automatic Recirculation Valve (ARV)
- Choke Valves
- Blowdown Valves
- Y, R, & T type Diverter Valves
- Multiway Diverter Valves
- Custom Diverter Valves
- SwitchPlug™ Multiway Lift Plug Valves
- SwitchPlug™ Multiway Lift Plug Valves (MSV)
- In-Line Control Valves
- Multistage Control Valves
- Cage Control Valves
- In-Line Control Valves
- Multiway Lift Plug Valves
- In-Tank Emergency Shut-Off Valves
- Changeover Valves
- Non-Slam Check Valves
- Line Blind Systems
- Goggle Valves
- Steam Injection Valves

SCHUFL VALVES - 100 YEARS OF INNOVATION