

**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 iron  stainless steel | gJl-250  gX5crniMo19-11-2 / cf8M | Jl-1040  1.4408 |  |
| 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 epDM  fluorelastomer |  |  |  |
| 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 w  nBr all all all w  fkM 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

neither emerson, emerson automation solutions, nor any of their affiliated entities assumes responsibility for the selection, use or maintenance of any product. responsibility for proper selection, use, and maintenance of any product remains solely with the purchaser and end user.

keystone is a mark owned by one of the companies in the emerson automation solutions business unit of emerson electric co. emerson automation solutions, emerson and the emerson logo are trademarks and service marks of emerson electric co. all other marks are the property of their respective owners.

the contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. all sales are governed by our terms and conditions, which are available upon request. we reserve the right to modify or improve the designs or specifications of such products at any time without notice.

emerson.com/finalcontrol