



Goetze **P**roduct **S**ervice

REVISION AND ADJUSTMENT

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COMPETENT PARTNER: GOETZE KG

Individuality for more safety

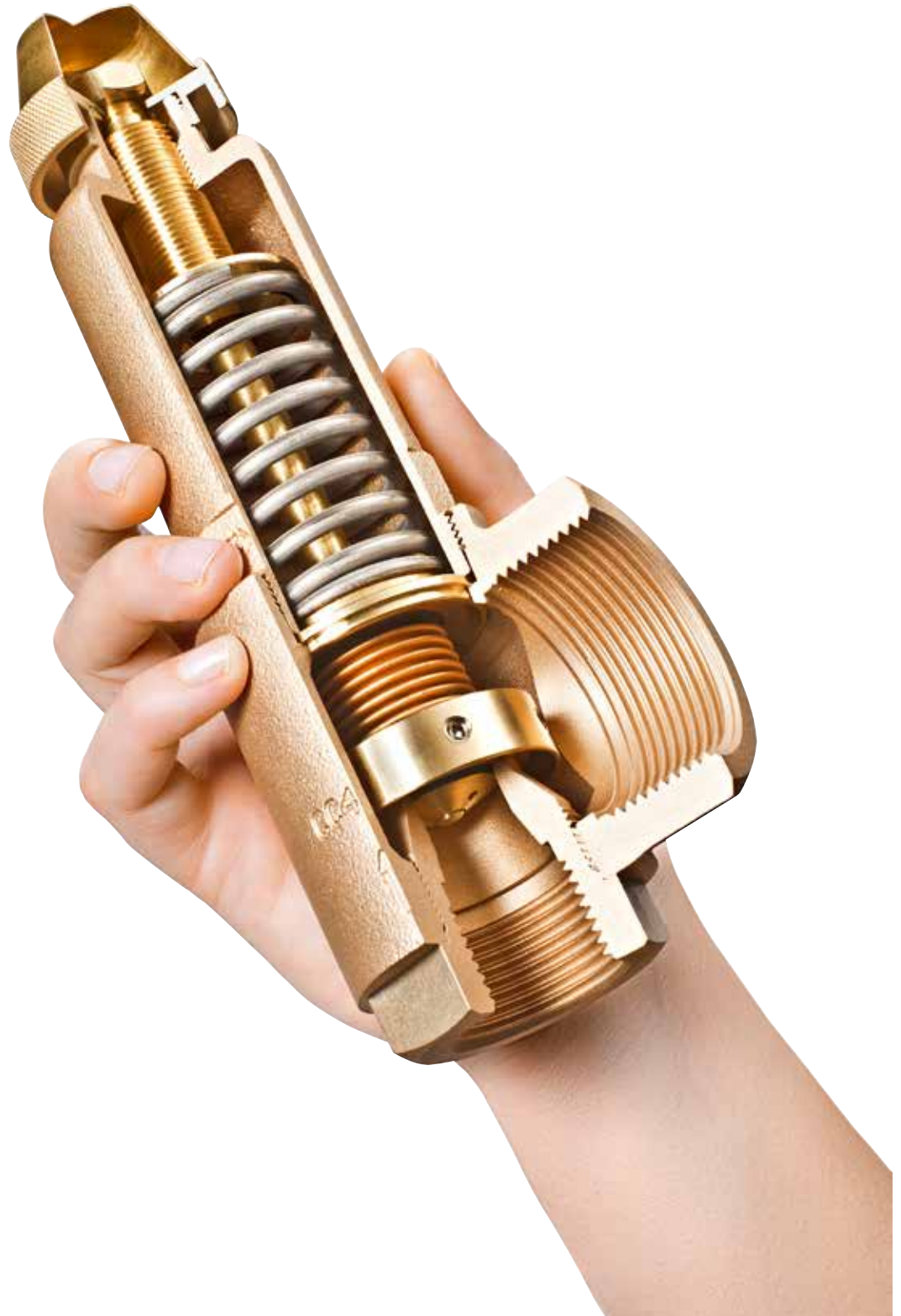
The competence of Goetze KG Armaturen has been in demand for more than 65 years. Our wealth of experience is as broad and varied as our areas of application for our high-performance fittings. Our well thought-out family of products covers every industrial application: Liquids of all kinds, gases, technical vapours and steam. Goetze valves are used with temperatures ranging from $-270\text{ }^{\circ}\text{C}$ up to $400\text{ }^{\circ}\text{C}$ and the greatest possible safety is a priority.

We have the right solution for you: Take us at our word! We have been designing and manufacturing safety valves for a highly diversified range of applications for over 65 years. With over 300.000 valves per year „Made in Germany“, we are your competent partner for all matters relating to the handling of pressure.

At any time, you can reach a competent contact partner as part of our in-house team at Goetze. Whether it is for the product selection, the configuration of the right valve, urgent requests, whether per telephone call, per mail or per chat, there is a personal multilingual consultant at your disposal.



GENERAL PRINCIPLES: SAFETY VALVES



EXEMPTION FROM LIABILITY

Notes on GOETZE exemption from liability for certified service companies

- Declaration of exemption from liability.
- Service company is liable.
- The company Goetze KG Armaturen allows customers to adjust the supplied valves themselves and to use their own seals. In this case the company Goetze KG Armaturen does not assume any warranty for defects or damages, unless the customer proves that the damage was not caused by the adjustment or modification carried out by him/her.
- Goetze KG Armaturen does not assume any warranty for defects or damage caused by unauthorised adjustment and sealing of safety valves.

What happens to the manufacturer's warranty when the seal is opened?

In general, the manufacturer's warranty expires when the seal is opened.

PURPOSE OF SAFETY VALVE

A safety valve serves one single purpose: to protect against unacceptable overpressure in installations or parts of installations which would result in the system bursting. A safety valve is a mechanical safety device that responds when all other control and monitoring devices fail and an impermissibly high pressure occurs in a vessel, storage tank, pipeline or something similar. For example, this can occur due to cooling failure, incorrect dosing or a blocked discharge line. If the pressure in a vessel protected by a safety valve rises above a permissible value, the valve opens and allows a part of the pressurised Media to escape from the vessel. As a result, the pressure drops again. When the pressure has dropped far enough, the safety valve closes. As a result, a safety valve does not allow the entire contents of a vessel to escape but only as much as is necessary to reduce the pressure back to a permissible value.

STRUCTURE / FUNCTION

A spring-loaded safety valve (Figure 1) is a mechanical component consisting of the following main components: seat, disc, lifting ring, spring, spindle and a pressure screw for adjusting the spring preload. These components are installed in a body with connections for the supply and discharge lines and a spring housing.

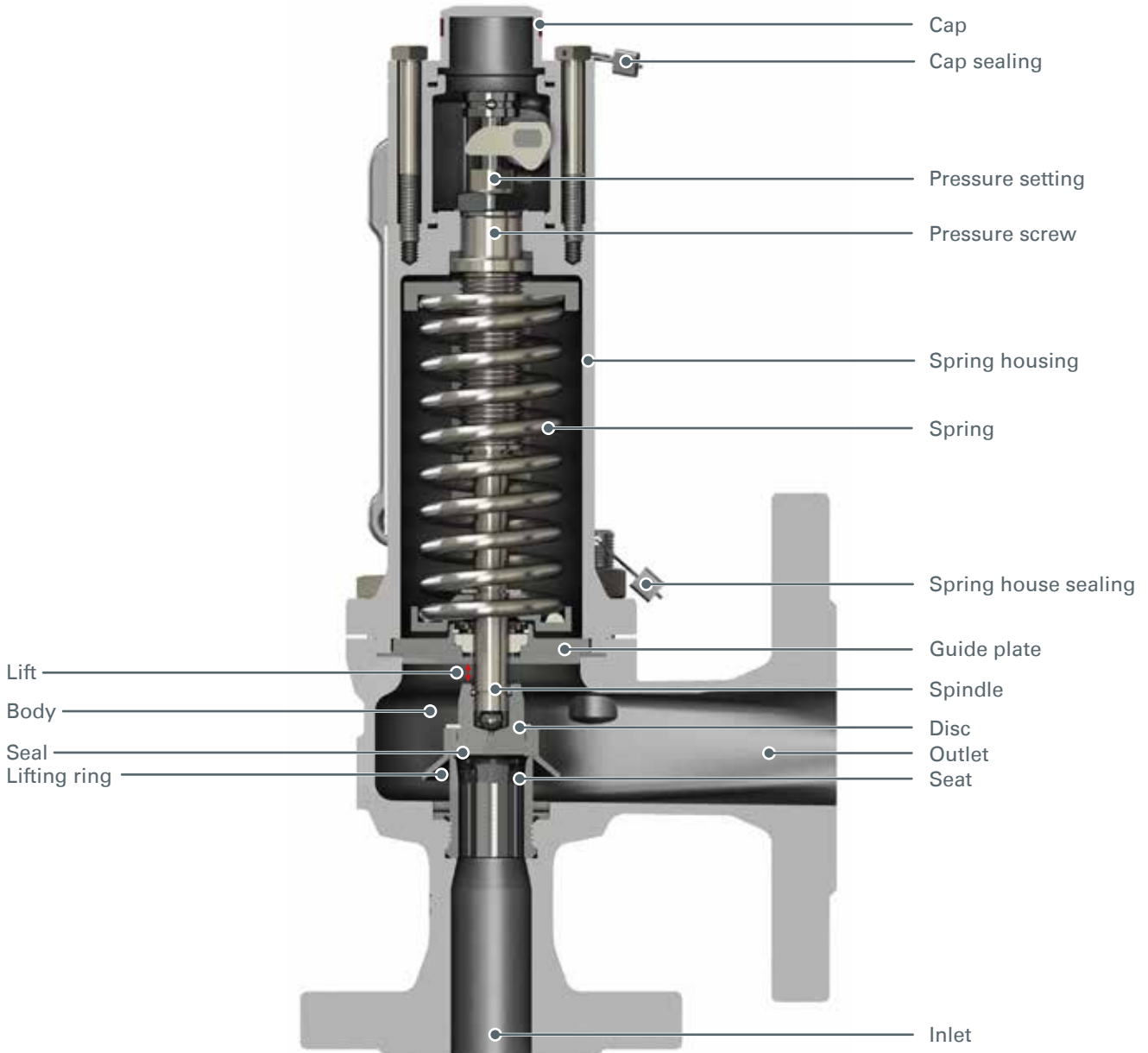


Figure 1: Cross section of a spring-loaded safety valve.

Via the supply line, the fluid enters the safety valve vertically from below. During normal operation, the valve plate sits on the valve seat and closes the opening. The force required for this is applied by the spring. It is clamped between an upper fixed and a lower movable valve disc. The pressure screw, which determines the position of the upper valve disc, can be used to adjust the contraction of the spring. This results in the pretension of the spring, and therefore the response pressure. The spindle guides the disc and transmits the force of the spring via the spring plate. The seat has a defined internal diameter, which is used to determine the maximum mass flow to which the valve can dissipate, taking the flow coefficient into account.

When closed, the spring force F_1 outweighs the Media force F_2 (Figure 2). If the pressure in the system increases and therefore the force F_2 , the spring force F_1 can no longer keep the valve completely closed above a certain pressure. A soft hissing sound from the valve can be heard. This is the response point of the safety valve (response point = lowest pressure at which the valve is audibly leaking). If the pressure continues to rise, the valve opens completely and the Media can flow out (Figure 3).

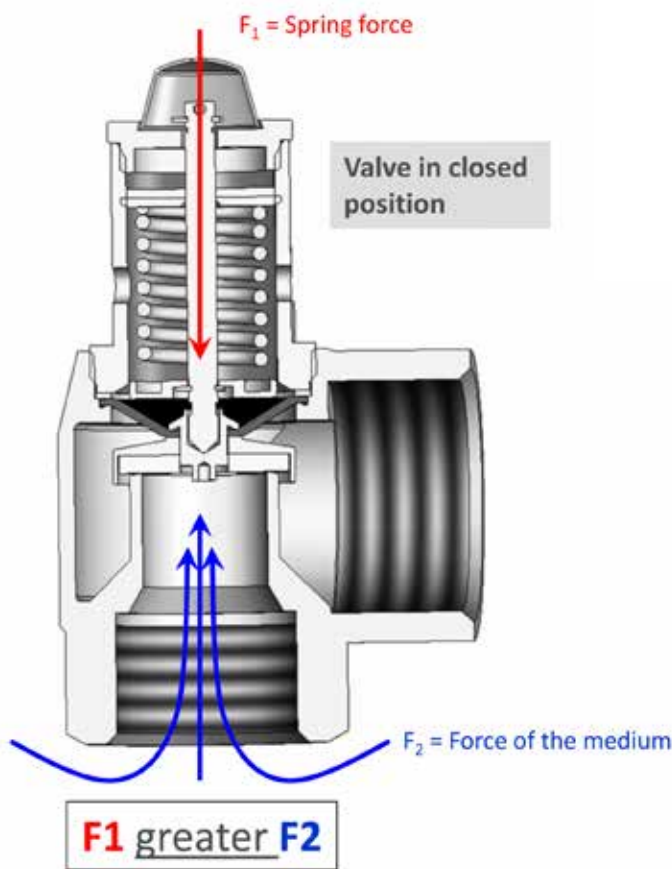


Figure 2: Illustration of the forces in the valve in the closed state

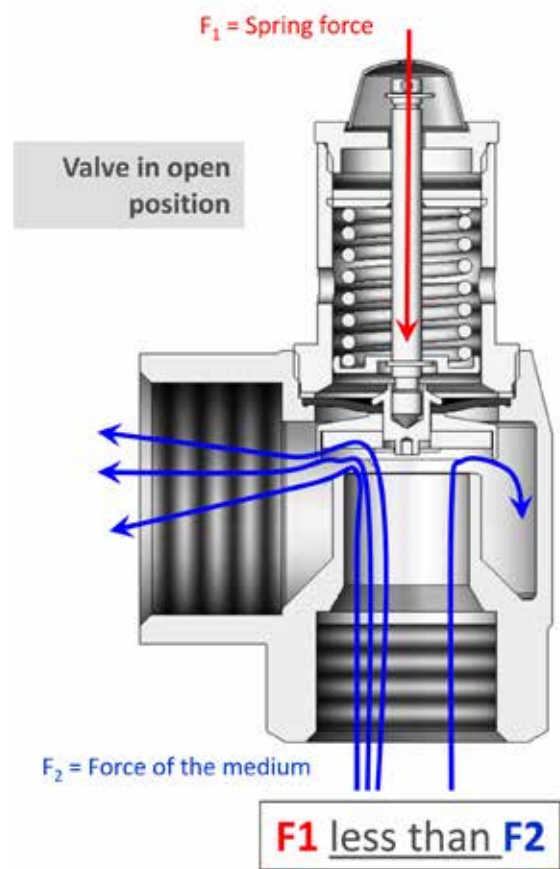


Figure 3: Illustration of the forces in the valve in the open state

A distinction is made between valves with different opening characteristics. The opening behaviour of a valve can best be illustrated in a stroke-pressure diagram (Figure 4) as a hysteresis curve. The stroke over the pressure is plotted in it. The regular maximum operating pressure is approximately 85% of the valve response pressure. When the response pressure (1) is reached, the valve opens. First proportional to the increase in pressure, at the "pop point" (2) abruptly to its maximum stroke. In terms of design, this is achieved by increasing the area exposed to pressure. The pressure acts only on the cone when the valve is closed. When the valve is open, pressure is also applied to the stroke ring. This suddenly increases the force and the valve opens. The pressure at which the valve reaches its full opening is the opening pressure (3) of the valve. The pressure difference between response pressure and opening pressure is called the opening pressure difference.

If the pressure drops below the response pressure (4), the valve closes slowly at first, then abruptly again. The pressure difference between the closing pressure (5) and the response pressure is referred to as the closing pressure difference. It is caused by the impulse current of the flowing fluid and the increase in the pressure contact area caused by the lifting ring of the valve. The valve must comply with certain opening and closing pressure differentials (according to DIN EN ISO 4126-1 and AD2000-A2) depending on the type (standard valve or full globe valve) and Media (compressible or incompressible):

Opening pressure difference:

- 10% for normal and proportional safety valves (all media)
- 5% for full stroke safety valves (all media)

Closing pressure difference:

- 10% for compressible media (both types)
- 20% for non-compressible media (both types)

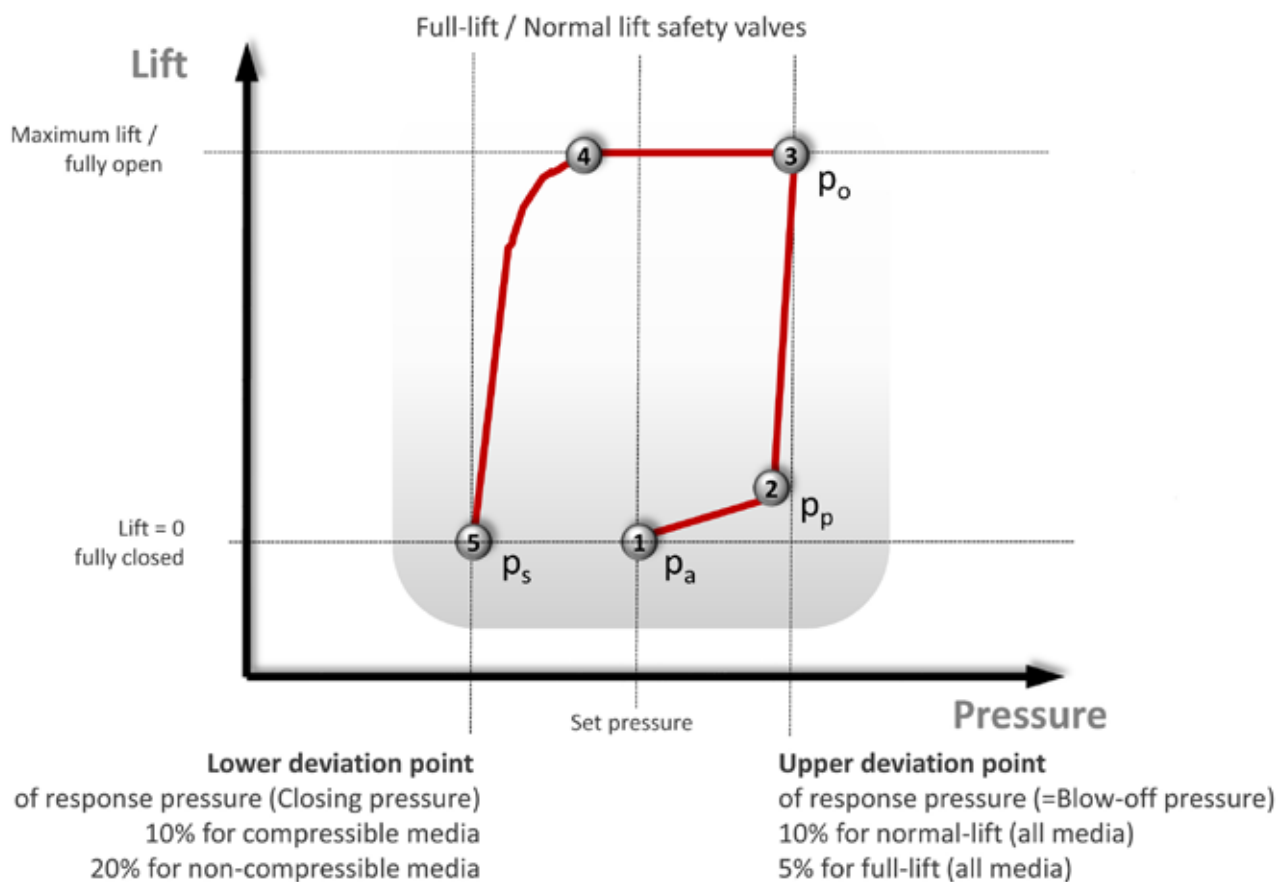


Figure 4: Stroke-pressure diagram describing the opening and closing behaviour of spring-loaded full-stroke or normal safety valves

In the case of full stroke valves, there is an additional requirement that the proportion of the stroke up to sudden opening (proportional safety valves according to AD2000-A2) must not exceed 20% of the total stroke.

With the third type of valve, the proportional safety valve, the stroke of the valve increases or decreases almost continuously with increasing or decreasing pressure. A sudden opening without pressure increase over a range of more than 10% of the stroke does not occur. After tripping, these safety valves achieve the stroke required for the mass flow to be discharged (DIN EN ISO 4126-1 and AD2000-A2) within a maximum pressure rise of 10%.

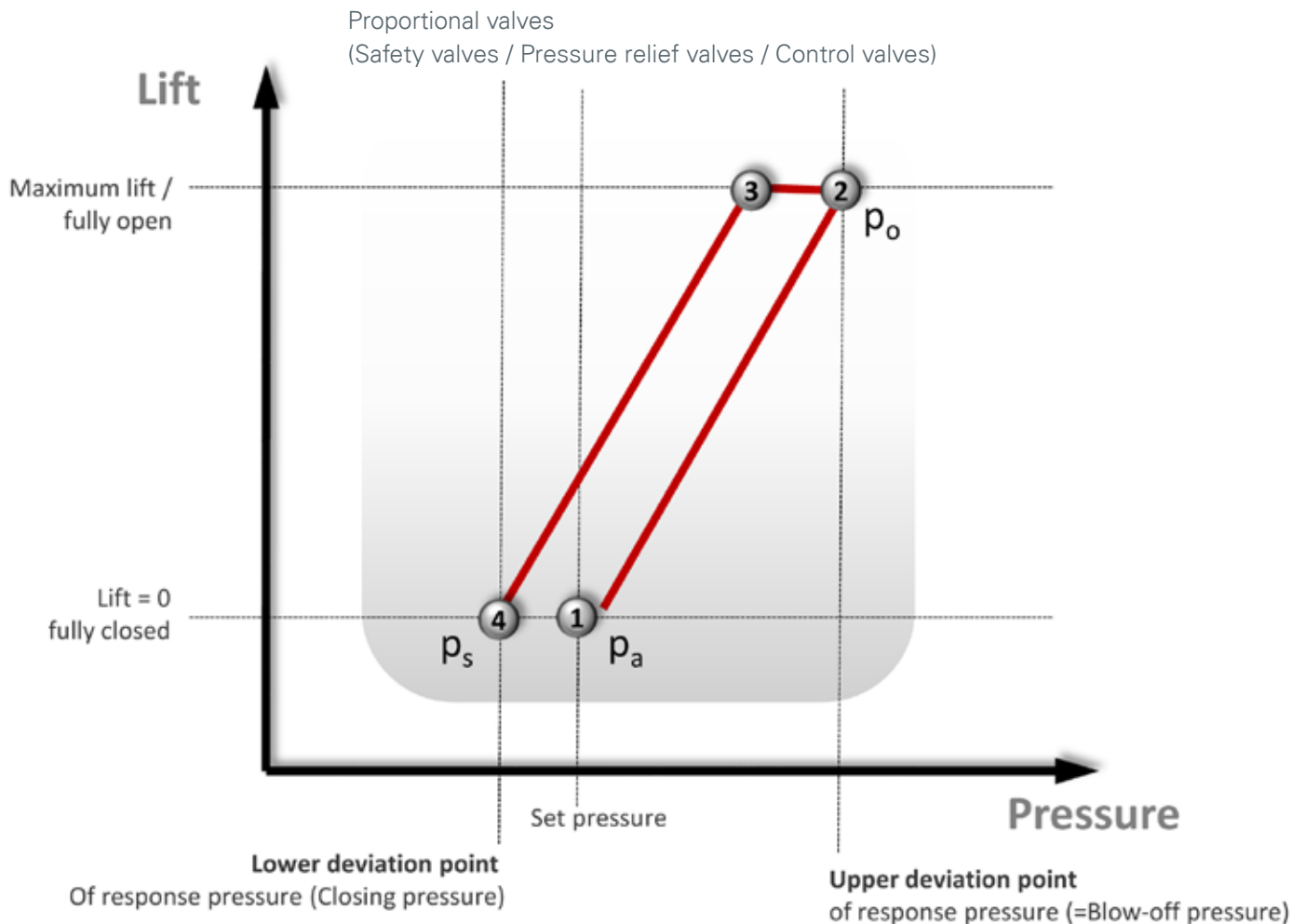


Figure 5: Stroke-pressure diagram to describe the opening and closing behaviour of spring-loaded proportional safety valves

- ① Response pressure (first audible air noise or first visible drops of water)
- ② Blow-off pressure (maximum stroke reached)
- ③ The pressure at which the valve begins to close
- ④ Closing pressure (valve is closed and tight)

VARIANTS

Various versions of individual valve components are available for individual valve adaptation to the conditions in the plant.

Lifting

There is a possibility of a version with rotary lifting or lever lifting for manual opening and lifting of the valve.

For a rotary lift (Figure 6), turning a knurled nut on the bonnet of the valve raises the stem. This pulls the disc located on the spindle up with it. This creates a gap between the seat and disc and fluid can flow through the valve. Rotary lifting is usually used for threaded valves up to 2" and for air and water applications.

Pulling on a lever causes the spindle and disc to lift off the seat for lever lifting (Figure 7). Lever lifting is usually used with flange safety valves and steam valves. For the latter, the installation of a lever lift is mandatory.

A version without lifting device (Figure 8) is also available.



Figure 6: Rotary lifting device



Figure 7: Lever lifting device



Figure 8: without lifting device

Blocking Screw (Option A01)

If the valve in the system is to be closed and tight beyond its response pressure, for example for a pressure test, a blocking screw is used. This is screwed into a threaded hole provided for this purpose in the cap of the valve from above to the spindle (Figure 9). This prevents the valve from opening. After the pressure test, the pressure screw must be removed again as otherwise the valve will not be able to open even in an emergency. Close the threaded hole in the cap with another screw (Figure 10).

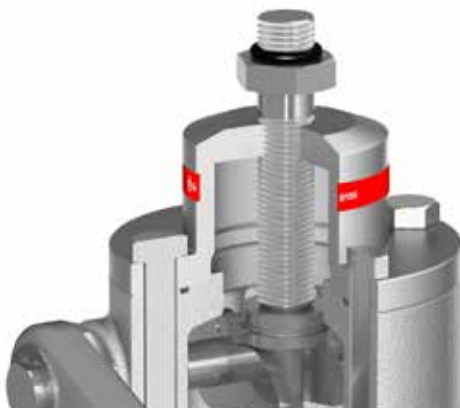


Figure 9: The spindle is locked



Figure 10: The spindle is free and the cap is sealed gas-tight

Stroke Sensor (Option S62)

A stroke sensor is offered for monitoring the response of a valve. This is screwed into the cap from above like the blocking screw (Figure 12). It strikes when the valve reaches its full stroke. This means that the control station of the system in which the valve is installed directly notices that the safety valve has blown off. For some series, lateral installation of the sensor is also possible (Figure 11).



Figure 11: Installation of the stroke sensor from the side



Figure 12: Installation of the stroke sensor from above

Gas-Tight / Open

With some media it may be necessary to protect the environment from the influences of the Media even when the valve responds. Goetze offers valves in a gas-tight version for this purpose. However, if the Media does not pose any danger to the environment, an open or non-gas-tight version can be selected.



Figure 13: Safety valve in open version



Figure 14: Safety valve in gas-tight design

Bellows / Diaphragm

If the spring chamber must also be protected from the Media in the event of a response, the use of a bellows is recommended. This connects the guide plate with the disc and thus prevents the Media from entering the spring chamber through the spindle guide. In this way, it also prevents soiling or sticking of the sliding parts and ensures perfect functioning of the valve even with sticky or viscous media. In addition, the metallic bellows compensates for counter pressure. The response pressure of the valve remains the same regardless of whether it is an external back pressure or the intrinsic back pressure. In the event of a blowdown, the natural back pressure can build up at the outlet of the valve depending on the dimensions and design of the installed blowdown line.

An elastomer diaphragm or an elastomer bellows can prevent the Media from penetrating into the spring chamber instead of a metal bellows, depending on the valve type, if back pressure compensation is not required and the Media is neutral.

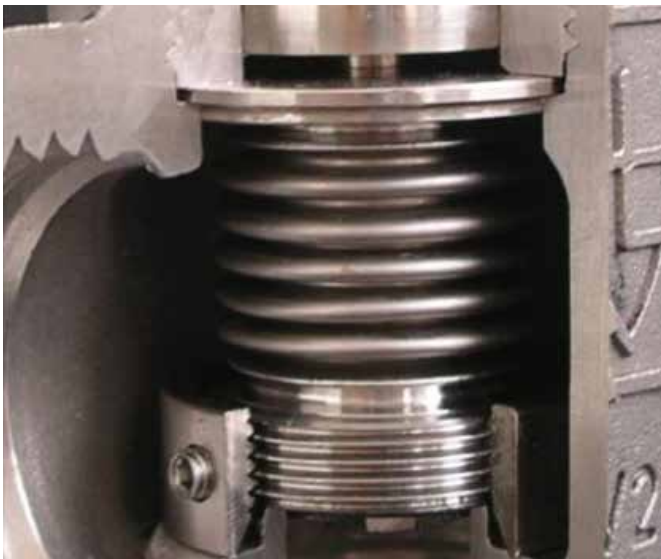


Figure 15: Cutaway model of valve with bellows



Figure 16: Cross section of a valve with elastomer bellows

COMPARISON

There are different types of valves that perform different tasks in plants and require appropriate approvals and tests.

- **Safety valves** are safety equipment in accordance with Directive 2014/68/EU, Pressure Equipment Directive. As the last link in a series of safety measures, they prevent the plant component from bursting due to an impermissibly high pressure. They are set to the desired response pressure, marked accordingly and sealed. A later change of the setting pressure is only possible in experienced workshops. The set pressure of all safety valves is checked before delivery, if required also in the presence of an inspection company. A safety valve must pass an EU type examination and, if necessary, a TÜV component test before it can be sold in series.
- **Pressure relief valves** fulfil the same function as safety valves. However, they have no safety function and are therefore not classified as safety equipment but only as pressure equipment according to the Pressure Equipment Directive. No special examination is necessary. As a rule, they have a proportional opening characteristic. Pressure relief valves do not achieve the performance of safety valves and can be delivered adjusted, marked and sealed, but do not have to be.
- The **set pressure** within the spring range can be adjusted by the plant operator as required in the case of overflow/control valves. They perform a "pressure control task" in the system. As this is not a safety-relevant function, overflow/regulating valves are only classified as pressure-maintaining equipment according to the Pressure Equipment Directive. No special examination is necessary. These valves have a proportional opening characteristic in order to avoid pressure surges in the system. Overflow valves must always be gas-tight
- **Pressure reducing valves** require a component approval for building services engineering if they are used for drinking water installations. Their task is to reduce the pressure in a part of the plant. While with pressure relief valves the presence of an excessively high pressure on the inlet side and therefore a flow through the valve is the exception, with pressure reducing valves a higher applied pressure on the inlet side is the rule. They are continuously flowed through and ensure a uniform fluid flow with constant, reduced pressure on the outlet side even with fluctuating pressure on the inlet side (e.g. after a pump).


Safety valve (TÜV/CE)	Pressure relief valve	Overflow- / Control valve	Pressure reducing valve
<ul style="list-style-type: none"> ▪ TÜV/CE Type Test Approval ▪ Last "line of defence" in equipment under pressure ▪ Used on equipment requiring official approval according to PED ▪ Opening characteristic <ul style="list-style-type: none"> > full lift > normal lift > proportional ▪ Must be set, sealed and marked ▪ Set pressure pre-set / non adjustable 	<ul style="list-style-type: none"> ▪ No TÜV/CE Type Test Approval ▪ No safety function according to PED ▪ Can be used on equipment not requiring official approval according to PED ▪ Proportional opening characteristic ▪ Can be set, sealed and marked 	<ul style="list-style-type: none"> ▪ No TÜV/CE Type Test approval ▪ No safety function according to PED ▪ „Control / relief“ task in system oder plant ▪ Proportional opening characteristic ▪ Gastight version ▪ Adjustable spring range 	<ul style="list-style-type: none"> ▪ Type Test Approval for building services applications ▪ No safety function ▪ Task of pressure reduction on outlet side of a valve in a system
			

Figure 17: Valve type comparison

APPROVALS

In order to be allowed to sell a safety valve, it must pass an EU type examination and, if applicable, a TÜV component examination.

Basically, an entrance examination consists of four parts:

1. The test on the sufficient dimensioning of the components as well as the suitability of the materials used.
2. Ensuring that the specific design requirements required by the application have been met.
3. The certification of the performances (discharge figures) with the media air and water.
4. Compliance with the functional characteristics (opening and closing pressure differences) with the media air and water to demonstrate suitability for:
 - Air:
 - Air, gases and technical vapours
 - Steam
 - Heating water (up to 120 °C)
 - Solar heating systems
 - Water:
 - Liquids
 - Hot water (up to 95 °C)

These tests are described in detail in the VdTÜV data sheet "Safety Valve 100" and other applicable documents.

EU Type Examination

An EU type examination is a type approval by an independent "notified body" according to the Pressure Equipment Directive 2014/68/EU. It checks whether the minimum requirements are met for a safety valve as required in Annex 1 of the DGR and in the harmonised standard ISO 4126-1.

During a type examination, the valves can be approved for the following media:

- L for liquids
- S/G for steam/gas

The manufacturer is also obliged to supply the valve with assembly and operating instructions including a declaration of conformity in accordance with DGR 2014/68/EU. These inspection certificates are valid for a period of 10 years.

TÜV Component Test

In order to pass a TÜV component test, the requirements of the following standards must be met as well:

- VdTÜV data sheet SV 100
- AD2000 data sheet A2

This allows an additional application-specific marking of the valves:







- D/G/H for hot water with permissible flow temperatures up to 120 °C (heating systems according to DIN EN 12828)
- H for hot water of 2.5 bar and 3 bar with a permissible flow temperature of up to 120 °C and a permissible heat output of up to 2700 kW (water heating systems to DIN EN 12828)
- SOL for closed intrinsically safe solar heating systems with water or water mixtures as heat transfer Media according to DIN EN 12976-1
- W for water heating systems according to DIN EN 12897 up to 10 bar
- F/K/S for stationary pressure vessels and vehicle containers for liquid, granular and powdery goods according to TRB 801 No. 22 and 23

Further Approvals

Goetze valves also meet the criteria for various other approvals. An overview of which approvals or certificates are valid for which series can be found on the Goetze homepage (<https://www.goetze-armaturen.com/en/company/certificates/products-and-corresponding-certificates/>).

Overview of existing approvals and certificates:

GENERAL TYPE TEST APPROVALS

	National Type Test (TÜV)	EU type test		CRN
➤ EUROPEAN PED	➤ NATIONAL TYPE TEST (TÜV)	➤ EC-TYPE TEST	➤ TYPE TEST (USA)	➤ CANADIAN REGISTRATION NUMBER (CRN)
				UK CA
➤ TR ZU 032/2013 (RU)	➤ MANUFACTURE LICENSE (CHINA) TSG ZF001-2006	➤ KOREA GAS SAFETY (KR)	➤ KOSHA	➤ TYPE APPROVAL (UK)

APPLICATIONS: POTABLE WATER AND BUILDING TECHNOLOGY

					
➤ TYPE APPROVAL (DE)	➤ TYPE APPROVAL (FR)	➤ TYPE APPROVAL (EN)	➤ TYPE APPROVAL	➤ TYPE APPROVAL (PL)	➤ TYPE APPROVAL (NO)

APPLICATIONS: SHIPBUILDING AND RAILWAY

						
➤ TYPE APPROVAL	➤ TYPE APPROVAL	➤ TYPE APPROVAL	➤ TYPE APPROVAL	➤ TYPE APPROVAL	➤ TYPE APPROVAL	➤ DEUTSCHE BAHN

Definition, Standards and Regulations

National:

- TRD 421: **Safety devices against excess pressure**
For safety valves for group I, III and IV steam boilers
- TRD 721: **Safety devices against excess pressure**
For safety valves for group II steam boilers
- DIN 4751: **Water heating**
For closed, thermostatically protected heat generation systems with flow temperatures up to 120°C as safety equipment
- DIN 4753: **Domestic hot water heaters, domestic hot water heating systems and DHW storage tanks**
- DIN 4747: **District heating systems**
As safety-related equipment for substations, house stations and house systems for connection to heating water district heating networks
- AD 2000 A2: **Safety devices against excess pressure**
General for safety valves

European / International:

- DIN EN ISO 4126 series: **Safety devices against impermissible overpressure**
in particular Part 1: Safety valves and Part 7: General data
- RL 2014/68/EU: **European Pressure Equipment**
Directive for pressure equipment with a maximum allowable pressure (PS) of more than 0.5 bar
- DIN EN 12828: **Heating systems in buildings**
For the planning of hot water heating systems
- DIN EN 12952: **Water-tube boilers and system components**
Particularly part 10: Requirements for safety devices against excessive pressure
- DIN EN 12953: **Shell boilers**
Particularly Part 8: Requirements for safety devices against excessive pressure

Further application-specific standards:

- DIN EN 764-7: **Safety devices for unfired pressure equipment**
- DIN EN 13648: **Safety valves for cryogenic operation**
- DIN SPEC 4683: **Liquid helium cryostats - Safety devices against excess pressure**

MARKING / TESTING

The labelling is carried out in accordance with the standards and regulations applied. The data is either entered on a nameplate attached to the valve or lasered directly onto the valve spring housing.

- ① Valve type
- ② Nominal size
- ③ Narrowest cross-section of flow
- ④ Valve stroke
- ⑤ Seat seal material
- ⑥ Serial number
- ⑦ Setting pressure
- ⑧ Allowable back pressure
- ⑨ Set temperature
- ⑩ General and application-specific standards as required
- ⑪ Opening pressure difference for steam
- ⑫ Opening pressure difference for gas
- ⑬ Opening pressure difference for water
- ⑭ TÜV-mark - Safety valve -
Year of component test - Test number
Narrowest flow diameter
- ⑮ Co-efficient for steam / gases
- ⑯ Co-efficient for liquids
- ⑰ Data matrix code (serial number)
- ⑱ CE labelling

Type				①
Size	DN			②
Flow area		mm ²		③
Lift		mm		④
Sealing				⑤
Serial no.				⑥
	Set p.	Back p.	Temp.	
bar	⑦	⑧	⑨ °C	
	ISO 4126-1			⑩
Steam	5 %			⑪
Gas	5 %			⑫
Liquid	10 %			⑬
TÜV-SV	⑭	D/G-0	⑮	
		F	⑯	

⑱

0036
 ⑰

DATA MATRIX

www.goetze-armaturen.de

○ Made in Germany ○

Figure 18: Identification on a nameplate attached to the valve

REVISION INSTRUCTIONS



V-0195 REVISION AND ADJUSTMENT INSTRUCTIONS

Series:
455 / 355

Variant:
sGO / sGL / tGFO / tGFL / tbGFO / tbGFL / bGFO / bGFL / bHL

Scope

The scope of these Revision and Adjustment Instructions (V-0195) covers series 455/355. Details referring to the fields of application and application limits can be found in the series data sheets.

Mitgeltende Dokumente

- V-0196: Overview of spare parts
- V-0197: Overview of assembly aids
- V-0219: Spring tables
- V-0220: Coefficients of flow
- V-0221: Tightening torques
- V-0223: Minimum dimensions after lapping
- Certificate EU-Type examination - production type
- TÜV-Rheinland certificate for EU type examination
- Assembly, maintenance and operating instructions
- Data sheets

Additional information:

- 3D- and 2D-Models

1 GENERAL INFORMATION

- Ensure a well-kept and clean workplace.
- The instructions in the installation, maintenance and operating instructions must be observed.
- Observe the tightening torques specified in document V-0221!
- Use recommended assembly aids (see document "V-0197: Overview of assembly aids)!
- Ensure that the lapped sealing surfaces of seat and disc are intact before, during and after the assembly!
- Do not scratch sealing surfaces for O-rings or graphite packings.
- Do not use damaged O-rings! Example: Seal crushed or has scratches.
- Do not use worn and scuffed tools to avoid slipping.

2 SPRING CHANGE

Disassembly



2.1

Remove seal.

2.2

Loosen the four hexagon bolts on the cap.

2.3

Remove the O-ring seal from the groove.

> ATTENTION! Only DN 15 – DN 25, Variant tGFO

Remove the second, small O-ring from the groove of the measuring bore (see 2.17).

> Steps 2.4 to 2.9 for variants with lifting device only



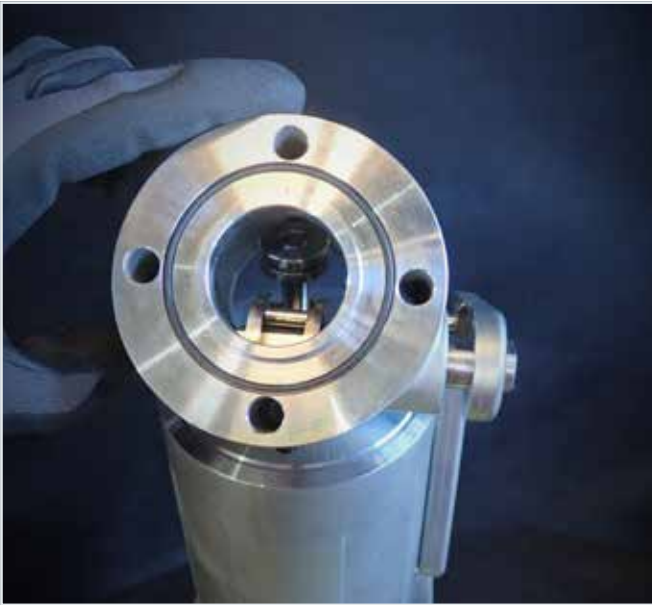
2.4

Remove the lock washer from the lever axle.



2.5

Remove lever, if necessary O-ring and stop plate.



2.6
Remove the lifting device from the spring housing, turning the lever axle so that the lifting device can be removed. If necessary, put the lever back on the axle to be able to rotate the axle better.



2.7
Remove the O-ring seal from the groove.

> ATTENTION! Only DN 15 – DN 25
Remove the second, small O-ring from the groove of the measuring bore (see 2.17, page 24).



2.8
Remove the wire ring from the outer groove of the spindle head and push out the cylindrical pin with a pin punch.

2.9
Remove spindle head from spindle.

2.10
Loosen the lock nut on the pressure screw, do not completely unscrew it.

ATTENTION!

If no spring change is necessary, the new pressure can now be set.

Then continue with 2.17.



2.11
Fully release the spring by turning the pressure screw counterclockwise.

ATTENTION!

If the pressure screw is difficult to turn, it is recommended to check the thread for integrity and to replace the pressure screw if necessary.



2.12

Loosen the hexagonal bolts between the spring housing and the body as well as the nuts on the stud bolts and remove the spring housing.

2.13

Remove pressure spring.

Assembly



2.14

Place the new compression spring on the lower spring plate via the spindle.

2.15

Guide spring housing with mounted pressure screw over spindle, align bore with stud bolts and place on body.

ATTENTION!

Align the spring housing in such a way that the nameplate is opposite the outlet opening.

Now the pressure can be adjusted. For this purpose, the notes in chapter 2.12 on page 47 and the following must be observed.



2.16

Screw the bonnet to the enclosure using hexagon nuts and grub screws as well as hexagon bolts with the specified torque (V-0221, see page 72).

The spring tables for the series are compiled in the separate document (V-0219 Spring tables). From these you can see which spring must be used for which pressure range with which nominal size and variant. The springs are permanently marked with numbers, starting with L-. The numbers do not allow any conclusions to be drawn about the functional range or the nominal width, but serve as a check during installation. Behind this is the spare part number (E...) via which the spring can be requested as a spare part.

Table 1 shows an example of such a spring table.

Table 1: Spring table example

DN 32					
tGFO, tGFL, sGFO, sGFL					
Pressure range [bar]		Spring			
from	to	455		355	
0,2	1	L-2581	E0455.032.027	L-2855	E0355.032.010
1,01	1,6	L-2582	E0455.032.028	L-2856	E0355.032.011
...
25,01	40	L-2590 + L-2592	E0455.032.036 + E0455.032.037	L-2864 + L-2865	E0355.032.019 + E0355.032.020

In another separate document (V-0220 Coefficients of flow) the indication tables of the valves are given. A identification diagram is also provided in the safety valve data sheet.

From the coefficients of flow table the discharge coefficient (K_{dr} - or α_w value) at the given response pressure can be read. This is necessary because the performance at subcritical compressible flows is dependent on the response pressure of the valve. For incompressible media the discharge coefficient is constant over the entire range.

Table 2: Example of an coefficients of flow

Pressure range [bar]		K_{dr} - or α_w -value	Media
from	to		
0,2	0,39	0,518	G/D
...
2	2,99	0,725	G/D
3	40	0,74	G/D
0,2	40	0,54	Liquid

After adjusting the pressure, you can proceed with the assembly:



2.17

Grease the O-ring with a suitable lubricant and insert it into the cover groove.

ATTENTION! Only DN 15 – DN 25

Remove the second, small O-ring from the groove of the measuring bore.

> Steps 2.18 to 2.22 for variants with lifting device only

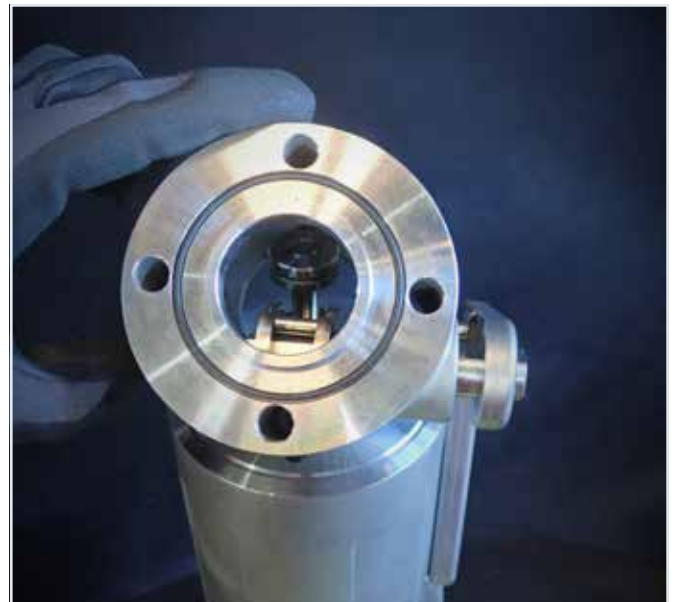


2.18

Place spindle head on spindle end and insert cylindrical pin through openings of spindle head and spindle.

2.19

Push the wire ring over the spindle head into the outer groove.



2.20

Position the lifting device on the spring housing. Turn the lever axle in such a way that the lever fork is located under the spindle head. The lifting device must rest completely on the spring housing. Do not squeeze the O-ring at the edge of the groove!

2.21

Grease the O-ring with a suitable lubricant and place it in the groove of the lifting device.



2.22

In this order, push the stop plate and lever onto the lever axle. Pay attention to alignment! Mount the lock washer on the lever axle.



2.23

Place cap on lifting device (tGFL) or cover (tGFO) and screw hexagon head screws through cap and lifting device (tGFL only) to cover. Cap must be completely in contact; O-ring must not be squeezed at the edge of the groove!



2.24

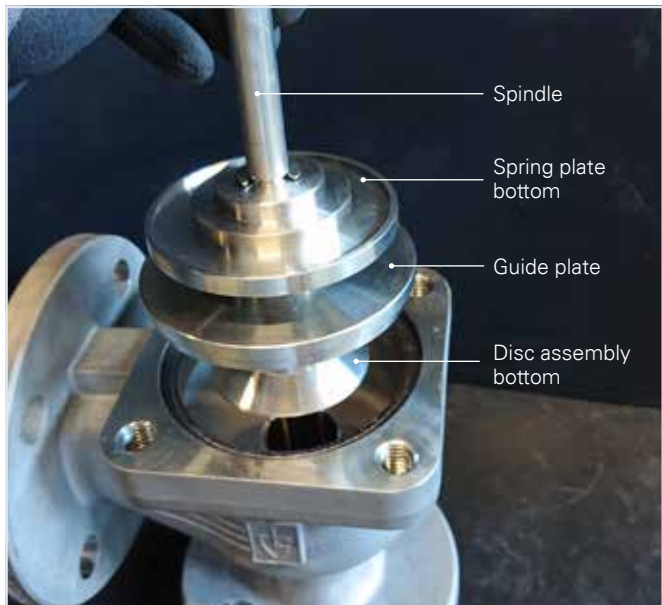
Position the hexagon head screws in such a way that two screws with a hole in the screw head are side by side in the direction in which the stud screw is screwed into the body. This is important for the seal (on p. 43).

3 LAPPING SEAT AND DISC

Disassembly

3.1

Steps 2.1 to 2.13 as described on the previous pages.



3.2

Remove spindle assembly. The spindle assembly consists of spindle, bottom spring plate, guide plate and disc assembly.



ATTENTION!

The bellows with upper and lower welding plates and a protective sleeve are additionally attached to the spindle in the bellows version. Be sure to hold the stem assembly against the weld-on plate.



3.3

Remove the graphite packing from the housing. If necessary, remove the remains of the graphite packing from the sealing surface of the housing without damaging it.



3.4

Remove the disc assembly from the spindle:

- DN 15 - DN 50 Remove the disc assembly from the spindle by simultaneously pulling and turning it. If necessary, loosen the snap ring from the disc and mount it on the spindle.
- DN 65 – DN 100 by pulling out the cotter pin.

**ATTENTION!**

When removing the disc from the bellows, make sure that the bellows is not overstretched (do not pull on the bellows).

3.5

Remove the ball from the disc.



3.6

Place disc on mounting support. This should prevent damage to the lapped sealing surface on the disc. The lifting ring should be suspended in the air.

3.7

Remove the circlip from the disc.



3.8

Lift the spacer ring, shim rings and lifting ring off the disc.

Now the seat in the body and the disc can be lapped.

The total height of the seat or disc after lapping must not be less than the heights specified in document V-0223 (see page 73).

Assembly



3.9
Place the disc on the mounting support and mount the lifting ring on the disc.

3.10
Place shims, thickness 0.1mm and 0.3mm, as well as spacer ring on lifting ring.

3.11
Check whether the installation clearance is suitable, too large or too small with this laterally in the disc groove before installing a new (!) circlip. Axial play should be as small as possible, i.e. if a further 0.1 mm shim was used, the circlip would no longer fit completely in the groove. If necessary, add or remove appropriate shims.



3.12
Mount the circlip in the groove.

3.13
When mounting the circlip, make sure that the circlip is not overstretched. It is recommended to use the assembly tool (see V-0197, see page 60). Place the mounting cone on the disc, place the circlip on the mounting cone and slide the circlip with the mounting sleeve into the disc groove until it snaps into place.

ATTENTION!

If the disc assembly has to be disassembled again, a new circlip must be used!



3.14
Apply a little stainless steel grease to the bottom of the bore of the disc and insert the ball.

3.15
Coat the contact spindle surface for the ball with a little stainless steel grease.



3.16
Insert spindle into disc.

- DN 15 - DN 50 the spindle must engage with the round wire snap ring in the groove of the disc.
- DN 65 – DN 100 Push the spring coter pin sideways into the groove.

3.17
Insert graphite packing into body and carefully place spindle assembly with assembled disc assembly on the screwed-in seat.

ATTENTION!

Hold the spindle assembly vertically to avoid loosening the disc assembly.

ATTENTION!

For versions with bellows, it is essential to hold on to the welding plate.

3.18
Continue with 2.14 on p. 22 (assembly spring change).

4 REPLACE SOFT SEAL FLAT

Disassembly

4.1

Steps 3.1 to 3.2 as described on the previous pages.



4.2

Remove the disc assembly from the spindle:

- DN 15 - DN 50 Remove the disc assembly from the spindle by simultaneously pulling and turning it. If necessary, loosen the snap ring from the disc and mount it on the spindle.
- DN 65 – DN 100 by pulling out the cotter pin.



ATTENTION!

When removing the disc from the bellows, make sure that the bellows is not overstretched (do not pull on the bellows).

4.3

Remove the ball from the disc.



4.4

Remove the locking device from the groove of the stroke ring.



4.5

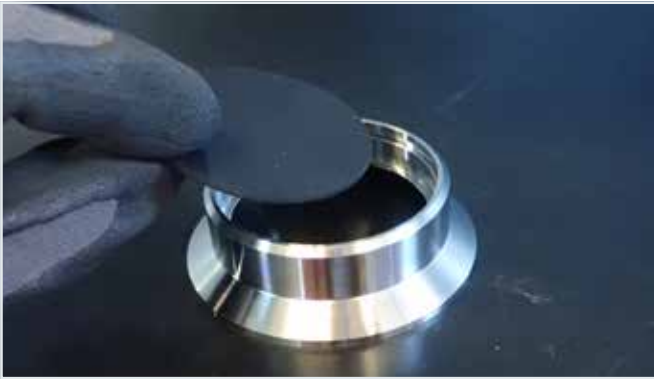
Remove taper and shim rings from stroke ring.

4.6

Remove seal.

Now a new seal can be inserted.

Assembly



4.7
Insert new seal.



4.8
Insert disc and shim rings.
4.9
Secure with a new circlip.



4.10
Bore bottom of disc with some stainless steel grease and insert the ball.
4.11
Coat the contact surface of spindle for ball with some stainless steel grease.



4.12
Insert spindle into disc.

- DN 15 - DN 50 The spindle must engage in the groove of the disc with a round wire snap ring.
- DN 65 – DN 100 Push the spring cotter pin sideways into the groove.

4.13
Carefully place the stem assembly with disc assembly onto the screwed-in seat.

ATTENTION!

Hold the spindle assembly vertically to avoid loosening the plug assembly.

ATTENTION!

For versions with bellows, it is essential to hold on to the welding plate.

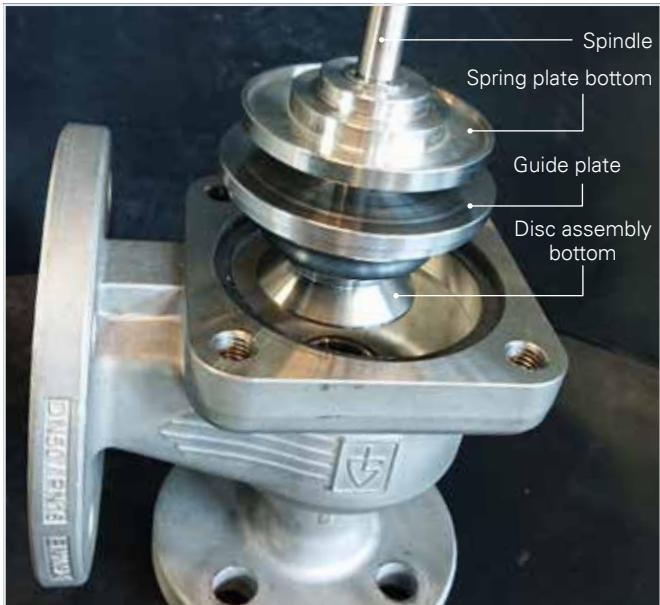
4.13.1
Continue with 2.14 on p. 22 (assembly spring change).

5 REPLACE ELASTOMER BELLOWS AND SEAL (DGH-VARIANT)

Disassembly

5.1

Steps 2.1 to 2.13 as described on the previous pages.



5.2

Remove spindle assembly. The spindle assembly consists of spindle, spring plate bottom, guide plate and disc assembly.

> Carry out steps 5.3 to 5.5 only if the bellows is to be replaced



5.3

Using a slotted screwdriver, go under the end of the ear clamp and bend the end of the band upwards until the serration comes loose and the ear clamp can be removed.

5.4

Release elastomer bellows from guide plate and disc. Remove the disc assembly from the spindle:

- DN 15 - DN 50 Remove the disc assembly from the spindle by simultaneously pulling and turning it. If necessary, loosen the snap ring from the disc and mount it on the spindle.
- DN 65 - DN 100 by pulling out the cotter pin.



5.5

Remove ball.

2.5.6

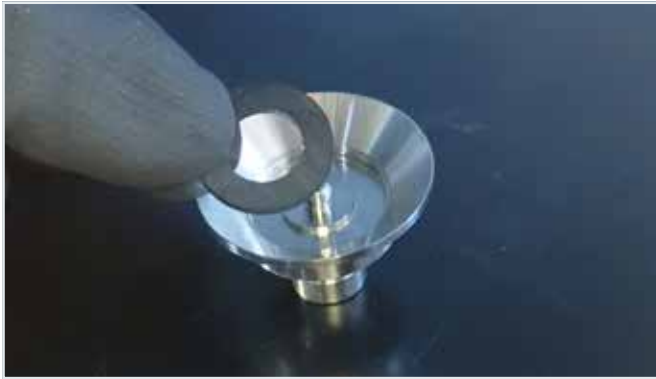
Unscrew seal holder with assembly tool.

5.7

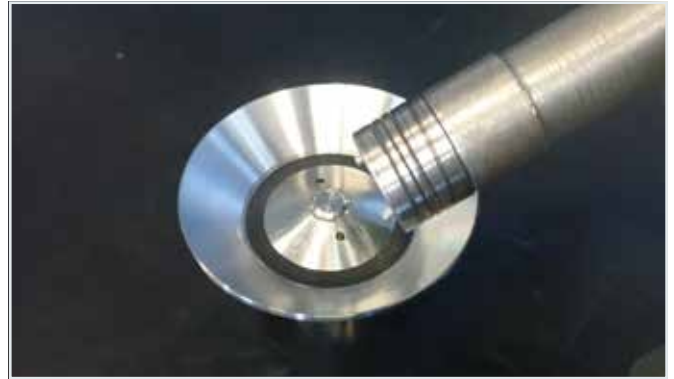
Remove sealing.

Now a new seal can be inserted.

Assembly



5.8
Insert new seal.



5.9
Screw the seal holder on and tighten with the assembly tool.

5.10
Secure screw connection with center punch.

> Steps 5.11 to 5.18 only if elastomer bellows need to be replaced.



5.11
Place ear clamp in outer groove of elastomer bellows.

5.12
Put the elastomer bellows together with the ear clamp with the appropriate opening over the disc. Press down bellows until rib of bellows lies in groove of disc.

5.13
Tighten the ear clamp with pliers. When tightening, make sure that the ear clamp lies in the groove of the elastomer bellows.



5.14
Coat the bottom of the bore of the disc with some stainless steel grease and insert the ball.

5.15
Slide the guide plate and, if necessary, the stroke limiter onto the spindle from below. If necessary, remove the snap ring from the disc and mount it on the spindle.

5.16
Coat the contact surface of spindle for ball with some stainless steel grease and then insert the spindle into the disc.

- DN 15 – DN 50 Spindle must engage with round wire snap ring in the disc of the taper.
- DN 65 – DN 100 Insert cotter pin via slot in taper in disc in groove.

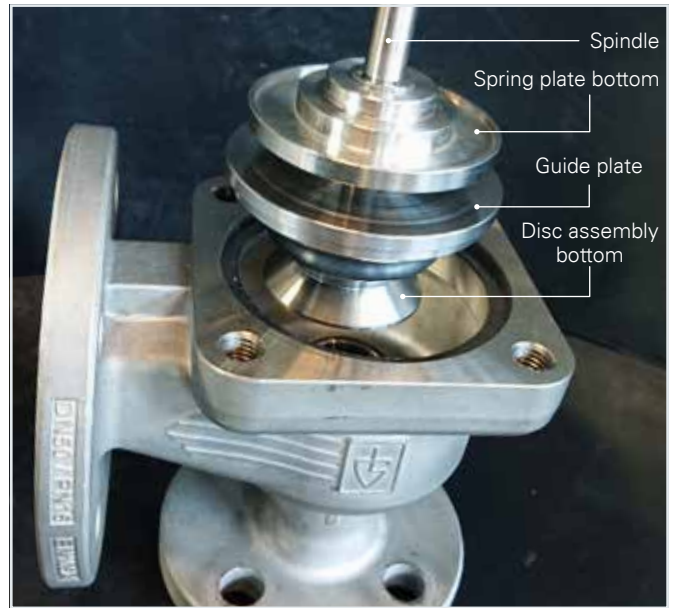


5.17

Put the elastomer bellows together with the ear clamp with the other opening over the attachment of the guide plate. Press down elastomer bellows until rib of bellows lies in the groove.

5.18

Tighten the ear clamp with pliers. When tightening, make sure that the ear clamp lies in the groove of the elastomer bellows.



5.19

Carefully place stem assembly with disc assembly onto screwed seat.

ATTENTION!

Hold the spindle assembly vertically to avoid loosening the plug assembly.

5.20

Continue with 2.4 on p.22 (assembly spring change).

6 REPLACE PRESSURE SCREW

Disassembly

6.1

Steps 2.1 to 2.11 as described on the previous pages.



6.2

Loosen the lock nut completely and remove it.

6.3

Loosen the hexagonal bolts between the spring housing and the body as well as the nuts on the stud bolts and remove the spring housing.



6.4

Remove the sliding ring or axial washers and axial bearing from the pressure screw.

6.5

Remove the old pressure screw.

Assembly



6.6
Turn the spring plate onto the new pressure screw - attention: left-hand thread! - and, if necessary, fit the round wire snap ring in the groove of the pressure screw.

6.7
Measure the guide and coat approx. 2/3 of the thread of the pressure screw from above with stainless steel grease, also at the position of the spring plate.



6.8
Place the pressure screw over the spindle on the spring. Place the sliding ring or axial washers and axial bearing on the pressure screw.



6.9
Put on the housing, making sure that it is aligned with the upper spring plate.

6.10
Screw on the lock nut.

ATTENTION!

Keep the spindle assembly vertical to avoid loosening of the to avoid loosening the disc assembly.

6.11
Continue with 2.12 on p.22.

7 REPLACE BELLOWS

Disassembly

7.1

Steps 2.1 to 2.13 as described on the previous pages.



7.2

Remove the spindle assembly. The spindle assembly consists of the spindle, lower spring plate, guide plate, bellows with upper and lower weld-on plate and a protective sleeve and cone assembly. Be sure to hold the spindle assembly by the weld-on plate.



7.3

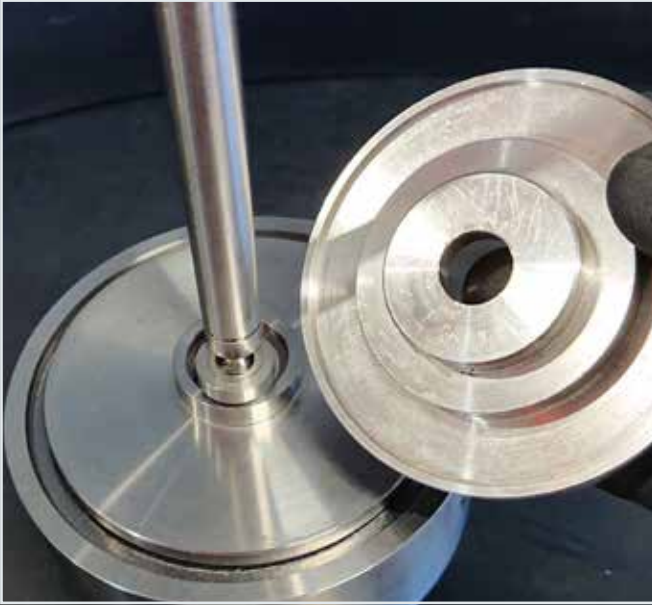
Remove the disc assembly from the spindle:

- DN 15 - DN 50 Remove the disc assembly from the spindle by simultaneously pulling and turning it. If necessary, loosen the snap ring from the disc and mount it on the spindle.
- DN 65 – DN 100 by pulling out the cotter pin.

ATTENTION!

When removing the cone, make sure that the bellows is not overstretched (do not pull on the bellows).





7.4
Dismantle the spring plate and guide plate from the spindle.

7.5
Remove graphite packings from housing and weld-on plate.

> Steps 7.6 and 7.7 only for DN 50



7.6
Remove spindle with bellows from weld-on plate.



7.7
Pull the spindle out of the bellows.

Assembly



7.8
Place new graphite packings in the housing and welding plate.

> Steps 7.9 to 7.11 only for DN 50



7.9
Place plug assembly on seat with greased ball inserted.



7.10
Place bellows protection and weld-on plate on housing.



- 7.11
Insert the spindle into the bellows assembly.
- 7.12
Insert bellows into weld-on plate and insert into cone.



- 7.13
Mount the guide plate and spring plate on the spindle.

> Steps 7.14 to 7.15 only for DN 15 – DN 40 and DN 65 – DN 100



- 7.14
Insert spindle into cone with greased ball.
- DN 15 – DN 40 Spindle must engage with round wire snap ring in groove of taper.
 - DN 65 – DN 100 Press the spring split pin into the groove on the side.



- 7.15
Carefully place spindle assembly with mounted plug assembly on screwed seat.

ATTENTION!

Hold the spindle assembly vertically to avoid loosening the taper assembly. Be sure to hold the spindle assembly by the welding plate.

- 7.16
Continue with 2.4 on p.22 (assembly spring change).

8 REPLACE SEAT AND CONE

Disassembly

8.1

Steps 3.1 to 3.13 as described on the previous pages.



8.2

Place the assembly tool on the seat and unscrew the seat from the housing by turning it anticlockwise.

8.3

Remove the graphite packing from the housing.

8.4

Remove the remains of the graphite packing from the sealing surface of the housing without damaging it.

Now a new seat and a new plug can be installed in the valve.

Assembly



8.5

Insert new seat seal into housing.

8.6

Screw the new seat into the housing. Tighten to the specified torque using the assembly tool.

8.7

Continue with 3.9 on p.28 (assembly spring change).

9 SEALING



9.1

Insert the seal wire through the hole in the stud screw on the body and seal both ends.

9.2

Insert the seal wire through the hole of a hexagon head screw on the cap, twist until the second screw is reached and insert one end through the second hexagon head screw with hole. Lead other end around second screw head, push it through under the twisted wire and seal it together with the other end.

ATTENTION!

The seal must provide information about the person responsible for the settings (company or personnel identification).

10 DISPATCH PREPARATION



10.1
Seal flange connections with suitable flange covers.

> Step 10.2 only for variants with lifting mechanism

10.2
Fix the lever to the valve with cable ties until it arrives at the place of use.

10.3
Pack the valves in such a way that they are protected from damage and dirt during transport and possible subsequent storage.

MARKING / TESTING

All important information on the valve is entered on the nameplate.

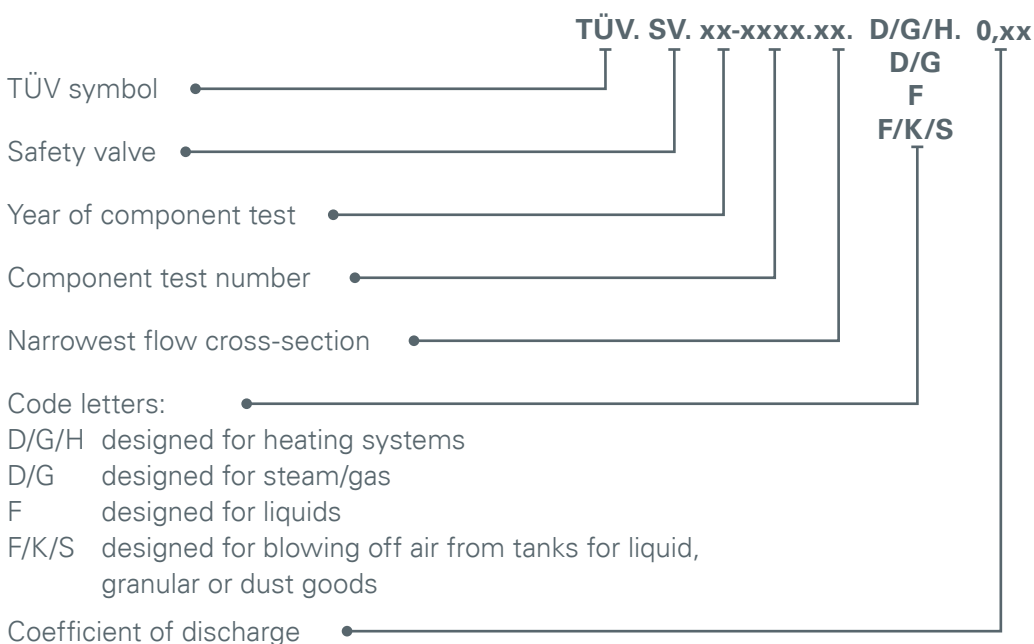
- ① Valve type
- ② Nominal size
- ③ Narrowest cross-section of flow
- ④ Valve stroke
- ⑤ Seat seal material
- ⑥ Serial number
- ⑦ Setting pressure
- ⑧ Allowable back pressure
- ⑨ Set temperature
- ⑩ General and application-specific standards as required
- ⑪ Opening pressure difference for steam
- ⑫ Opening pressure difference for gas
- ⑬ Opening pressure difference for water
- ⑭ TÜV-mark
- ⑮ Co-efficient for steam / gases
- ⑯ Co-efficient for liquids
- ⑰ Data matrix code (serial number)
- ⑱ CE labelling

Pressure conversion

The change in response pressure and the associated possible change in the discharge coefficient for vapours/ gases must be permanently marked on the nameplate (item numbers 7 and 15). The corresponding discharge coefficient can be found in the performance table.

Type	_____	①	
Size	DN _____	②	
Flow area	_____ mm ²	③	
Lift	_____ mm	④	
Sealing	_____	⑤	
Serial no.	_____	⑥	
	Set p.	Back p.	Temp.
bar	⑦	⑧	⑨ °C
	ISO 4126-1	⑩	
Steam	5 %	⑪	
Gas	5 %	⑫	
Liquid	10 %	⑬	
TÜV-SV	⑭	D/G-H	⑮
		F	⑯

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12 ADJUST VALVES

12.1

Set valve to test position for flange valves.

12.2

Select the appropriate receptacle for the test station, place the valve on it and tighten or screw it in sufficiently.

12.3

Preload the spring by turning (clockwise) the pressure screw on the hexagon spring (note: pressure screw is non-rising).

12.4

Select suitable pressure gauge. The pressure gauge must have valid calibration for accuracy class 1.0. Select it in such a way that the set pressure is within the reading range of 25% to 75%.

12.5

Pressurize the valve and turn the pressure screw until the set pressure is reached.

- Adjustment tolerance: 0 to 3% of set pressure
- Set pressure: first audible leak, if necessary higher tightness requirement (see 2.13; Gas tightness test).

12.6

Secure pressure screw with lock nut and check setting pressure again.

12.7

After adjustment, check seat tightness: audibly tight at min. 90% of set pressure.

12.8

Relieve valve from pressure and dismantle from test station.

Mark the new set pressure and, if necessary, the changed discharge number on the type plate (see page 44 nameplate).

The position of the upper spring plate can be determined using the measuring hole in the valve cover. Insert the depth gauge of a caliper gauge through the measuring hole until it touches the spring plate. Note measurement for documentation.



13 GAS TIGHTNESS TEST

The leak test must be carried out in accordance with API 527 (bubble test).

The structure of the test is described below. The adjusted valve is mounted at room temperature on the test station. The outlet of the valve is closed with a plug. A hose is inserted through it and inserted at the other end into a container filled with water. Hose diameter (6.12 mm) and immersion depth in water (12.7 mm) are defined by API 527.

The valve inlet is loaded to 90% of the response pressure if the response pressure is greater than or equal to 3.45 bar or to 0.345 bar below the response pressure. After a standing time t_s , the number of bubbles occurring in the water vessel must be counted over a period of one minute. During this period, the number of bubbles must not exceed a fixed number. The values entered in Table 4 apply to a pressure range from 1.03 bar to 68.9 bar at room temperature.

Table 3: Service life and number of bubbles for bubble test as a function of valve size

Valve Size [DN]	t_s [min]	Bubbles for MS (MD) [min]	Bubbles for SS (WD) [min]
15	1	20	0
20-50	1	40	0
65 - 100	2	40	0
≥ 150	5	40	0

MS (MD) = Metallic Sealing

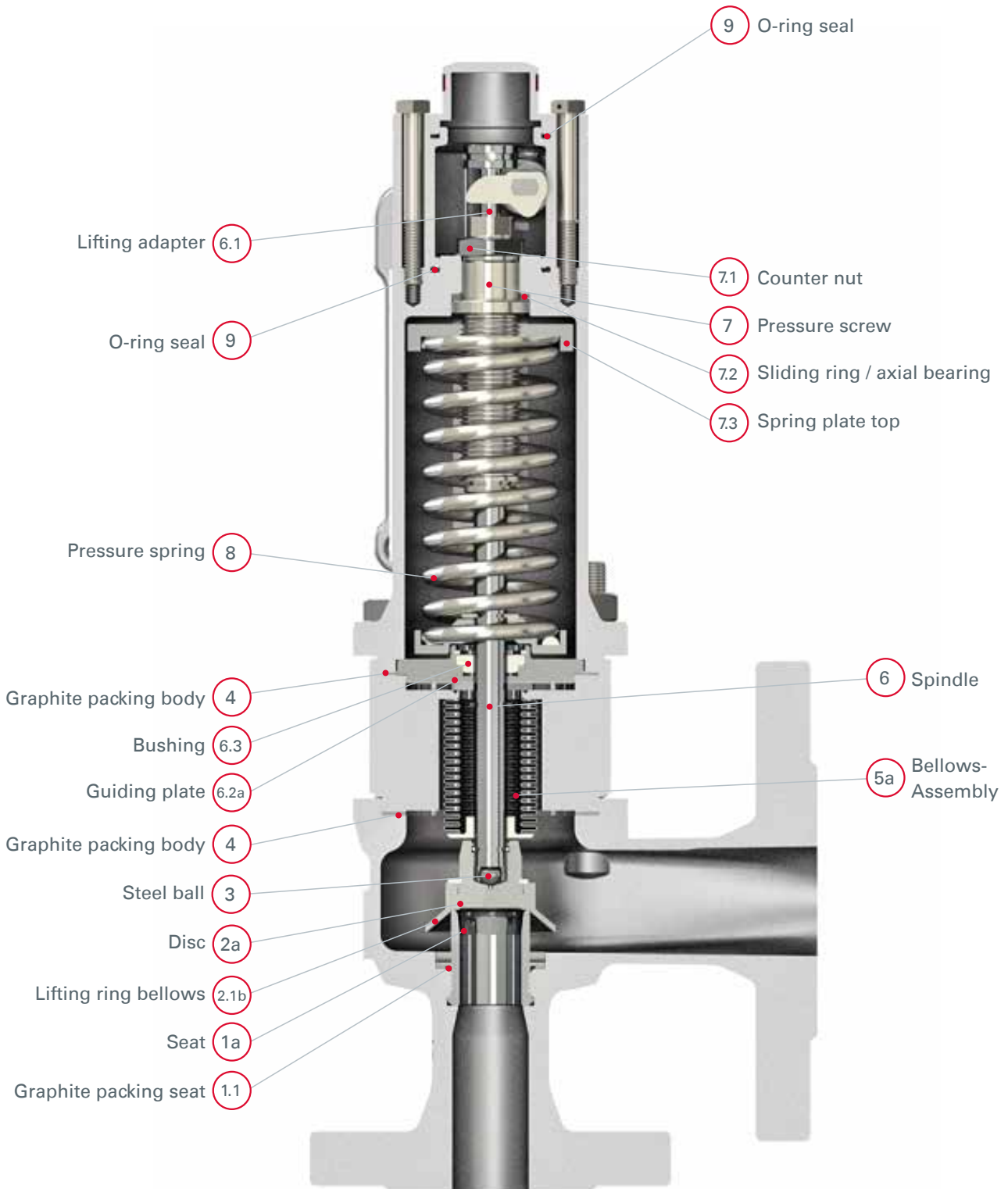
SS (WD) = Soft Sealing

ADDITIONAL MATERIAL



V-0196 SPARE PARTS OVERVIEW

Spare parts in 455tbGFL MD / 355tbGFL MD

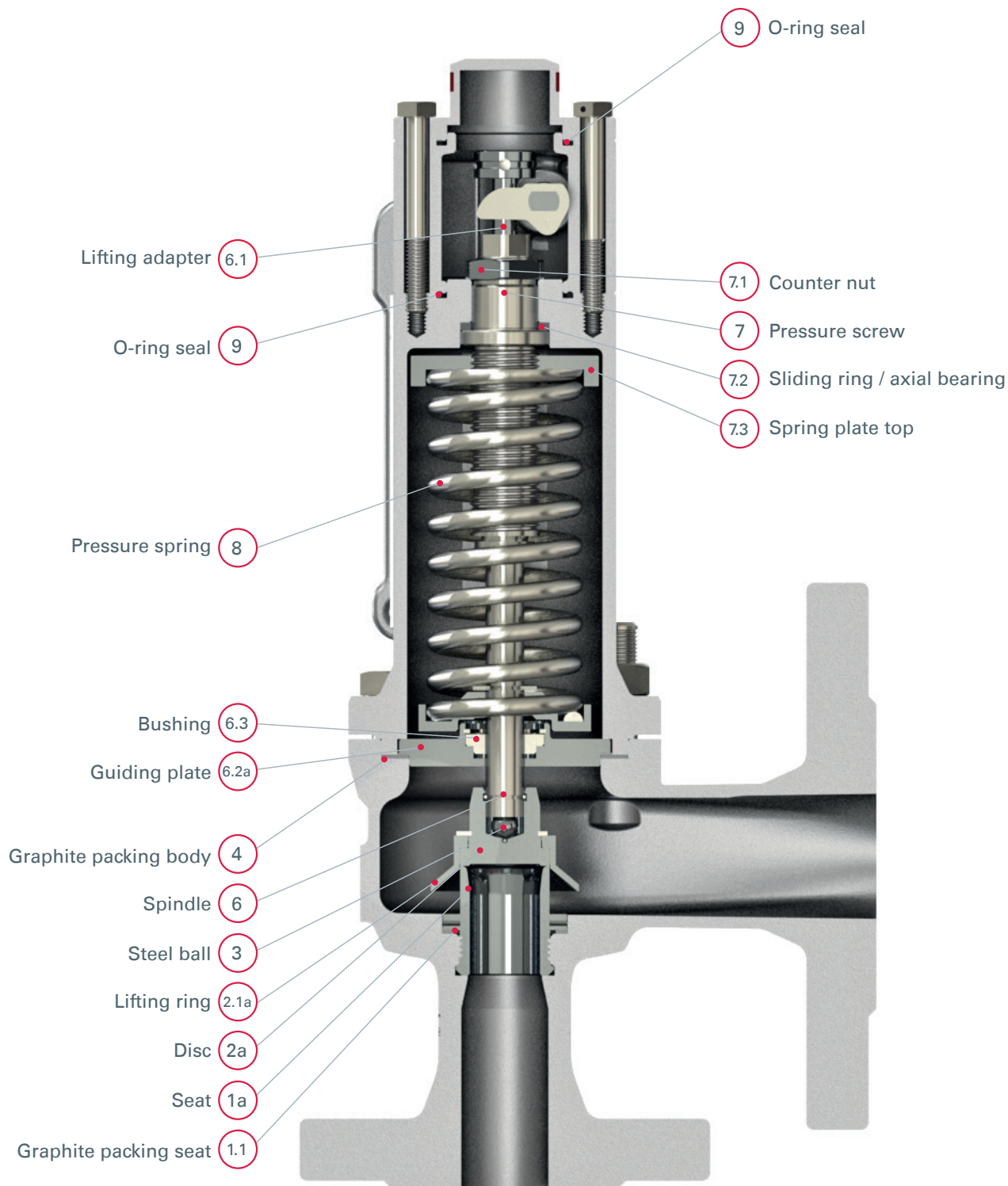


■ SINGLE PARTS 455tbGFL MD / 355tbGFL MD

Pos.	Description	Material 455	Material 355
1a	Seat	1.4404 / 316L	1.4404 / 316L
1.1	Graphite packing seat	Graphite + 1.4401 / Graphite + 316L	Graphite + 1.4401 / Graphite + 316L
2a	Disc	1.4404 / 316L	1.4122 / Hardened stainless steel
2.1b	Lifting ring bellows	1.4404 / 316L	1.4021 / 420
3	Steel ball	1.4401 / 316L	1.4401 / 316L
4	Graphite packing body	Graphite + 1.4401 / Graphite + 316L	Graphite + 1.4401 / Graphite + 316L
5a	Bellows-Assembly	1.4571 / 316Ti	1.4571 / 316Ti
6	Spindle	1.4404 / 316L	1.4021 / 420
6.1	Lifting Adapter	1.4404 / 316L	1.4021 / 420
6.2a	Guiding plate	1.4404 / 316L	1.4021 / 420
6.3	Bushing	Ni-Graphite	Ni-Graphite
7	Pressure screw	1.4404 / 316L	1.4122 / Hardened stainless steel
7.1	Counter nut	1.4404 / 316L	1.4404 / 316L
7.2	Sliding rind / axial bearing	PEEK, steel	PEEK, steel
7.3	Spring plate top	1.4404 / 316L	1.4104 / 430F
8	Pressure spring	1.4310 / 302	1.8159 / 6150
9	O-ring seal	EPDM	EPDM

Changes in material selection may occur depending on the application.

Spare parts in 455tGFL MD / 355tGFL MD

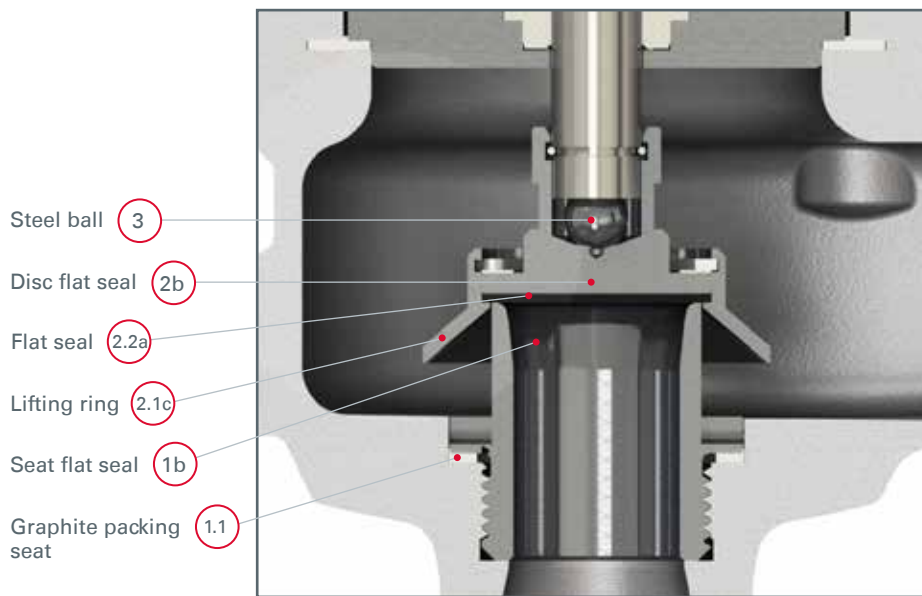


■ SINGLE PARTS 455tGFL MD / 355tGFL MD

Pos.	Description	Material 455	Material 355
1a	Seat	1.4404 / 316L	1.4404 / 316L
1.1	Graphite packing seat	Graphite + 1.4401 / Graphite + 316L	Graphite + 1.4401 / Graphite + 316L
2a	Disc	1.4404 / 316L	1.4122 / Hardened stainless steel
2.1a	Lifting ring	1.4404 / 316L	1.4021 / 420
3	Steel ball	1.4401 / 316L	1.4401 / 316L
4	Graphite packing body	Graphite + 1.4401 / Graphite + 316L	Graphite + 1.4401 / Graphite + 316L
6	Spindle	1.4404 / 316L	1.4021 / 420
6.1	Lifting Adapter	1.4404 / 316L	1.4021 / 420
6.2a	Guiding plate	1.4404 / 316L	1.4021 / 420
6.3	Bushing	Ni-Graphite	Ni-Graphite
7	Pressure screw	1.4404 / 316L	1.4122 / Hardened stainless steel
7.1	Counter nut	1.4404 / 316L	1.4404 / 316L
7.2	Sliding rind / axial bearing	PEEK, steel	PEEK, steel
7.3	Spring plate top	1.4404 / 316L	1.4104 / 430F
8	Pressure spring	1.4310 / 302	1.8159 / 6150
9	O-ring seal	EPDM	EPDM

Changes in material selection may occur depending on the application.

Spare parts in 455tGFL EPDM/355tGFL EPDM

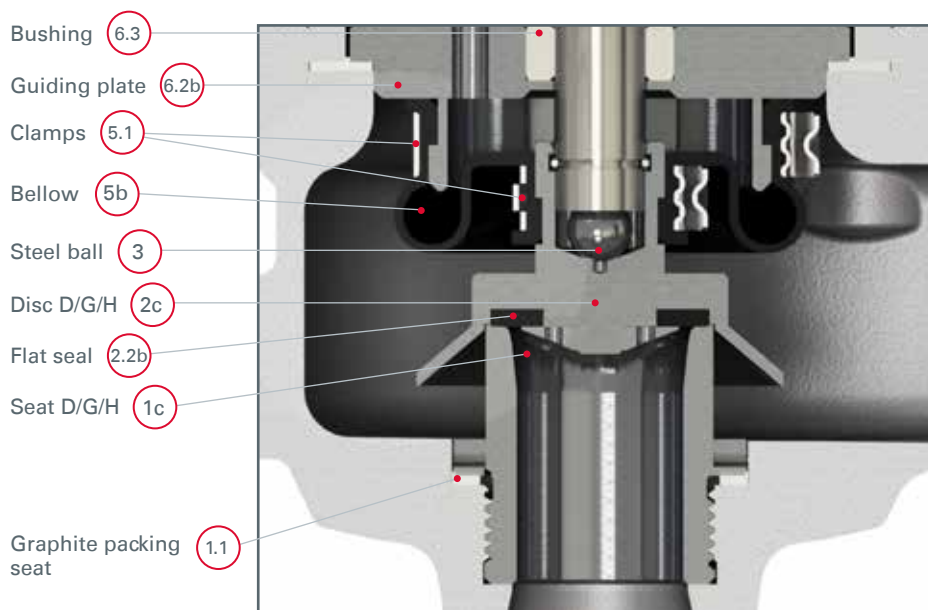


■ SPARE PARTS 455TGFL EPDM / 355TGFL EPDM

Pos.	Description	Material 455	Material 355
1b	Seat flat seal	1.4404 / 316L	1.4404 / 316L
1.1	Graphite packing seat	Graphite + 1.4401 / Graphite + 316L	Graphite + 1.4401 / Graphite + 316L
2b	Disc flat seal	1.4404 / 316L	1.4122 / Hardened stainless steel
2.1c	Lifting ring flat seal	1.4404 / 316L	1.4021 / 420
2.2a	Flat seal	EPDM, FKM, PTFE	EPDM, FKM, PTFE
3	Steel ball	1.4401 / 316L	1.4401 / 316L

Changes in material selection may occur depending on the application.

Spare parts in 455bHL EPDM / 355bHL EPDM



■ SPARE PARTS 455bHL EPDM / 355bHL EPDM

Pos.	Description	Material 455	Material 355
1c	Seat D/G/H	1.4404 / 316L	1.4404 / 316L
1.1	Graphite packing seat	Graphite + 1.4401 / Graphite + 316L	Graphite + 1.4401 / Graphite + 316L
2c	Disc D/G/H	1.4404 / 316L	1.4122 / Hardened stainless steel
2.2b	Flat seal D/G/H	EPDM	EPDM
3	Steel ball	1.4401 / 316L	1.4401 / 316L
5b	Bellow DGH	EPDM	EPDM
5.1	Clamps	1.4301 / 304	1.4301 / 304
6.2b	Guiding plate D/G/H	1.4404 / 316L	1.4021 / 420
6.3	Bushing	Ni-Graphite	Ni-Graphite

Changes in material selection may occur depending on the application.

Spare parts sets in series 455

Pos.	Sealing sets	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
1.1, 3, 4, 9	Sealing set	E0455.015.001	E0455.020.001	E0455.025.001	E0455.032.001	E0455.040.001	E0455.050.001	E0455.065.001	E0455.080.001	E0455.100.001
Pos.	Primary seal	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
2a	Cone Metallic seal	E0455.015.002	E0455.020.002	E0455.025.002	E0455.032.002	E0455.040.002	E0455.050.002 ¹ / E0455.050.031 ²	E0455.065.002	E0455.080.002	E0455.100.002 ³ / E0455.100.030 ⁴
2.2a	Flat seal EPDM	E0455.015.003	E0455.020.003	E0455.025.003	E0455.032.003	E0455.040.003	E0455.050.003	E0455.065.003	E0455.080.003	E0455.100.003
2.2a	Flat seal FKMVI	E0455.015.004	E0455.020.004	E0455.025.004	E0455.032.004	E0455.040.004	E0455.050.004	E0455.065.004	E0455.080.004	E0455.100.004
2.2a	Flat seal PTFE	E0455.015.005	E0455.020.005	E0455.025.005	E0455.032.005	E0455.040.005	E0455.050.005	E0455.065.005	E0455.080.005	E0455.100.005
2.2a	Flat seal PTFE K	E0455.015.006	E0455.020.006	E0455.025.006	E0455.032.006	E0455.040.006	E0455.050.006	E0455.065.006	E0455.080.006	E0455.100.006
2.2b	Flat seal DGH	E0455.015.007	E0455.020.007	E0455.025.007	E0455.032.007	E0455.040.007	E0455.050.007	E0455.065.007	E0455.080.007	E0455.100.007
Pos.	Seat set	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
1a, 1.1	Metallic seal	E0455.015.008	E0455.020.008	E0455.025.008	E0455.032.008	E0455.040.008	E0455.050.008 ¹ / E0455.050.009 ²	E0455.065.008	E0455.080.008	E0455.100.008
1b, 1.1	Flat seal	E0455.015.009	E0455.020.009	E0455.025.009	E0455.032.009	E0455.040.009	E0455.050.010	E0455.065.009	E0455.080.009	E0455.100.009
1c, 1.1	DGH	E0455.015.010	E0455.020.010	E0455.025.010	E0455.032.010	E0455.040.010	- ⁵	- ⁵	- ⁵	- ⁵
Pos.	Cone assemblies	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
2a, 2.1a, 3	Metallic seal	E0455.015.011	E0455.020.011	E0455.025.011	E0455.032.011	E0455.040.011	E0455.050.011 ¹ / E0455.050.012 ²	E0455.065.010	E0455.080.010	E0455.100.010 ³ / E0455.100.011 ⁴
2a, 2.1b, 3	Metallic seal bellow	E0455.015.012	E0455.020.012	E0455.025.012	E0455.032.012	E0455.040.012	E0455.050.013 ¹ / E0455.050.014 ²	E0455.065.011	E0455.080.011	E0455.100.012
2b, 2.1c, 2.2a, 3	Flat seal EPDM	E0455.015.013	E0455.020.013	E0455.025.013	E0455.032.013	E0455.040.013	E0455.050.015	E0455.065.012	E0455.080.012	E0455.100.013
2b, 2.1d, 2.2a, 3	Flat seal EPDM bellow	E0455.015.014	E0455.020.014	E0455.025.014	E0455.032.014	E0455.040.014	E0455.050.016	E0455.065.013	E0455.080.013	E0455.100.014
2b, 2.1c, 2.2a, 3	Flat seal FKMVI	E0455.015.015	E0455.020.015	E0455.025.015	E0455.032.015	E0455.040.015	E0455.050.017	E0455.065.014	E0455.080.014	E0455.100.015
2b, 2.1d, 2.2a, 3	Flat seal FKMVI bellow	E0455.015.016	E0455.020.016	E0455.025.016	E0455.032.016	E0455.040.016	E0455.050.018	E0455.065.015	E0455.080.015	E0455.100.016
2b, 2.1c, 2.2a, 3	Flat seal PTFE	E0455.015.017	E0455.020.017	E0455.025.017	E0455.032.017	E0455.040.017	E0455.050.019	E0455.065.016	E0455.080.016	E0455.100.017
2b, 2.1d, 2.2a, 3	Flat seal PTFE bellow	E0455.015.018	E0455.020.018	E0455.025.018	E0455.032.018	E0455.040.018	E0455.050.020	E0455.065.017	E0455.080.017	E0455.100.018
2b, 2.1c, 2.2a, 3	Flat seal PTFE carbon	E0455.015.019	E0455.020.019	E0455.025.019	E0455.032.019	E0455.040.019	E0455.050.021	E0455.065.018	E0455.080.018	E0455.100.019
2b, 2.1d, 2.2a, 3	Flat seal PTFE carbon bellow	E0455.015.020	E0455.020.020	E0455.025.020	E0455.032.020	E0455.040.020	E0455.050.022	E0455.065.019	E0455.080.019	E0455.100.020
2c, 2.2b, 3	Flat seal DGH	E0455.015.021	E0455.020.021	E0455.025.021	E0455.032.021	E0455.040.021	E0455.050.023	E0455.065.020	E0455.080.020	E0455.100.021

Pos.	Spindle set	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
3, 6, 6.2a, 6.3	without lifting	E0455.015.022	E0455.020.022	E0455.025.022	E0455.032.022	E0455.040.022	E0455.050.024 ¹ / E0455.050.026 ²	E0455.065.021	E0455.080.021	E0455.100.022 ³ / E0455.100.024 ⁴
3, 6, 6.1 6.2a, 6.3	lifting	E0455.015.023	E0455.020.023	E0455.025.023	E0455.032.023	E0455.040.023	E0455.050.025 ¹ / E0455.050.027 ²	E0455.065.022	E0455.080.022	E0455.100.023 ³ / E0455.100.025 ⁴
3, 6, 6.1 6.2b, 6.3	DGH	E0455.015.042	E0455.020.028	E0455.025.041	E0455.032.040	E0455.040.042	E0455.050.047	E0455.065.041	E0455.080.040	E0455.100.040
Pos.	Pressure screw set	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
7, 7.1, 7.2, 7.3	Pressure screw	E0455.020.024	E0455.020.024	E0455.025.024	E0455.032.024	E0455.040.024	E0455.050.028	E0455.065.023	E0455.080.023	E0455.100.026 ^{3/7} / E0455.100.027 ⁴
Pos.	Bellows set	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
5a	Metal bellows ⁶	E0455.015.024	E0455.020.025	E0455.025.025	E0455.032.025	E0455.040.025	E0455.050.029	E0455.065.024	E0455.080.024	E0455.100.028
5a	Metal bellows LowPressure ⁷	E0455.015.025	E0455.020.026	E0455.025.026	E0455.032.026	E0455.040.026	E0455.050.030	E0455.065.025	E0455.080.025	E0455.100.029
5 b, 5.1	Elastomer bellows DGH	E0455.020.027	E0455.020.027	E0455.020.027	E0455.040.027	E0455.040.027	E0455.040.027	E0455.080.026	E0455.080.026	E0455.080.026
Pos.	Pressure spring	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
8	Spring									

Ersatzteilnummern Federn siehe Dokument V-0219 Federtabellen

¹ Set pressure > 3.0 bar for version without bellows² Setting pressure ≤ 3.0 bar for version without bellows, always for version with bellows³ Setting pressure ≤ 10.0 bar⁴ Setting pressure > 10.0 bar⁵ Please use the spare part number of the flat gasket version.⁶ DN 15 - DN 40 set pressure > 5.0 bar, DN 50 set pressure > 4.0 bar, DN 65 - DN 100 set pressure > 3.5 bar⁷ DN 15 - DN 40 set pressure ≤ 5.0 bar, DN 50 set pressure ≤ 4.0 bar, DN 65 - DN 100 set pressure ≤ 3.5 bar

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Spare parts sets in series 355

Pos.	Sealing sets	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
1.1, 3, 4, 9	Sealing set	E0455.015.001	E0455.020.001	E0455.025.001	E0455.032.001	E0455.040.001	E0455.050.001	E0455.065.001	E0455.080.001	E0455.100.001
Pos.	Primary seal	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
2a	Cone Metallic seal ¹	E0355.015.009	E0355.020.009	E0355.025.009	E0355.032.009	E0355.040.009	E0355.050.009	E0355.065.009	E0355.080.009	E0355.100.009
2.2a	Flat seal EPDM	E0455.015.003	E0455.020.003	E0455.025.003	E0455.032.003	E0455.040.003	E0455.050.003	E0455.065.003	E0455.080.003	E0455.100.003
2.2a	Flat seal FKMVI	E0455.015.004	E0455.020.004	E0455.025.004	E0455.032.004	E0455.040.004	E0455.050.004	E0455.065.004	E0455.080.004	E0455.100.004
2.2a	Flat seal PTFE	E0455.015.005	E0455.020.005	E0455.025.005	E0455.032.005	E0455.040.005	E0455.050.005	E0455.065.005	E0455.080.005	E0455.100.005
2.2a	Flat seal PTFE K	E0455.015.006	E0455.020.006	E0455.025.006	E0455.032.006	E0455.040.006	E0455.050.006	E0455.065.006	E0455.080.006	E0455.100.006
2.2b	Flat seal DGH	E0455.015.007	E0455.020.007	E0455.025.007	E0455.032.007	E0455.040.007	E0455.050.007	E0455.065.007	E0455.080.007	E0455.100.007
Pos.	Seat set	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
1a, 1.1	Metallic seal	E0455.015.008	E0455.020.008	E0455.025.008	E0455.032.008	E0455.040.008	E0455.050.009	E0455.065.008	E0455.080.008	E0455.100.008
1b, 1.1	Flat seal	E0455.015.009	E0455.020.009	E0455.025.009	E0455.032.009	E0455.040.009	E0455.050.010	E0455.065.009	E0455.080.009	E0455.100.009
1c, 1.1	DGH	E0455.015.010	E0455.020.010	E0455.025.010	E0455.032.010	E0455.040.010	- ⁵	- ⁵	- ⁵	- ⁵
Pos.	Cone assemblies	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
2a, 2.1a, 3	Metallic seal	E0355.015.001	E0355.020.001	E0355.025.001	E0355.032.001	E0355.040.001	E0355.050.001	E0355.065.001	E0355.080.001	E0355.100.001
2a, 2.1b, 3	Metallic seal bellow	E0455.015.012	E0455.020.012	E0455.025.012	E0455.032.012	E0455.040.012	E0455.050.013 ³ / E0455.050.014 ⁴	E0455.065.011	E0455.080.011	E0455.100.012
2b, 2.1c, 2.2a, 3	Flat seal EPDM	E0355.015.002	E0355.020.002	E0355.025.002	E0355.032.002	E0355.040.002	E0355.050.002	E0355.065.002	E0355.080.002	E0355.100.002
2b, 2.1d, 2.2a, 3	Flat seal EPDM bellow	E0455.015.014	E0455.020.014	E0455.025.014	E0455.032.014	E0455.040.014	E0455.050.016	E0455.065.013	E0455.080.013	E0455.100.014
2b, 2.1c, 2.2a, 3	Flat seal FKMVI	E0355.015.003	E0355.020.003	E0355.025.003	E0355.032.003	E0355.040.003	E0355.050.003	E0355.065.003	E0355.080.003	E0355.100.003
2b, 2.1d, 2.2a, 3	Flat seal FKMVI bellow	E0455.015.016	E0455.020.016	E0455.025.016	E0455.032.016	E0455.040.016	E0455.050.018	E0455.065.015	E0455.080.015	E0455.100.016
2b, 2.1c, 2.2a, 3	Flat seal PTFE	E0355.015.004	E0355.020.004	E0355.025.004	E0355.032.004	E0355.040.004	E0355.050.004	E0355.065.004	E0355.080.004	E0355.100.004
2b, 2.1d, 2.2a, 3	Flat seal PTFE bellow	E0455.015.018	E0455.020.018	E0455.025.018	E0455.032.018	E0455.040.018	E0455.050.020	E0455.065.017	E0455.080.017	E0455.100.018
2b, 2.1c, 2.2a, 3	Flat seal PTFE carbon	E0355.015.005	E0355.020.005	E0355.025.005	E0355.032.005	E0355.040.005	E0355.050.005	E0355.065.005	E0355.080.005	E0355.100.005
2b, 2.1d, 2.2a, 3	Flat seal PTFE carbon bellow	E0455.015.020	E0455.020.020	E0455.025.020	E0455.032.020	E0455.040.020	E0455.050.022	E0455.065.019	E0455.080.019	E0455.100.020
2c, 2.2b, 3	Flat seal DGH	E0355.015.006	E0355.020.006	E0355.025.006	E0355.032.006	E0355.040.006	E0355.050.006	E0355.065.006	E0355.080.006	E0355.100.006

Pos.	Spindle set	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
3, 6, 6.2a, 6.3	without lifting	E0355.015.007	E0355.020.007	E0355.025.007	E0355.032.007	E0355.040.007	E0355.050.007	E0355.065.007	E0355.080.007	E0355.100.007
3, 6, 6.1 6.2a, 6.3	lifting	E0355.015.008	E0355.020.008	E0355.025.008	E0355.032.008	E0355.040.008	E0355.050.008	E0355.065.008	E0355.080.008	E0355.100.008
3, 6, 6.1 6.2b, 6.3	DGH	E0355.015.026	E0355.020.011	E0355.025.025	E0355.032.023	E0355.040.025	E0355.050.026	E0355.065.026	E0355.080.025	E0355.100.020
Pos.	Pressure screw set	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
7, 7.1, 7.2, 7.3	Pressure screw ^{1,2}	E0355.020.010	E0355.020.010	E0355.025.010	E0355.040.010	E0355.040.010	E0355.050.010	E0355.065.010	E0355.080.010 / E0355.080.011 ⁶	E0355.100.010
Pos.	Bellows set	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
5a	Metal bellows ⁷	E0455.015.025	E0455.020.025	E0455.025.025	E0455.032.025	E0455.040.025	E0455.050.029	E0455.065.024	E0455.080.024	E0455.100.028
5a	Metal bellows LowPressure ⁸	E0455.015.026	E0455.020.026	E0455.025.026	E0455.032.026	E0455.040.026	E0455.050.030	E0455.065.025	E0455.080.025	E0455.100.029
5b, 5.1	Elastomer bellows DGH	E0455.020.027	E0455.020.027	E0455.020.027	E0455.040.027	E0455.040.027	E0455.040.027	E0455.080.026	E0455.080.026	E0455.080.026
Pos.	Pressure spring	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
8	Spring ¹									

Ersatzteilnummern Federn siehe Dokument V-0219 Federtabellen

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V-0197 OVERVIEW OF ASSEMBLY AIDS

Usage	Tools	DN 15	DN 20	DN 25	DN 32	DN 40	DN 50	DN 65	DN 80	DN 100
Screws for spring housing/body	jaw insertion tool	SW16/17	SW16/17	SW18	SW22	SW22	SW24	SW24	SW24	SW24
Screws for cap/spring housing 255 / 355 pressure screw	jaw insertion tool	SW10	SW10	SW10	SW13	SW13	SW13	SW16/17	SW16/17	SW16/17
455 pressure screw	combination wrench	SW13	SW13	SW15	SW20	SW20	SW20	SW24	SW24	SW30
Lock nut	combination wrench	SW13	SW13	SW15	SW20	SW20	SW20	SW24	SW24	SW30
Circlip for disc	combination wrench	SW20	SW20	SW20	SW32	SW32	SW32	SW41	SW41	SW41
Drive seat tool	combination wrench	A1	A1	A1	A2	A2	A2	A2	A3	A3
Screw-in seat	socket wrench insert	SW13	SW13	SW13	SW24	SW24	SW24	SW30	SW30	SW30
	assembly tool ¹⁾	H-455-15-003 B	H-455-20-007 B	H-455-25-007 B ²⁾	H-455-32-003 B	H-455-40-007 B	H-455-50-013 B	H-455-65-003 B	H-455-80-008 B	H-455-100-008 B

¹⁾ Necessary for seat assembly / disassembly, can be obtained from Goetze under the stated item number

²⁾ for the bHL variant, a different tool is required for this nominal width: H-455-25-007 FD B G

V-0219 SPRING TABLES

Metallic sealing

DN 15					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	0,8	L-1420	E0455.015.026	L-2827	E0355.015.010
0,81	1,5	L-525 N	E0455.015.027	L-2828	E0355.015.011
1,51	1,9	L-1422	E0455.015.028	L-2829	E0355.015.012
1,91	2,4	L-526 N	E0455.015.029	L-2830	E0355.015.013
2,41	2,7	L-2509	E0455.015.030	L-2831	E0355.015.014
2,71	3	L-2015	E0455.015.031	L-2832	E0355.015.015
3,01	3,5	L-1423	E0455.015.032	L-2833	E0355.015.016
3,51	3,9	L-2016	E0455.015.033	L-3140	E0355.015.017
3,91	6	L-527 N	E0455.015.034	L-2834	E0355.015.018
6,01	8,5	L-2017	E0455.015.035	L-2835	E0355.015.019
8,51	11	L-2505	E0455.015.036	L-2836	E0355.015.020
11,01	14,7	L-2018	E0455.015.037	L-2837	E0355.015.021
14,71	18	L-1433	E0455.015.038	L-2838	E0355.015.022
18,01	21,5	L-529 N	E0455.015.039	L-2839	E0355.015.023
21,51	28,5	L-2510	E0455.015.040	L-2840	E0355.015.024
28,51	40	L-1434	E0455.015.041	L-2841	E0355.015.025

DN 20					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	1	L-1420	E0455.015.026	L-2827	E0355.015.010
1,01	1,6	L-525 N	E0455.015.027	L-2828	E0355.015.011
1,61	2,4	L-1422	E0455.015.028	L-2829	E0355.015.012
2,41	3,5	L-2509	E0455.015.030	L-2831	E0355.015.014
3,51	4,5	L-2015	E0455.015.031	L-2832	E0355.015.015
4,51	8,8	L-1423	E0455.015.032	L-2833	E0355.015.016
8,81	13	L-527 N	E0455.015.034	L-2834	E0355.015.018
13,01	18,8	L-2505	E0455.015.036	L-2836	E0355.015.020
18,81	25,4	L-1433	E0455.015.038	L-2838	E0355.015.022
25,41	27,7	L-529 N	E0455.015.039	L-2839	E0355.015.023
27,71	40	L-2510	E0455.015.040	L-2840	E0355.015.024

DN 25					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	0,9	L-1848	E0455.025.027	L-2842	E0355.025.011
0,91	1,49	L-1849	E0455.025.028	L-2843	E0355.025.012
1,5	1,94	L-1850	E0455.025.029	L-2844	E0355.025.013
1,95	2,44	L-1858	E0455.025.030	L-2845	E0355.025.014
2,45	2,89	L-2405	E0455.025.031	L-2846	E0355.025.015
2,9	3,69	L-1851	E0455.025.032	L-2847	E0355.025.016
3,7	5,89	L-1852	E0455.025.033	L-2848	E0355.025.017
5,9	8,59	L-2406	E0455.025.034	L-2849	E0355.025.018
8,6	13,29	L-1853	E0455.025.035	L-2851	E0355.025.019
13,3	21,69	L-1854	E0455.025.036	L-2852	E0355.025.020
21,7	30,79	L-1855	E0455.025.037	L-2853	E0355.025.021
30,8	40	L-1856	E0455.025.038	L-2854	E0355.025.022

DN 32					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	1	L-2581	E0455.032.027	L-2855	E0355.032.010
1,01	1,6	L-2582	E0455.032.028	L-2856	E0355.032.011
1,61	2,2	L-2583	E0455.032.029	L-2857	E0355.032.012
2,21	2,7	L-2584	E0455.032.030	L-2858	E0355.032.013
2,71	3,2	L-2585	E0455.032.031	L-2859	E0355.032.014
3,21	3,9	L-2586	E0455.032.032	L-2860	E0355.032.015
3,91	6,5	L-2587	E0455.032.033	L-2861	E0355.032.016
6,51	8	L-2588	E0455.032.034	L-2862	E0355.032.017
8,01	15	L-2589	E0455.032.035	L-2863	E0355.032.018
15,01	25	L-2590	E0455.032.036	L-2864	E0355.032.019
25,01	40	L-2590 + L-2592	E0455.032.036 + E0455.032.037	L-2864 + L-2865	E0355.032.019 + E0355.032.020

DN 40					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	1,1	L-1879	E0455.040.028	L-2866	E0355.040.011
1,11	1,6	L-2425	E0455.040.029	L-2867	E0355.040.012
1,61	2,1	L-2435	E0455.040.030	L-2868	E0355.040.013
2,11	2,6	L-1882	E0455.040.031	L-2869	E0355.040.014
2,61	2,9	L-2436	E0455.040.032	L-2870	E0355.040.015
2,91	3,4	L-2437	E0455.040.033	L-2871	E0355.040.016
3,41	4,1	L-2438	E0455.040.034	L-2872	E0355.040.017
4,11	5,8	L-1883	E0455.040.035	L-2873	E0355.040.018
5,81	10,8	L-1884	E0455.040.036	L-2874	E0355.040.019
10,81	24	L-1885	E0455.040.037	L-2875	E0355.040.020
24,01	25,5	L-2426	E0455.040.038	L-2876	E0355.040.021
25,51	40	L-2503 + L-2504	E0455.040.039 + E0455.040.040	L-2877 + L-2878	E0355.040.022 + E0355.040.023

DN 50			
tGFO, tGFL, sGO, sGL			
Pressure Range [bar]		Spring	
from	to	455	
0,2	0,8	L-1860	E0455.050.032
0,81	1	L-1861	E0455.050.033
1,01	1,7	L-1862	E0455.050.034
1,71	2	L-1869	E0455.050.035
2,01	2,6	L-1863	E0455.050.036
2,61	3	L-1864	E0455.050.037 *
3,01	5,7	L-1863	E0455.050.036
5,71	8,5	L-1864	E0455.050.037
8,51	15	L-1865	E0455.050.039
15,01	26	L-1866	E0455.050.041
26,01	32	L-1867	E0455.050.042
32,01	40	L-1868	E0455.050.045

* Pressure change above the marked limit at 3 bar only after consultation!

DN 50			
tGFO, tGFL, sGO, sGL			
Pressure Range [bar]		Spring	
from	to	355	
0,2	0,8	L-2879	E0355.050.011
0,81	1	L-2880	E0355.050.012
1,01	1,7	L-2881	E0355.050.013
1,71	2	L-2882	E0355.050.014
2,01	2,6	L-2883	E0355.050.015
2,61	3,2	L-2884	E0355.050.016
3,21	3,7	L-3152	E0355.050.017
3,71	4,9	L-2885	E0355.050.018
4,91	5,5	L-3153	E0355.050.019
5,51	8,5	L-2886	E0355.050.020
8,51	12,5	L-2887	E0355.050.021
12,51	13,5	L-3154	E0355.050.023
13,51	24,5	L-2888	E0355.050.024
24,51	40	L-3155 + L-3154	E0355.050.025 + E0355.050.023

DN 65					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	1,1	L-2607	E0455.065.026	L-2889	E0355.065.011
1,11	1,7	L-2608	E0455.065.027	L-2890	E0355.065.012
1,71	2,2	L-2609	E0455.065.028	L-2891	E0355.065.013
2,21	2,5	L-2610	E0455.065.029	L-2892	E0355.065.014
2,51	2,8	L-2611	E0455.065.030	L-2893	E0355.065.015
2,81	3,2	L-2612	E0455.065.031	L-2894	E0355.065.016
3,21	4,3	L-2613	E0455.065.032	L-2895	E0355.065.017
4,31	5,1	L-2614	E0455.065.033	L-2896	E0355.065.018
5,11	5,4	L-2615	E0455.065.034	L-2897	E0355.065.019
5,41	7,7	L-2616	E0455.065.035	L-2898	E0355.065.020
7,71	12,2	L-2617	E0455.065.036	L-2899	E0355.065.021
12,21	24	L-2618 + L-2619	E0455.065.037 + E0455.065.038	L-2900 + L-2901	E0355.065.022 + E0355.065.023

DN 80					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	0,9	L-1960	E0455.080.027	L-2902	E0355.080.012
0,91	1,4	L-1962	E0455.080.028	L-2903	E0355.080.013
1,41	2	L-1963	E0455.080.029	L-2904	E0355.080.014
2,01	2,4	L-2636	E0455.080.030	L-2905	E0355.080.015
2,41	4,9	L-1964	E0455.080.031	L-2906	E0355.080.016
4,91	6,5	L-1965	E0455.080.032	L-2907	E0355.080.017
6,51	11,7	L-1966	E0455.080.033	L-2908	E0355.080.018
11,71	20	L-1967	E0455.080.034	L-2909	E0355.080.019
20,01	25,5	L-1968 + L-2637	E0455.080.035 + E0455.080.036	L-2910 + L-1911	E0355.080.020 + E0355.080.021

DN 100					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	1	L-2639	E0455.100.031	L-2912	E0355.100.011
1,01	1,6	L-2640	E0455.100.032	L-2913	E0355.100.012
1,61	2,4	L-2641	E0455.100.033	L-2914	E0355.100.013
2,41	3,2	L-2642	E0455.100.034	L-2915	E0355.100.014
3,21	5	L-2643	E0455.100.035	L-2916	E0355.100.015
5,01	8,1	L-2644	E0455.100.036	L-2917	E0355.100.016
8,11	14	L-2645	E0455.100.037	L-2918	E0355.100.017
14,01	20	L-2645 + L-2647	E0455.100.037 + E0455.100.038	L-2918 + L-2919	E0355.100.018 + E0355.100.019

Metal sealing with bellows

DN 15 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
1,2	1,4	L-1420	E0455.015.026
1,41	2	L-516 N	E0455.015.043
2,01	2,4	L-517 N	E0455.015.044
2,41	2,7	L-525 N	E0455.015.027
2,71	3,3	L-1422	E0455.015.028
3,31	4	L-526 N	E0455.015.029
4,01	4,4	L-2509	E0455.015.030
4,41	5	L-2015	E0455.015.031

DN 15 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
5,01	5,3	L-2509	E0455.015.030
5,31	6,6	L-2015	E0455.015.031
6,61	7,7	L-1423	E0455.015.032
7,71	9,5	L-527 N	E0455.015.034
9,51	11	L-2017	E0455.015.035
11,01	14	L-2505	E0455.015.036
14,01	16	L-2018	E0455.015.037
16,01	18,7	L-1433	E0455.015.038
18,71	22,3	L-529 N	E0455.015.039
22,31	25	L-2510	E0455.015.040
25,01	34	L-1434	E0455.015.041
34,01	40	L-695 N	E0455.015.045

DN 20 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
0,8	1	L-1420	E0455.015.026
1,01	1,4	L-517 N	E0455.015.044
1,41	2,2	L-525 N	E0455.015.027
2,21	2,73	L-1422	E0455.015.028
2,74	3,15	L-526 N	E0455.015.029
3,16	3,75	L-2509	E0455.015.030
3,76	5	L-1423	E0455.015.032

DN 20 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
5,01	6	L-1423	E0455.015.032
6,01	7,4	L-527 N	E0455.015.034
7,41	8,6	L-2017	E0455.015.035
8,61	11	L-2505	E0455.015.036
11,01	12,5	L-2018	E0455.015.037
12,51	15	L-1433	E0455.015.038
15,01	21	L-529 N	E0455.015.039
21,01	24,5	L-2510	E0455.015.040
24,51	32	L-1434	E0455.015.041
32,01	40	L-695 N	E0455.015.045

DN 25 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
0,5	1,1	L-1848	E0455.025.027
1,11	1,65	L-1849	E0455.025.028
1,66	2,2	L-1850	E0455.025.029
2,21	2,7	L-1858	E0455.025.030
2,71	3,4	L-2405	E0455.025.031
3,41	4,1	L-1851	E0455.025.032
4,11	5	L-1852	E0455.025.033

DN 25 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
5,01	5,55	L-1852	E0455.025.033
5,56	7,3	L-2406	E0455.025.034
7,31	8,6	L-1853	E0455.025.035
8,61	13	L-1854	E0455.025.036
13,01	16	L-1855	E0455.025.037
16,01	23	L-1857	E0455.025.039
23,01	28	L-1856	E0455.025.038
28,01	35	L-2525	E0455.025.042
35,01	40	L-3187	E0455.025.043

DN 32 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
1	1,6	L-2581	E0455.032.027
1,61	2,5	L-2582	E0455.032.028
2,51	3	L-2583	E0455.032.029
3,01	3,5	L-2584	E0455.032.030
3,51	4	L-2585	E0455.032.031
4,01	4,5	L-2586	E0455.032.032
4,51	5	L-2587	E0455.032.033

DN 32 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
5,01	6	L-2586	E0455.032.032
6,01	7,1	L-2594	E0455.032.041
7,11	9	L-2588	E0455.032.034
9,01	12	L-2589	E0455.032.035
12,01	14	L-2595	E0455.032.038
14,01	17	L-2590	E0455.032.036
17,01	22	L-2591	E0455.032.039
22,01	29	L-2590 + L-2592	E0455.032.036 + E0455.032.037
29,01	35	L-2591 + L-2592	E0455.032.039 + E0455.032.037
35,01	40	L-2591 + L-3209	E0455.032.039 + E0455.032.042

DN 40 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
1	1,7	L-1879	E0455.040.028
1,71	2	L-2582	E0455.040.043
2,01	2,4	L-1881	E0455.040.044
2,41	2,6	L-2435	E0455.040.030
2,61	3,1	L-1882	E0455.040.031
3,11	3,6	L-2436	E0455.040.032
3,61	4,2	L-2437	E0455.040.033
4,21	5	L-2438	E0455.040.034

DN 40 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
5,01	5,3	L-2436	E0455.040.032
5,31	6	L-2437	E0455.040.033
6,01	7,2	L-2438	E0455.040.034
7,21	10,3	L-1884	E0455.040.036
10,31	14,8	L-1885	E0455.040.037
14,81	18,5	L-2426	E0455.040.038
18,51	23,8	L-2503 + L-2504	E0455.040.039 + E0455.040.040
23,81	30	L-2809	E0455.040.045
30,01	40	L-3210	E0455.040.046
35,01	40	L-2591 + L-3209	E0455.032.039 + E0455.032.042

DN 50 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
3	4	L-1863	E0455.050.036
4,01	5	L-1864	E0455.050.037
5,01	5,5	L-1865	E0455.050.039

DN 50 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
5,51	6,4	L-1863	E0455.050.036
6,41	8	L-1864	E0455.050.037
8,01	9,8	L-1865	E0455.050.039
9,81	14	L-1866	E0455.050.041
14,01	18,7	L-1867	E0455.050.042
18,71	22,5	L-3004	E0455.050.044
22,51	31	L-3005	E0455.050.046
31,01	40	L-3006	E0455.050.048

DN 50 LP			
Bellows in parts (new contour)			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
0,5	1,2	L-1860	E0455.050.032
1,21	1,7	L-1861	E0455.050.033
1,71	2	L-1862	E0455.050.034
2,01	2,4	L-2437	E0455.040.033
2,41	2,5	L-1869	E0455.050.035
2,51	2,9	L-2438	E0455.040.034
2,91	3,3	L-1863	E0455.050.036
3,31	4	L-1864	E0455.050.037

DN 50 HP			
Bellows in parts (new contour)			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
4,01	4,5	L-1863	E0455.050.036
4,51	5	L-1864	E0455.050.037
5,01	7	L-1865	E0455.050.039
7,01	10	L-1866	E0455.050.041
10,01	12	L-1867	E0455.050.042
12,01	17	L-3004	E0455.050.044
17,01	26	L-3005	E0455.050.046
26,01	30,5	L-3006	E0455.050.048
30,51	37	L-3007	E0455.050.049
37,01	40	L-3421	E0455.050.050

DN 65 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
0,3	1	L-2607	E0455.065.026
1,01	1,7	L-2608	E0455.065.027
1,71	2,2	L-2609	E0455.065.028
2,21	2,5	L-2610	E0455.065.029
2,51	2,8	L-2611	E0455.065.030
2,81	3	L-2612	E0455.065.031
3,01	3,5	L-2613	E0455.065.032

DN 65 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
3,51	4,5	L-2613	E0455.065.032
4,51	5,5	L-2614	E0455.065.033
5,51	5,7	L-2615	E0455.065.034
5,71	6,8	L-2616	E0455.065.035
6,81	8,3	L-2617	E0455.065.036
8,31	12,5	L-2618 + L-2619	E0455.065.037 + E0455.065.038
12,51	18,5	L-3193	E0455.065.039
18,51	30	L-3194	E0455.065.040
30,01	40	L-3611	E0455.065.042

DN 80 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
0,2	1	L-1960	E0455.080.027
1,01	1,4	L-1962	E0455.080.028
1,41	2	L-1963	E0455.080.029
2,01	2,4	L-2636	E0455.080.030
2,41	3	L-1964	E0455.080.031
3,01	3,5	L-1965	E0455.080.032

DN 80 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
3,51	4,4	L-1964	E0455.080.031
4,41	5,5	L-1965	E0455.080.032
5,51	7,5	L-1966	E0455.080.033
7,51	10,3	L-1967	E0455.080.034
10,31	13,3	L-1968 + L-2637	E0455.080.035 + E0455.080.036
13,31	17	L-2811	E0455.080.038
17,01	25	L-2812	E0455.080.039
25,01	29	L-2813	E0455.080.041
29,01	40	L-3612 + L-3613	E0455.080.042 + E0455.080.043

DN 100 LP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
0,2	1,1	L-2639	E0455.100.031
1,11	1,6	L-2640	E0455.100.032
1,61	2,1	L-2641	E0455.100.033
2,11	2,8	L-2642	E0455.100.034
2,81	3,5	L-2643	E0455.100.035

DN 100 HP			
tbGFL, tbGFO, bGFL, bGFO			
Pressure Range [bar]		Spring	
from	to	455 + 355	
3,51	4	L-2642	E0455.100.034
4,01	4,2	L-2643	E0455.100.035
4,21	6	L-2644	E0455.100.036
6,01	10,5	L-2645	E0455.100.037
10,51	18	L-2645 + L-2647	E0455.100.037 + E0455.100.038
18,01	22,5	L-2645 + L-3195	E0455.100.037 + E0455.100.039
22,51	25	L-2645 + L-3196	E0455.100.037 + E0455.100.041
25,01	40	L-3614 + L-3615	E0455.100.042 + E0455.100.043

D/G/H

DN 15					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	0,9	L-1420	E0455.015.026	L-2827	E0355.015.010
0,91	1	L-516 N	E0455.015.043	L-516 N	E0455.015.043
1,01	1,2	L-517 N	E0455.015.044	L-3329	E0355.015.027
1,21	1,5	L-525 N	E0455.015.027	L-2828	E0355.015.011
1,51	2	L-1422	E0455.015.028	L-2829	E0355.015.012
2,01	2,7	L-2509	E0455.015.030	L-2831	E0355.015.014
2,71	3,4	L-2015	E0455.015.031	L-2832	E0355.015.015
3,41	4,1	L-1423	E0455.015.032	L-2833	E0355.015.016
4,11	5,2	L-527 N	E0455.015.034	L-2834	E0355.015.018
5,21	6,8	L-2017	E0455.015.035	L-2835	E0355.015.019
6,81	9	L-2505	E0455.015.036	L-2836	E0355.015.020
9,01	10,8	L-2018	E0455.015.037	L-2837	E0355.015.021
10,81	13,2	L-1433	E0455.015.038	L-2838	E0355.015.022
13,21	15	L-529 N	E0455.015.039	L-2839	E0355.015.023

DN 20					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	1,02	L-1420	E0455.015.026	L-2827	E0355.015.010
1,03	1,4	L-517 N	E0455.015.044	L-3329	E0355.015.027
1,41	1,65	L-525 N	E0455.015.027	L-2828	E0355.015.011
1,66	2,05	L-1422	E0455.015.028	L-2829	E0355.015.012
2,06	2,5	L-2509	E0455.015.030	L-2831	E0355.015.014
2,51	3	L-1423	E0455.015.032	L-2833	E0355.015.016
3,01	3,9	L-527 N	E0455.015.034	L-2834	E0355.015.018
3,91	6,1	L-2017	E0455.015.035	L-2835	E0355.015.019
6,11	9,1	L-2505	E0455.015.036	L-2836	E0355.015.020
9,11	15	L-2018	E0455.015.037	L-2837	E0355.015.021
15,01	17,5	L-1433	E0455.015.038	L-2838	E0355.015.022
17,51	25	L-529 N	E0455.015.039	L-2839	E0355.015.023

DN 25					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	0,9	L-1848	E0455.025.027	L-2842	E0355.025.011
0,91	1,15	L-1849	E0455.025.028	L-2843	E0355.025.012
1,16	1,44	L-1596	E0455.025.040	L-3423	E0355.025.024
1,45	2	L-1850	E0455.025.029	L-2844	E0355.025.013
2,01	2,4	L-2405	E0455.025.031	L-2846	E0355.025.015
2,41	2,7	L-1851	E0455.025.032	L-2847	E0355.025.016
2,71	3,4	L-1852	E0455.025.033	L-2848	E0355.025.017
3,41	4,8	L-2406	E0455.025.034	L-2849	E0355.025.018
4,81	5,8	L-1853	E0455.025.035	L-2851	E0355.025.019
5,81	11	L-1854	E0455.025.036	L-2852	E0355.025.020
11,01	13	L-1855	E0455.025.037	L-2853	E0355.025.021
13,01	19,8	L-1857	E0455.025.039	L-3302	E0355.025.023
19,81	25	L-1856	E0455.025.038	L-2854	E0355.025.022

DN 32					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	0,8	L-2581	E0455.032.027	L-2855	E0355.032.010
0,81	1,3	L-2582	E0455.032.028	L-2856	E0355.032.011
1,31	1,8	L-2583	E0455.032.029	L-2857	E0355.032.012
1,81	2,1	L-2584	E0455.032.030	L-2858	E0355.032.013
2,11	2,3	L-2585	E0455.032.031	L-2859	E0355.032.014
2,31	2,7	L-2586	E0455.032.032	L-2860	E0355.032.015
2,71	3,35	L-2587	E0455.032.033	L-2861	E0355.032.016
3,36	4,6	L-2588	E0455.032.034	L-2862	E0355.032.017
4,61	5,5	L-2589	E0455.032.035	L-2863	E0355.032.018
5,51	6,7	L-2595	E0455.032.038	L-3330	E0355.032.021
6,71	8,2	L-2590	E0455.032.036	L-2864	E0355.032.019
8,21	11	L-2591	E0455.032.039	L-3331	E0355.032.022
11,01	14,5	L-2590 + L-2592	E0455.032.036 + E0455.032.037	L-2864 + L-2865	E0355.032.019 + E0355.032.020
14,51	25	L-2591 + L-2592	E0455.032.039 + E0455.032.037	L-3331 + L-2865	E0355.032.022 + E0355.032.020

DN 40					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	0,9	L-1879	E0455.040.028	L-2866	E0355.040.011
0,91	1,4	L-2425	E0455.040.029	L-2867	E0355.040.012
1,41	2	L-1882	E0455.040.031	L-2869	E0355.040.014
2,01	2,3	L-2437	E0455.040.033	L-2871	E0355.040.016
2,31	2,7	L-2438	E0455.040.034	L-2872	E0355.040.017
2,71	3,2	L-1883	E0455.040.035	L-2873	E0355.040.018
3,21	5	L-1884	E0455.040.036	L-2874	E0355.040.019
5,01	6,7	L-1885	E0455.040.037	L-2875	E0355.040.020
6,71	8,5	L-2426	E0455.040.038	L-2876	E0355.040.021
8,51	15	L-1886	E0455.040.041	L-3303	E0355.040.024
15,01	25	L-2503 + L-2504	E0455.040.039 + E0455.040.040	L-2877 + L-2878	E0355.040.022 + E0355.040.023

DN 50					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	0,77	L-1860	E0455.050.032	L-2879	E0355.050.011
0,78	1,05	L-1861	E0455.050.033	L-2880	E0355.050.012
1,06	1,4	L-1862	E0455.050.034	L-2881	E0355.050.013
1,41	1,72	L-1869	E0455.050.035	L-2882	E0355.050.014
1,73	2,2	L-1863	E0455.050.036	L-2883	E0355.050.015
2,21	2,75	L-1864	E0455.050.037	L-2884	E0355.050.016
2,76	4	L-1865	E0455.050.039	L-2885	E0355.050.018
4,01	5	L-3003	E0455.050.040	L-3153	E0355.050.019
5,01	6,2	L-1866	E0455.050.041	L-2886	E0355.050.020
6,21	8	L-1867	E0455.050.042	L-2887	E0355.050.021
8,01	8,5	L-1841	E0455.050.043	L-3363	E0355.050.022
8,51	14	L-3004	E0455.050.044	L-3154	E0355.050.023
14,01	17	L-1868	E0455.050.045	L-2888	E0355.050.024
17,01	25	L-3005	E0455.050.046	L-3155	E0355.050.025

DN 65					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	1,4	L-2607	E0455.065.026	L-2889	E0355.065.011
1,41	1,7	L-2608	E0455.065.027	L-2890	E0355.065.012
1,71	2,2	L-2609	E0455.065.028	L-2891	E0355.065.013
2,21	2,6	L-2610	E0455.065.029	L-2892	E0355.065.014
2,61	2,9	L-2611	E0455.065.030	L-2893	E0355.065.015
2,91	3,3	L-2612	E0455.065.031	L-2894	E0355.065.016
3,31	3,8	L-2613	E0455.065.032	L-2895	E0355.065.017
3,81	4,2	L-2614	E0455.065.033	L-2896	E0355.065.018
4,21	4,7	L-2615	E0455.065.034	L-2897	E0355.065.019
4,71	5,7	L-2616	E0455.065.035	L-2898	E0355.065.020
5,71	6,6	L-2617	E0455.065.036	L-2899	E0355.065.021
6,61	7,6	L-2615 + L-2619	E0455.065.034 + E0455.065.038	L-2897 + L-2901	E0355.065.019 + E0355.065.023
7,61	13	L-2618 + L-2619	E0455.065.037 + E0455.065.038	L-2900 + L-2901	E0355.065.022 + E0355.065.023
13,01	20,2	L-3193	E0455.065.039	L-2901 + L-3472	E0355.065.023 + E0355.065.024
20,21	25	L-3194	E0455.065.040	L-3473 + L-3472	E0355.065.025 + E0355.065.024

DN 80					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	0,9	L-1960	E0455.080.027	L-2902	E0355.080.012
0,91	1,4	L-1962	E0455.080.028	L-2903	E0355.080.013
1,41	1,9	L-1963	E0455.080.029	L-2904	E0355.080.014
1,91	2,4	L-2636	E0455.080.030	L-2905	E0355.080.015
2,41	3	L-1964	E0455.080.031	L-2906	E0355.080.016
3,01	3,5	L-1965	E0455.080.032	L-2907	E0355.080.017
3,51	4	L-3512	E0455.080.037	L-3513	E0355.080.022
4,01	5	L-1966	E0455.080.033	L-2908	E0355.080.018
5,01	6	L-1968	E0455.080.035	L-2910	E0355.080.020
6,01	7	L-3512 + L-2636	E0455.080.037 + E0455.080.030	L-3513 + L-2905	E0355.080.022 + E0355.080.015
7,01	8	L-1967	E0455.080.034	L-2909	E0355.080.019
8,01	12,5	L-1966 + L-2637	E0455.080.033 + E0455.080.036	L-2908 + L-2911	E0355.080.018 +E0355.080.021
12,51	18	L-1968 + L-2637	E0455.080.035 + E0455.080.036	L-2910 + L-2911	E0355.080.020 + E0355.080.021
18,01	23	L-2811	E0455.080.038	L-3520 + L-3513	E0355.080.023 + E0355.080.022
23,01	25	L-2812	E0455.080.039	L-3521 + L-3513	E0355.080.024 + E0355.080.022

DN 100					
bHL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,5	1	L-2639	E0455.100.031	L-2912	E0355.100.011
1,01	1,6	L-2640	E0455.100.032	L-2913	E0355.100.012
1,61	2,1	L-2641	E0455.100.033	L-2914	E0355.100.013
2,11	2,6	L-2642	E0455.100.034	L-2915	E0355.100.014
2,61	3,1	L-2643	E0455.100.035	L-2916	E0355.100.015
3,11	5,3	L-2644	E0455.100.036	L-2917	E0355.100.016
5,31	6,6	L-2645	E0455.100.037	L-2918	E0355.100.017
6,61	7,5	L-2644 + L-2647	E0455.100.036 + E0455.100.038	L-2917 + L-2919	E0355.100.016 + E0355.100.018
7,51	10,5	L-2641 + L-3195	E0455.100.033 + E0455.100.039	L-2914 + L-3550	E0355.100.013 + E0355.100.019
10,51	17,8	L-2645 + L-2647	E0455.100.037 + E0455.100.038	L-2918 + L-2919	E0355.100.017 + E0355.100.018
17,81	22,5	L-2645 + L-3195	E0455.100.037 + E0455.100.039	L-2918 + L-3550	E0355.100.017 + E0355.100.019

For continuous flat seal see
metallic sealing except:

DN 50					
tGFO, tGFL, sGO, sGL					
Pressure Range [bar]		Spring			
from	to	455		355	
0,2	0,8	L-1860	E0455.050.032	L-2879	E0355.050.011
0,81	1	L-1861	E0455.050.033	L-2880	E0355.050.012
1,01	1,7	L-1862	E0455.050.034	L-2881	E0355.050.013
1,71	2	L-1869	E0455.050.035	L-2882	E0355.050.014
2,01	2,6	L-1863	E0455.050.036	L-2883	E0355.050.015
2,61	3,2	L-1864	E0455.050.037	L-2884	E0355.050.016
3,21	3,7	L-3002	E0455.050.038	L-3152	E0355.050.017
3,71	4,9	L-1865	E0455.050.039	L-2885	E0355.050.018
4,91	5,5	L-3003	E0455.050.040	L-3153	E0355.050.019
5,51	8,5	L-1866	E0455.050.041	L-2886	E0355.050.020
8,51	12,5	L-1867	E0455.050.042	L-2887	E0355.050.021
12,51	13,5	L-3004	E0455.050.044	L-3154	E0355.050.023
13,51	24,5	L-1868	E0455.050.045	L-2888	E0355.050.024
24,51	40	L-3005	E0455.050.046	L-3155 + L-3154	E0355.050.025 + E0355.050.023

V-0220 COEFFICIENTS OF FLOW

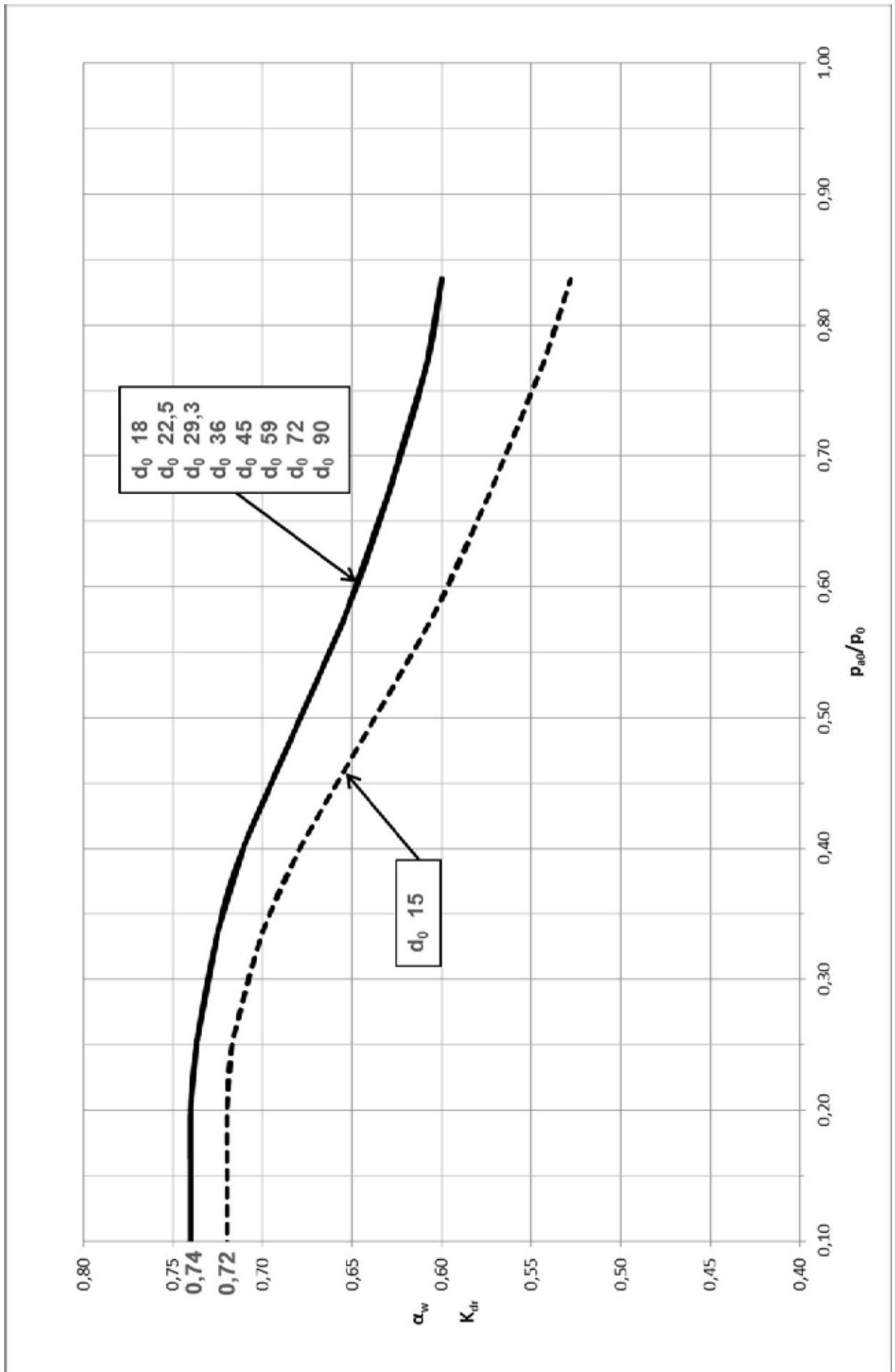
For nominal sizes DN 20 to DN 100

Pressure Range [bar]			
from	to	K_{dr} - or α_w -value	Media
0,2	0,39	0,6	Air
0,4	0,59	0,619	Air
0,6	0,79	0,64	Air
0,8	0,99	0,66	Air
1	1,49	0,68	Air
1,5	1,99	0,712	Air
2	2,99	0,725	Air
3	40	0,74	Air
0,2	40	0,54	Water

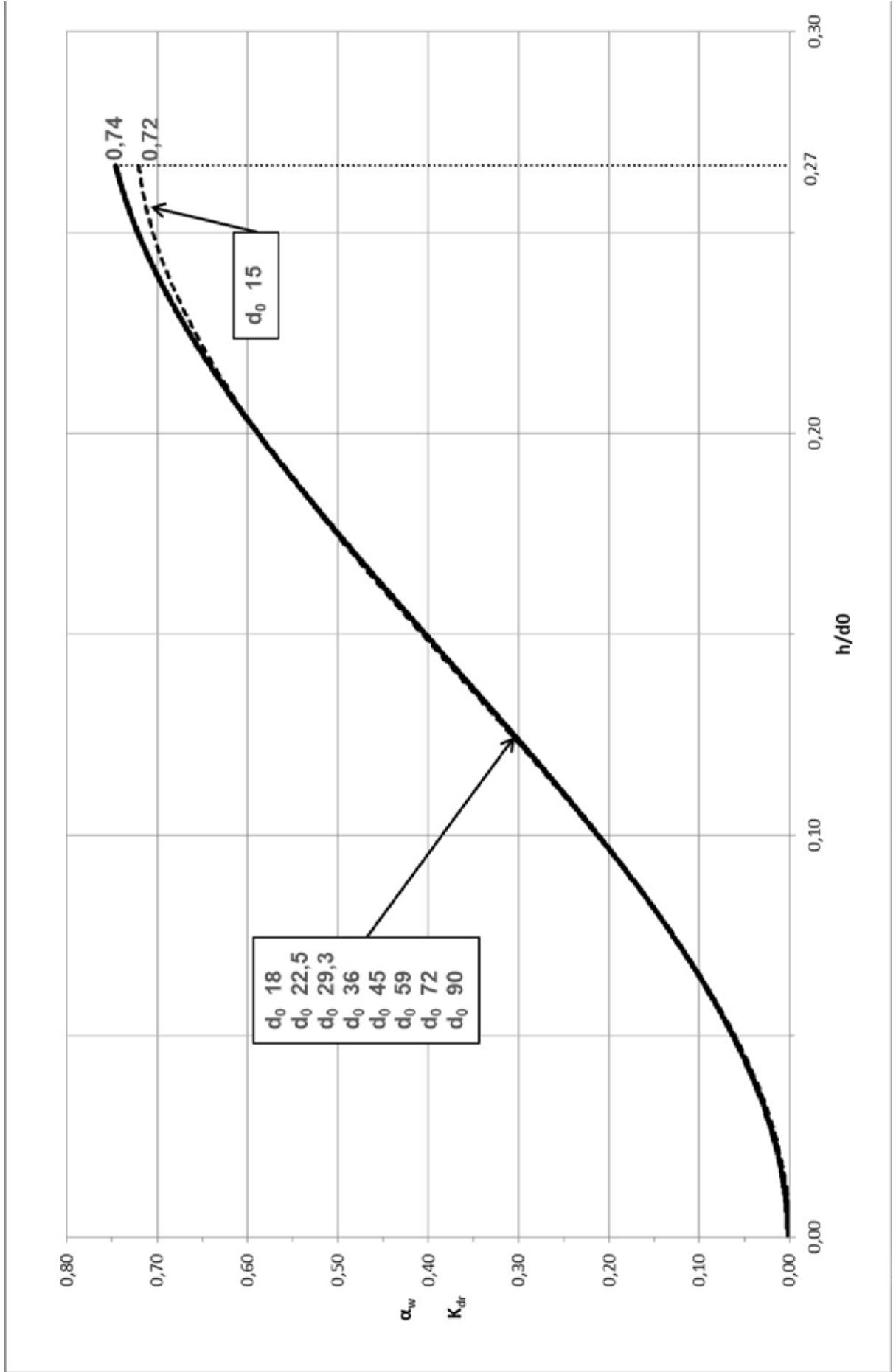
For nominal sizes DN 15

Pressure Range [bar]			
from	to	K_{dr} - or α_w -value	Media
0,2	0,39	0,518	Air
0,4	0,59	0,55	Air
0,6	0,79	0,6	Air
0,8	0,99	0,625	Air
1	1,49	0,652	Air
1,5	1,99	0,699	Air
2	2,99	0,718	Air
3	40	0,72	Air
0,2	40	0,49	Water

Outflow coefficient over back pressure ratio p_{a0}/p_a



Outflow coefficient above h/d_0 - Ratio for determining required stroke reduction



V-0221 TIGHTENING TORQUES

Tightening torque seat

DN	Screw	Tightening torque	Top
15	H-455-15-003 G	55 Nm	SW13
20	H-455-20-007 G	70 Nm	SW13
25	H-455-25-007 G ¹⁾	85 Nm	SW13
32	H-455-32-003 G	105 Nm	SW24
40	H-455-40-007 G	125 Nm	SW24
50	H-455-50-013 G	165 Nm	SW24
65	H-455-65-003 G	300 Nm	SW30
80	H-455-80-008 G	500 Nm	SW30
100	H-455-100-008 G	750 Nm	SW30

¹⁾ for the bHL variant, a different tool is required for this nominal width: H-455-25-007 FD B G



Screwing seat into body.

Tightening torque of body screws and nuts

DN	Screw	Tightening torque	Tool
15	M10	45 Nm	SW16/SW17
20	M10	45 Nm	SW16/SW17
25	M12	70 Nm	SW18
32	M14	110 Nm	SW22
40	M14	110 Nm	SW22
50	M16	150 Nm	SW24
65	M16	150 Nm	SW24
80	M16	150 Nm	SW24
100	M16	150 Nm	SW24



Screw connection of spring housing and body.

Tightening torque of cap screws

DN	Screw	Tightening torque	Tool
15	M6	10 Nm	SW10
20	M6	10 Nm	SW10
25	M6	10 Nm	SW10
32	M8	25 Nm	SW13
40	M8	25 Nm	SW13
50	M8	25 Nm	SW13
65	M10	45 Nm	SW16/SW17
80	M10	45 Nm	SW16/SW17
100	M10	45 Nm	SW16/SW17



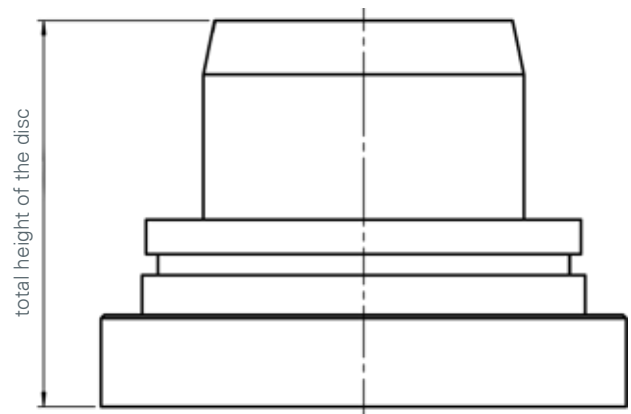
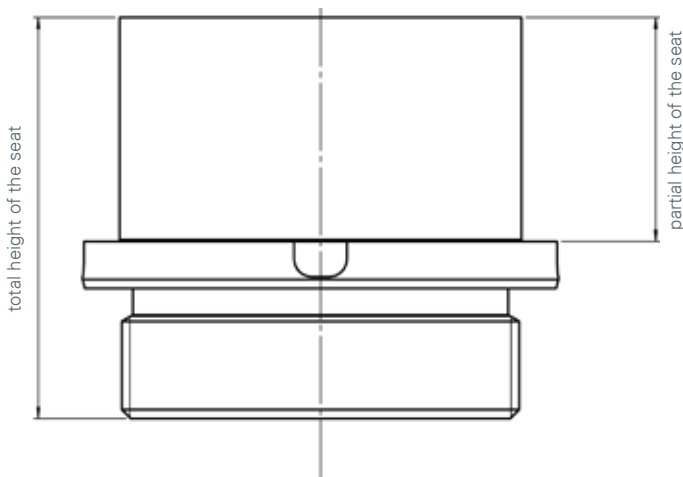
Screw connection of cap with body with and without lifting device.

V-0223 SCREWING SEAT INTO BODY

The total height of the seat or plug must not fall below the height specified in the table after all lapping processes. Goetze recommends machining the seat sealing surface in the installed state to achieve better tightness. Alternatively, the partial height of the seat can be measured before the first lapping. Over all lapping processes, this partial height must not decrease by more than 0.05mm.

The table shows the minimum heights of the seat or cone in mm after lapping.

DN	15	20	25	32	40	50	65	80	100
Total height seat	23,3	28	32,5	37,1	45,2	42,4	66,5	84,3	92,9
Partial height seat	8,15	12,15	15,65	19,95	25,05	29,95	39,65	50,05	58,55
Lever 455	22	19,9	19,9	28	33,6	33,4	41,1	43,4	45,4
Lever 355	21	18,9	20,4	28	32,4	35,4	32,1	34,3	44,9



CERTIFICATE EU TYPE EXAMINATION CERTIFICATE

Zertifikat

EU-Baumusterprüfung (Baumuster)

nach Richtlinie 2014/68/EU

Zertifikat Nr.: 01 202 642/B-18 T034

Name und Anschrift des
Herstellers:

Goetze KG Armaturen
Robert-Mayer-Str. 21
D-71636 Ludwigsburg
GERMANY

Hiermit wird bescheinigt, dass das unten genannte Baumuster die Anforderungen der Richtlinie 2014/68/EU erfüllt.

Geprüft nach Richtlinie
2014/68/EU:

Modul B -
EU-Baumusterprüfung (Baumuster)

Prüfbericht Nr.: 642/0125520290-10 (EQ 2915870)

Beschreibung des Baumusters:

Sicherheitsventil
Bauart: direkt wirkend, federbelastet
Typ: 255, 355 und 455
Baugröße(n): DN 15, 20, 25, 32, 40, 50, 65, 80, 100
Medium/Fluidgruppe: Dämpfe, Gase und Flüssigkeiten
der Fluidgruppen 1 und 2
Einstellüberdruck: 0,2 bis 40,0 bar

Fertigungsstätte/Lieferer: **Goetze KG Armaturen**
Robert-Mayer-Str. 21
D-71636 Ludwigsburg
GERMANY

Gültig bis: 15.12.2027

Das CE-Zeichen darf erst am Produkt angebracht und die **Konformitätserklärung** erst ausgestellt werden, wenn ein **korrespondierendes Konformitätsbewertungsverfahren** der Richtlinie 2014/68/EU bezogen auf **Produktion/Produkt** vollständig erfüllt ist.

Aachen, 12.11.2018

M. Rönning
i.A. Dipl.-Ing. M. Rönning

TÜV Rheinland Industrie Service GmbH
Notifizierte Stelle für Druckgeräte, Kennnummer: 0035
Am Grauen Stein, D-51105 Köln, GERMANY

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D-011-Rev21

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Genau. Richtig.

CERTIFICATE TÜV-RHEINLAND

ZERTIFIKAT CERTIFICATE

basierend auf / based on

TÜV Rheinland Merkblatt Bauteile – Sicherheitsventile

Leaflet components - Safety valves

Bauteilkennzeichen <i>Type approval no.</i>	TÜV SV 17 – 2094 Revision 1
Produkt <i>Product</i>	direkt wirkendes Sicherheitsventil , federbelastet <i>direct acting safety valve, spring loaded</i>
Hersteller <i>Manufacturer</i>	Goetze KG Armaturen Robert-Mayer-Str. 21 D-71636 Ludwigsburg
Typbezeichnung <i>Type designation</i>	255, 355 und 455 in DN 15, 20, 25, 32, 40, 50, 65, 80, 100 Einstellüberdruck 0,2 bis 40,0 bar
Prüfgrundlagen <i>Test-specifications</i>	<ul style="list-style-type: none"> • VdTÜV-Merkblatt „Sicherheitsventil 100“, Ausgabe 04.2017 in Verbindung mit VdTÜV-Merkblatt „Allgemeines 002“, • Richtlinie 2014/68/EU vom 15.05.2014 in der Fassung vom 23.06.2015, • AD 2000-Merkblätter A2, Ausgabe 04.2015 und A4, Ausgabe 11.2015, • DIN EN ISO 4126-1, Ausgabe 12.2013
Prüfberichte-Nr. <i>Test report no.</i>	642-0124985580-2094-P12 und 642/0125520290-20
www.tuv.com-ID	0000015086
TÜV-EQ-Nr.	2915871
Gültig bis <i>Valid until</i>	15. Dezember 2022 <i>December, 15. 2022</i>

Das Bauteilkennzeichen wird in Anwendung der Anforderungen der aufgeführten Prüfgrundlagen zuerkannt. Die technischen Daten des Merkblatts sind zu beachten. Die laufende Fertigung ist jährlich zu überprüfen.
The type-test approval is awarded in applying the requirements of the test standards listed. The technical data listed in the leaflet must be considered. The production shall be annually reviewed.

Aachen, 12.11.2018

TÜV Rheinland Industrie Service - Zertifizierungsstelle für Druckgeräte
TÜV Rheinland Industrial Services - Certification Body for Pressure Equipment



i.A. Dipl.-Ing. M. Rönnig

TÜV Rheinland Industrie Service GmbH, Am Grauen Stein, D-51105 Köln
Regionalbereich Mitte-West, Deworastr. 1-3, D-54290 Trier, Tel. +49-651/2005-100

www.tuv.com


Bauteilgeprüft
Gültig bis:
15.12.2022

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ID 0000015086

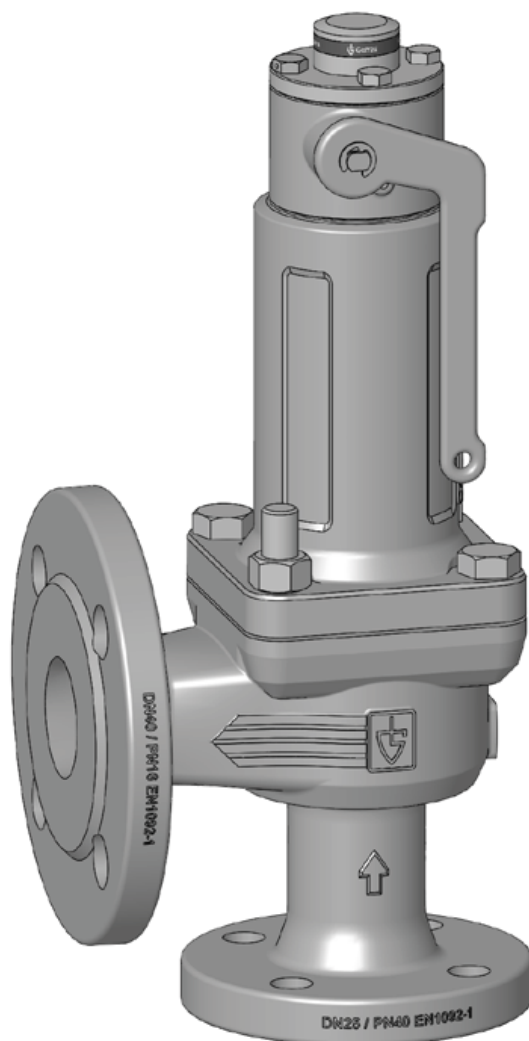


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ASSEMBLY INSTRUCTION

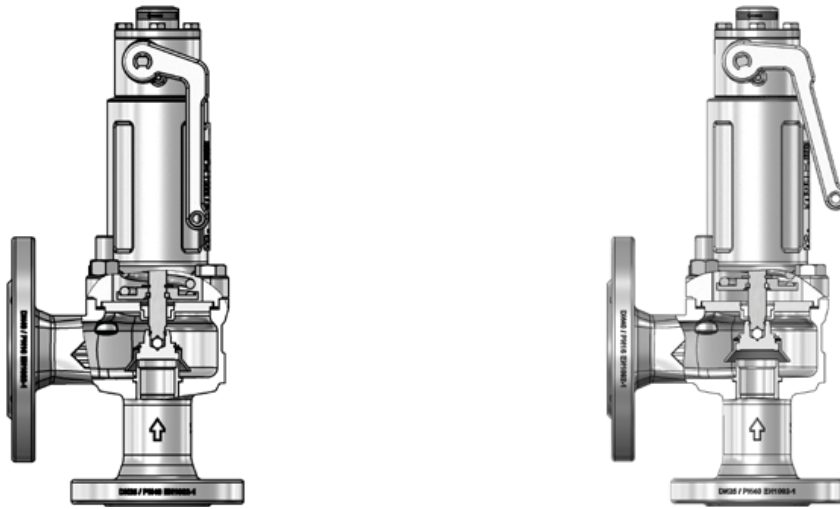


455, 355, 255

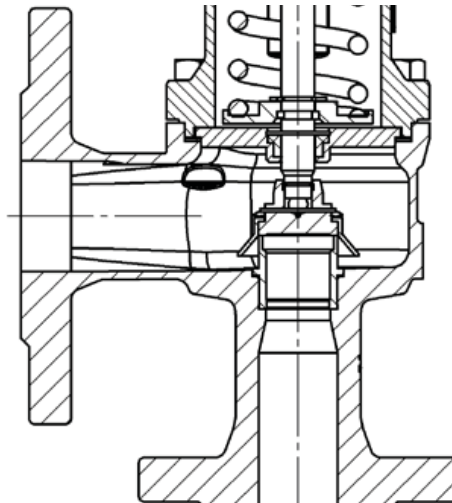


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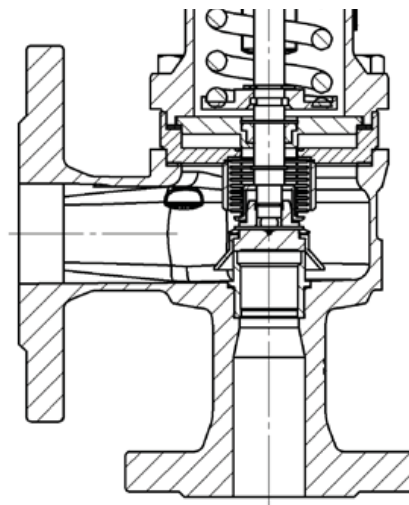
a)



b)



c)



Assembly and maintenance instructions

Safety valve 455, 355, 255



1 General Notes of Safety

- Only use the valve:
 - for the intended purpose
 - in a flawless, damage-free state
 - in a safe and danger-conscious manner
 - within its operating limits, otherwise there is a risk to human life
- Always observe the installation instructions.
- Faults that may impair safety must be addressed immediately.
- The valves are exclusively intended for the application area stated in these installation instructions. Any other or further use is not valid as the intended use.
- All assembly work must be carried out by experienced personnel.
- These operating instructions do not replace any national regulations, regulations on accident prevention or local safety regulation
- All structural modifications of the valve are strictly prohibited. This applies in particular to inserting drill holes or welding on other objects.
- The following points must be observed during all repair work:
 - Pressurised cushions of air in the system must be removed and the affected pipelines drained. Before performing these steps, the operator must be aware of the risks that can arise from residues of the operating medium.
 - Appropriate and sufficient items of personal protection clothing must be worn. These include protective shoes, safety goggles, protective gloves, etc.
 - The system must be protected against restarting by appropriate measures and means.
 - The valve should have reached room temperature.

en

2 General Notes

Safety valves are high-quality fittings which require a particularly careful handling. The sealing surfaces are precision-machined at the seat and cone to attain the required tightness. Always avoid the penetration of foreign particles into the valve during assembly and during the operation. The tightness of a safety valve can be impaired when using hemp, Teflon tape, as well as through welding beads, among other things. Rough handling of the finished valve during storage, transport and assembly can result in a valve leaking. If the valves are painted, make sure that the sliding parts do not come into contact with the paint.

3 Range of Application

For details on the range of application of the individual versions please refer to the datasheets of the manufacturer.

4 Installation and Assembly

Spring-loaded safety valves are to be installed with the spring bonnet pointing vertically upward. To guarantee perfect function of the valves, they must be mounted so that no unauthorized static, dynamic or thermal loads can take effect. Suitable protective measures must be taken if escaping medium can result in direct or indirect risk to persons or the environment if the body responds. Medium escaping through open spring bonnets must also be considered.

Supply line

Supply line supports for safety valves should be as short as possible and are to be designed so that no higher pressure losses than max. 3% of the response pressure can occur at full valve load.

Condensation drainage line

In the event of possible condensate formation the pipes or the valves themselves must be fitted at their lowest point with a continuously operating condensate discharge device. Please make sure that the condensation or escaping media is safely drained away. The body, lines and sound absorbers must be protected against freezing.

Blow off line / counterpressure

The safety valves blow off line is to be designed so that the necessary mass flow can be discharged depressurized when blowing off. For safety valves with metal bellows, a counterpressure of up to max. 4 bar does not impair the response pressure of the safety valve when discharging.

5 Operation / maintenance

The working pressure of the installation should be at least 10% below the closing pressure of the safety valve. This means that the safety valve can close correctly again after blow off. In case of minor leaks caused by impurities between the sealing surfaces, the valve can be cleaned by lifting it up to blow off. If the leak cannot be eliminated, the sealing surface is likely to be damaged, and this can be repaired only in our factory or by experienced specialists. Lifting is performed by activating the lifting lever on the valve top (fig. a). For delivery purposes the lifting lever is blocked by means of a strap which has to be removed for actuating the lifting device.

Safety valves without bellows (Fig. b)

For safety valves without bellows, the maximum allowable back pressure on the valve outlet side is 10% of the set pressure. If a continuous superimposed back pressure exists, this has to be considered when setting the safety valve on the manufacturer's test stand and must be notified in the order. If a higher back pressure (including superimposed back pressure in combination with built-up back pressure), exists, this is to be considered in the design and the manufacturer is to be consulted.

Safety valves with metal bellows (Fig. c)

Under superimposed back pressure, the bellows have a compensating effect on the set pressure of the safety valve. In order not to adversely affect the safe function, the maximum allowable superimposed back pressure on the valve outlet side must not exceed 30% of the set pressure. If a higher back pressure (including superimposed back pressure in combination with built-up back pressure), exists, this is to be considered in the design and the manufacturer is to be consulted.

Lifting device for maintenance

In the case of safety valves with a lifting device it is recommended, and in certain plant-specific cases even stipulated that the valves from time to time must be made to blow-off by lifting the seal off the seat, in order to assure the correct functioning of the safety valve. They can be opened at an operating pressure of $\geq 85\%$ of the response pressure at the latest. The lifting device is not to be operated when in a pressure-free state.

Safety valves represent the last point of protection for the silo or installation. They should be capable of preventing unauthorized excess pressure when all other upstream regulation, control and monitoring devices fail. They should be capable of preventing unauthorized excess pressure when all other upstream regulation, control and monitoring devices fail. The maintenance intervals for these fittings are to be specified by the operator according to the conditions of use.

6 Dismantling the fitting

In addition to the general valid assembly instructions, attention must be paid that the installation must generally be depressurized before dismantling the valve. If the medium in the system is harmful to health, flammable, explosive, or imposes any other risk, the piping system must be drained completely and suitable action is to be taken in order to exclude any hazards.

Caution is required as regards residues that might continue flowing!

Appropriate and sufficient items of personal protection clothing must be worn!

If necessary, the safety valve is to be heated or cooled to a safe temperature.

7 Repairs

Repairs to safety valves must be performed only by Goetze KG Armaturen or by an experienced specialist workshop using exclusively genuine spare parts.

8 Warranty

This valve has been tested prior to leaving the factory. We grant a warranty for our products which entails the repair, free of charge, of any parts that are returned and verified as being prematurely unsuitable for use due to defective material or manufacturing. We shall not assume liability for any damage or other such obligations. If the factory seal is damaged (in the case of pressure limiting valves), in the event of any incorrect handling or installation, contamination or normal wear, warranty claims shall be null and void.

Fig. a): Lifting my means of a lever

Fig. b): Safety valve without bellows

Fig. c): Safety valve with bellows

9 Marking / testing

- 1: Valve type
- 2: Nominal size
- 3: Narrowest cross-section of flow
- 4: Valve stroke
- 5: Seat seal material
- 6: Serial number
- 7: Setting pressure
- 8: Allowable back pressure
- 9: Set temperature
- 10: General and application-specific standards as required
- 11: Opening pressure difference for steam
- 12: Opening pressure difference for gas
- 13: Opening pressure difference for water
- 14: TÜV-mark **S**afety **V**alve
Year of component test
Test number
Narrowest flow diameter
- 15: Co-efficient for steam / gases
- 16: Co-efficient for liquids
- 17: Data matrix code
(serial number)
- 18: CE labelling

Type	_____	①
Size	DN _____	②
Flow area	_____ mm ²	③
Lift	_____ mm	④
Sealing	_____	⑤
Serial no.	_____	⑥

	Set p.	Back p.	Temp.
bar	⑦	⑧	⑨ °C

	ISO 4126-1	⑩
Steam	5 %	⑪
Gas	5 %	⑫
Liquid	10 %	⑬

TÜV · SV · _____ ⑭ · _____ D/G · 0, _____ ⑮
F · 0, _____ ⑯

⑰

⑱

CE 0036 DATA MATRIX

www.goetze-armaturen.de

Made in Germany

We check the safety valves for pressure resistance and tightness, adjust the requested set pressure and seal them.

The identification on the type plate or on the spring bonnet of the valve is applied using a permanent marking system. The identification also contains the necessary details according to DIN EN ISO 4126-1.

EN Declaration of conformity

according to Annex IV of Directive 2014/68/EU

Goetze KG Armaturen
Robert-Mayer-Straße 21
D-71636 Ludwigsburg

Name and address of the manufacturer

We declare under sole responsibility that the delivered product:

Safety valve

Series	Nominal size	TÜV type approval no.	EU type examination
810 / 410	DN8 – DN50 DN10 – DN15	2055 2103	01 202 642TR/B-190005, revision 1 01 202 642/B-18 T004
812 / 412 / 813 / 413	DN15 - DN50	2003	01 202 642-B-15 2003, revision 1
690 / 691	DN8	2032	01 202 642TR/B-190010
492	DN10 – DN15 DN6 – DN15	2076 2100	01 202 642TR-B(B)-16 0018 01 202 642/B-22 T005
642 / 6420 645 / 6450	DN15 – DN65 DN15 – DN50	2102	01 202 642TR-B-18 0001
455 / 355 / 255	DN15 – DN100	2094	01 202 642/B-18 T034 / change 2
400	DN20	2062	01 202 642/B-22 T024
4000	DN25 – DN100	2095	01 202 642-B-18 T024, revision 1
4020 / 4040 / 4060	DN25	2111	01 202 642 TR/B-210007
451 bH / 851 bH	DN 15 – DN 32	665	01 202 642-B-18 T023, revision 2
451 G / 851 G	DN 15 – DN 32	666	01 202 642/B-22 T050, revision 0
352 / 452 / 852	DN 40 – DN 50	2007	01 202 642TR-B(B)-16 0012, revision 1
652 sGK	DN 15 – DN 50	312	01 202 642-B-11028, revision 1
861 / 461	DN 8 – DN 15	2061	01 202 642TR/B-21 0027
420	DN 8 – DN 10	2069	01 202 642/B-18 T033, revision 1
460	DN 10 – DN 25	2067	01 202 642/B-22 T025
1460/1860	DN 8	2060	01 202 642B-18 TR03, revision 2

has been manufactured in compliance with the directive 2014/68/EU and DIN EN ISO 4126-1 and was subjected to the following conformity assessment procedure:

Category IV, Module B + D

Other applied standards and technical specifications:

AD 2000-A2, AD 2000-A4, VdTÜV SV 100

Name of authorizing notified body for EU-type examination

TÜV Rheinland Industrie Service GmbH
Am Grauen Stein
D-51105 Köln

The monitoring of the production quality assurance is performed by

Certification number: 01 202 173/Q-23 0205

Identification number 0035

Name and address of the notified body

Ludwigsburg, 13.06.2023
(Place and date of issue)



D. Weimann
Managing Director

DATA SHEET 455

→ Series 455

455

Safety valves made of stainless steel, angle-type with flange connections



■ SUITABLE FOR

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

■ EXAMPLES OF USE

Full-lift safety valve for the protection of:

- Pressure tanks and -systems for neutral / non-neutral vapours and gases
- Steam plants
- Silo containers for liquid, granular and dusty materials¹

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

- Chemical and petrochemical plants
- Biogas plants
- Industrial- and commercial boiler plants
- Shipbuilding industry and marine equipment
- Production and processing of industrial gases
- secondary areas in the food-, beverage-, pharmaceutical- and cosmetics-industries

■ CHARACTERISTICS

- Maintenance-friendly construction
- single trim for gases, vapours and liquids
- replaceable seat
- easily detachable cone-stroke ring connection
- freely rotatable spindle-taper connection
- extensive range of spare parts, see spare parts flange safety valves
- vertical and horizontal installation position possible

Safety valves are set and sealed at the factory.

■ APPROVALS

TÜV-Type test approval 2094	D/G (full-lift), F (normal), F/K/S ¹ (Full lift)
EU type examination	S/G, L, F/K/S ¹
TSG ZF001-2006	D/G (S/G), F (L), F/K/S ¹
TR ZU 032/2013 - TR ZU 010/2011	D/G (S/G), F (L), F/K/S ¹
Requirements	
DGR 2014/68/EU	TRD 421 and DIN EN 12952-7
DIN EN ISO 4126-1	DIN EN 12953-8
AD 2000 Data sheet A2	UK PESR 2016 No. 1105
VdTÜV Guideline SV 100	
Classification society	
Det Norske Veritas	DNV
Bureau Veritas	BV
Russian Maritime Register of Shipping	RS
Lloyds Register	LR
Registro Italiano Navale	RINA



■ MATERIAL



■ SPECIFICATION

DN 15 to DN 100	- 60°C to + 400°C depending on version on request special version up to -270°C	0,2 – 40 bar depending on version

■ MATERIALS

Component	Material	DIN EN	ASME
Body and spring housing	Stainless steel	1.4408	CF8M
Valve seat	Stainless steel	1.4404	316 L
Internal parts	Stainless steel	1.4404	316 L
Spring	Stainless steel	1.4310	302
Bellows (optional)	Stainless steel	1.4571	316 Ti

b	with bellows, non-gastight version of spring housing (10mm bore)	for neutral and non-neutral media and/or counter pressure ¹ . Spring, moving parts and the environment are protected from being affected by the medium.
t	gastight version of spring housing	for neutral and non-neutral media without counter pressure. The environment is protected from being affected by the medium.
tb	gastight version with bellows	for neutral and non-neutral and particularly for flammable, toxic and environmentally hazardous media and/or counter pressure ¹ . Spring, moving parts and the environment are protected from being affected by the medium. Double gastight.

¹ up to max. 30% of the response pressure

■ MEDIUM

G	gaseous	Air, vapours, gases and steam
GF	gaseous and liquid	Air, vapours, gases, steam and liquids

■ TYPE OF LIFTING MECHANISM

L	Standard with lifting lever
0	without lifting device

■ AVAILABLE NOMINAL DIAMETERS AND CONNECTION SIZES

Nominal diameter DN	15	20	25	32	40	50	65	80	100
Inlet	15	20	25	32	40	50	65	80	100
Outlet	25	■							
	32		■						
	40			■					
	50				■				
	65					■			
	80						■		
	100							■	
	150								■

■ CONNECTION TYPE INLET / OUTLET FLANGE CONNECTIONS

FL / FL	Standard	Flange connection / flange connection	DIN EN 1092 / DIN EN 1092
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■ SEALS

MD	Metal-to-metal sealing	Flat seal	0,2bar to 40bar	-60°C (-270°C ¹) to +400°C
EPDM	Ethylene propylene diene	Flat seal	0,2bar to 40bar	-40°C to +170°C
FKM	Fluorocarbon	Flat seal	0,2bar to 40bar	-20°C to +200°C
FFKM²	Perfluorinated rubber	Flat seal	0,2bar to 40bar	-10°C to +260°C
PTFE	Polytetrafluoroethylene	Flat seal	0,2bar ³ to 10bar	-60°C (-200°C ⁴) to +225°C
PTFE CARBON	Polytetrafluoroethylene with carbon	Flat seal	10bar to 40bar	-60°C (-200°C ⁴) to +225°C

Auxiliary seals are made of highly resistant, adhesive-free graphite/stainless steel foil. Top cap with O-rings in EPDM.

² Standard Kalrez® 6375, alternatively Kalrez® 6230 with FDA, USP, 3-A

³ DN15 from 2bar, DN20 from 1,5bar, DN25 from 1bar (lower set pressures on request)

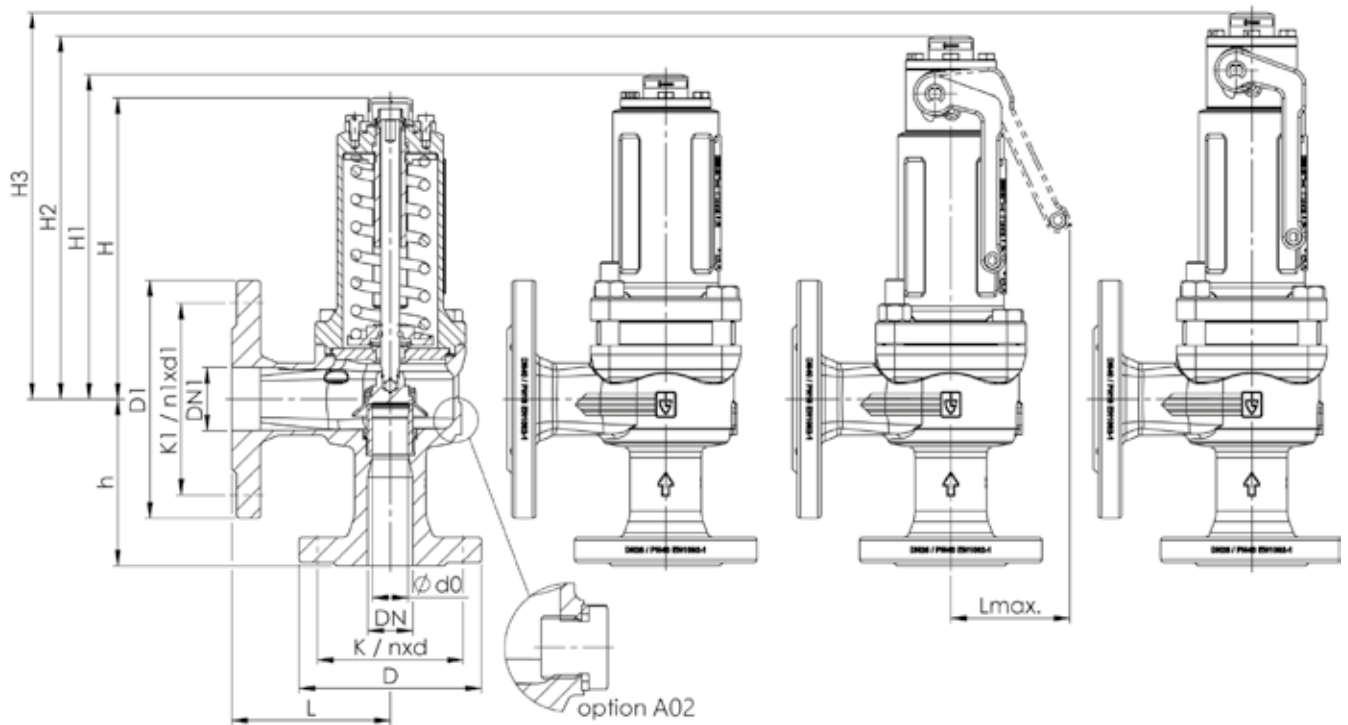
⁴ on request, with option P13 - design for cryogenic operating temperatures

■ NOMINAL DIAMETERS, CONNECTIONS, INSTALLATION DIMENSIONS

Series 455: Connection, installation dimensions, ranges of adjustment										
Nominal diameter	DN	15	20	25	32	40	50	65	80	100
Connection DIN EN 1092-1	DN / PN	15 / 40	20 / 40	25 / 40	32 / 40	40 / 40	50 / 40	65 / 40	80 / 40	100 / 40
Outlet DIN EN 1092-1	DN1 / PN	25 / 16	32 / 16	40 / 16	50 / 16	65 / 16	80 / 16	100 / 16	125 / 16	150 / 16
Installation dimensions in mm	L	80	95 (85 ⁷)	100	110	115	120	140	160	180
	h	90	85 (95 ⁷)	105	115	140	150	170	195	220
	D	95	105	115	140	150	165	185	200	235
	K / nxd	65 / 4x14	75 / 4x14	85 / 4x14	100 / 4x18	110 / 4x18	125 / 4x18	145 / 8x18	160 / 8x18	190 / 8x22
	D1	115	140	150	165	185	200	220	250	285
	K1 / n1xd1	85 / 4x14	100 / 4x18	110 / 4x18	125 / 4x18	145 / 8x18	160 / 8x18	180 / 8x18	210 / 8x18	240 / 8x22
	H / H1 ¹	167 / 207	165 / 205	204 / 249	260 / 300	302 / 330	352 / 392	427 / 462	486 / 530	577 / 624
	H2 ² / H3 ³	206 / 246	204 / 244	242 / 287	321 / 361	363 / 391	413 / 453	497 / 532	556 / 600	647 / 694
Weight	Lmax	75	85	95	120	130	160	205	215	255
	A02	1/8"	1/8"	1/4"	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"
	α_w / K_{dr} (F)	0,49	0,54	0,54	0,54	0,54	0,54	0,54	0,54	0,54
	α_w / K_{dr} (D/G) ⁴	0,72	0,74	0,74	0,74	0,74	0,74	0,74	0,74	0,74
	do	15,0	18,0	22,5	29,3	36,0	45,0	59,0	72,0	90,0
	kg ⁵	5,0	6,0	10,5	16,0	18,5	25,0	45,0	57,5	91,5
	kg ^{1,5}	5,5	6,5	11,0	18,5	20,5	27,5	49,0	63,5	100,5
Range of adjustment	bar	0,2 - 40	0,2 - 40	0,2 - 40	0,2 - 40	0,2 - 40	0,2 - 40	0,2 - 24	0,2 - 25,5	0,2 - 20
	bar	1,2 - 40	0,8 - 40	0,5 - 40	1,0 - 40	0,9 - 40	0,5 - 40	0,3 - 30 (40 ⁶)	0,2 - 29 (40 ⁶)	0,2 - 25 (40 ⁶)
	bar	1,2 - 40	0,8 - 40	0,5 - 40	1,0 - 40	0,9 - 40	0,5 - 40	0,3 - 30 (40 ⁶)	0,2 - 29 (40 ⁶)	0,2 - 25 (40 ⁶)

¹ Values for the version with bellows
² Values for the version with lifting lever
³ Values for the version with bellows and lifting lever
⁴ Flow coefficients for blow-off pressures < 3,0 bar: Please refer to the Flow Coefficients Chart.
⁵ Details for version with gastight spring housing
⁶ Spring material 1.8159 nickel plated
⁷ deviating leg dimension with option P13

■ MAIN DIMENSIONS, INSTALLATION DIMENSIONS



Series 455 ■ INDIVIDUAL SELECTION / VALVE CONFIGURATION

Series	Valve version	Medium	Lifting device	Nominal diameter DN	Connection type		Connection size		Seal	Options	Set pressure	Quantity
					Inlet	Outlet	Inlet	Outlet				
455	<i>t</i>	<i>GF</i>	<i>L</i>	<i>50</i>	FL	FL	<i>50</i>	<i>80</i>	<i>MD</i>	<i>S62</i>	<i>10,0</i>	<i>1</i>
455					FL	FL						
455					FL	FL						
455					FL	FL						

■ TECHNICAL FINISHES, VARIANTS, ACCESSORIES

S60	Pressure sensor connection M5 or G1/4 for monitoring the springhousing (only for valves with bellow)	<input type="checkbox"/>	A01	Gagging screw for tests of valve tightness and resistance to pressure with the fitted valve	<input type="checkbox"/>
S62	Inductive proximity sensor, assembled, for indication of valve position, including connection cable 5m	<input type="checkbox"/>	A02	Connection for condensate in the outlet body – G1/4" upto DN32, G1/2" as of DN40	<input type="checkbox"/>
		<input type="checkbox"/>	A07	Stroke limitation	<input type="checkbox"/>

■ 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"/>
P13	Version for cryogenic operating temperatures	<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	Det Norske Veritas (DNV) 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) ¹	<input type="checkbox"/>	AK4	Bureau Veritas (BV) type approval	<input type="checkbox"/>
AA11	UK Type examination acc. to Directive UK PESR 2016 No. 1105	<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"/>

¹ approved up to -196°C, below -60°C with option P13

■ CAPACITY TABLE ACC. TO ISO 4126-1 / AD2000 A2

Series 455: Blowing-off rates at 10% above set pressure																
Nominal diameter DN		15			20			25			32			40		
		d0 = 15 mm			d0 = 18 mm			d0 = 22,5 mm			d0 = 29,3 mm			d0 = 36 mm		
Set pressure bar		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III
Air I Nm ³ /h	0,2	71,7	60,5	2,4	118,1	99,6	3,7	184,5	155,6	5,9	312,9	263,8	9,9	472,4	398,2	15,0
	0,5	112,6	91,9	3,4	173,6	141,6	5,4	271,3	221,3	8,4	460,0	375,2	14,2	694,4	566,5	21,5
	1	167,1	133,1	4,6	249,9	199,1	7,3	390,5	311,1	11,4	662,3	527,5	19,3	999,8	796,3	29,2
Steam II kg/h ¹⁾	1,5	225,2	178,2	5,6	329,3	260,5	9,0	514,6	407,0	14,0	872,6	690,2	23,7	1317,3	1042,0	35,8
	2	278,0	218,5	6,5	404,6	318,1	10,4	632,2	497,0	16,2	1072,1	842,8	27,4	1618,5	1272,3	41,4
	2,5	325,9	254,9	7,3	479,7	375,2	11,6	749,5	586,3	18,1	1271,1	994,2	30,7	1918,8	1500,8	46,3
Water III m ³ /h	3	373,8	291,1	8,0	553,2	430,8	12,7	864,4	673,1	19,8	1465,8	1141,5	33,6	2212,8	1723,2	50,8
	3,5	421,7	327,2	8,6	624,2	484,2	13,7	975,3	756,6	21,4	1653,9	1283,0	36,3	2496,7	1936,8	54,9
	4	469,7	363,1	9,2	695,2	537,5	14,7	1086,3	839,8	22,9	1842,1	1424,1	38,9	2780,8	2149,8	58,7
	4,5	517,8	399,0	9,8	766,3	590,5	15,6	1197,3	922,6	24,3	2030,4	1564,6	41,2	3065,1	2361,9	62,2
	5	565,8	434,8	10,3	837,4	643,5	16,4	1308,4	1005,5	25,6	2218,8	1705,1	43,5	3349,6	2574,1	65,6
	5,5	613,9	470,5	10,8	908,6	696,4	17,2	1419,7	1088,1	26,9	2407,4	1845,2	45,6	3634,3	2785,6	68,8
	6	662,0	506,2	11,3	979,8	749,2	18,0	1530,9	1170,6	28,1	2596,1	1985,1	47,6	3919,2	2996,8	71,9
	6,5	710,2	541,8	11,8	1051,1	801,9	18,7	1642,3	1252,9	29,2	2785,0	2124,7	49,6	4204,3	3207,5	74,8
	7	758,4	577,4	12,2	1122,4	854,5	19,4	1753,7	1335,2	30,3	2973,9	2264,2	51,4	4489,6	3418,1	77,7
	7,5	806,6	612,9	12,7	1193,8	907,1	20,1	1865,2	1417,3	31,4	3163,1	2403,5	53,2	4775,0	3628,4	80,4
	8	854,8	648,4	13,1	1265,2	959,7	20,8	1976,8	1499,5	32,4	3352,3	2542,7	55,0	5060,7	3838,6	83,0
	8,5	903,2	683,9	13,5	1336,7	1012,2	21,4	2088,5	1581,6	33,4	3541,7	2682,1	56,7	5346,7	4049,0	85,6
	9	951,5	719,5	13,9	1408,2	1064,8	22,0	2200,3	1663,8	34,4	3731,2	2821,4	58,3	5632,7	4259,3	88,1
	9,5	999,8	754,9	14,3	1479,8	1117,3	22,6	2312,1	1745,7	35,3	3920,9	2960,4	59,9	5919,1	4469,1	90,5
	10	1048,2	790,3	14,6	1551,4	1169,6	23,2	2424,0	1827,5	36,3	4110,6	3099,1	61,5	6205,5	4678,4	92,8
	11	1145,1	860,8	15,3	1694,8	1274,0	24,3	2648,1	1990,6	38,0	4490,6	3375,6	64,5	6779,1	5096,0	97,4
	12	1242,2	931,5	16,0	1838,4	1378,6	25,4	2872,5	2154,1	39,7	4871,1	3652,9	67,4	7353,6	5514,5	101,7
13	1339,3	1002,1	16,7	1982,2	1483,1	26,5	3097,2	2317,4	41,4	5252,2	3929,7	70,1	7928,9	5932,5	105,9	
14	1436,7	1072,9	17,3	2126,3	1587,9	27,5	3322,3	2481,2	42,9	5633,8	4207,5	72,8	8505,0	6351,8	109,9	
15	1534,1	1143,3	17,9	2270,5	1692,1	28,4	3547,6	2643,9	44,4	6016,0	4483,5	75,3	9081,9	6768,4	113,7	
16	1631,7	1213,9	18,5	2414,9	1796,5	29,4	3773,2	2807,1	45,9	6398,6	4760,2	77,8	9659,5	7186,1	117,5	
17	1729,4	1284,5	19,1	2559,5	1901,0	30,3	3999,3	2970,3	47,3	6781,9	5037,1	80,2	10238,2	7604,1	121,1	
18	1827,3	1354,7	19,6	2704,3	2004,9	31,1	4225,5	3132,7	48,7	7165,6	5312,3	82,5	10817,4	8019,6	124,6	
19	1925,3	1425,4	20,2	2849,4	2109,5	32,0	4452,2	3296,1	50,0	7549,9	5589,5	84,8	11397,6	8438,1	128,0	
20	2023,4	1496,1	20,7	2994,7	2214,2	32,8	4679,2	3459,8	51,3	7934,9	5867,0	87,0	11978,8	8857,0	131,3	
21	2121,7	1566,8	21,2	3140,1	2318,8	33,6	4906,5	3623,2	52,6	8320,3	6144,1	89,1	12560,6	9275,4	134,6	
22	2220,2	1637,4	21,7	3285,8	2423,3	34,4	5134,1	3786,4	53,8	8706,4	6421,0	91,2	13143,4	9693,3	137,7	
23	2318,8	1707,9	22,2	3431,8	2527,7	35,2	5362,1	3949,5	55,0	9093,0	6697,5	93,3	13727,0	10110,7	140,8	
24	2417,5	1778,3	22,7	3577,8	2631,9	36,0	5590,4	4112,4	56,2	9480,1	6973,7	95,3	14311,4	10527,7	143,9	
25	2516,3	1848,9	23,1	3724,1	2736,4	36,7	5819,0	4275,6	57,4	9867,7	7250,5	97,3	14896,5	10945,6	146,8	
26	2615,3	1919,7	23,6	3870,7	2841,2	37,4	6048,0	4439,4	58,5	10256,1	7528,2	99,2	15482,9	11364,8	149,8	
27	2714,5	1990,5	24,0	4017,5	2946,0	38,2	6277,3	4603,1	59,6	10644,9	7805,8	101,1	16069,9	11783,9	152,6	
28	2813,8	2061,3	24,5	4164,4	3050,7	38,9	6506,9	4766,7	60,7	11034,3	8083,2	102,9	16657,7	12202,7	155,4	
29	2913,2	2132,0	24,9	4311,6	3155,3	39,5	6736,8	4930,2	61,8	11424,2	8360,5	104,8	17246,3	12621,3	158,2	
30	3012,8	2202,6	25,3	4458,9	3259,9	40,2	6967,1	5093,6	62,8	11814,6	8637,6	106,6	17835,7	13039,6	160,9	
32	3212,4	2345,2	26,2	4754,4	3470,8	41,5	7428,7	5423,2	64,9	12597,5	9196,5	110,1	19017,5	13883,3	166,1	
34	3412,6	2487,7	27,0	5050,6	3681,8	42,8	7891,6	5752,8	66,9	13382,4	9755,4	113,4	20202,5	14727,1	171,3	
36	3613,4	2630,4	27,8	5347,8	3892,9	44,1	8356,0	6082,7	68,8	14169,9	10315,0	116,7	21391,3	15571,8	176,2	
38	3814,8	2773,5	28,5	5645,8	4104,8	45,3	8821,6	6413,8	70,7	14959,6	10876,3	119,9	22583,4	16419,2	181,1	
40	4016,7	2916,7	29,3	5944,7	4316,8	46,4	9288,6	6745,0	72,6	15751,5	11438,0	123,1	23778,9	17267,1	185,8	

¹⁾Please observe the pressure-/temperature rating

■ CAPACITY TABLE ACC. TO ISO 4126-1 / AD2000 A2

CONTINUATION - Series 455: Blowing-off rates at 10% above set pressure													
Nominal diameter DN		50			65			80			100		
		d0 = 45 mm			d0 = 59 mm			d0 = 72 mm			d0 = 90 mm		
Set pressure bar		I	II	III	I	II	III	I	II	III	I	II	III
Air I Nm ³ /h	0,2	738,1	622,3	23,4	1268,7	1069,7	40,3	1889,4	1593,0	60,0	2952,2	2489,0	93,7
	0,5	1085,0	885,1	33,5	1865,1	1521,5	57,6	2777,6	2265,9	85,8	4340,0	3540,4	134,1
	1	1562,2	1244,3	45,6	2685,4	2138,9	78,4	3999,1	3185,3	116,8	6248,6	4977,0	182,5
	1,5	2058,3	1628,1	56,0	3538,2	2798,8	96,2	5269,1	4168,0	143,3	8233,0	6512,6	224,0
Steam II kg/h ¹⁾	2	2528,9	1988,0	64,7	4347,2	3417,4	111,2	6473,9	5089,3	165,7	10115,5	7952,0	258,9
	2,5	2998,2	2345,0	72,4	5153,9	4031,1	124,5	7675,3	6003,3	185,3	11992,7	9380,1	289,6
	3	3457,5	2692,5	79,3	5943,5	4628,4	136,4	8851,2	6892,7	203,1	13830,0	10769,8	317,4
Water III m ³ /h	3,5	3901,1	3026,2	85,7	6706,0	5202,1	147,4	9986,8	7747,1	219,5	15604,4	12104,9	342,9
	4	4345,0	3359,1	91,7	7469,1	5774,3	157,6	11123,2	8599,2	234,7	17380,1	13436,3	366,6
	4,5	4789,2	3690,5	97,2	8232,8	6344,0	167,2	12260,5	9447,6	248,9	19157,0	14761,9	389,0
	5	5233,8	4022,1	102,5	8997,0	6914,0	176,2	13398,5	10296,5	262,4	20935,2	16088,3	410,0
	5,5	5678,6	4352,4	107,5	9761,6	7481,9	184,8	14537,3	11142,3	275,3	22714,5	17409,8	430,1
	6	6123,7	4682,5	112,3	10526,8	8049,3	193,1	15676,8	11987,3	287,5	24495,0	18730,2	449,3
	6,5	6569,2	5011,7	116,9	11292,5	8615,2	201,0	16817,1	12829,9	299,3	26276,7	20046,8	467,7
	7	7014,9	5340,7	121,3	12058,8	9180,7	208,6	17958,2	13672,2	310,6	28059,7	21362,8	485,3
	7,5	7461,0	5669,3	125,6	12825,5	9745,6	215,9	19100,1	14513,4	321,5	29843,9	22677,3	502,4
	8	7907,3	5997,8	129,7	13592,7	10310,3	223,0	20242,7	15354,4	332,1	31629,2	23991,3	518,9
	8,5	8354,2	6326,5	133,7	14360,9	10875,4	229,9	21386,7	16195,9	342,3	33416,7	25306,1	534,9
	9	8801,1	6655,1	137,6	15129,2	11440,2	236,5	22530,8	17037,1	352,3	35204,4	26620,5	550,4
	9,5	9248,6	6983,0	141,4	15898,4	12003,8	243,0	23676,3	17876,4	361,9	36994,3	27931,9	565,5
	10	9696,1	7310,1	145,1	16667,7	12566,1	249,4	24821,9	18713,7	371,4	38784,3	29240,2	580,2
	11	10592,3	7962,4	152,1	18208,3	13687,5	261,5	27116,2	20383,8	389,5	42369,1	31849,7	608,6
	12	11490,0	8616,3	158,9	19751,5	14811,6	273,2	29414,4	22057,8	406,8	45960,1	34465,4	635,7
13	12388,9	9269,5	165,4	21296,7	15934,3	284,4	31715,6	23729,8	423,5	49555,7	37077,9	661,7	
14	13289,1	9924,7	171,7	22844,1	17060,6	295,1	34020,0	25407,1	439,5	53156,3	39698,6	686,7	
15	14190,4	10575,7	177,7	24393,5	18179,7	305,5	36327,5	27073,7	454,9	56761,7	42302,6	710,8	
16	15093,0	11228,3	183,5	25945,0	19301,6	315,5	38638,0	28744,5	469,8	60371,9	44913,2	734,1	
17	15997,2	11881,4	189,2	27499,3	20424,2	325,2	40952,7	30416,3	484,3	63988,6	47525,5	756,7	
18	16902,1	12530,7	194,7	29055,0	21540,4	334,6	43269,5	32078,5	498,4	67608,5	50122,7	778,7	
19	17808,7	13184,6	200,0	30613,3	22664,5	343,8	45590,2	33752,5	512,0	71234,7	52738,3	800,0	
20	18716,9	13839,0	205,2	32174,5	23789,5	352,8	47915,2	35427,9	525,3	74867,4	55356,1	820,8	
21	19625,9	14492,7	210,3	33737,1	24913,2	361,5	50242,2	37101,4	538,3	78503,5	57971,0	841,1	
22	20536,5	15145,7	215,2	35302,6	26035,7	370,0	52573,5	38773,1	551,0	82146,1	60582,9	860,9	
23	21448,5	15798,0	220,1	36870,2	27156,9	378,3	54908,1	40442,8	563,4	85794,0	63191,9	880,3	
24	22361,5	16449,5	224,8	38439,7	28276,9	386,4	57245,5	42110,7	575,5	89446,1	65798,0	899,2	
25	23275,8	17102,5	229,4	40011,4	29399,3	394,4	59586,1	43782,3	587,4	93103,3	68409,8	917,8	
26	24192,0	17757,6	234,0	41586,3	30525,5	402,2	61931,4	45459,4	599,0	96767,8	71030,3	936,0	
27	25109,2	18412,3	238,5	43163,0	31651,0	409,9	64279,5	47135,5	610,4	100436,6	73649,3	953,8	
28	26027,7	19066,7	242,8	44741,9	32775,9	417,4	66630,8	48810,8	621,6	104110,6	76266,8	971,3	
29	26947,3	19720,7	247,1	46322,8	33900,2	424,8	68985,1	50485,0	632,6	107789,3	78882,9	988,5	
30	27868,3	20374,4	251,4	47905,9	35023,8	432,1	71342,7	52158,4	643,5	111473,0	81497,5	1005,4	
32	29714,9	21692,7	259,6	51080,3	37290,0	446,3	76070,2	55533,3	664,6	118859,7	86770,8	1038,4	
34	31566,3	23011,0	267,6	54262,9	39556,3	460,0	80809,8	58908,3	685,0	126265,4	92044,2	1070,4	
36	33424,0	24330,9	275,4	57456,2	41825,1	473,3	85565,3	62287,0	704,9	133695,8	97323,5	1101,4	
38	35286,5	25655,0	282,9	60657,9	44101,3	486,3	90333,4	65676,9	724,2	141145,9	102620,2	1131,6	
40	37154,5	26979,8	290,3	63869,1	46378,6	498,9	95115,5	69068,3	743,0	148618,0	107919,2	1161,0	

¹⁾Please observe the pressure-/temperature rating



■ CAPACITY TABLE ACC. TO AD2000 A2

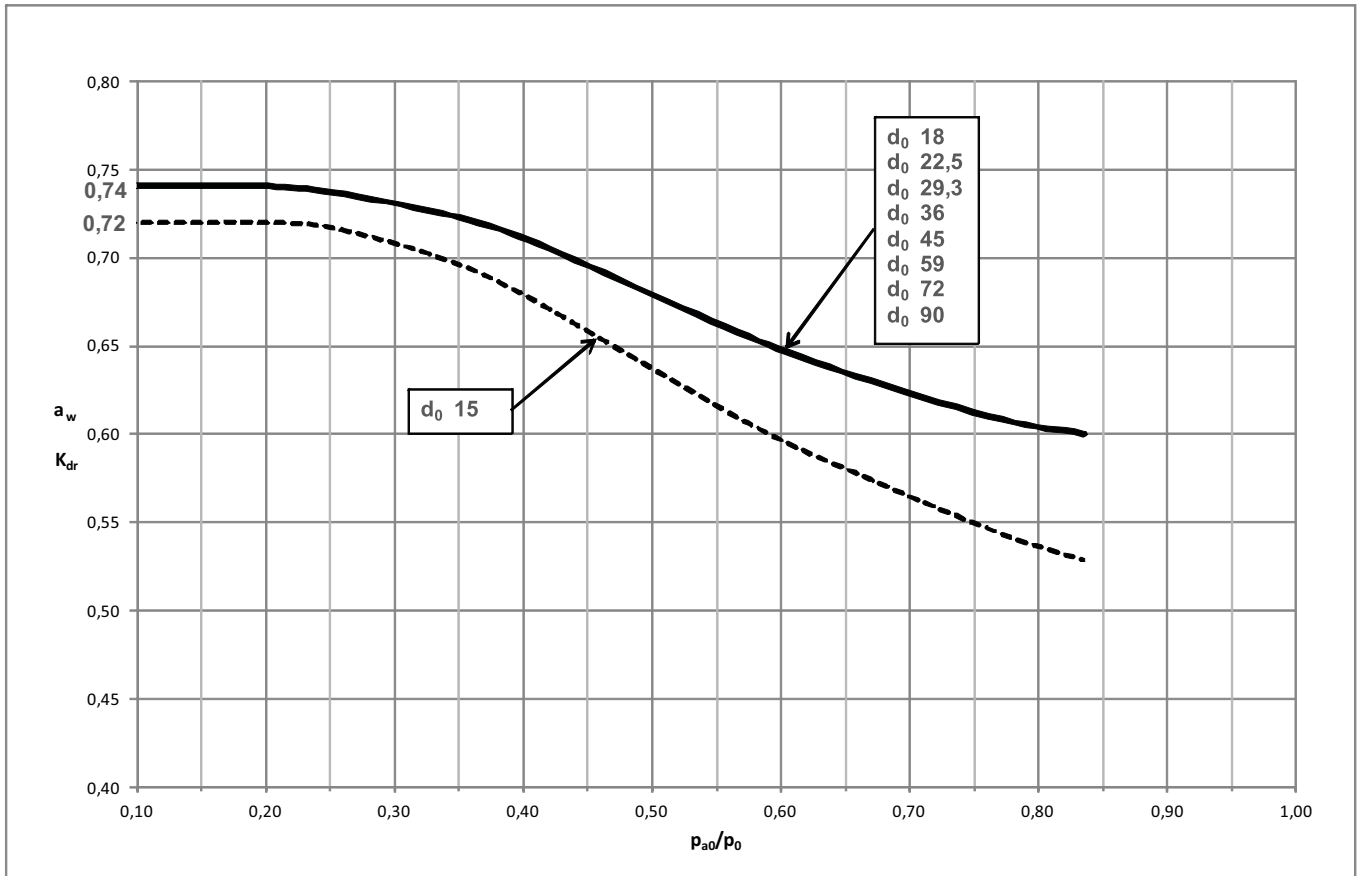
Series 455: Blowing-off rates at 5% above set pressure											
Nominal diameter DN		15		20		25		32		40	
		d0 = 15 mm		d0 = 18 mm		d0 = 22,5 mm		d0 = 29,3 mm		d0 = 36 mm	
Set pressure bar		I	II	I	II	I	II	I	II	I	II
Air I	0,2	71,7	60,5	118,1	99,6	184,5	155,6	312,9	263,8	472,4	398,2
	0,5	112,6	91,9	173,6	141,6	271,3	221,3	460,0	375,2	694,4	566,5
	Nm ³ /h	1	167,1	133,1	250,0	199,1	390,5	311,1	662,3	527,5	999,8
Steam II	1,5	220,3	174,4	322,5	255,3	503,9	398,9	854,6	676,4	1290,1	1021,1
	2	269,3	211,9	391,2	307,8	611,2	480,9	1036,5	815,5	1564,7	1231,1
	2,5	315,0	246,6	462,5	362,2	722,7	565,9	1225,5	959,6	1850,1	1448,6
	3	360,7	281,2	533,9	416,2	834,2	650,3	1414,7	1102,7	2135,6	1664,7
	3,5	406,5	315,7	601,6	467,2	940,1	730,1	1594,2	1238,0	2406,6	1869,0
	4	452,3	350,1	669,4	518,1	1046,0	809,5	1773,8	1372,8	2677,8	2072,4
	4,5	498,2	384,3	737,3	568,8	1152,0	888,8	1953,6	1507,2	2949,2	2275,3
	5	544,0	418,5	805,2	619,4	1258,1	967,9	2133,5	1641,3	3220,8	2477,7
	5,5	589,9	452,7	873,1	670,0	1364,3	1046,8	2313,5	1775,2	3492,5	2679,9
	6	635,9	486,8	941,1	720,4	1470,5	1125,7	2493,6	1908,9	3764,5	2881,7
	6,5	681,9	520,8	1009,2	770,8	1576,8	1204,3	2673,9	2042,2	4036,6	3083,0
	7	727,9	554,8	1077,2	821,0	1683,2	1282,9	2854,3	2175,5	4308,9	3284,1
	7,5	773,9	588,7	1145,4	871,2	1789,6	1361,3	3034,8	2308,4	4581,5	3484,9
	8	820,0	622,6	1213,5	921,4	1896,2	1439,8	3215,5	2441,5	4854,2	3685,8
	8,5	866,1	656,5	1281,8	971,6	2002,8	1518,1	3396,3	2574,3	5127,1	3886,3
	9	912,2	690,4	1350,0	1021,8	2109,5	1596,6	3577,2	2707,5	5400,2	4087,3
	9,5	958,4	724,3	1418,4	1072,0	2216,2	1675,0	3758,2	2840,4	5673,5	4287,9
	10	1004,6	758,1	1486,7	1122,0	2323,0	1753,2	3939,4	2973,0	5947,0	4488,1
	11	1097,0	825,6	1623,6	1221,8	2536,9	1909,1	4302,1	3237,4	6494,5	4887,3
	12	1189,7	893,0	1760,7	1321,6	2751,1	2065,0	4665,3	3501,8	7042,9	5286,4
	13	1282,4	960,3	1898,0	1421,3	2965,6	2220,8	5029,1	3766,0	7592,0	5685,3
	14	1375,3	1027,9	2035,5	1521,3	3180,4	2377,0	5393,3	4030,8	8141,9	6085,0
	15	1468,4	1095,4	2173,2	1621,3	3395,6	2533,2	5758,1	4295,8	8692,6	6485,0
	16	1561,5	1162,4	2311,0	1720,3	3611,0	2688,0	6123,4	4558,3	9244,1	6881,3
	17	1654,8	1230,0	2449,1	1820,4	3826,7	2844,4	6489,3	4823,6	9796,4	7281,8
	18	1748,2	1297,2	2587,4	1919,9	4042,8	2999,9	6855,7	5087,2	10349,5	7679,7
	19	1841,8	1364,2	2725,8	2019,1	4259,1	3154,8	7222,5	5349,8	10903,3	8076,2
20	1935,5	1431,8	2864,5	2119,1	4475,8	3311,0	7590,0	5614,8	11458,1	8476,2	
21	2029,3	1499,3	3003,4	2219,0	4692,8	3467,2	7957,9	5879,6	12013,5	8876,0	
22	2123,3	1566,8	3142,5	2318,8	4910,1	3623,2	8326,4	6144,1	12569,8	9275,4	
23	2217,4	1634,2	3281,7	2418,6	5127,7	3779,0	8695,5	6408,4	13127,0	9674,3	
24	2311,6	1701,5	3421,2	2518,2	5345,6	3934,7	9065,0	6672,4	13684,7	10072,8	
25	2406,0	1768,7	3560,9	2617,7	5563,9	4090,2	9435,2	6936,0	14243,6	10470,8	
26	2500,5	1836,0	3700,8	2717,3	5782,5	4245,8	9805,8	7200,0	14803,1	10869,3	
27	2595,2	1903,6	3840,9	2817,4	6001,4	4402,2	10177,0	7465,1	15363,5	11269,6	
28	2690,0	1971,2	3981,2	2917,4	6220,6	4558,4	10548,8	7730,1	15924,7	11669,6	
29	2784,9	2038,8	4121,7	3017,4	6440,1	4714,6	10921,0	7995,0	16486,6	12069,5	
30	2880,0	2106,3	4262,3	3117,3	6659,9	4870,7	11293,7	8259,7	17049,3	12469,1	
32	3070,5	2241,5	4544,3	3317,4	7100,5	5183,5	12041,0	8790,1	18177,4	13269,7	
34	3261,6	2377,5	4827,2	3518,8	7542,5	5498,1	12790,4	9323,6	19308,8	14075,1	
36	3453,3	2513,6	5110,9	3720,1	7985,8	5812,7	13542,1	9857,1	20443,6	14880,5	
38	3645,5	2649,9	5395,4	3921,8	8430,3	6127,9	14295,9	10391,5	21581,4	15687,3	
40	3836,8	2786,5	5678,4	4124,1	8872,5	6443,9	15045,8	10927,4	22713,6	16496,3	

¹⁾Please observe the pressure-/temperature rating

■ FLOW COEFFICIENTS CHART

Series 455

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 DN50 ($d_0=45 \text{ mm}$), safety valve set at $= 0,3 \text{ bar(g)}$ and blowing-off into the enviroment the blow-off pressure is determined as follows:

Set-pressure	0,3	bar(g)
+ Atmospheric pressure	1,01325	bar(a)
+ permissible overpressure	0,1	bar(g)
~ Blow-off pressure	1,41	bar(a)

Consequently:

$$\frac{p_{a0}}{p_0} = \frac{1,01325 \text{ bar(a)}}{1,41 \text{ bar(a)}} = 0,72 \quad \text{and extracted from the chart} \quad \alpha_w \text{ i.e. } K_{dr} = 0,62$$

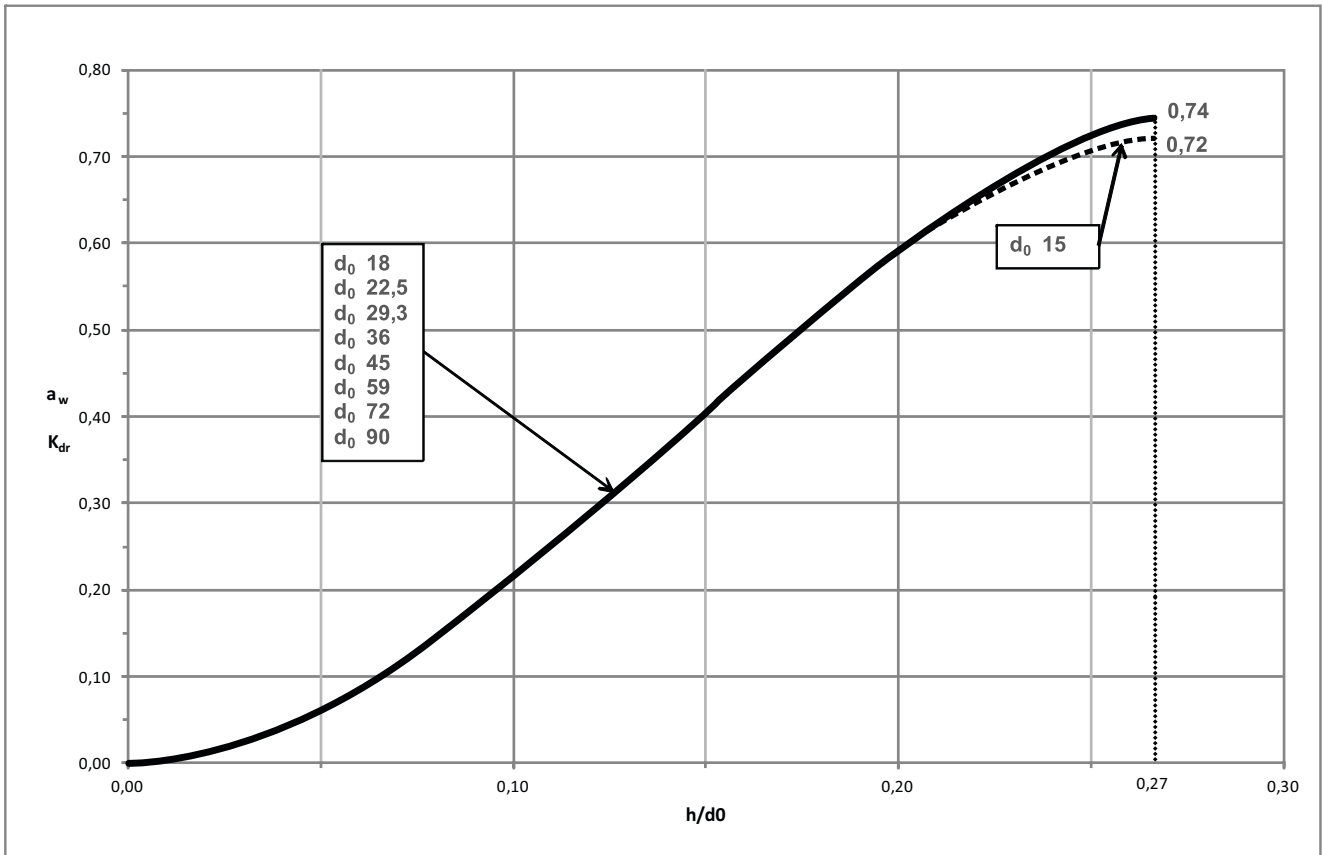
Units:

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

■ FLOW COEFFICIENTS CHART

Series 455

Coefficient of discharge α_w i.e. K_{dr} as a function of the ratio of stroke / flow diameter h/d_0 of vapours and gases

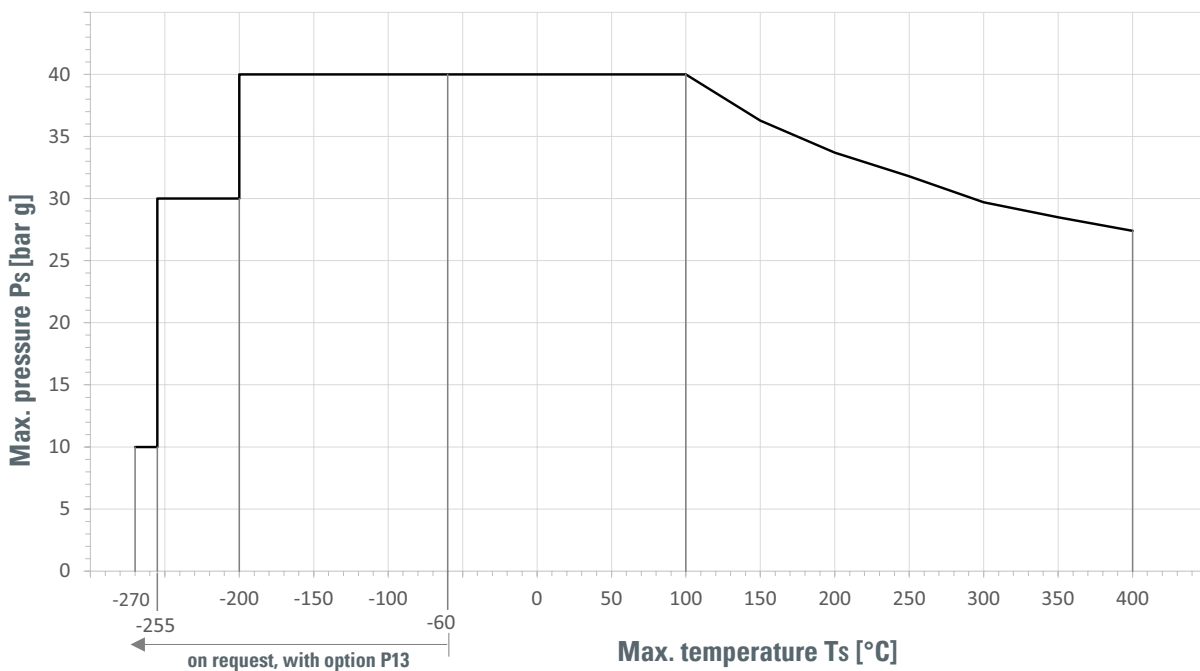


If the capacity of the respective nominal diameter is too high, the minimum necessary stroke can be determined with the required coefficient of discharge α_w bzw. K_{dr} .

The required discharge coefficient α_w / K_{dr} must be specified to determine the necessary stroke limitation.

Pressure-/ temperature rating

PN 40 | Material: 1.4408



Pressure-temperature assignment above 50°C according to DIN EN 1092-1; below -10°C according to AD2000 W10.

DATA SHEET 355

→ Series 355

355

Safety valves made of spheroidal graphite cast iron, angle-type with flange connections



■ MATERIAL



■ SPECIFICATION



DN 15 to DN 100



- 10°C to + 350°C
depending on version



0,2 – 40 bar
depending on version

■ SUITABLE FOR

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

■ EXAMPLES OF USE

Full-lift safety valve for the protection of:

- Pressure tanks and -systems for neutral / non-neutral vapours and gases
- Steam plants
- Silo containers for liquid, granular and dusty materials¹

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

- Chemical and petrochemical plants
- Biogas plants
- Industrial- and commercial boiler plants
- Shipbuilding industry and marine equipment
- Production and processing of industrial gases
- secondary areas in the food-, beverage-, pharmaceutical- and cosmetics-industries

■ CHARACTERISTICS

- Maintenance-friendly construction
- single trim for gases, vapours and liquids
- replaceable seat
- easily detachable cone-stroke ring connection
- freely rotatable spindle-taper connection
- extensive range of spare parts, see spare parts flange safety valves
- vertical and horizontal installation position possible

Safety valves are set and sealed at the factory.

■ APPROVALS

TÜV-Type test approval 2094	D/G (full-lift), F (normal), F/K/S ¹ (Full lift)
EU type examination	S/G, L, F/K/S ¹
TSG ZF001-2006	D/G (S/G), F (L), F/K/S ¹
TR ZU 032/2013 - TR ZU 010/2011	D/G (S/G), F (L), F/K/S ¹

Requirements

DGR 2014/68/EU	TRD 421 and DIN EN 12952-7
DIN EN ISO 4126-1	DIN EN 12953-8
AD 2000 Data sheet A2	UK PESR 2016 No. 1105
VdTÜV Guideline SV 100	

Classification society

Det Norske Veritas	DNV
Bureau Veritas	BV
American Bureau of Shipping	ABS
Russian Maritime Register of Shipping Lloyds Register	RS LR
Registro Italiano Navale	RINA

■ MATERIALS

Component	Material	DIN EN	ASME
Body and spring housing	Spheroidal graphite cast iron	5.3103	Gr. 60-40-18
Valve seat	Stainless steel	1.4404	316 L
Internal parts	Steel	1.4021/1.4104/1.4122	420/430F/1.4122
Spring	Steel	1.8159 / FDSiCr	
Bellows (optional)	Stainless steel	1.4571	316 Ti

¹ Only for version with bellows and gas-tight spring housing

Series 355 ■ VALVE VERSION

s	non-gastight, open spring housing	for neutral media, no liquids, without counter pressure
b	with bellows, non-gastight version of spring housing (10mm bore)	for neutral and non-neutral media and/or counter pressure ¹ . Spring, moving parts and the environment are protected from being affected by the medium.
t	gastight version of spring housing	for neutral and non-neutral media without counter pressure. The environment is protected from being affected by the medium.
tb	gastight version with bellows	for neutral and non-neutral and particularly for flammable, toxic and environmentally hazardous media and/or counter pressure ¹ . Spring, moving parts and the environment are protected from being affected by the medium. Double gastight.

¹ up to max. 30% of the response pressure

■ MEDIUM

G	gaseous	Air, vapours, gases and steam
GF	gaseous and liquid	Air, vapours, gases, steam and liquids

■ TYPE OF LIFTING MECHANISM

L	Standard with lifting lever
0	without lifting device

■ AVAILABLE NOMINAL DIAMETERS AND CONNECTION SIZES

Nominal diameter DN	15	20	25	32	40	50	65	80	100
Inlet	15	20	25	32	40	50	65	80	100
Outlet	25	■							
	32		■						
	40			■					
	50				■				
	65					■			
	80						■		
	100							■	
	150								■

■ CONNECTION TYPE INLET / OUTLET FLANGE CONNECTIONS

FL / FL	Standard	Flange connection / flange connection	DIN EN 1092 / DIN EN 1092
----------------	----------	---------------------------------------	---------------------------

Flange connection inlet in standard with pressure rating PN40, for pressure rating PN16 please indicate when ordering.

■ SEALS

MD	Metal-to-metal sealing	Flat seal	0,2bar to 40bar	-10°C to +350°C
EPDM	Ethylene propylene diene	Flat seal	0,2bar to 40bar	-10°C to +170°C
FKM	Fluorocarbon	Flat seal	0,2bar to 40bar	-10°C to +200°C
FFKM²	Perfluorinated rubber	Flat seal	0,2bar to 40bar	-10°C to +260°C
PTFE	Polytetrafluoroethylene	Flat seal	0,2bar ³ to 10bar	-10°C to +225°C
PTFE CARBON	Polytetrafluoroethylene with carbon	Flat seal	10bar to 40bar	-10°C to +225°C

Auxiliary seals are made of highly resistant, adhesive-free graphite/stainless steel foil. Top cap with O-rings in EPDM.

² Standard Kalrez® 6375, alternatively Kalrez® 6230 with FDA, USP, 3-A

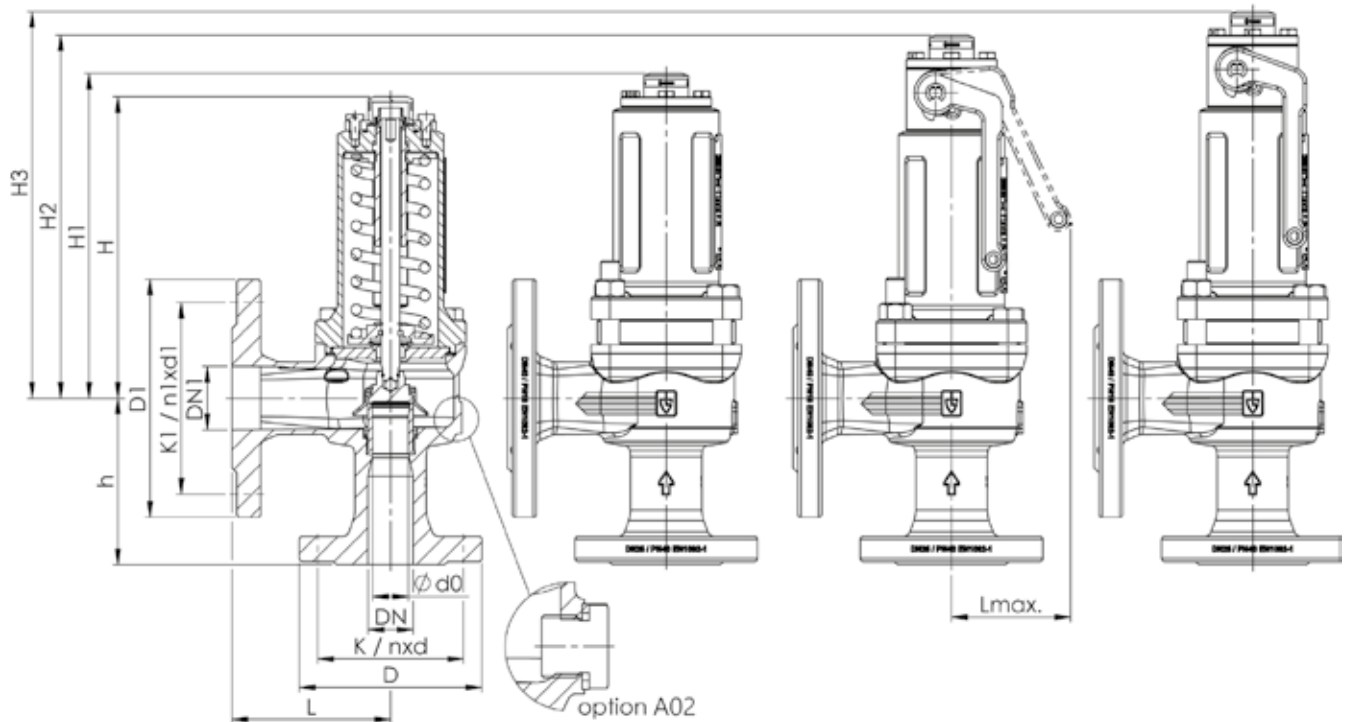
³ DN15 from 2bar, DN20 from 1,5bar, DN25 from 1bar (lower set pressures on request)

■ NOMINAL DIAMETERS, CONNECTIONS, INSTALLATION DIMENSIONS

Series 355: Connection, installation dimensions, ranges of adjustment										
Nominal diameter	DN	15	20	25	32	40	50	65	80	100
Connection DIN EN 1092-2	DN / PN	15 / 40	20 / 40	25 / 40	32 / 40	40 / 40	50 / 40	65 / 40 (16 ²)	80 / 40	100 / 40 (16 ²)
Outlet DIN EN 1092-2	DN1 / PN	25 / 16	32 / 16	40 / 16	50 / 16	65 / 16	80 / 16	100 / 16	125 / 16	150 / 16
Installation dimensions in mm	L	80	95 (85 ⁶)	100	110	115	120	140	160	180
	h	90	85 (95 ⁶)	105	115	140	150	170	195	220
	D	95	105	115	140	150	165	185	200	235
	K / nxd	65 / 4x14	75 / 4x14	85 / 4x14	100 / 4x19	110 / 4x19	125 / 4x19	145 / 8x19	160 / 8x18	190 / 8x23
	D1	115	140	150	165	185	200	220	250	285
	K1 / n1xd1	85 / 4x14	100 / 4x19	110 / 4x19	125 / 4x19	145 / 4x19	160 / 8x19	180 / 8x19	210 / 8x19	240 / 8x23
	H / H1 ¹	167 / 207	165 / 205	190 / 230	260 / 300	302 / 330	352 / 392	427 / 462	486 / 530	577 / 624
	H2 ² / H3 ³	206 / 246	204 / 244	229 / 269	321 / 361	363 / 391	413 / 453	497 / 532	556 / 600	647 / 694
	Lmax	75	85	95	120	130	160	205	215	255
	A02	1/4"	1/4"	1/4"	1/4"	1/2"	1/2"	1/2"	1/2"	1/2"
Weight	α_w / K_{dr} (F)	0,49	0,54	0,54	0,54	0,54	0,54	0,54	0,54	0,54
	α_w / K_{dr} (D/G) ⁴	0,72	0,74	0,74	0,74	0,74	0,74	0,74	0,74	0,74
	do	15,0	18,0	22,5	29,3	36,0	45,0	59,0	72,0	90,0
	kg ⁵	5,5	6,5	9,0	16,5	19,5	26,0	44,0	57,0	90,0
	kg ^{1,5}	6,0	7,0	9,5	19,0	21,5	28,5	48,0	63,0	99,0
	kg ^{2,5}	6,0	7,0	9,5	19,0	22,0	28,5	47,5	60,5	93,5
Range of adjustment	bar	0,2 - 40	0,2 - 40	0,2 - 40	0,2 - 40	0,2 - 40	0,2 - 40	0,2 - 24	0,2 - 25,5	0,2 - 20
	Pressure range with bellows	bar	1,2 - 40	0,8 - 40	0,5 - 40	1,0 - 40	0,9 - 40	0,5 - 40	0,3 - 40	0,2 - 40

¹ Values for the version with bellows
² Values for the version with lifting lever
³ Values for the version with bellows and lifting lever
⁴ Flow coefficients for blow-off pressures < 3,0 bar: Please refer to the Flow Coefficients Chart.
⁵ Values for the version with gastight spring housing
⁶ Option S66
⁷ Flange connection inlet in standard with pressure rating PN40, for pressure rating PN16 please indicate when ordering.

■ MAIN DIMENSIONS, INSTALLATION DIMENSIONS



Series 355 ■ INDIVIDUAL SELECTION / VALVE CONFIGURATION

Series	Valve version	Medium	Lifting device	Nominal diameter DN	Connection type		Connection size		Seal	Options	Set pressure	Quantity
					Inlet	Outlet	Inlet	Outlet				
355	s	G	L	50	FL	FL	50	80	MD	S62	10,0	1
355					FL	FL						
355					FL	FL						
355					FL	FL						

■ TECHNICAL FINISHES, VARIANTS, ACCESSORIES

S60	Pressure sensor connection M5 or G1/4 for monitoring the springhousing (only for valves with bellows)	<input type="checkbox"/>	A01	Gagging screw for tests of valve tightness and resistance to pressure with the fitted valve	<input type="checkbox"/>
S62	Inductive proximity sensor, assembled, for indication of valve position, including connection cable 5m	<input type="checkbox"/>	A02	Connection for condensate in the outlet body – G1/4" upto DN32, G1/2" as of DN40	<input type="checkbox"/>
S66	Customised length of sides	<input type="checkbox"/>	A07	Stroke limitation	<input type="checkbox"/>

■ PROPERTIES

P01	Oil- and grease-free production	<input type="checkbox"/>		<input type="checkbox"/>
		<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"/>	C07	SIL evaluation relating to IEC 61508-2	<input type="checkbox"/>
C02	Test certificate acc. DIN EN 10204 3.1 (WPZ 3.1)	<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"/>
C03	Material test certificate acc. DIN EN 10204 3.1 (MPZ 3.1) (pressure retaining part)	<input type="checkbox"/>	C10	Certificate of oil- and grease free production	<input type="checkbox"/>
C04	TÜV/DEKRA individual inspection acc. EN 10204 3.2 (TÜV/DEKRA-APZ)	<input type="checkbox"/>	C11	Certification of the production process especially for gaseous oxygen applications by employment of specific materials	<input type="checkbox"/>
C05	Sealing material Manufacturer certification (FDA, USP 3, 3-A,...), Please indicate description of certificate:	<input type="checkbox"/>			<input type="checkbox"/>

■ ADMISSIONS / ACCREDITATIONS

AA1	EC Type examination acc. to Directive 2014/68/EU	<input type="checkbox"/>	AK1	Det Norske Veritas (DNV) 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"/>
AA11	UK Type examination acc. to Directive UK PESR 2016 No. 1105	<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

■ CAPACITY TABLE ACC. TO ISO 4126-1 / AD2000 A2

Series 355: Blowing-off rates at 10% above set pressure																	
Nominal diameter DN		15			20			25			32			40			
		d0 = 15 mm			d0 = 18 mm			d0 = 22,5 mm			d0 = 29,3 mm			d0 = 36 mm			
Set pressure bar		I	II	III	I	II	III	I	II	III	I	II	III	I	II	III	
Air I	0,2	71,7	60,5	2,4	118,1	99,6	3,7	184,5	155,6	5,9	312,9	263,8	9,9	472,4	398,2	15,0	
	0,5	112,6	91,9	3,4	173,6	141,6	5,4	271,3	221,3	8,4	460,0	375,2	14,2	694,4	566,5	21,5	
	Nm ³ /h	1	167,1	133,1	4,6	249,9	199,1	7,3	390,5	311,1	11,4	662,3	527,5	19,3	999,8	796,3	29,2
Steam II	1,5	225,2	178,2	5,6	329,3	260,5	9,0	514,6	407,0	14,0	872,6	690,2	23,7	1317,3	1042,0	35,8	
	2	278,0	218,5	6,5	404,6	318,1	10,4	632,2	497,0	16,2	1072,1	842,8	27,4	1618,5	1272,3	41,4	
	kg/h ¹⁾	2,5	325,9	254,9	7,3	479,7	375,2	11,6	749,5	586,3	18,1	1271,1	994,2	30,7	1918,8	1500,8	46,3
Water III	3	373,8	291,1	8,0	553,2	430,8	12,7	864,4	673,1	19,8	1465,8	1141,5	33,6	2212,8	1723,2	50,8	
	m ³ /h	3,5	421,7	327,2	8,6	624,2	484,2	13,7	975,3	756,6	21,4	1653,9	1283,0	36,3	2496,7	1936,8	54,9
	4	469,7	363,1	9,2	695,2	537,5	14,7	1086,3	839,8	22,9	1842,1	1424,1	38,9	2780,8	2149,8	58,7	
	4,5	517,8	399,0	9,8	766,3	590,5	15,6	1197,3	922,6	24,3	2030,4	1564,6	41,2	3065,1	2361,9	62,2	
	5	565,8	434,8	10,3	837,4	643,5	16,4	1308,4	1005,5	25,6	2218,8	1705,1	43,5	3349,6	2574,1	65,6	
	5,5	613,9	470,5	10,8	908,6	696,4	17,2	1419,7	1088,1	26,9	2407,4	1845,2	45,6	3634,3	2785,6	68,8	
	6	662,0	506,2	11,3	979,8	749,2	18,0	1530,9	1170,6	28,1	2596,1	1985,1	47,6	3919,2	2996,8	71,9	
	6,5	710,2	541,8	11,8	1051,1	801,9	18,7	1642,3	1252,9	29,2	2785,0	2124,7	49,6	4204,3	3207,5	74,8	
	7	758,4	577,4	12,2	1122,4	854,5	19,4	1753,7	1335,2	30,3	2973,9	2264,2	51,4	4489,6	3418,1	77,7	
	7,5	806,6	612,9	12,7	1193,8	907,1	20,1	1865,2	1417,3	31,4	3163,1	2403,5	53,2	4775,0	3628,4	80,4	
	8	854,8	648,4	13,1	1265,2	959,7	20,8	1976,8	1499,5	32,4	3352,3	2542,7	55,0	5060,7	3838,6	83,0	
	8,5	903,2	683,9	13,5	1336,7	1012,2	21,4	2088,5	1581,6	33,4	3541,7	2682,1	56,7	5346,7	4049,0	85,6	
	9	951,5	719,5	13,9	1408,2	1064,8	22,0	2200,3	1663,8	34,4	3731,2	2821,4	58,3	5632,7	4259,3	88,1	
	9,5	999,8	754,9	14,3	1479,8	1117,3	22,6	2312,1	1745,7	35,3	3920,9	2960,4	59,9	5919,1	4469,1	90,5	
	10	1048,2	790,3	14,6	1551,4	1169,6	23,2	2424,0	1827,5	36,3	4110,6	3099,1	61,5	6205,5	4678,4	92,8	
	11	1145,1	860,8	15,3	1694,8	1274,0	24,3	2648,1	1990,6	38,0	4490,6	3375,6	64,5	6779,1	5096,0	97,4	
	12	1242,2	931,5	16,0	1838,4	1378,6	25,4	2872,5	2154,1	39,7	4871,1	3652,9	67,4	7353,6	5514,5	101,7	
13	1339,3	1002,1	16,7	1982,2	1483,1	26,5	3097,2	2317,4	41,4	5252,2	3929,7	70,1	7928,9	5932,5	105,9		
14	1436,7	1072,9	17,3	2126,3	1587,9	27,5	3322,3	2481,2	42,9	5633,8	4207,5	72,8	8505,0	6351,8	109,9		
15	1534,1	1143,3	17,9	2270,5	1692,1	28,4	3547,6	2643,9	44,4	6016,0	4483,5	75,3	9081,9	6768,4	113,7		
16	1631,7	1213,9	18,5	2414,9	1796,5	29,4	3773,2	2807,1	45,9	6398,6	4760,2	77,8	9659,5	7186,1	117,5		
17	1729,4	1284,5	19,1	2559,5	1901,0	30,3	3999,3	2970,3	47,3	6781,9	5037,1	80,2	10238,2	7604,1	121,1		
18	1827,3	1354,7	19,6	2704,3	2004,9	31,1	4225,5	3132,7	48,7	7165,6	5312,3	82,5	10817,4	8019,6	124,6		
19	1925,3	1425,4	20,2	2849,4	2109,5	32,0	4452,2	3296,1	50,0	7549,9	5589,5	84,8	11397,6	8438,1	128,0		
20	2023,4	1496,1	20,7	2994,7	2214,2	32,8	4679,2	3459,8	51,3	7934,9	5867,0	87,0	11978,8	8857,0	131,3		
21	2121,7	1566,8	21,2	3140,1	2318,8	33,6	4906,5	3623,2	52,6	8320,3	6144,1	89,1	12560,6	9275,4	134,6		
22	2220,2	1637,4	21,7	3285,8	2423,3	34,4	5134,1	3786,4	53,8	8706,4	6421,0	91,2	13143,4	9693,3	137,7		
23	2318,8	1707,9	22,2	3431,8	2527,7	35,2	5362,1	3949,5	55,0	9093,0	6697,5	93,3	13727,0	10110,7	140,8		
24	2417,5	1778,3	22,7	3577,8	2631,9	36,0	5590,4	4112,4	56,2	9480,1	6973,7	95,3	14311,4	10527,7	143,9		
25	2516,3	1848,9	23,1	3724,1	2736,4	36,7	5819,0	4275,6	57,4	9867,7	7250,5	97,3	14896,5	10945,6	146,8		
26	2615,3	1919,7	23,6	3870,7	2841,2	37,4	6048,0	4439,4	58,5	10256,1	7528,2	99,2	15482,9	11364,8	149,8		
27	2714,5	1990,5	24,0	4017,5	2946,0	38,2	6277,3	4603,1	59,6	10644,9	7805,8	101,1	16069,9	11783,9	152,6		
28	2813,8	2061,3	24,5	4164,4	3050,7	38,9	6506,9	4766,7	60,7	11034,3	8083,2	102,9	16657,7	12202,7	155,4		
29	2913,2	2132,0	24,9	4311,6	3155,3	39,5	6736,8	4930,2	61,8	11424,2	8360,5	104,8	17246,3	12621,3	158,2		
30	3012,8	2202,6	25,3	4458,9	3259,9	40,2	6967,1	5093,6	62,8	11814,6	8637,6	106,6	17835,7	13039,6	160,9		
32	3212,4	2345,2	26,2	4754,4	3470,8	41,5	7428,7	5423,2	64,9	12597,5	9196,5	110,1	19017,5	13883,3	166,1		
34	3412,6	2487,7	27,0	5050,6	3681,8	42,8	7891,6	5752,8	66,9	13382,4	9755,4	113,4	20202,5	14727,1	171,3		
36	3613,4	2630,4	27,8	5347,8	3892,9	44,1	8356,0	6082,7	68,8	14169,9	10315,0	116,7	21391,3	15571,8	176,2		
38	3814,8	2773,5	28,5	5645,8	4104,8	45,3	8821,6	6413,8	70,7	14959,6	10876,3	119,9	22583,4	16419,2	181,1		
40	4016,7	2916,7	29,3	5944,7	4316,8	46,4	9288,6	6745,0	72,6	15751,5	11438,0	123,1	23778,9	17267,1	185,8		

¹⁾Please observe the pressure-/temperature rating



■ CAPACITY TABLE ACC. TO ISO 4126-1 / AD2000 A2

CONTINUATION - Series 355: Blowing-off rates at 10% above set pressure														
Nominal diameter DN		50 d0 = 45 mm			65 d0 = 59 mm			80 d0 = 72 mm			100 d0 = 90 mm			
Set pressure bar		I	II	III	I	II	III	I	II	III	I	II	III	
Air I	0,2	738,1	622,3	23,4	1268,7	1069,7	40,3	1889,4	1593,0	60,0	2952,2	2489,0	93,7	
	0,5	1085,0	885,1	33,5	1865,1	1521,5	57,6	2777,6	2265,9	85,8	4340,0	3540,4	134,1	
	Nm³/h	1	1562,2	1244,3	45,6	2685,4	2138,9	78,4	3999,1	3185,3	116,8	6248,6	4977,0	182,5
Steam II	1,5	2058,3	1628,1	56,0	3538,2	2798,8	96,2	5269,1	4168,0	143,3	8233,0	6512,6	224,0	
	2	2528,9	1988,0	64,7	4347,2	3417,4	111,2	6473,9	5089,3	165,7	10115,5	7952,0	258,9	
	kg/h ¹⁾	2,5	2998,2	2345,0	72,4	5153,9	4031,1	124,5	7675,3	6003,3	185,3	11992,7	9380,1	289,6
Water III	3	3457,5	2692,5	79,3	5943,5	4628,4	136,4	8851,2	6892,7	203,1	13830,0	10769,8	317,4	
	m³/h	3,5	3901,1	3026,2	85,7	6706,0	5202,1	147,4	9986,8	7747,1	219,5	15604,4	12104,9	342,9
	4	4345,0	3359,1	91,7	7469,1	5774,3	157,6	11123,2	8599,2	234,7	17380,1	13436,3	366,6	
	4,5	4789,2	3690,5	97,2	8232,8	6344,0	167,2	12260,5	9447,6	248,9	19157,0	14761,9	389,0	
	5	5233,8	4022,1	102,5	8997,0	6914,0	176,2	13398,5	10296,5	262,4	20935,2	16088,3	410,0	
	5,5	5678,6	4352,4	107,5	9761,6	7481,9	184,8	14537,3	11142,3	275,3	22714,5	17409,8	430,1	
	6	6123,7	4682,5	112,3	10526,8	8049,3	193,1	15676,8	11987,3	287,5	24495,0	18730,2	449,3	
	6,5	6569,2	5011,7	116,9	11292,5	8615,2	201,0	16817,1	12829,9	299,3	26276,7	20046,8	467,7	
	7	7014,9	5340,7	121,3	12058,8	9180,7	208,6	17958,2	13672,2	310,6	28059,7	21362,8	485,3	
	7,5	7461,0	5669,3	125,6	12825,5	9745,6	215,9	19100,1	14513,4	321,5	29843,9	22677,3	502,4	
	8	7907,3	5997,8	129,7	13592,7	10310,3	223,0	20242,7	15354,4	332,1	31629,2	23991,3	518,9	
	8,5	8354,2	6326,5	133,7	14360,9	10875,4	229,9	21386,7	16195,9	342,3	33416,7	25306,1	534,9	
	9	8801,1	6655,1	137,6	15129,2	11440,2	236,5	22530,8	17037,1	352,3	35204,4	26620,5	550,4	
	9,5	9248,6	6983,0	141,4	15898,4	12003,8	243,0	23676,3	17876,4	361,9	36994,3	27931,9	565,5	
	10	9696,1	7310,1	145,1	16667,7	12566,1	249,4	24821,9	18713,7	371,4	38784,3	29240,2	580,2	
	11	10592,3	7962,4	152,1	18208,3	13687,5	261,5	27116,2	20383,8	389,5	42369,1	31849,7	608,6	
	12	11490,0	8616,3	158,9	19751,5	14811,6	273,2	29414,4	22057,8	406,8	45960,1	34465,4	635,7	
13	12388,9	9269,5	165,4	21296,7	15934,3	284,4	31715,6	23729,8	423,5	49555,7	37077,9	661,7		
14	13289,1	9924,7	171,7	22844,1	17060,6	295,1	34020,0	25407,1	439,5	53156,3	39698,6	686,7		
15	14190,4	10575,7	177,7	24393,5	18179,7	305,5	36327,5	27073,7	454,9	56761,7	42302,6	710,8		
16	15093,0	11228,3	183,5	25945,0	19301,6	315,5	38638,0	28744,5	469,8	60371,9	44913,2	734,1		
17	15997,2	11881,4	189,2	27499,3	20424,2	325,2	40952,7	30416,3	484,3	63988,6	47525,5	756,7		
18	16902,1	12530,7	194,7	29055,0	21540,4	334,6	43269,5	32078,5	498,4	67608,5	50122,7	778,7		
19	17808,7	13184,6	200,0	30613,3	22664,5	343,8	45590,2	33752,5	512,0	71234,7	52738,3	800,0		
20	18716,9	13839,0	205,2	32174,5	23789,5	352,8	47915,2	35427,9	525,3	74867,4	55356,1	820,8		
21	19625,9	14492,7	210,3	33737,1	24913,2	361,5	50242,2	37101,4	538,3	78503,5	57971,0	841,1		
22	20536,5	15145,7	215,2	35302,6	26035,7	370,0	52573,5	38773,1	551,0	82146,1	60582,9	860,9		
23	21448,5	15798,0	220,1	36870,2	27156,9	378,3	54908,1	40442,8	563,4	85794,0	63191,9	880,3		
24	22361,5	16449,5	224,8	38439,7	28276,9	386,4	57245,5	42110,7	575,5	89446,1	65798,0	899,2		
25	23275,8	17102,5	229,4	40011,4	29399,3	394,4	59586,1	43782,3	587,4	93103,3	68409,8	917,8		
26	24192,0	17757,6	234,0	41586,3	30525,5	402,2	61931,4	45459,4	599,0	96767,8	71030,3	936,0		
27	25109,2	18412,3	238,5	43163,0	31651,0	409,9	64279,5	47135,5	610,4	100436,6	73649,3	953,8		
28	26027,7	19066,7	242,8	44741,9	32775,9	417,4	66630,8	48810,8	621,6	104110,6	76266,8	971,3		
29	26947,3	19720,7	247,1	46322,8	33900,2	424,8	68985,1	50485,0	632,6	107789,3	78882,9	988,5		
30	27868,3	20374,4	251,4	47905,9	35023,8	432,1	71342,7	52158,4	643,5	111473,0	81497,5	1005,4		
32	29714,9	21692,7	259,6	51080,3	37290,0	446,3	76070,2	55533,3	664,6	118859,7	86770,8	1038,4		
34	31566,3	23011,0	267,6	54262,9	39556,3	460,0	80809,8	58908,3	685,0	126265,4	92044,2	1070,4		
36	33424,0	24330,9	275,4	57456,2	41825,1	473,3	85565,3	62287,0	704,9	133695,8	97323,5	1101,4		
38	35286,5	25655,0	282,9	60657,9	44101,3	486,3	90333,4	65676,9	724,2	141145,9	102620,2	1131,6		
40	37154,5	26979,8	290,3	63869,1	46378,6	498,9	95115,5	69068,3	743,0	148618,0	107919,2	1161,0		

¹⁾Please observe the pressure-/temperature rating



■ CAPACITY TABLE ACC. TO AD2000 A2

Series 355: Blowing-off rates at 5% above set pressure											
Nominal diameter DN		15		20		25		32		40	
		d0 = 15 mm		d0 = 18 mm		d0 = 22,5 mm		d0 = 29,3 mm		d0 = 36 mm	
Set pressure bar		I	II	I	II	I	II	I	II	I	II
Air I	0,2	71,7	60,5	118,1	99,6	184,5	155,6	312,9	263,8	472,4	398,2
	0,5	112,6	91,9	173,6	141,6	271,3	221,3	460,0	375,2	694,4	566,5
Nm ³ /h	1	167,1	133,1	250,0	199,1	390,5	311,1	662,3	527,5	999,8	796,3
	1,5	220,3	174,4	322,5	255,3	503,9	398,9	854,6	676,4	1290,1	1021,1
Steam II	2	269,3	211,9	391,2	307,8	611,2	480,9	1036,5	815,5	1564,7	1231,1
	2,5	315,0	246,6	462,5	362,2	722,7	565,9	1225,5	959,6	1850,1	1448,6
kg/h ¹⁾	3	360,7	281,2	533,9	416,2	834,2	650,3	1414,7	1102,7	2135,6	1664,7
	3,5	406,5	315,7	601,6	467,2	940,1	730,1	1594,2	1238,0	2406,6	1869,0
	4	452,3	350,1	669,4	518,1	1046,0	809,5	1773,8	1372,8	2677,8	2072,4
	4,5	498,2	384,3	737,3	568,8	1152,0	888,8	1953,6	1507,2	2949,2	2275,3
	5	544,0	418,5	805,2	619,4	1258,1	967,9	2133,5	1641,3	3220,8	2477,7
	5,5	589,9	452,7	873,1	670,0	1364,3	1046,8	2313,5	1775,2	3492,5	2679,9
	6	635,9	486,8	941,1	720,4	1470,5	1125,7	2493,6	1908,9	3764,5	2881,7
	6,5	681,9	520,8	1009,2	770,8	1576,8	1204,3	2673,9	2042,2	4036,6	3083,0
	7	727,9	554,8	1077,2	821,0	1683,2	1282,9	2854,3	2175,5	4308,9	3284,1
	7,5	773,9	588,7	1145,4	871,2	1789,6	1361,3	3034,8	2308,4	4581,5	3484,9
	8	820,0	622,6	1213,5	921,4	1896,2	1439,8	3215,5	2441,5	4854,2	3685,8
	8,5	866,1	656,5	1281,8	971,6	2002,8	1518,1	3396,3	2574,3	5127,1	3886,3
	9	912,2	690,4	1350,0	1021,8	2109,5	1596,6	3577,2	2707,5	5400,2	4087,3
	9,5	958,4	724,3	1418,4	1072,0	2216,2	1675,0	3758,2	2840,4	5673,5	4287,9
	10	1004,6	758,1	1486,7	1122,0	2323,0	1753,2	3939,4	2973,0	5947,0	4488,1
	11	1097,0	825,6	1623,6	1221,8	2536,9	1909,1	4302,1	3237,4	6494,5	4887,3
	12	1189,7	893,0	1760,7	1321,6	2751,1	2065,0	4665,3	3501,8	7042,9	5286,4
	13	1282,4	960,3	1898,0	1421,3	2965,6	2220,8	5029,1	3766,0	7592,0	5685,3
	14	1375,3	1027,9	2035,5	1521,3	3180,4	2377,0	5393,3	4030,8	8141,9	6085,0
	15	1468,4	1095,4	2173,2	1621,3	3395,6	2533,2	5758,1	4295,8	8692,6	6485,0
	16	1561,5	1162,4	2311,0	1720,3	3611,0	2688,0	6123,4	4558,3	9244,1	6881,3
	17	1654,8	1230,0	2449,1	1820,4	3826,7	2844,4	6489,3	4823,6	9796,4	7281,8
	18	1748,2	1297,2	2587,4	1919,9	4042,8	2999,9	6855,7	5087,2	10349,5	7679,7
	19	1841,8	1364,2	2725,8	2019,1	4259,1	3154,8	7222,5	5349,8	10903,3	8076,2
	20	1935,5	1431,8	2864,5	2119,1	4475,8	3311,0	7590,0	5614,8	11458,1	8476,2
	21	2029,3	1499,3	3003,4	2219,0	4692,8	3467,2	7957,9	5879,6	12013,5	8876,0
	22	2123,3	1566,8	3142,5	2318,8	4910,1	3623,2	8326,4	6144,1	12569,8	9275,4
	23	2217,4	1634,2	3281,7	2418,6	5127,7	3779,0	8695,5	6408,4	13127,0	9674,3
	24	2311,6	1701,5	3421,2	2518,2	5345,6	3934,7	9065,0	6672,4	13684,7	10072,8
	25	2406,0	1768,7	3560,9	2617,7	5563,9	4090,2	9435,2	6936,0	14243,6	10470,8
	26	2500,5	1836,0	3700,8	2717,3	5782,5	4245,8	9805,8	7200,0	14803,1	10869,3
	27	2595,2	1903,6	3840,9	2817,4	6001,4	4402,2	10177,0	7465,1	15363,5	11269,6
	28	2690,0	1971,2	3981,2	2917,4	6220,6	4558,4	10548,8	7730,1	15924,7	11669,6
	29	2784,9	2038,8	4121,7	3017,4	6440,1	4714,6	10921,0	7995,0	16486,6	12069,5
	30	2880,0	2106,3	4262,3	3117,3	6659,9	4870,7	11293,7	8259,7	17049,3	12469,1
	32	3070,5	2241,5	4544,3	3317,4	7100,5	5183,5	12041,0	8790,1	18177,4	13269,7
	34	3261,6	2377,5	4827,2	3518,8	7542,5	5498,1	12790,4	9323,6	19308,8	14075,1
	36	3453,3	2513,6	5110,9	3720,1	7985,8	5812,7	13542,1	9857,1	20443,6	14880,5
	38	3645,5	2649,9	5395,4	3921,8	8430,3	6127,9	14295,9	10391,5	21581,4	15687,3
	40	3836,8	2786,5	5678,4	4124,1	8872,5	6443,9	15045,8	10927,4	22713,6	16496,3

¹⁾Please observe the pressure-/temperature rating

■ CAPACITY TABLE ACC. TO AD2000 A2

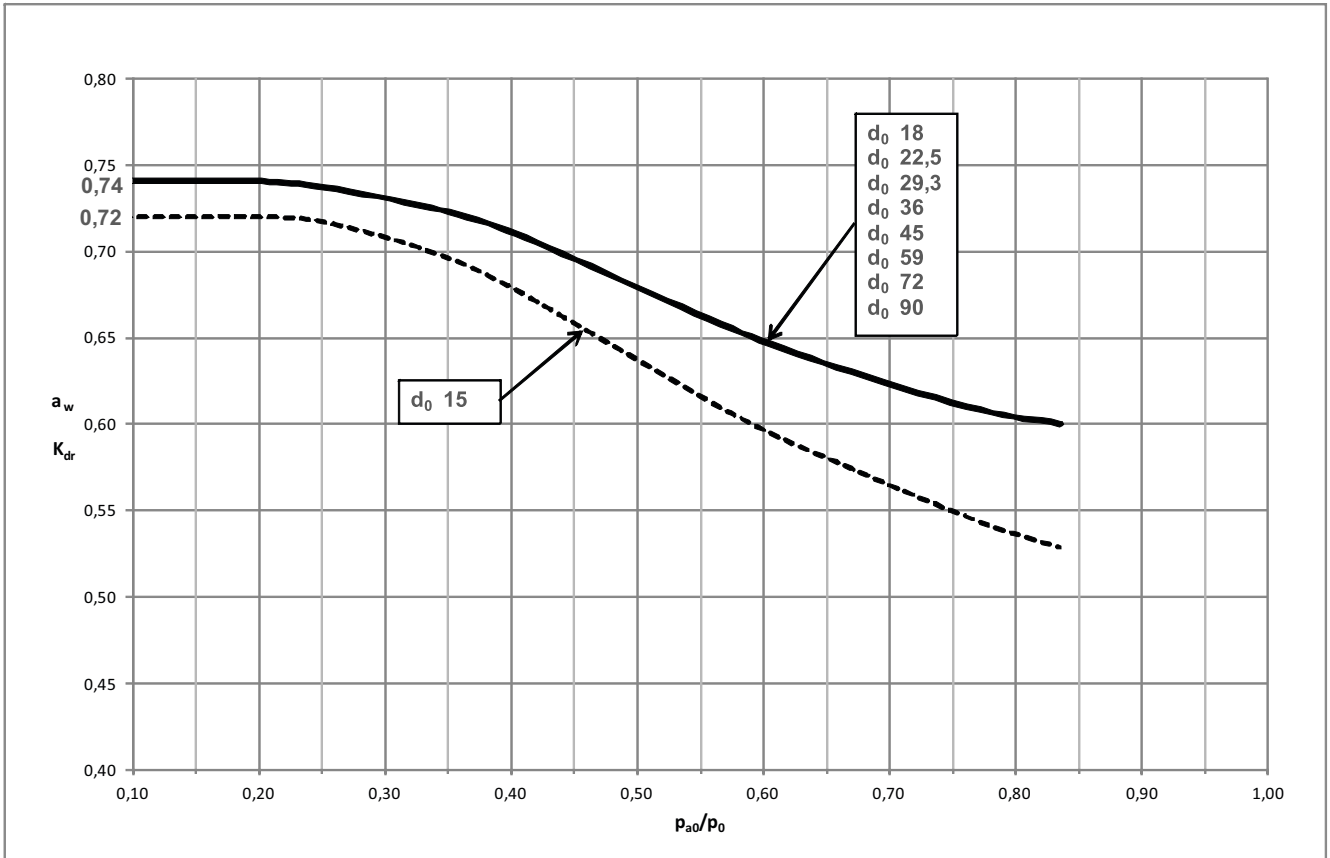
CONTINUATION - Series 355: Blowing-off rates at 5% above set pressure										
Nominal diameter DN		50		65		80		100		
		d0 = 45 mm		d0 = 59 mm		d0 = 72 mm		d0 = 90 mm		
Set pressure bar		I	II	I	II	I	II	I	II	
Air I	0,2	738,1	622,3	1268,7	1069,7	1889,5	1593,0	2952,3	2489,0	
	0,5	1085,0	885,1	1865,2	1521,5	2777,7	2265,9	4340,1	3540,4	
	Nm³/h	1	1562,2	1244,3	2685,4	2138,9	3999,2	3185,3	6248,8	4977,0
Steam II	1,5	2015,8	1595,5	3465,2	2742,6	5160,4	4084,4	8063,1	6381,9	
	2	2444,8	1923,6	4202,6	3306,6	6258,6	4924,3	9779,1	7694,3	
	kg/h¹)	2,5	2890,8	2263,5	4969,3	3891,0	7400,5	5794,6	11563,2	9054,0
	3	3336,9	2601,0	5736,1	4471,2	8542,4	6658,6	13347,5	10404,1	
	3,5	3760,3	2920,3	6464,0	5020,0	9626,4	7475,9	15041,2	11681,1	
	4	4184,1	3238,1	7192,4	5566,3	10711,2	8289,5	16736,2	12952,3	
	4,5	4608,1	3555,1	7921,4	6111,3	11796,8	9101,1	18432,5	14220,5	
	5	5032,4	3871,4	8650,8	6655,1	12883,0	9910,9	20129,7	15485,8	
	5,5	5457,0	4187,4	9380,7	7198,2	13970,0	10719,7	21828,1	16749,6	
	6	5882,0	4502,7	10111,2	7740,1	15057,8	11526,8	23527,8	18010,6	
	6,5	6307,2	4817,2	10842,1	8280,8	16146,4	12332,0	25228,8	19268,8	
	7	6732,7	5131,5	11573,6	8821,1	17235,8	13136,6	26930,9	20525,9	
	7,5	7158,5	5445,1	12305,6	9360,3	18325,9	13939,6	28634,2	21780,6	
	8	7584,6	5759,0	13038,1	9899,8	19416,7	14743,0	30338,5	23036,0	
	8,5	8011,1	6072,3	13771,1	10438,4	20508,3	15545,2	32044,2	24289,4	
	9	8437,8	6386,3	14504,7	10978,2	21600,8	16349,0	33751,2	25545,3	
	9,5	8864,9	6699,9	15238,9	11517,2	22694,1	17151,7	35459,6	26799,5	
10	9292,1	7012,7	15973,3	12055,0	23787,9	17952,6	37168,6	28050,9		
11	10147,7	7636,4	17444,0	13127,1	25978,1	19549,2	40590,7	30545,6		
12	11004,5	8259,9	18917,0	14198,9	28171,6	21145,4	44018,2	33039,7		
13	11862,5	8883,2	20391,8	15270,3	30368,0	22741,0	47450,0	35532,8		
14	12721,7	9507,9	21868,8	16344,2	32567,6	24340,2	50886,9	38031,6		
15	13582,3	10132,8	23348,1	17418,4	34770,6	25940,0	54329,0	40531,3		
16	14443,9	10752,0	24829,2	18482,8	36976,3	27525,1	57775,4	43007,9		
17	15306,9	11377,8	26312,7	19558,5	39185,6	29127,1	61227,6	45511,0		
18	16171,1	11999,5	27798,3	20627,3	41397,9	30718,8	64684,3	47998,1		
19	17036,4	12619,1	29285,8	21692,4	43613,2	32304,9	68145,6	50476,4		
20	17903,2	13244,1	30775,9	22766,8	45832,2	33904,9	71612,9	52976,4		
21	18771,1	13868,8	32267,7	23840,6	48053,9	35504,0	75084,2	55475,0		
22	19640,3	14492,7	33762,0	24913,2	50279,3	37101,4	78561,4	57971,0		
23	20510,9	15116,1	35258,4	25984,7	52507,8	38697,1	82043,5	60464,2		
24	21382,4	15738,7	36756,6	27055,0	54739,0	40291,1	85529,6	62954,8		
25	22255,7	16360,7	38257,8	28124,2	56974,6	41883,4	89022,8	65442,8		
26	23129,9	16983,3	39760,5	29194,5	59212,5	43477,3	92519,5	67933,2		
27	24005,5	17608,7	41265,7	30269,6	61454,1	45078,3	96022,0	70434,9		
28	24882,4	18233,8	42773,1	31344,1	63698,9	46678,5	99529,5	72935,2		
29	25760,4	18858,5	44282,4	32418,0	65946,5	48277,8	103041,4	75434,1		
30	26639,6	19482,9	45793,8	33491,4	68197,3	49876,3	106558,3	77931,7		
32	28402,2	20733,9	48823,7	35641,9	72709,6	53078,8	113608,7	82935,6		
34	30170,0	21992,3	51862,6	37805,1	77235,1	56300,4	120679,9	87969,3		
36	31943,1	23250,7	54910,5	39968,3	81774,2	59521,9	127772,2	93003,0		
38	33721,0	24511,4	57966,8	42135,4	86325,8	62749,2	134884,1	98045,6		
40	35490,0	25775,5	61007,7	44308,3	90854,4	65985,2	141960,0	103101,8		

¹)Please observe the pressure-/temperature rating

■ FLOW COEFFICIENTS CHART

Series 355

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 DN50 ($d_0=45 \text{ mm}$), safety valve set at $= 0,3\text{bar(g)}$ and blowing-off into the enviroment the blow-off pressure is determined as follows:

Set-pressure	0,3	bar(g)
+ Atmospheric pressure	1,01325	bar(a)
+ permissable overpressure	0,1	bar(g)
~ Blow-off pressure	1,41	bar(a)

Consequently:

$$\frac{p_{a0}}{p_0} = \frac{1,01325 \text{ bar(a)}}{1,41 \text{ bar(a)}} = 0,72 \quad \text{and extracted from the chart } \alpha_w \text{ i.e. } K_{dr} = 0,62$$

Units:

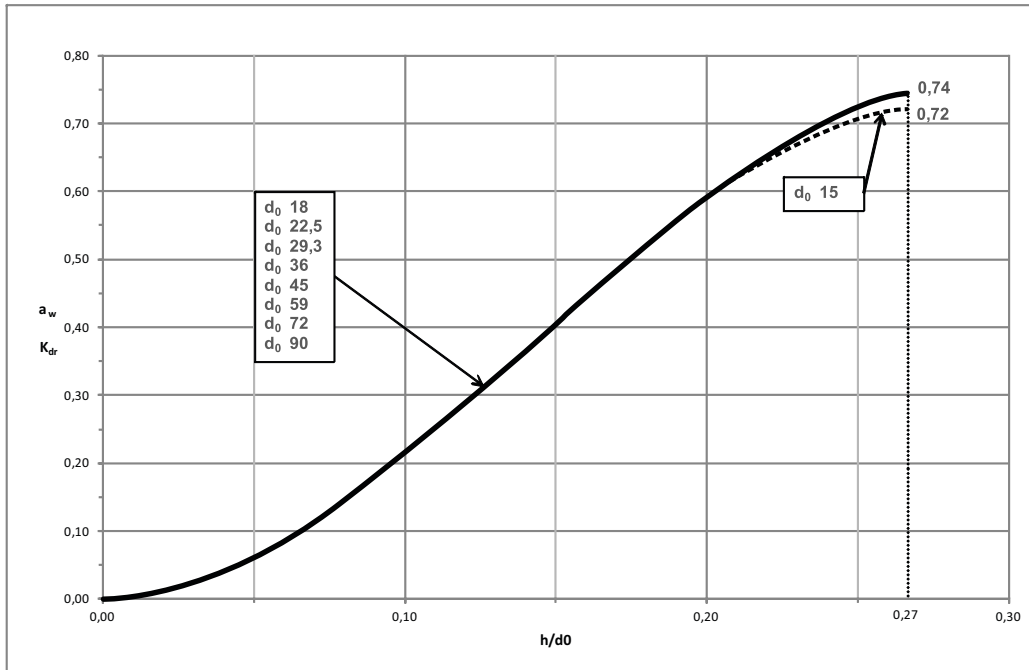
bar(a) \triangleq absolute pressure - pressure in relation to absolute vacuum (zero), e.g. $p_{atm} = 1,01325 \text{ bar(a)}$

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

■ FLOW COEFFICIENTS CHART

Series 355

Coefficient of discharge α_w i.e. K_{dr} as a function of the ratio stroke / flow diameter h/d_0 of vapours and gases

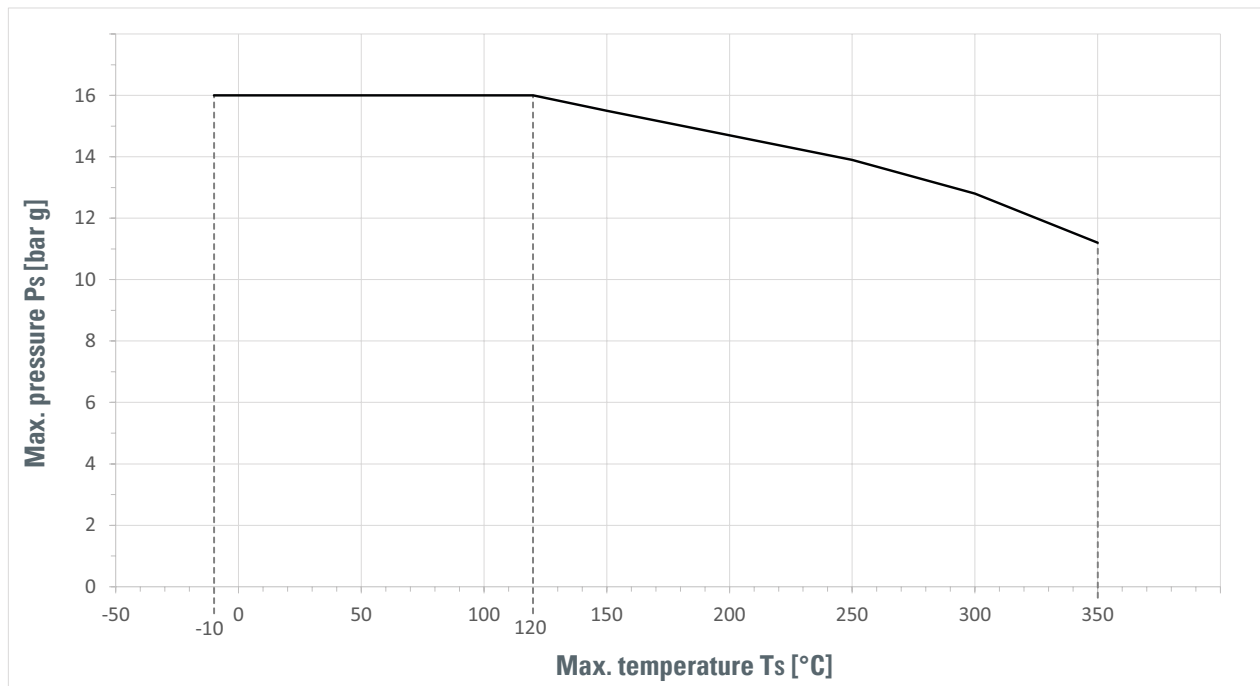


If the capacity of the respective nominal diameter is too high, the minimum necessary stroke can be determined with the required coefficient of discharge α_w bzw. K_{dr} .

The required discharge coefficient α_w / K_{dr} must be specified to determine the necessary stroke limitation.

Pressure-/ temperature rating

PN 16 | Material: 5.3103



Pressure-temperature relationship above 50°C according to DIN EN 1092-2.

