**Keystone** swing type wafer check valve

# Figure 86

high capacity, spring loaded swing type wafer check valve

## Features

* lightweight, wafer type check valve with face-to-face dimensions according isO 5752, table 5 long
* high flow capacity featuring a special shaped disc with a large opening angle resulting in

high kv values

* spring loaded disc for positive shut-off
* choice of cast iron or stainless steel body types
* field replaceable O-ring seat
* internal travel stop prevents the disc from slamming against the pipe
* excellent low pressure shut-off

the standard low pressure shut-off is less than 0.1 bar (10 kpa)

* slam free operation
* Optional heavy spring for slam free operation in systems with high decelerations
* Optional light spring for systems with low line velocities
* Optional adjustable travelstop for system with reduced inner diameter pipe

**General applications**

* Back flow prevention in pump or multi-pump systems
* high slam risk systems up to flow deceleration of 25 m/s2
* combined low line velocity and low pressure tightness
* vacuum breaker for storage tank protection
* high capacity/low pressure drop to ensure economical use
* not suitable for pulsating applications

**technical data**

sizes (Dn): 40-300

temperature (°c): -40 to +190 pressure (bar/kpa): 16/1600 flange acc.: pn 6/10/16/25

asMe 150/300

as 2129 c, D & e (multi) Jis 5/10/16/20/30

A Q

C B

12

11

 9

5

7

4

10

8

3

6

 2

1

|  |  |  |
| --- | --- | --- |
|  |  D  |  |
| **dimensions (mm)** |  |  |  |  |  |  |  |
| **size dn** | **a** | **B****(pn10/pn16)** | **B1** | **B2** | **c** | **d** | **e** | **Q** | **mass (kg)** |
| 40 | 47.0 | 94 | - | - | 22.0 | 33 | 54 | 38 | 0.9 |
| 50 | 60.0 | 109 | 98 | 105 | 34.0 | 43 | 59 | 50 | 1.4 |
| 65 | 70.5 | 129 | 111 | 124 | 43.5 | 46 | 60 | 65 | 1.9 |
| 80 | 82.5 | 144 | 130 | 137 | 59.5 | 64 | 62 | 78 | 3.0 |
| 100 | 114.3 | 162 | 162 | 175 | 77.0 | 64 | 60 | 102 | 3.7 |
| 125 | 132.0 | 194 | 194 | 197 | 98.0 | 70 | 61 | 126 | 5.6 |
| 150 | 168.0 | 220 | 215 | 222 | 115.0 | 76 | 72 | 149 | 8.2 |
| 200 | 220.0 | 272 | 272 | 279 | 158.0 | 89 | 70 | 196 | 12.4 |
| 250 | 267.0 | 330 | 336 | 340 | 185.0 | 114 | 66 | 250 | 23.3 |
| 300 | 324.0 | 380/386 | 380 | 410 | 241.5 | 114 | 65 | 298 | 33.0 |

### note

Dimension B is the outside diameter for isO pn 10/pn 16 flange drilling. Dimension B1 is the outside diameter for as 2129 c, D & e flange drilling. Dimension B2 is the outside diameter for asMe 150 flange drilling.

Dimension Q is the chordal disc dimension at the outlet face of the valve for disc clearance into pipe fitting or equipment.

## material selection

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Body** | **disc** | **seat** | **shaft** | **trim no.** | **sizes (dn)** |
| cast iron | stainless steel | epDM | stainless steel | 203 | 40-300 |
|  |  | nBr |  | 204 | 40-300 |
|  |  | fluorelastomer |  | 205 | 40-300 |
| stainless steel | stainless steel | nBr | stainless steel | 208 | 50-300 |
|  |  | fluorelastomer |  | 207 | 50-300 |

**parts list**

**part name**

1. Body
2. Disc
3. shaft
4. plug
5. seal
6. O-ring
7. Bushing
8. travel stop
9. tagplate
10. spring
11. rivet
12. eye bolt

|  |  |
| --- | --- |
| **material speciFication** |  |
| **part name** | **material** | **en/astm designation** | **en mat. no.** | **remark** |
| Body | cast ironstainless steel | gJl-250gX5crniMo19-11-2 / cf8M | Jl-10401.4408 |  |
| Disc | stainless steel | gX5crniMo19-11-2 / cf8M | 1.4408 |  |
| shaft | stainless steel | X5crniMo17-12-2 / 316 s/s | 1.4401 |  |
| plug | stainless steel | X5crniMo17-12-2 / 316 s/s | 1.4401 |  |
| Bushing | stainless steel | X5crniMo17-12-2 / 316 s/s | 1.4401 |  |
| travel stop | stainless steel | X5crniMo17-12-2 / 316 s/s | 1.4401 | Optional |
| spring | stainless steel | X5crniMo17-12-2 / 316 s/s | 1.4401 |  |
| seal | ptfe |  |  |  |
| O-ring | nBr epDMfluorelastomer |  |  |  |
| tag plate | aluminium |  |  |  |
| rivet | aluminium |  |  |  |
| eye-bolt | steel galvanized |  |  | size 125-300 |

## pressure-temperature diaGram

|  |  |  |
| --- | --- | --- |
| **size range Valve function****seat material disc material Body material dn (mm) Wafer/end of line** | **temperature in °c****-60 -40 -30 -20 -15 0 50 100 120 130 160 190** | **notes** |
| epDM all all all wnBr all all all wfkM all all all w |  | **16 Bar** |  |  |  | 1 |
|  |  |  | **16 Bar** |  |  |  |  | 2 |
| **16 Bar** | 3 |

**pressure-temperature diaGram**

|  |  |
| --- | --- |
| **note** | **trims** |
| 1 | 203 |
| 2 | 204 / 208 |
| 3 | 205 / 207 |

**relation BetWeen deceleration oF FloW (m/s2) and maximum return Velocity (m/s)**

|  |  |
| --- | --- |
|  | **deceleration of flow (m/s2)** |
| **size dn** | **spring type** | **2** | **4** | **6** | **8** | **10** | **12** | **14** | **16** | **18** | **20** | **22** | **24** | **26** | **28** | **30** | **32** | **34** |
| 40 | l | 0.00 | 0.32 | 0.63 | 0.88 | 1.12 | 1.30 | - | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.00 | 0.13 | 0.32 | 0.48 | 0.63 | 0.76 | 0.89 | 1.01 | 1.13 | 1.25 | 1.36 | - | - | - | - | - | - |
|  | h | 0.00 | 0.07 | 0.25 | 0.37 | 0.48 | 0.56 | 0.63 | 0.69 | 0.75 | 0.80 | 0.85 | 0.89 | 0.93 | 0.97 | 1.01 | 1.05 | 1.09 |
| 50 | l | 0.02 | 0.40 | 0.69 | 0.96 | 1.19 | 1.40 | - | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.00 | 0.19 | 0.39 | 0.56 | 0.73 | 0.87 | 1.00 | 1.13 | 1.25 | 1.36 | - | - | - | - | - | - | - |
|  | h | 0.00 | 0.13 | 0.29 | 0.41 | 0.51 | 0.59 | 0.66 | 0.72 | 0.77 | 0.82 | 0.87 | 0.91 | 0.95 | 0.99 | 1.03 | 1.07 | 1.11 |
| 65 | l | 0.04 | 0.41 | 0.69 | 0.94 | 1.15 | 1.34 | - | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.00 | 0.23 | 0.43 | 0.60 | 0.76 | 0.88 | 1.01 | 1.12 | 1.24 | 1.35 | - | - | - | - | - | - | - |
|  | h | 0.00 | 0.14 | 0.30 | 0.41 | 0.51 | 0.58 | 0.66 | 0.72 | 0.78 | 0.84 | 0.89 | 0.95 | 1.01 | 1.06 | 1.12 | 1.17 | 1.23 |
| 80 | l | 0.16 | 0.48 | 0.70 | 0.87 | 1.02 | 1.16 | 1.30 | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.09 | 0.33 | 0.50 | 0.65 | 0.78 | 0.90 | 1.01 | 1.12 | 1.22 | 1.32 | - | - | - | - | - | - | - |
|  | h | 0.03 | 0.22 | 0.35 | 0.46 | 0.54 | 0.63 | 0.69 | 0.75 | 0.81 | 0.86 | 0.91 | 0.97 | 1.02 | 1.07 | 1.12 | 1.18 | 1.23 |
| 100 | l | 0.12 | 0.42 | 0.67 | 0.88 | 1.07 | 1.23 | 1.37 | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.05 | 0.32 | 0.52 | 0.68 | 0.81 | 0.92 | 1.02 | 1.12 | 1.20 | 1.28 | 1.36 | - | - | - | - | - | - |
|  | h | 0.00 | 0.16 | 0.31 | 0.42 | 0.51 | 0.58 | 0.65 | 0.72 | 0.79 | 0.86 | 0.93 | 1.00 | 1.07 | 1.14 | 1.21 | 1.28 | 1.35 |
| 125 | l | 0.16 | 0.45 | 0.70 | 0.91 | 1.09 | 1.25 | 1.39 | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.09 | 0.33 | 0.53 | 0.70 | 0.84 | 0.97 | 1.08 | 1.19 | 1.29 | 1.39 | - | - | - | - | - | - | - |
|  | h | 0.02 | 0.18 | 0.33 | 0.44 | 0.53 | 0.61 | 0.69 | 0.77 | 0.84 | 0.91 | 0.98 | 1.05 | 1.12 | 1.19 | 1.26 | 1.33 | - |
| 150 | l | 0.22 | 0.68 | 1.02 | 1.35 | - | - | - | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.10 | 0.50 | 0.81 | 1.07 | 1.29 | 1.48 | - | - | - | - | - | - | - | - | - | - | - |
|  | h | 0.03 | 0.39 | 0.63 | 0.82 | 0.98 | 1.10 | 1.22 | 1.31 | - | - | - | - | - | - | - | - | - |
| 200 | l | 0.19 | 0.62 | 0.98 | 1.26 | 1.48 | - | - | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.09 | 0.45 | 0.75 | 1.01 | 1.21 | 1.34 | - | - | - | - | - | - | - | - | - | - | - |
|  | h | 0.00 | 0.34 | 0.56 | 0.73 | 0.88 | 0.99 | 1.10 | 1.19 | 1.29 | 1.39 | - | - | - | - | - | - | - |
| 250 | l | 0.21 | 0.48 | 0.73 | 0.93 | 1.13 | 1.29 | 1.45 | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.12 | 0.37 | 0.56 | 0.74 | 0.87 | 1.02 | 1.13 | 1.23 | 1.33 | - | - | - | - | - | - | - | - |
|  | h | 0.04 | 0.21 | 0.34 | 0.46 | 0.55 | 0.65 | 0.74 | 0.81 | 0.88 | 0.95 | 1.02 | 1.09 | 1.16 | 1.23 | 1.30 | 1.37 | - |
| 300 | l | 0.23 | 0.51 | 0.76 | 0.96 | 1.16 | 1.32 | - | - | - | - | - | - | - | - | - | - | - |
|  | s | 0.15 | 0.39 | 0.59 | 0.76 | 0.90 | 1.04 | 1.16 | 1.27 | 1.38 | - | - | - | - | - | - | - | - |
|  | h | 0.07 | 0.23 | 0.36 | 0.48 | 0.57 | 0.67 | 0.76 | 0.84 | 0.91 | 0.98 | 1.05 | 1.12 | 1.19 | 1.26 | 1.33 | - | - |

l = light, s = standard, h = heavy

**Kv Values**

|  |
| --- |
| **standard spring light spring heavy spring** |
| **size dn** | **Kv (m3/h)** | **Zeta****(-)** | **Δp open****(x10-3 bar)** | **Vst (m/s)** | **Δp open****(x10-3 bar)** | **Vst (m/s)** | **Δp open****w(x10-3 bar)** | **Vst (m/s)** |
| 40 | 26 | 6.06 | 16.0 | 1.1 | 8.0 | 0.82 | 20.0 | 2.1 |
| 50 | 60 | 2.78 | 12.0 | 1.4 | 6.0 | 1.10 | 15.0 | 2.7 |
| 65 | 100 | 2.85 | 13.0 | 1.4 | 6.5 | 1.10 | 16.0 | 2.6 |
| 80 | 170 | 2.27 | 6.9 | 1.5 | 3.5 | 1.30 | 8.8 | 2.5 |
| 100 | 300 | 1.78 | 9.0 | 1.2 | 4.5 | 0.95 | 11.0 | 2.2 |
| 125 | 477 | 1.72 | 10.0 | 1.2 | 5.0 | 0.96 | 12.0 | 2.2 |
| 150 | 730 | 1.52 | 3.7 | 1.6 | 1.9 | 1.40 | 4.6 | 2.5 |
| 200 | 1420 | 1.27 | 3.2 | 1.5 | 1.6 | 1.30 | 4.0 | 2.3 |
| 250 | 2340 | 1.14 | 4.0 | 1.5 | 2.0 | 1.30 | 4.9 | 2.3 |
| 300 | 3460 | 1.08 | 4.0 | 1.5 | 2.0 | 1.30 | 4.9 | 2.4 |

## loW pressure tiGhtness

### notes

1. kv is the volume of water in m3/hr that will pass through a given valve opening at a pressure drop of 1 bar.
2. Zeta is the flow resistance factor in the relation Δρ = zèta x ½ x ρ x v2 x10-5 in which Δρ is the pressure drop (bar)

ρ is the fluid density (kg/m3) v is the line velocity (m/s)

1. Δρ open is the openeningspressure of the valve (x10-3 bar).
2. vst is the steady flow velocity: this is the velocity at which the valve is just full open.
3. all data given for a horizontal pipeline.

**Fig. no low pressure tightness (bar)**

86 < 0.1

## dynamic characteristics

the graphs and table show the relation between flow deceleration and maximum return velocity. the pressure surge after disc closure can be calculated

Δρ = ρ x c x vr x 10-5 in which

* Δρ is the pressure rise to be added to the valve downstream pressure (bar)
* ρ is the density of the fluid (kg/m3)
* c is the speed of sound through the fluid (m/s) (for water 1200 m/s)
* vr is the maximum return velocity (m/s)

1.5

1.0

Maximum return velocity m/s

0.5

**spring type** standard light heavy Dn 40 Dn 50

1.5

1.0

Maximum return velocity m/s

0.5

**spring type** standard light heavy Dn 65 Dn 80

0

0 5 10

15 20 25

0

0 5 10 15

20 25

Deceleration of flow m/s2 Deceleration of flow m/s2

1.5

1.0

Maximum return velocity m/s

0.5

**spring type** standard light heavy Dn 100 Dn 125

1.5

1.0

Maximum return velocity m/s

0.5

**spring type** standard light heavy Dn 150 Dn 200

0

0 5 10 15 20 25

Deceleration of flow m/s2

0

0 5 10 15 20 25

Deceleration of flow m/s2

1.5

1.0

Maximum return velocity m/s

0.5

**spring type** standard light heavy Dn 250

1.5

1.0

Maximum return velocity m/s

0.5

**spring type** standard light heavy Dn 300

0

0 5 10

15 20

0

25 0

5 10

15 20 25

Deceleration of flow m/s2 Deceleration of flow m/s2

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