

→ Series 461



■ SUITABLE FOR

| | | |
|------------------------|-------------------------|--|
| Liquids | neutral and non-neutral | |
| Air, gases and vapours | neutral and non-neutral | |
| Steam | | |

■ EXAMPLES OF USE

For the protection of:

- pressure tanks and -systems for neutral / non-neutral vapours, gases and liquids

- steam boilers and steam plants

Please observe plant-specific regulations and use of appropriate valve version and sealing material.

- chemical plants, biogas plants
- desalination plants
- process equipment construction and medical technology
- shipbuilding industry and marine equipment
- secondary areas in the food-, beverage-, pharmaceutical- and cosmetics-industries
- offshore-applications

Safety valves are set and sealed at the factory.

■ APPROVALS

| | |
|---|------------------------------|
| TÜV-Type test approval 2061 | D/G, F |
| EC type examination | S/G, L |
| TSG ZF001-2006 | D/G (S/G), F (L) |
| TR ZU 032/2013 - TR ZU 010/2011 | D/G (S/G), F (L) |
| Requirements | |
| AD 2000 Data sheet A2 TRD 421 DIN EN ISO 4126-1 | PED 2014/68/EU KGS AA 319 |

Classification society

| | |
|---------------------------------------|---------|
| DNVGL | DNVGL |
| Lloyd's Register EMEA | LR EMEA |
| American Bureau of Shipping | ABS |
| Russian Maritime Register of Shipping | RS |
| Registro Italiano Navale | RINA |



■ MATERIAL



■ SPECIFICATION



1/4" – 1/2"



– 60°C to + 225°C
depending on version



0,5 – 70 bar

■ MATERIALS

| Component | Material | DIN EN | ASME |
|----------------|-----------------|--------|-------|
| Inlet body | Stainless steel | 1.4404 | 316 L |
| Outlet body | Stainless steel | 1.4408 | CF8M |
| Internal parts | Stainless steel | 1.4404 | 316 L |
| Spring | Stainless steel | 1.4310 | 302 |

Series 861 ■ VALVE VERSION

| | | |
|----------|--|--|
| s | Standard, non-gastight version of the spring housing | for neutral media without counter pressure, not for medium in combination GF |
| t | gastight version of spring housing | for neutral and non-neutral media, not counter pressure compensated. The environment is protected from being affected by the medium. |

■ MEDIUM

| | | |
|-----------|--------------------|---|
| G | gaseous | Air, vapours, gases and steam |
| F | liquid | The temperature of the medium under atmospheric pressure must not reach boiling point |
| GF | gaseous and liquid | Air, vapours, gases, steam and liquids |

■ TYPE OF LIFTING MECHANISM

| | | |
|----------|--|--|
| K | Standard with twist-type lifting mechanism, non-gastight version | |
| L | Lifting lever, non-gastight version | |
| O | without lifting device, standard for gastight version | |

■ AVAILABLE NOMINAL DIAMETERS AND CONNECTION SIZES

| Nominal diameter DN | | 8 | 10 | 15 |
|---------------------|-----------|----------|-----------|-----------|
| Inlet | | 1/4" (8) | 3/8" (10) | 1/2" (15) |
| Outlet | 1/2" (15) | ■ | ■ | ■ |

■ TYPE OF CONNECTION INLET / OUTLET THREADED CONNECTIONS

| | | | |
|--------------|----------|---|-------------------------------------|
| m / f | Standard | Male thread BSP-P / Female thread BSP-P | DIN EN ISO 228-1 / DIN EN ISO 228-1 |
|--------------|----------|---|-------------------------------------|

■ SEALS

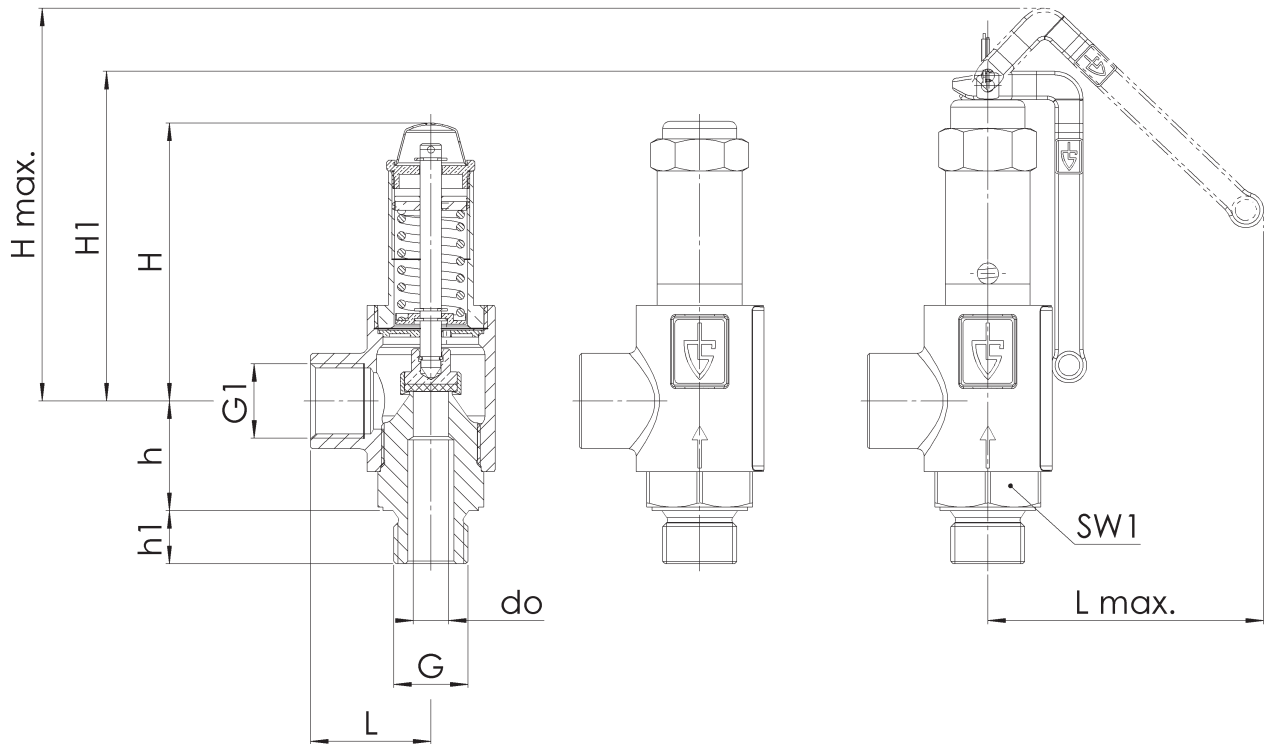
| | | | |
|-------------------|----------------------------------|-------------------------|-----------------|
| PTFE | Polytetrafluoroethylene | Flat seal up to 25 bar | -60°C to +225°C |
| PTFE+Kohle | Polytetrafluoroethylene + carbon | Flat seal from 25,1 bar | -60°C to +225°C |

■ NOMINAL DIAMETERS, CONNECTIONS, INSTALLATION DIMENSIONS

| Series 461: Connection, installation dimensions, ranges of adjustment | | | | | |
|---|--------------------------|-----------|-----------|-----------|-----------|
| Nominal diameter | DN | 8 | 10 | 15 | |
| Connection DIN EN ISO 228 | G | 1/4" (8) | 3/8" (10) | 1/2" (15) | 1/2" (15) |
| Outlet DIN EN ISO 228 | G1 | 1/2" (15) | 1/2" (15) | 1/2" (15) | 1/2" (15) |
| Installation dimensions in mm | L | 34 | 34 | 34 | 34 |
| | Lmax | 78 | 78 | 78 | 78 |
| | H | 79 | 79 | 79 | 133 |
| | H1 | 93 | 93 | 93 | 150 |
| | Hmax | 111 | 111 | 111 | 168 |
| | h | 31 | 31 | 31 | 31 |
| | h1 | 12 | 12 | 15 | 15 |
| | SW | 30 | 30 | 30 | 30 |
| Coefficients of flow ISO 4126-1 | $\alpha_w / Kdr (F)$ | 0,5 | 0,44 | 0,47 | 0,47 |
| | $\alpha_w / Kdr (D/G)^1$ | 0,68 | 0,64 | 0,71 | 0,71 |
| Weight | kg | 0,5 | 0,5 | 0,6 | 1 |
| | Range of adjustment | bar | 0,5-70 | 0,5-70 | 0,5-30 |

¹Coefficients of flow for blow-off pressures >3,0 bar. For lower pressures refer to values in the capacity table.

■ MAIN DIMENSIONS, INSTALLATION DIMENSIONS



| Series | Valve version | Medium | Lifting device | Nominal diameter DN | Connection type | | Connection size | | Seal | Options | Set pressure | Quantity |
|--------|---------------|--------|----------------|---------------------|-----------------|--------|-----------------|--------|------|---------|--------------|----------|
| | | | | | Inlet | Outlet | Inlet | Outlet | | | | |
| 461 | t | G | 0 | 8 | m | f | 8 | 15 | PTFE | | 12,3 | 2 |
| 461 | | | | | m | f | | 15 | | | | |
| 461 | | | | | m | f | | 15 | | | | |
| 461 | | | | | m | f | | 15 | | | | |

■ PROPERTIES

| | | | |
|------------|--|--------------------------|--------------------------|
| GOX | Especially for gaseous O2 applications by employment of specific materials including oil- and grease free production process | <input type="checkbox"/> | <input type="checkbox"/> |
| P01 | Oil- and grease-free production | <input type="checkbox"/> | <input type="checkbox"/> |
| | | <input type="checkbox"/> | <input type="checkbox"/> |

■ CERTIFICATES / APPROVALS

| | | | | | |
|------------|---|--------------------------|------------|---|--------------------------|
| C01 | Factory certificate acc. DIN EN 10204 2.2 (WKZ 2.2) | <input type="checkbox"/> | C06 | ATEX evaluation acc. to 2014/34/EU | <input type="checkbox"/> |
| C02 | Test certificate acc. DIN EN 10204 3.1 (WPZ 3.1) | <input type="checkbox"/> | C07 | SIL evaluation relating to IEC 61508-2 | <input type="checkbox"/> |
| C03 | Material test certificate acc. DIN EN 10204 3.1 (MPZ 3.1) (pressure retaining part) | <input type="checkbox"/> | C09 | Seat tightness test with helium, leak detection method under vacuum incl. Factory Inspection Certificate 3.1 acc. to DIN EN 10204 | <input type="checkbox"/> |
| C04 | TÜV/DEKRA individual inspection acc. EN 10204 3.2 (TÜV/DEKRA-APZ) | <input type="checkbox"/> | C10 | Certificate of oil- and grease free production | <input type="checkbox"/> |
| C05 | Sealing material Manufacturer certification (FDA, USP 3, 3-A, ...), Please indicate description of certificate: | <input type="checkbox"/> | C11 | Certification of the production process especially for gaseous oxygen applications by employment of specific materials | <input type="checkbox"/> |

■ ADMISSIONS / ACCREDITATIONS

| | | | | | |
|------------|--|--------------------------|------------|--|--------------------------|
| AA1 | EC Type examination acc. to Directive 2014/68/EU | <input type="checkbox"/> | AK1 | DNV-GL (DNVGL) type approval | <input type="checkbox"/> |
| AA2 | TÜV component test acc. to VdTÜV specification sheet SV 100 | <input type="checkbox"/> | AK2 | Lloyd's Register (LR) type approval | <input type="checkbox"/> |
| AA4 | EAC - certificate/declaration with passport for the valve and laser marking of the valve | <input type="checkbox"/> | AK3 | American Bureau of Shipping (ABS) type approval | <input type="checkbox"/> |
| AA5 | Manufacture License of Special Equipment People's Republic of China (ML) | <input type="checkbox"/> | AK4 | Bureau Veritas (BV) type approval | <input type="checkbox"/> |
| | | <input type="checkbox"/> | AK5 | Russian Maritime Register of Shipping (RMRS) type approval | <input type="checkbox"/> |
| | | <input type="checkbox"/> | AK6 | Registro Italiano Navale (RINA) type approval | <input type="checkbox"/> |
| | | <input type="checkbox"/> | AL | Individual inspection by notified body inspector – (body to be indicated): | <input type="checkbox"/> |

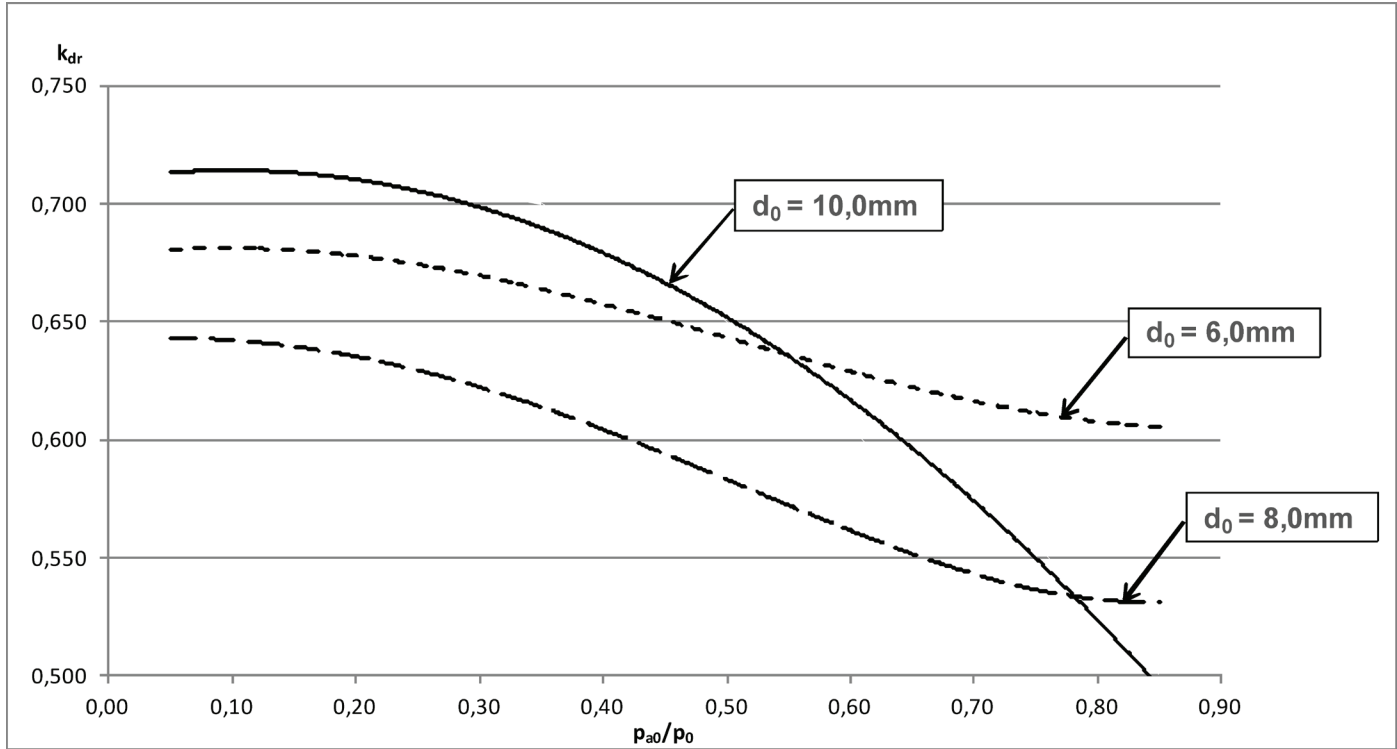
■ ENQUIRY

Copy and send to: order@goetze-armaturen.de.

Order form easily to be found online under the section for each series.

| Series 461: Blowing-off rates at 10% above set pressure | | | | | | | | | | |
|---|--------|-----------|-------|--------|-----------|-------|--------|------------|-------|------|
| Nominal diameter DN | | 8 | | | 10 | | | 15 | | |
| Set pressure bar | | d0 = 6 mm | | | d0 = 8 mm | | | d0 = 10 mm | | |
| | | I | II | III | I | II | III | I | II | III |
| Air I | 0,5 | 18,9 | 15,5 | 0,6 | 29,7 | 24,3 | 0,9 | 49,4 | 40,4 | 1,4 |
| | 1,0 | 26,1 | 20,8 | 0,8 | 41,9 | 33,4 | 1,2 | 73,5 | 58,5 | 2,0 |
| | 1,5 | 33,8 | 26,7 | 0,9 | 55,3 | 43,8 | 1,4 | 97,5 | 77,2 | 2,4 |
| Steam II | 2,0 | 41,3 | 32,5 | 1,1 | 68,4 | 53,8 | 1,7 | 120,1 | 94,5 | 2,8 |
| | 2,5 | 48,8 | 38,2 | 1,2 | 81,0 | 63,4 | 1,9 | 141,7 | 110,9 | 3,1 |
| | 3,0 | 56,2 | 43,8 | 1,3 | 93,4 | 72,8 | 2,0 | 163,3 | 127,3 | 3,4 |
| | 3,5 | 63,4 | 49,3 | 1,4 | 105,8 | 82,2 | 2,2 | 184,2 | 143,1 | 3,7 |
| | 4,0 | 70,6 | 54,7 | 1,5 | 118,3 | 91,6 | 2,4 | 205,1 | 158,8 | 3,9 |
| Water III | 4,5 | 77,8 | 60,1 | 1,6 | 130,4 | 100,7 | 2,5 | 226,0 | 174,5 | 4,2 |
| | 5,0 | 85,1 | 65,5 | 1,7 | 142,4 | 109,7 | 2,6 | 246,9 | 190,2 | 4,4 |
| | 5,5 | 92,3 | 70,9 | 1,8 | 154,5 | 118,8 | 2,8 | 267,8 | 205,9 | 4,6 |
| | 6,0 | 99,5 | 76,3 | 1,8 | 166,6 | 127,8 | 2,9 | 288,7 | 221,5 | 4,8 |
| | 6,5 | 106,7 | 81,7 | 1,9 | 178,6 | 136,8 | 3,0 | 309,6 | 237,1 | 5,0 |
| | 7,0 | 113,9 | 87,1 | 2,0 | 190,7 | 145,8 | 3,1 | 330,5 | 252,7 | 5,2 |
| | 7,5 | 121,1 | 92,5 | 2,1 | 202,7 | 154,8 | 3,2 | 351,4 | 268,3 | 5,4 |
| | 8,0 | 128,3 | 97,8 | 2,1 | 214,8 | 163,7 | 3,3 | 372,3 | 283,8 | 5,6 |
| | 8,5 | 135,5 | 103,2 | 2,2 | 226,8 | 172,7 | 3,4 | 393,2 | 299,4 | 5,7 |
| | 9,0 | 142,8 | 108,6 | 2,3 | 238,9 | 181,7 | 3,5 | 414,1 | 314,9 | 5,9 |
| | 9,5 | 150,0 | 113,9 | 2,3 | 250,9 | 190,7 | 3,6 | 435,0 | 330,5 | 6,1 |
| | 10,0 | 157,2 | 119,3 | 2,4 | 263,0 | 199,6 | 3,7 | 455,8 | 346,0 | 6,2 |
| | 11,0 | 171,6 | 130,0 | 2,5 | 287,1 | 217,6 | 3,9 | 497,6 | 377,1 | 6,5 |
| | 12,0 | 186,0 | 140,7 | 2,6 | 311,2 | 235,5 | 4,1 | 539,4 | 408,1 | 6,8 |
| | 13,0 | 200,4 | 151,4 | 2,7 | 335,3 | 253,3 | 4,3 | 581,2 | 439,1 | 7,1 |
| | 14,0 | 214,8 | 162,1 | 2,8 | 359,4 | 271,3 | 4,4 | 623,0 | 470,2 | 7,4 |
| | 15,0 | 229,2 | 172,9 | 2,9 | 383,5 | 289,2 | 4,6 | 664,8 | 501,4 | 7,6 |
| | 16,0 | 243,6 | 183,5 | 3,0 | 407,6 | 307,1 | 4,7 | 706,6 | 532,3 | 7,9 |
| | 17,0 | 258,0 | 194,3 | 3,1 | 431,7 | 325,1 | 4,9 | 748,3 | 563,4 | 8,1 |
| | 18,0 | 272,4 | 205,0 | 3,2 | 455,8 | 343,0 | 5,0 | 790,1 | 594,6 | 8,4 |
| | 19,0 | 286,8 | 215,8 | 3,3 | 479,9 | 361,0 | 5,2 | 831,9 | 625,8 | 8,6 |
| | 20,0 | 301,2 | 226,5 | 3,4 | 504,0 | 379,0 | 5,3 | 873,7 | 657,0 | 8,8 |
| | 21,0 | 315,7 | 237,3 | 3,5 | 528,1 | 397,0 | 5,4 | 915,5 | 688,2 | 9,0 |
| | 22,0 | 330,1 | 248,0 | 3,5 | 552,3 | 415,0 | 5,5 | 957,3 | 719,4 | 9,3 |
| | 23,0 | 344,5 | 258,8 | 3,6 | 576,4 | 433,1 | 5,7 | 999,1 | 750,7 | 9,5 |
| | 24,0 | 358,9 | 269,6 | 3,7 | 600,5 | 451,2 | 5,8 | 1040,8 | 782,0 | 9,7 |
| | 25,0 | 373,3 | 280,4 | 3,8 | 624,6 | 469,2 | 5,9 | 1082,6 | 813,4 | 9,9 |
| | 26,0 | 387,7 | | 3,9 | 648,7 | | 6,0 | 1124,4 | | 10,1 |
| | 27,0 | 402,1 | | 3,9 | 672,8 | | 6,1 | 1166,2 | | 10,2 |
| | 28,0 | 416,5 | | 4,0 | 696,9 | | 6,3 | 1208,0 | | 10,4 |
| 29,0 | 430,9 | | 4,1 | 721,0 | | 6,4 | 1249,8 | | 10,6 | |
| 30,0 | 445,3 | | 4,1 | 745,1 | | 6,5 | 1291,6 | | 10,8 | |
| 32,0 | 474,1 | | 4,3 | 793,3 | | 6,7 | 1375,1 | | 11,2 | |
| 34,0 | 502,9 | | 4,4 | 841,5 | | 6,9 | 1458,7 | | 11,5 | |
| 36,0 | 531,8 | | 4,5 | 889,7 | | 7,1 | 1542,3 | | 11,8 | |
| 38,0 | 560,6 | | 4,7 | 938,0 | | 7,3 | 1625,8 | | 12,2 | |
| 40,0 | 589,4 | | 4,8 | 986,2 | | 7,5 | 1709,4 | | 12,5 | |
| 42,0 | 618,2 | | 4,9 | 1034,4 | | 7,7 | 1793,0 | | 12,8 | |
| 44,0 | 647,0 | | 5,0 | 1082,6 | | 7,8 | 1876,6 | | 13,1 | |
| 46,0 | 675,8 | | 5,1 | 1130,8 | | 8,0 | 1960,1 | | 13,4 | |
| 48,0 | 704,6 | | 5,2 | 1179,0 | | 8,2 | 2043,7 | | 13,7 | |
| 50,0 | 733,5 | | 5,3 | 1227,2 | | 8,4 | 2127,3 | | 13,9 | |
| 51,0 | 747,9 | | 5,4 | 1251,3 | | 8,4 | 2169,1 | | 14,1 | |
| 52,0 | 762,3 | | 5,4 | 1275,4 | | 8,5 | 2210,8 | | 14,2 | |
| 53,0 | 776,7 | | 5,5 | 1299,5 | | 8,6 | 2252,6 | | 14,4 | |
| 54,0 | 791,1 | | 5,6 | 1323,7 | | 8,7 | 2294,4 | | 14,5 | |
| 55,0 | 805,5 | | 5,6 | 1347,8 | | 8,8 | 2336,2 | | 14,6 | |
| 56,0 | 819,9 | | 5,7 | 1371,9 | | 8,8 | 2378,0 | | 14,8 | |
| 57,0 | 834,3 | | 5,7 | 1396,0 | | 8,9 | 2419,8 | | 14,9 | |
| 58,0 | 848,7 | | 5,8 | 1420,1 | | 9,0 | 2461,6 | | 15,0 | |
| 59,0 | 863,1 | | 5,8 | 1444,2 | | 9,1 | 2503,4 | | 15,2 | |
| 60,0 | 877,5 | | 5,9 | 1468,3 | | 9,2 | 2545,1 | | 15,3 | |
| 61,0 | 891,9 | | 5,9 | 1492,4 | | 9,2 | 2586,9 | | 15,4 | |
| 62,0 | 906,3 | | 5,9 | 1516,5 | | 9,3 | 2628,7 | | 15,5 | |
| 63,0 | 920,8 | | 6,0 | 1540,6 | | 9,4 | 2670,5 | | 15,7 | |
| 64,0 | 935,2 | | 6,0 | 1564,7 | | 9,5 | 2712,3 | | 15,8 | |
| 65,0 | 949,6 | | 6,1 | 1588,8 | | 9,5 | 2754,1 | | 15,9 | |
| 66,0 | 964,0 | | 6,1 | 1612,9 | | 9,6 | 2795,9 | | 16,0 | |
| 67,0 | 978,4 | | 6,2 | 1637,0 | | 9,7 | 2837,6 | | 16,1 | |
| 68,0 | 992,8 | | 6,2 | 1661,1 | | 9,7 | 2879,4 | | 16,3 | |
| 69,0 | 1007,2 | | 6,3 | 1685,2 | | 9,8 | 2921,2 | | 16,4 | |
| 70,0 | 1021,6 | | 6,3 | 1709,4 | | 9,9 | 2963,0 | | 16,5 | |

Coefficient of discharge α_w i.e. K_{dr} as a function of the relation between the pressures p_{a0} / p_0 of vapours and gases



$$\frac{p_{a0}}{p_0} = \frac{\text{counter pressure bar(a)}}{\text{blow-off pressure bar(a)}} \quad p_{atm} = \text{ambient i.e. atmospheric pressure} = 1,01325 \text{ bar(a)}$$

Example to determine the coefficient of discharge α_w i.e. K_{dr} in relation to the set-pressure p_{set}

| Set-pressure | Blow-off pressure |
|------------------|---------------------------------------|
| p_{set} bar(g) | p_0 bar(a) |
| ≤ 1 | $p_{set} + p_{atm} + 0,1 \text{ bar}$ |
| > 1 | $p_{set} \times 1,1 + p_{atm}$ |

For a safety valve set at = 0,5bar(g) and blowing-off into the enviroment the blow-off pressure is determined as follows:

| | | |
|----------------------------|---------|--------|
| Set-pressure | 0,5 | bar(g) |
| + Atmospheric pressure | 1,01325 | bar(a) |
| + permissable overpressure | 0,1 | bar(g) |
| ~ Blow-off pressure | 1,61 | bar(a) |

Consequently:

$$\frac{p_{a0}}{p_0} = \frac{1,01325 \text{ bar(a)}}{1,61 \text{ bar(a)}} = 0,72 \quad \text{and extracted from the chart } \alpha_w \text{ i.e. } K_{dr} = 0,56 \text{ at } d_0=8,0\text{mm}$$

Units:

bar(a) $\hat{=}$ absolute pressure - pressure in relation to absolute vacuum (zero), e.g. $p_{atm} = 1,01325 \text{ bar(a)}$
 bar(g) $\hat{=}$ overpressure - pressure above i.e. in relation to $p_{atm} = 1,01325 \text{ bar(a)}$