

T 8212 EN

CERA1700 · Sliding Disk Valves with Ceramic Lining

Types SSC15, SSC22 and SSC30



Application

Sliding disk valves with ceramic seal system and ceramic lining for on/off or throttling service in industrial applications.

| | |
|------------------------|---------------------------------------|
| Valve size | DN 10 to 65 · NPS 3/8 to 2½ |
| Pressure rating | PN 10 to 40 · Class 150 to 300 |
| Temperatures | –10 to 310 °C |

Ceramic-lined and ceramic-sealed Types SSC15, SSC22 and SSC30 Sliding Disk Valves are used for industrial applications under extreme conditions. The valves have a long service life even with a high switching frequency. They can withstand intensive abrasion in the control position in cases where dead spaces in the valve are not permissible.

The principle of operation is based on three floating ceramic disks that seal each other. The middle disk moves in a linear motion. Various control characteristics can be achieved through the use of different bore geometries in the disk. The two outer disks are stationary. The springs are used for live-loading the seal system.

The valve body does not need to be made of special materials as the process medium only comes into contact with the ceramic parts and seals.

Versions

Standard version for temperatures ranging from –10 to +310 °C · Pressure rating PN 10 to 40/Class 150 and 300
Body made of stainless steel 1.4301 with flanges · With Type 3277 Pneumatic Actuator for integral positioner attachment (see Data Sheet ▶ T 8310-1)

- **Type SSC15** in valve sizes DN 10 to 40/NPS 3/8 to 1½
- **Type SSC22** in valve sizes DN 15 to 65/NPS 1/2 to 2½
- **Type SSC30** in valve sizes DN 25 to 65/NPS 1 to 2½

Further versions

- **High-temperature version** up to 450 °C
- **Light-weight version:** for on/off service only, without anti-wear liners
- **Material options** for seals as well as different ceramic materials
- With **packing**
- With **seal gas connection**



Fig. 1: Series CERA1700 Sliding Disk Valve

Why use ceramic valves?

Ceramic-lined valves are preferably used for corrosive media (possibly containing solid matter) or (very) abrasive media. Ceramic linings are particularly suitable to meet high temperature, pressure, abrasion or corrosion requirements where other linings, e.g. made of PTFE or PFA, reach their limits.

Ceramic materials

The following ceramic materials are used for valve linings:

- Alumina (Al_2O_3)
- Zirconium dioxide (ZrO_2)
- Silicon carbide (SSiC)
- Silicon nitride (Si_3N_4)

The benefits and special features of ceramics include:

1. Corrosion resistance

The corrosion resistance of ceramics is significantly superior to other materials. Ceramics are fully resistant to most solvents. In most cases, alkaline solutions do not pose any difficulties. The ceramics used exhibit good resistance properties to most acids up to relatively high temperatures. However, there are various factors that need to be taken into account. For example, all oxide ceramics are not resistant to fluorides. Some ceramics, e.g. Yttria-partially-stabilized zirconia (Y-PSZ), react sensitively to steam, i.e. are hydrothermally unstable. It is essential to be aware that mixtures of reagents usually react differently than when handled separately.

2. Compression and flexural strength

In contrast to metal, the flexural, tensile and compression strength properties of ceramics vary significantly. While the compression strength of almost all dense ceramics is superior to that of metals, more attention must be paid especially to the tensile and flexural strength.

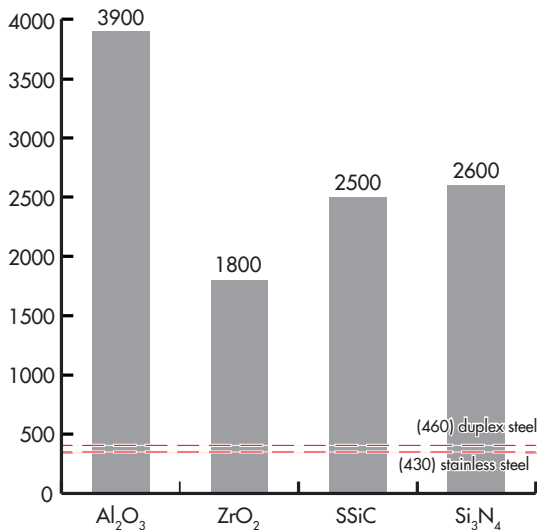


Fig. 2: Compression strength in MPa

The diagrams illustrate the difference between metals and ceramics even though comparing their strength properties is not clear-cut.

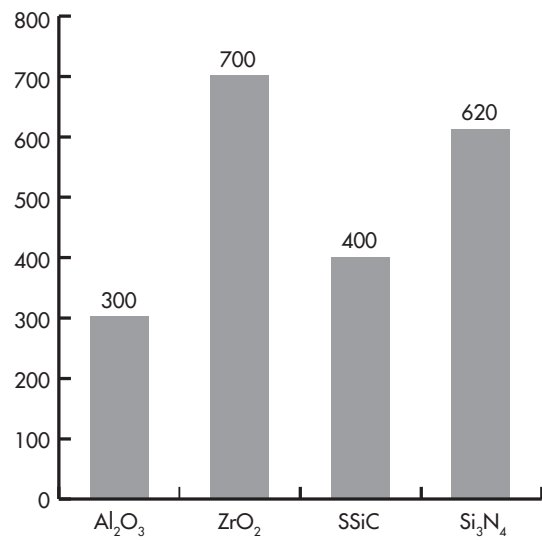


Fig. 3: Flexural strength in MPa

3. Density

Generally, ceramic valves are lighter than valves made of other materials. For example, ceramics are up to 78 % less dense than carbide metal and up to 60 % less dense than stainless steel.

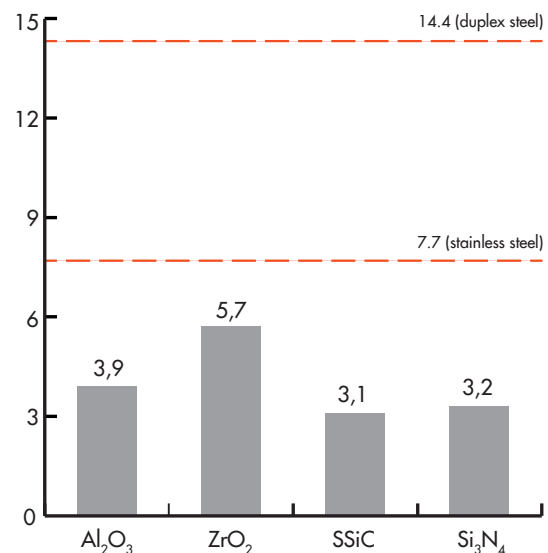


Fig. 4: Density in g/cm^3

4. Hardness and wear resistance

The wear resistance of components considerably depends on the type of stress they are exposed to. Ceramics are much harder and better wear-resistance properties than metals. Frequently, a combination of different kinds of wear, such as abrasion, high velocity erosion, impact wear and cavitation, arise which ceramic components usually endure much better in comparison to metal components. Direct impact loads must be dealt with on a case-by-case basis.

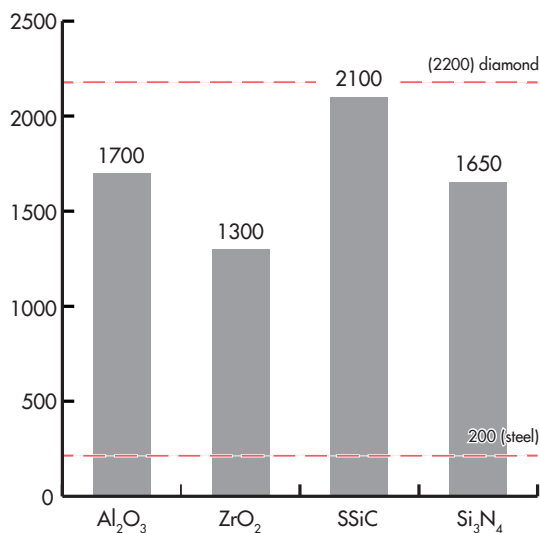


Fig. 5: Vickers hardness 1 in GPa

5. Thermal shock resistance

The thermal shock resistance is more relevant than the maximum service temperature. Ceramic components maintain their shape, material strength and physical properties even at very high temperatures. The thermal shock resistance significantly depends on the shape of the component and not just the material. Simple shapes, such as pipes, are more rugged than parts with greatly varying wall thicknesses.

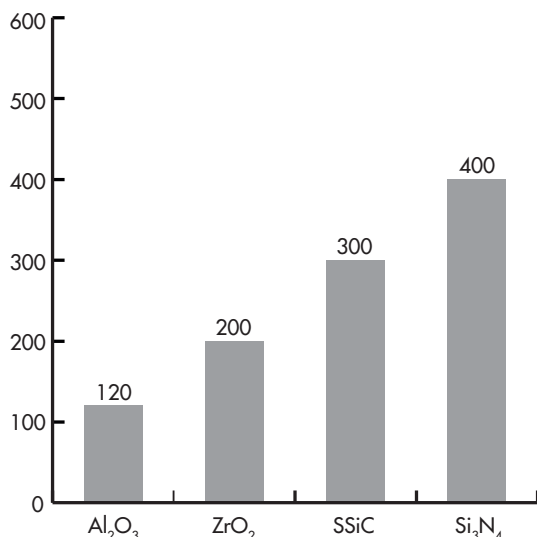


Fig. 6: Thermal shock resistance ΔT in °C

TA Luft packing

The current TA Luft regulations impose stringent fugitive emission limits for valve stem sealing. The TA Luft packing sets cover almost all applications and are suitable for use in new valves or for retrofitting existing valves.

The packing sets guarantee the leakage rates specified in the VDI directives over the entire temperature range. In precise terms, the sealing system must demonstrate a leakage rate of $10^{-4} \frac{\text{mbar} \times \text{l}}{\text{s} \times \text{m}}$ at a temperature of 250 °C or a leakage rate of $10^{-2} \frac{\text{mbar} \times \text{l}}{\text{s} \times \text{m}}$ above this temperature. The packing is live loaded in these applications to ensure continuous compression of the packing. The live loading system is designed and adjusted based on the operating temperature and operating pressure.

Available packing sets to meet TA Luft requirements:

| BuraTAL® T3 9650/T3 | |
|---------------------|-------------------|
| Temperature range | -10 to +250 °C |
| Pressure | 63 bar |
| Chemical resistance | pH value: 1 to 13 |

| BuraTAL® T3 9650/T1 | |
|---------------------|-------------------|
| Temperature range | -40 to +280 °C |
| Pressure | 40 bar |
| Chemical resistance | pH value: 1 to 14 |

| BuraTAL® HT 9650/HT | |
|---------------------|-------------------|
| Temperature range | -200 to +400 °C |
| Pressure | 300 bar |
| Chemical resistance | pH value: 1 to 13 |

| Valtec® 7250 | |
|---------------------|-------------------|
| Temperature range | -200 to +280 °C |
| Pressure | 30 bar |
| Chemical resistance | pH value: 1 to 14 |

Table 1: Technical data

| Series CERA1700 Sliding Disk Valves | | Type SSC15 | Type SSC22 | Type SSC30 |
|---|-------------|-----------------------------------|------------|------------|
| Valve size | DN | 10 to 40 | 15 to 65 | 25 to 65 |
| | NPS | ¾ to 1½ | ½ to 2½ | 1 to 2½ |
| Pressure rating ¹⁾ | PN | 10 to 40 | | |
| | Class | 150 and 300 | | |
| Flange end connections | DIN | See DIN EN 1092-1 | | |
| | ANSI | ASME B16.5 | | |
| Face-to-face dimensions | | EN 558-1, series 47 ²⁾ | | |
| Temperature ranges ³⁾ | Seal type 1 | -10 to +180 °C (Viton®) | | |
| | Seal type 2 | -10 to +260 °C (Kalrez® 6375) | | |
| | Seal type 3 | -10 to +310 °C (Kalrez® 7075) | | |
| Characteristic | | Equal percentage or linear | | |
| Bore geometry of sliding disk | | Round or V-shaped | | |
| Leakage class | EN 60534-4 | I and VI | | |
| Compliance | | CE | | |
| Type 3277 Pneumatic Actuator | | ▶ T 8310-1 | | |
| Type 3273 Side-mounted Handwheel for Type 3277 Pneumatic Actuator | | ▶ T 8312 | | |

¹⁾ Other pressure ratings on request

²⁾ Other face-to-face dimensions possible on request through the use of an adapter

³⁾ High-temperature version up to 450 °C on request

Table 2: Materials · • Standard version; ◦ Special version/option

| Series CERA1700 Sliding Disk Valves | |
|-------------------------------------|---|
| Body | • 1.4301 ◦ 1.4571 |
| Sliding disk | • Al ₂ O ₃ ◦ SSiC, ◦ ZrO ₂ |
| Washer | • Al ₂ O ₃ ◦ SSiC, ◦ ZrO ₂ , ◦ SSiC-DLC |
| Yoke | • 1.4301 ◦ 1.4571 |
| Anti-wear sleeve | • SSiC ◦ Al ₂ O ₃ |
| O-rings | • Seal type 1 ◦ DS-Typ 2, ◦ DS-Typ 3 |
| Bolts, nuts | • A2-/A4-70 |
| Bearing bushing | • PTFE/carbon |
| Packing | • Graphite ◦ Packing, ◦ TA Luft |
| Type 3277 Pneumatic Actuator | |
| | ▶ T 8310-1 |

Table 3: K_{VS} and C_V coefficients and associated nominal sizes

| | | Type | SSC15 | | | | | | | | | | SSC22 | | | | SSC30 | | | |
|--|---------------|--------------|-------------|-------|----------|-------|-----------------|-------|----------|-------|----------|-------|----------|-------|-----------------|-------|----------|-------|-----------------|-------|
| | | Travel | 20 | | 12/20 | | 20 | | 17 | | 27 | | 22/27 | | 27 | | 29/35 | | | |
| Valve size | Bore geometry | mm | Ø5 x 18 | | Ø7 x 18 | | Ø10 Ø10 x 18 | | Ø13 x 18 | | Ø15 | | Ø15 x 25 | | Ø20 Ø20 x 25 | | Ø25 | | Ø27 Ø27 x 32 | |
| | | Sliding disk | K_{VS} | C_V | K_{VS} | C_V | K_{VS} | C_V | K_{VS} | C_V | K_{VS} | C_V | K_{VS} | C_V | K_{VS} | C_V | K_{VS} | C_V | K_{VS} | C_V |
| 10 | 3/8 | V-shaped | 1.3 | 1.5 | 3.2 | 3.7 | 5.4 | 6.3 | - | - | - | - | - | - | - | - | - | - | - | - |
| | | Round | | | | | | | | | | | | | | | | | | |
| 15 | 1/2 | V-shaped | 1.1 | 1.3 | 2.5 | 2.9 | 6.6 | 7.7 | 11.7 | 13.7 | 14.6 | 17.0 | 14.6 | 17.0 | - | - | - | - | - | - |
| | | Round | | | | | | | | | | | | | | | | | | |
| 20 | 3/4 | V-shaped | 0.9 | 1.1 | 2.3 | 2.7 | 5.9 | 6.9 | 10.3 | 12.0 | 15.4 | 18.0 | 15.4 | 18.0 | 28.0 | 32.7 | 43.8 | 51.0 | - | - |
| | | Round | | | | | | | | | | | | | | | | | | |
| 25 | 1 | V-shaped | 1.0 | 1.2 | 2.2 | 2.6 | 5.2 | 6.1 | 9.0 | 10.5 | 14.5 | 16.9 | 14.5 | 16.9 | 34.7 | 40.5 | 54.2 | 63.3 | 38.0 | 44.3 |
| | | Round | | | | | | | | | | | | | | | | | | |
| 32 | 1 1/4 | V-shaped | 0.7 | 0.8 | 1.8 | 2.1 | 4.9 | 5.7 | 7.9 | 9.2 | 13.0 | 15.2 | 13.0 | 15.2 | 27.3 | 31.9 | 42.7 | 49.8 | 66.5 | 77.6 |
| | | Round | | | | | | | | | | | | | | | | | | |
| 40 | 1 1/2 | V-shaped | - | - | 1.6 | 1.9 | 4.8 | 5.6 | 7.7 | 9.0 | 11.9 | 13.9 | 11.9 | 13.9 | 22.8 | 26.6 | 35.6 | 41.6 | 56.5 | 65.9 |
| | | Round | | | | | | | | | | | | | | | | | | |
| 50 | 2 | V-shaped | - | - | - | - | - | - | - | - | - | - | 10.7 | 12.5 | 19.7 | 23.0 | 30.8 | 35.9 | 50.8 | 59.3 |
| | | Round | | | | | | | | | | | | | | | | | | |
| 65 | 2 1/2 | V-shaped | - | - | - | - | - | - | - | - | - | - | 8.0 | 9.3 | 19.0 | 22.2 | 29.7 | 34.6 | 49.0 | 57.3 |
| | | Round | | | | | | | | | | | | | | | | | | |
| Actuating forces | | | | | | | | | | | | | | | | | | | | |
| Force required by valve | | kN | 5.4 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 4.0 | 5.4 | 3.8 | 4.4 | 4.4 | | | | | | |
| Linear force of Type 3277 Pneumatic Actuator | | kN | 9.9 to 17.7 | | | | | | | | | | | | | | | | | |

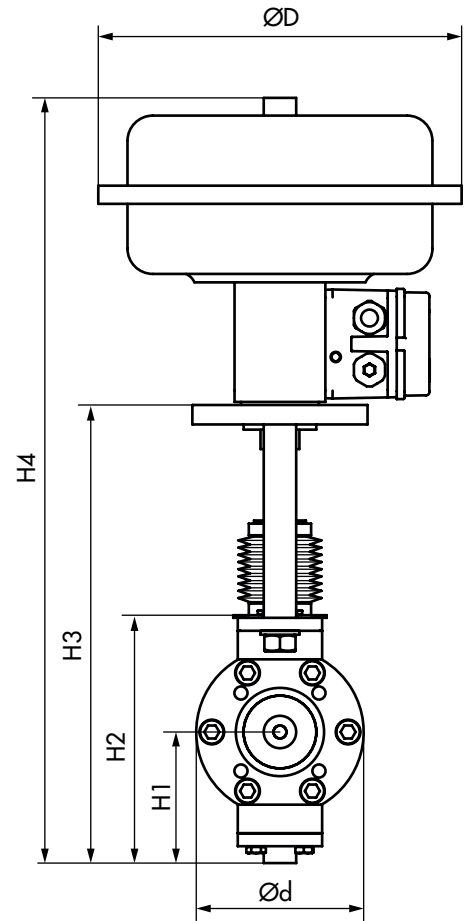
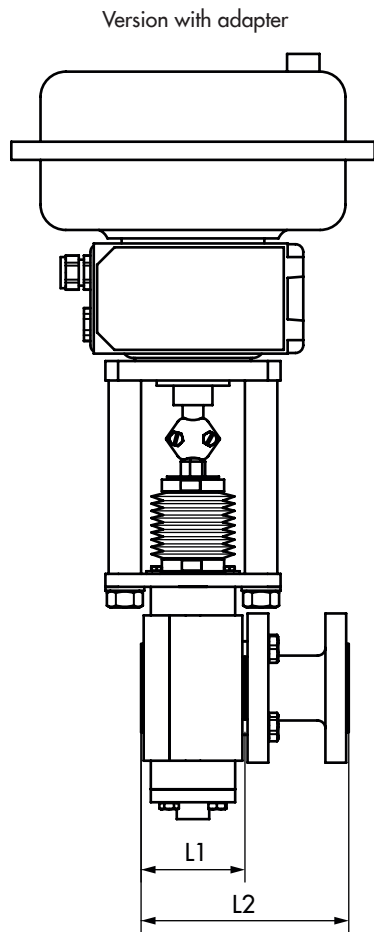
Bench ranges of Type 3277 Pneumatic Actuator (► T 8310-1)

Table 4: Dimensions and weights

| | | DN | 10 | 15 | 20 | 25 | 32 | 40 | 50 | 65 |
|---|------------------|-----|--|------------------|-----|-----|-------|-------|-----|-------|
| | | NPS | 3/8 | 1/2 | 3/4 | 1 | 1 1/4 | 1 1/2 | 2 | 2 1/2 |
| Type SSC15 with Type 3277 Actuator | | | | | | | | | | |
| Height | H1 | mm | 101 | | | | 111 | | | |
| | H2 | mm | 191 | | | | 211 | | | |
| | H3 | mm | 353 | | | | 373 | | | |
| | H4 | mm | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |
| Diameter | Ød | mm | 129 | | | | 149 | | | |
| | ØD | mm | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |
| Face-to-face dimensions | L1 | mm | 75 ¹⁾ | 75 ¹⁾ | 75 | 80 | 90 | 100 | - | - |
| | L2 | mm | 130 | 130 | 150 | 160 | 180 | 200 | | |
| Weight | Without actuator | kg | 11.5 | | | | | | | |
| | With actuator | kg | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |
| Type SSC22 with Type 3277 Actuator | | | | | | | | | | |
| Height | H1 | mm | 118 | | | | | | | |
| | H2 | mm | 218 | | | | | | | |
| | H3 | mm | 380 | | | | | | | |
| | H4 | mm | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |
| Diameter | Ød | mm | 149 | | | | | | | |
| | ØD | mm | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |
| Face-to-face dimensions | L1 | mm | 75 ¹⁾ | 75 | 80 | 90 | 100 | 110 | 130 | |
| | L2 | mm | 130 | 150 | 160 | 180 | 200 | 230 | 290 | |
| Weight | Without actuator | kg | 13.5 | | | | | | | |
| | With actuator | kg | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |
| Type SSC30 with Type 3277 Actuator | | | | | | | | | | |
| Height | H1 | mm | 150 | | | | | | | |
| | H2 | mm | 274 | | | | | | | |
| | H3 | mm | 436 | | | | | | | |
| | H4 | mm | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |
| Diameter | Ød | mm | 195 | | | | | | | |
| | ØD | mm | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |
| Face-to-face dimensions | L1 | mm | 75 | 80 | 90 | 100 | 110 | 130 | | |
| | L2 | mm | 150 | 160 | 180 | 200 | 230 | 290 | | |
| Weight | Without actuator | kg | 28 | | | | | | | |
| | With actuator | kg | Depends on the size of the mounted Type 3277 Actuator (▶ T 8310-1) | | | | | | | |

¹⁾ Not included in the standard (EN 558-1, series 47)

Dimensional drawings



Types SSC15, SSC22 and SSC30 Sliding Disk Valves with Type 3277 Actuator (355v2 cm²)

Ordering text

| Criteria | Value |
|-------------------------------|--|
| Valve size | DN/NPS ... |
| Pressure rating | PN ... |
| Temperature range | |
| Materials | See Table 1 on page 4. |
| Bore geometry of sliding disk | Round/V-shaped |
| Characteristic | Equal percentage, linear or on/off |
| Process medium | |
| Max. flow rate | in kg/h or m ³ /h |
| Pressure | p1 and p2 in bar |
| Actuator | Type 3277 (Data Sheet ► T 8310-1) |
| Fail-safe position | Actuator stem extends (FA)/actuator stem retracts (FE) |