Modulate Action

Safety Relief Valves
Series 433
Series 429

CATALOG

LESER

The-Safety-Valve.com

Product range

LESER

LESER Safety Valves for every industrial application

Modulate Action

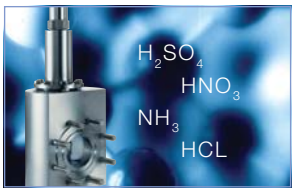
High Performance

Compact Performance

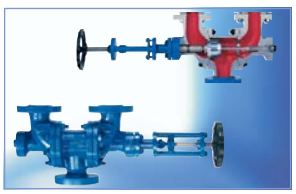
API

High Efficiency

Clean Service



Critical Service



Best Availability

Series 433

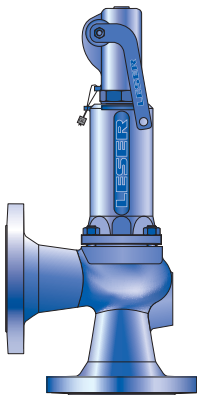
Type 431, 433

Type 431, 433 PN 160

Series 429

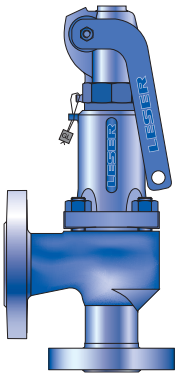
Type 427, 429

General



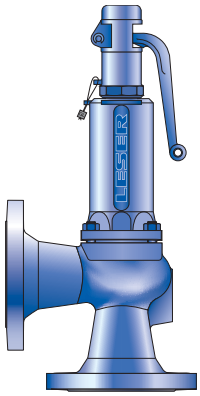
Type 431, 433

DN 15 – DN 150
Set pressure 0.2 – 40 bar



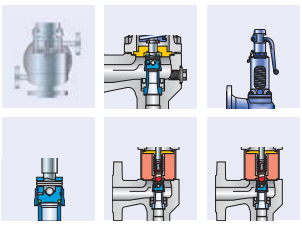
Type 431, 433 PN 160

DN 15
Set pressure 0.3 – 160 bar



Type 427, 429

DN 15 – DN 150
Set pressure 1.5 – 40 bar



Options

Contents

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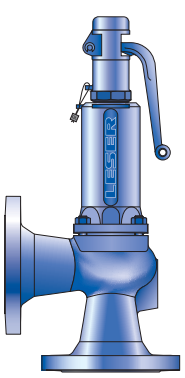
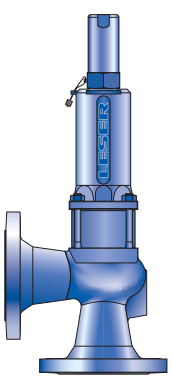
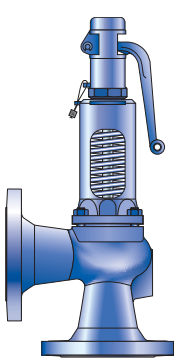


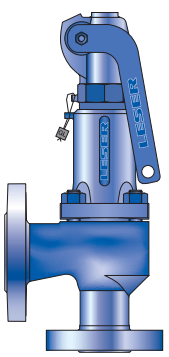
Type 433
Plain lever H3
Closed bonnet
Conventional design



Type 433
Cap H2
Closed bonnet
Balanced bellows design

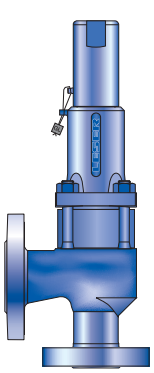


Type 431
Plain lever H3
Open bonnet
Conventional design

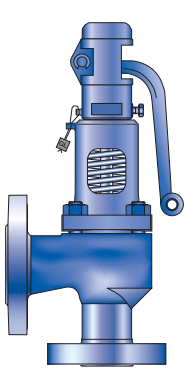


Type 433 PN 160
Packed lever H4
Closed bonnet
Conventional design

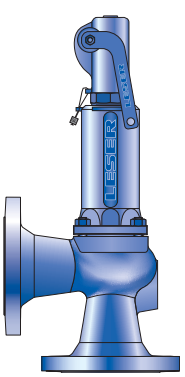
Contents



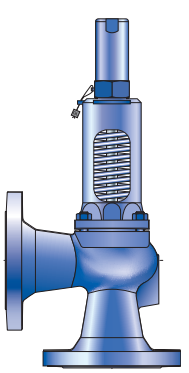
Type 433 PN 160
Cap H2
Closed bonnet
Balanced bellows design



Type 431 PN 160
Plain lever H3
Open bonnet
Conventional design



Type 429
Packed lever H4
Closed bonnet
Conventional design



Type 427
Cap H2
Open bonnet
Conventional design

General Information

LESER – Modulate Action Safety Valves

The Modulate Action product group stands for

- ✓ Suitable solutions for all areas of applications, especially thermal expansion
- ✓ Lowest possible loss of medium
- ✓ Compact construction and low weight

LESER Modulate Action Safety Valves

- are characterised by longstanding proof in service and are constantly optimised by service specialists.
- are available as standard safety valves or proportional safety valves.
- reach their full lift within a pressure increase of 10% above the set pressure
- are suitable for almost all industrial applications.
- are accepted by numerous rules and regulations and approved by leading classification societies.

Examples of this are:

- European Community: CE marking as per Pressure Equipment Directives 97/23/EG and DIN EN ISO 4126-1
- Germany: VdTÜV approval as per Pressure Equipment Directive, EN ISO 4126-1, TÜV SV 100 and AD 2000-Merkblatt A2
- China: AQSIQ based on the approvals as per AD 2000-Merkblatt A2
- Eurasian Custom Union: Approval acc. to Eurasian Custom Union (EAC - Eurasian Conformity)

Furthermore, all LESER Modulate Action safety valves are designed, marked, produced and approved according to the requirements of the following regulations (directives, codes, rules and standards): EN ISO 4126-7, EN 12266-1/-2, EN 1092 Part I and II Flange, ASME B 16.34 and ASME B16.5- Flange, AD 2000-Merkblatt A4, AD 2000-Merkblatt HP0.

LESER Modulate Action safety valves can be used for all steam, gas, and liquid applications and are characterised by their low loss of medium.

The Series 433 standard safety relief valves have component testing according to AD 2000-Merkblatt A2 for steam, gases, and liquids. For the Series 429 proportional safety valves, there is only component testing as per AD 2000-Merkblatt A2 for steam and gasses, because the required coefficient of discharge is not reached for liquids. Nevertheless, Series 429 can be used as per the rules and regulations for thermal expansion.

Furthermore, Series 429 proportional safety valves are used as overflow valves or in bypass systems.

Applications

LESER – Modulate Action Safety Valves

provide the ultimate solution for all industrial applications with steam, gasses, and liquids.

Series 433 standard safety valves
acc. to definition AD 2000-Merkblatt A2
are ideal relief valves for medium mass flows. Their greater proportional range leads to a constant mode of operation and relief of pressure peaks for liquids in particular.

Typical applications for LESER Modulate Action Series 433 safety valves are:

- chemical industry
  - recycling facilities: Low medium loss
  - piping with long line lengths
  - two-phase flow
  - waste gas purification systems on the outlet side
- heat-transfer oil systems
- liquids protection
  - metering pumps
  - hydraulic systems
  - pulsating operating pressures
- machine building (OEM)
  - piston compressors with small and medium capacities
- overflow function
- thermal expansion
  - protection of pipeline segments
  - sealed storage tanks

Series 429 proportional safety valves
acc. to definition AD 2000-Merkblatt A2
opens proportional to pressure increase. This is usually achieved by using a disc without a lifting aid. Proportional safety valves are normally used anywhere where only very small mass flows are to be expected and the medium loss is to be kept as low as possible (e. g. thermal expansion).

Both proportional as well as standard safety valves are characterised by particularly stable operation.

General design feature

LESER – Modulate Action Safety Valves

offer a large number of models, materials, and accessories for adaptation to any application:

- 11 valve sizes from DN 15 to DN 150 – ½" up to 6" with connection possibilities for the respective application
- Nominal pressure ratings from PN 16 to PN 160 / Class 150 to Class 600 fulfil most pressure requirements
- Orifice 0.2 x D to > 1.1 x M cover all common performance requirements.
- The required material for the application can be chosen from the large choice of body materials, for example:
  - 0.6025 / cast iron (Series 433)
  - 0.7043 / ductile iron
  - 1.0619 / WCB
  - 1.4408 / CF8M
- centre to face dimensions acc. to DIN 3320
- set pressures from 0.2 to 160 bar qualify Modulate Action safety valves for all industrial systems
- operating temperatures from -270 to 450 °C make use possible in numerous applications
- compact construction and low weight for easy handling
- same nominal inlet and outlet diameter
- identical construction for steam, gasses and liquids (single trim) reduces the number of required spare parts and facilitates cost-effective maintenance
- construction without a blow down ring guarantees easy service and prevents incorrect settings of the blow down ring
- the one-part spindle reduces friction, guarantees optimal guidance and reliable operation under all operating conditions
- the self-emptying angle type body prevents residue and reduces corrosion

LESER – Modulate Action safety valves can be individually adapted to the applications with a multitude of accessories. Examples are:

- discs with soft seal (O-ring) fulfil increased demands of functional tightness
- stellited or hardened metal seat surfaces of disc and seat reduce the wear and increase the service life
- balanced bellows for compensation of the back pressure and to protect the moving parts
- heating jacket for heating the safety valve when protecting cold stiff media
- each component can be constructed of an alternative material according to customer specifications

Valve finder

LESER

How to find the right Product Group

High operating to set pressure ratio, high backpressure or low total height?
Yes → **High Efficiency**

No

Clean Service application?
Yes → **Clean Service**

No

Critical Service / highly corrosive application?
Yes → **Critical Service**

No

API specified application?
Yes → **API**

No

Steam, gas and liquid application with low capacity in relation to valve size?
Yes → **Modulate Action**

No

Required Orifice letter?
Orifice ≥ F → **High Performance**
Orifice ≤ F → **Compact Performance**

Additional components beyond safety valves
Yes → **Best Availability**

Medium-controlled

Spring loaded

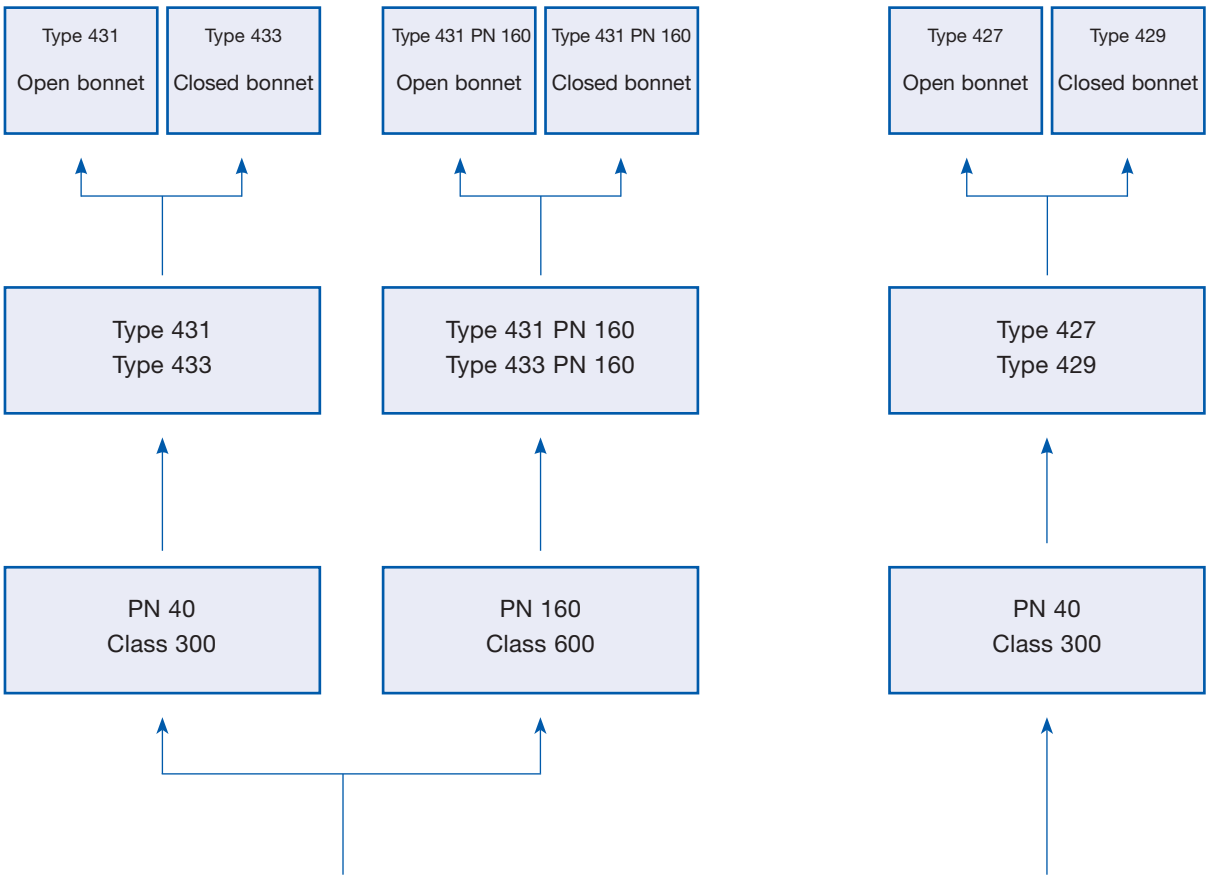
Safety Valves

Change-over valve

Bursting disc

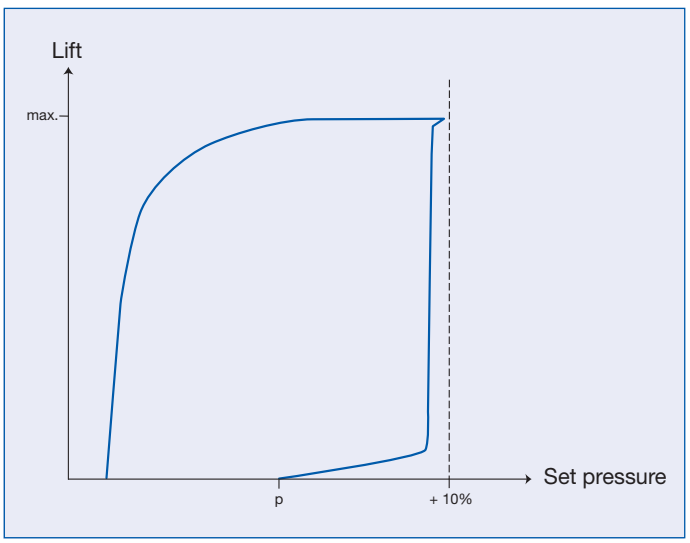
Valve finder

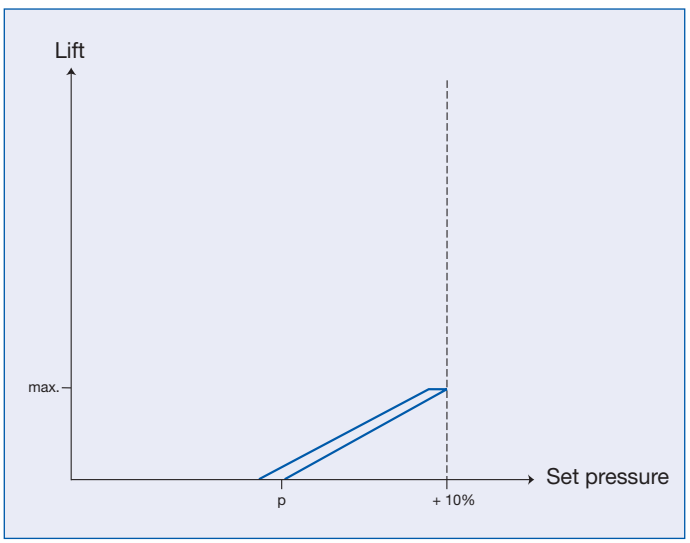
How to find the right Modulate Action Safety Valve



Standard Safety Valve
acc. to definition AD 2000-Merkblatt A2
for medium capacities with a large proportional range
Mainly used for thermal expansion.

Proportional Safety Valve
acc. to definition AD 2000-Merkblatt A2
with linear opening and closing characteristics
proportional to increasing or falling pressure
Mainly used with incompressible media





How to find the right
Modulate Action Safety Valve

Valve selection

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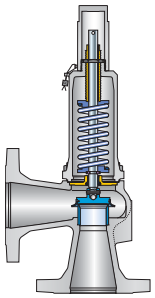
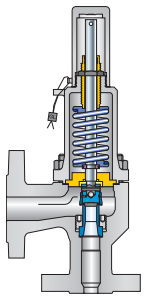
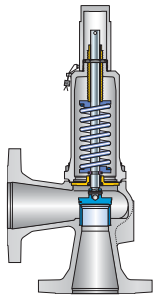






Valve size

Type	431 / 433	433 PN 160	427 / 429
min.	DN 15	DN 15	DN 15
	1/2"	1/2"	1/2"
max.	DN 150	DN 15	DN 150
	6"	1/2"	6"

Materials

	Type	431 / 433	433 PN 160	427 / 429
0.6025	Cast iron	✓	–	–
0.7043	Ductile 60-40-18	✓	–	✓
1.0619	WCB	✓	✓	✓
1.4408	CF8M	✓	✓	✓

Set pressure

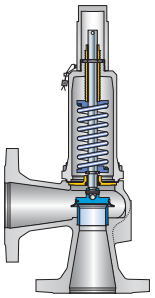
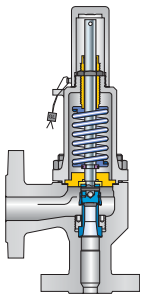
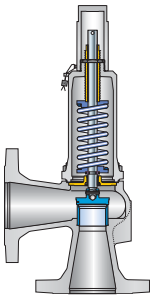
Type	431 / 433	433 PN 160	427 / 429
Metric units min. [bar]	0.2	0.3	1.5
Metric units max. [bar]	40	160	40

Temperature application range

Type	431 / 433	433 PN 160	427 / 429
According to DIN EN min. [°C]	-270	-270	-270
According to DIN EN max. [°C]	450	450	450

Valve selection

LESER

Capacity

Type		431 / 433	433 PN 160	427 / 429
		Attention: Series 433 and 429 are CE certified, however not according to ASME.		
$LEO_{S/G}$	min.	0.111	0.111	0.023
$LEO_{S/G}$	max.	4.016	0.111	1.374
$Orifice_{S/G}$	min.	1.0 x D	1.0 x D	1.0 x D
$Orifice_{S/G}$	max.	1.1 x M	1.0 x D	1.07 x J
LEO_{L}	min.	0.115	0.129	The required discharge coefficient for liquids of α_w 0.05 acc. to AD 2000-Merkblatt A2 is not reached, therefore a component test is not possible.
LEO_{L}	max.	3.963	0.127	
$Orifice_{L}$	min.	1.0 x D	1.2 x D	
$Orifice_{L}$	max.	1.1 x M	1.2 x D	

Coefficient of discharge

Type	431 / 433				433 PN 160		427 / 429
	DN 15 O-ring disc	DN 15 Metal seat	DN 20	DN 25 – 150	DN 15 O-ring disc	DN 15 Metal seat	
Pressure increase acc. to DIN EN ISO 4126	10%	10%	10%	10%	10%	10%	10%
K_{dr} / α_w S/G	0.59	0.62	0.29	0.38	0.59	0.62	0.13
K_{dr} / α_w L	0.47	0.48	0.19	0.25	0.47	0.48	The required discharge coefficient for liquids of α_w 0.05 acc. to AD 2000-Merkblatt A2 is not reached, therefore a component test is not possible.

Approvals

Type			431 / 433	433 PN 160	427 / 429
Country	Code	Media		HDD	
Europe	DIN EN ISO 4126-1 CE marking	S/G/L	072020111Z0008/0/06	072020111Z0008/0/06	072020111Z0008/0/04
Germany	AD 2000-Merkblatt A2	S/G/L	TÜV SV 577	TÜV SV 577	TÜV SV 610
China	AQSIQ	S/G/L	✓	✓	–
Eurasian Custom Union	EAC	S/G/L	✓	✓	✓
Classification societies					
Bureau Veritas		BV	✓	✓	On request
ClassNK NIPPON Kaiji Kyokai		NK	✓	✓	
Det Norske Veritas		DNV	✓	✓	
Germanischer Lloyd		GL	✓	✓	
Lloyd`s Register EMEA		LREMEA	✓	✓	
Registro Italiano Navale		RINA	✓	✓	

How to use

LESER

General signs and symbols	
*	Standard
✓	Available
–	Not possible

Signs and symbols for flange drillings and flange facings	
*	Standard construction, specification of an option code not necessary
(*)	Flange dimensions with exception of flange thickness as per flange standards (e.g. ASME B16.5) Flange thickness is less (max. 2 mm), see “Hole patterns valid for different pressure ratings”
–	Flange hole pattern / sealing surface not possible

Option code for flange drillings and dimensions, e.g. H50	
H50	Flange drilling as specified in flange standard Outer flange diameter, flange thickness and height of flange facing may be larger, see “Dimensions”
(H50)	Flange dimensions except flange thickness are in accordance with standards (e.g. ASME B16.5) Flange thickness is smaller (max. 2 mm), see “Multiple pressure rating”
Stock Fini	Flange drilling as specified in standard. Flange thickness may be less than the flange outer diameter as specified in the standard, however complete nut support area is available
Option code for flange sealing surfaces, e.g. L36	
L36	Flange facing as specified in standard (e.g. Flange facing inlet Type B2 “smooth finish”)

General information concerning flange drillings and flange facings

Multiple pressure rating	The flange standard shows the same drilling, facing and outer diameter for several pressure ratings, e.g. from PN 16 to PN 40. Due to the pressure rating of the body, LESER fulfills the requirements for flange thickness, e.g. PN 16 but not PN 40.
Smooth Finish	In the applicable MSS SP-6 (Edition 2001), “Smooth Finish” is no longer mentioned. In MSS SP-6 (Edition 1980), “Smooth Finish” was defined as the surface quality of the flange with “250 µinch (6.3 µm) AARH max.”. LESER supplies flange sealing surfaces according to ASME B16.5 – 1996, Paragraph 6.4.4.3: “Either a serrated concentric or serrated spiral finish resulting in service finish from 125 to 250 µinch average roughness shall be furnished” This finish meets the requirements of MSS SP-6 (Edition 1980), which is not valid anymore!
Stock Finish	“Stock Finish” is not defined in any technical standard. If “Stock Finish” is specified in the order, then LESER delivers standard flange sealing surfaces as per DIN or ASME (marked with * in the “Flange sealing surfaces” table for each series).

Pressures – Symbols in use

Symbols	Name	Metric units
p	Set pressure	bar
p_0	Absolute pressure in vessel	
	$= p \cdot 1.1 + 1.013$	bar_a
	$= p \cdot 1.1 + 14.5$	
	The overpressure is 10% of the set pressure, but at least 0.2 bar	
p_a	Back pressure	bar
p_{a0}	Absolute back pressure	
	$(= p_a + 1.013)$	bar_a
	$(= p_a + 14.5)$	

Materials

In the table below, you will find a list of the LESER material codes. Please take into consideration that
– material quality certificate 3.1 acc. to EN 10204 is available for each body material
– material quality certificate 3.1, which certifies different materials, is available for many materials.

Material code	Valve body with flanges	Body material is certified acc. to 3.1 (EN 10204) for the following materials	
		acc. to DIN EN	acc. to ASME
xxx1.xxxx	Grey iron	0.6025	Cast iron
xxx2.xxxx	Carbon steel	1.0619	WCB, WCC
xxx4.xxxx	Stainless steel	1.4408, 1.4581	CF8M (Charpy Test at -196°C), CF10M
xxx5.xxxx	Nodular cast iron	0.7043	Ductile Gr. 60-40-18
xxx7.xxxx	High temperature carbon steel	1.7357	WC6

How to use

Example of determination of K_{dr}/α_w: Type 433 DN 25

Type 431, 433

Determination of coefficient of discharge in case of a lift restriction or back pressure

h = Lift [mm]
d_0 = Flow diameter [mm] of selected safety valve see "Article Numbers" table
h/d_0 = Ratio of lift / flow diameter
p_{a0} = Back pressure [bar_a]
p_0 = Set pressure [bar_a]
p_{a0}/p_0 = Ratio of back pressure / set pressure
K_{dr} = Coefficient of discharge acc. to DIN EN ISO 4126-1
α_w = Coefficient of discharge acc. to AD 2000-Merkblatt A2
K_b = Back pressure correction factor acc. to API 520 Section 3.3

Diagram for evaluation of ratio of lift / flow diameter (h/d_0) in reference to the coefficient of discharge (K_{dr}/α_w)

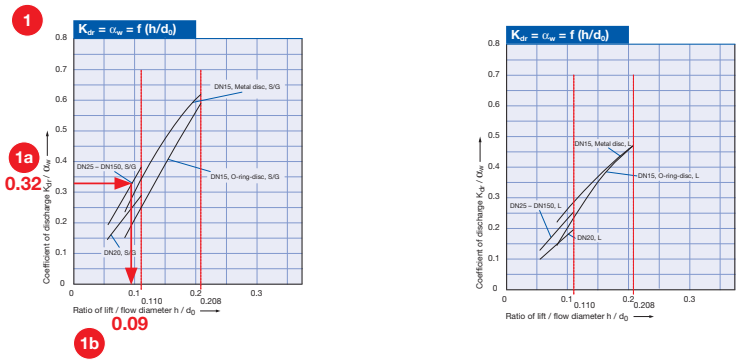
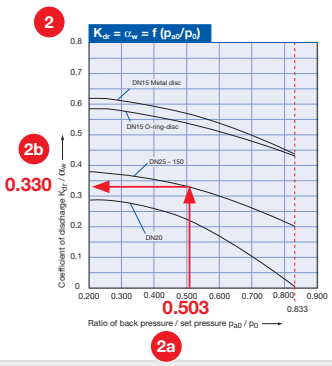


Diagram for evaluation of coefficient of discharge (K_{dr}/α_w) or K_b in reference to the ratio of back pressure / set pressure (p_{a0}/p_0)



Explanation

Example – Type 433, flow diameter d_0 = 13 mm, Lift h = 3.0 mm, K_{dr}/α_w D/G = 0.81

1 Diagram 1
Determining the restricted lift due to reduced K_{dr}/α_w

Step	Description	Example
1	Calculation of the necessary coefficient of discharge for the selected safety valve. The applicable formulas are to be taken from from the codes and standards.	1a $K_{dr}/\alpha_w = 0.32$
2	Choose the starting point (0.3) on the Y-axis of the diagram	
3	Draw a horizontal line to determine the intersection point of the curves.	
4	Draw a vertical line through the intersection point on the X-axis to determine the ratio of lift / flow diameter (h/d_0).	1b $h/d_0 = 0.09$
5	Calculation of the lift stopper with the formula $h = d_0 \times h/d_0$. (To order the lift restriction, please choose option code J51; see page 99/20).	h = 18 x 0.09 h = 1.62 mm

2 Diagram 2
Determination of reduced K_{dr}/α_w or K_b[1)] due to back pressure

Step	Description	Example
1	Calculation of the back pressure p_{a0}/p_0 with the use of the set pressure p_0 [bar_a] 0.962 and the back pressure p_{a0} [bar_a] 1.913	2a $p_{a0}/p_0 = 0.503$
2	Choose the starting point (0.503) on the X-axis of the diagram	
3	Draw a vertical line to determine the intersection point of the curves.	
4	Draw a horizontal line through the intersection point on the Y-axis to determine the reduced coefficient of discharge K_{dr}/α_w	2b $K_{dr}/\alpha_w = 0.330$
5	Calculation of the valve with the established coefficient of discharge K_{dr}/α_w or the correction factor for back pressure K_b	

How to use

LESER

Sample capacity table –
How to selcet capacities for steam: Type 433 DN 25

Capacity table – steam

Capacities for satureted steam according to AD 2000-Merkblatt A2,
based on set pressure plus 10% overpressure.

Metric units — (1) **AD 2000-Merkblatt A2** [kg/h]

	O-ring disc	Metal seat										
DN_I	15	15	20	(3) 25	(2) 32	40	50	65	80	100	125	150
DN_O	15	15	20	(3) 25	(4) 32	40	50	65	80	100	125	150
Actual Orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
Actual Orifice area A_0 [mm²]	113	113	254	(5) 254	254	416	661	1075	1662	2827	4301	6648
$LEO_{S/G}$*) [inch²]	0.111	0.111	0.117	(6) 0.154	0.154	0.251	0.399	0.650	1.004	1.708	2.598	4.016
Set pressure [bar] (7)	**Capacity** [kg/h]											
0.2				34	34	55	88	142	220	375	570	880
0.5	55	53	30	63	63	102	163	265	410	697	1060	1638
1	78	78	67	101	(8) 101	165	263	428	661	1125	1711	2645

Explanation — Type 433 DN 25

No.	Name		Metric units	Example
1	Code			AD 2000-Merkblatt A2
2	Nominal inlet diameter	DN_I		25
3	Nominal outlet diameter	DN_O		25
4	Actual orifice diameter	d_0	[mm]	18
5	Actual orifice area	A_0	[mm²]	254
6	LESER Effective Orifice	$LEO_{S/G}$	[inch²]	0.154
7	Set pressure		[bar_g]	1
8	Capacity		[kg/h]	101
9	Calculation basis		See table on page 00/10	

9

Calculation basis

		Metric units	
Code		Capacity calculation according to AD 2000-Merkblatt A2	
Medium			
Steam (Saturated steam)	Standard conditions	Steam table IAPWS-IF97 IAPWS Industrial Formulation for the Thermodynamic Properties of water and steam	[kg/h]
Air	Standard conditions	0 °C and 1013 mbar	[m_n^3/h]
Water	Standard conditions	20 °C	[10^3 kg/h]
All media			
	Design pressure	Set pressure plus 10% overpressure	
	Design pressure for low set pressures	Capacity at 1 bar (14.5 psig) and lower are calculated at 0.1 bar (1.45 psig) overpressure.	

Example — Determining the design pressure

Metric units	
Set pressure	Design pressure
10 bar	10 bar + 10% overpressure = 11 bar
0.5 bar	0.5 bar + 0.1 bar overpressure = 0.6 bar

6

LESER Effective Orifice

Pressure relief devices may be initally sized using the equations shown in API RP 520, Section 3.6 to 3.10 for steam, gasses, liquids, or two-phase flow. These equations use the coefficient of discharge (S/G 0.975, L 0.650) and the effective area (acc. to API Std. 526, Fifth Edition, June 2002, table 1), which are independent of the valve design.

This way, the designer can determine a preliminary valve size. By using the LESER Effective Orifice (LEO), the designer can select the safety valve directly according to the calculation. A verification with the selected actual orifice area and the accorded coefficient of discharge is not necessary.

$LEO_{S/G}$	**LESER Effective Orifice (for steam and gasses)**	**[inch²]**	see page 00/11
LEO_L	**LESER Effective Orifice (for liquids)**	**[inch²]**	see page 00/12

For further information refer to LESER ENGINEERING at www.leser.com/engineering.

The table is based on the accorded coefficient of discharge for steam and gases for ASME certified LESER safety valves.
The associated K-values can be seen in the “K-values” column.

$$LEO_{S/G}\ [inch^2] = A_0\ [inch^2] \cdot \left(\frac{K}{0.975}\right)$$

LEO$_{S/G}$ LESER Effective Orifice (for steam, gas and vapor)

Orifice acc. to API 526	LESER series	DN	Inlet size	d_0 [mm]	K_{dr}/α_w-values K-value[1)]	LEO$_{S/G}$ [inch^2]	% of next higher orifice	% of next lower orifice
	429	15	1/2"	12.0	0.130	**0.023**	21.2%	
	429	20	3/4"	18.0	0.130	**0.053**	47.8%	
	429	25	1"	18.0	0.130	**0.053**	47.8%	
	429	32	1 1/2"	18.0	0.130	**0.053**	47.8%	
	429	40	1 1/2"	23.0	0.130	**0.086**	78.1%	
	433	15 O-ring disc	1/2"	12.0	0.590	**0.106**	96.4%	
D						**0.110**	**100.0%**	**100.0%**
	433	15 Metal seat	1/2"	12.0	0.620	**0.111**	56.9%	101.3%
	433	20	3/4"	18.0	0.290	**0.117**	56.9%	106.7%
	429	50	2"	29.0	0.130	**0.137**	69.6%	124.1%
	433	25	1"	18.0	0.380	**0.154**	78.4%	139.8%
	433	32	1 1/2"	18.0	0.380	**0.154**	78.4%	139.8%
E						**0.196**	**100.0%**	**100.0%**
	429	65	2 1/2"	37.0	0.130	**0.222**	72.4%	113.4%
	433	40	1 1/2"	23.0	0.380	**0.251**	81.8%	128.1%
F						**0.307**	**100.0%**	**100.0%**
	429	80	3"	46.0	0.130	**0.343**	68.3%	111.9%
	433	50	2"	29.0	0.380	**0.399**	79.3%	130.0%
G						**0.503**	**100.0%**	**100.0%**
	429	100	4"	60.0	0.130	**0.584**	74.4%	116.2%
	433	65	2 1/2"	37.0	0.380	**0.650**	82.7%	129.1%
H						**0.785**	**100.0%**	**100.0%**
	429	125	5"	74.0	0.130	**0.889**	69.1%	113.2%
	433	80	3"	46.0	0.380	**1.004**	78.0%	127.9%
J						**1.287**	**100.0%**	**100.0%**
	429	150	6"	92.0	0.130	**1.374**	74.7%	106.7%
	433	100	4"	60.0	0.380	**1.708**	92.9%	132.7%
K						**1.838**	**100.0%**	**100.0%**
	433	125	5"	74.0	0.380	**2.598**	91.1%	141.4%
L						**2.853**	**100.0%**	**100.0%**
M						**3.600**	**100.0%**	**100.0%**
	433	150	6"	92.0	0.380	**4.016**	92.5%	116.3%
N						**4.340**	**100.0%**	**100.0%**

[1)] There is no ASME approval for the LESER Modulate Action Series 433 and 429. In order to be able to still use the LEO and hence obtain compatibility to the orifice acc. to API 526, the K_{dr}/α_w-value (approval acc. to DIN EN ISO 4126-1 and AD 2000-Merkblatt A2) was brought into the calculation.

The table is based on the accorded coefficient of discharge for liquids for ASME certified LESER safety valves.
The associated K-values can be seen in the “K-values” column.

$$LEO_L\ [inch^2] = A_0\ [inch^2] \cdot \left(\frac{K}{0.650}\right)$$

LEO$_L$ LESER Effective Orifice (for liquids)

Orifice acc. to API 526	LESER series	DN	Inlet size	d_0 [mm]	K_{dr}/α_w-values K-value[1]	LEO$_L$ [inch^2]	% of next higher orifice	% of next lower orifice
D						**0.110**	**100.0%**	**100.0%**
	433	20	3/4"	18.0	0.190	**0.115**	58.8%	104.8%
	433	15 O-ring disc	1/2"	12.0	0.590	**0.127**	64.8%	115.5%
	433	15 Metal seat	1/2"	12.0	0.480	**0.129**	66.0%	117.7%
	433	25	1"	18.0	0.250	**0.152**	77.4%	137.9%
	433	32	1 1/2"	18.0	0.250	**0.152**	77.4%	137.9%
E						**0.196**	**100.0%**	**100.0%**
	433	40	1 1/2"	23.0	0.250	**0.248**	80.7%	126.4%
F						**0.307**	**100.0%**	**100.0%**
	433	50	2"	29.0	0.250	**0.394**	78.3%	128.3%
G						**0.503**	**100.0%**	**100.0%**
	433	65	2 1/2"	37.0	0.250	**0.641**	81.7%	127.4%
H						**0.785**	**100.0%**	**100.0%**
	433	80	3"	46.0	0.250	**0.991**	77.0%	126.2%
J						**1.287**	**100.0%**	**100.0%**
	433	100	4"	60.0	0.250	**1.686**	91.7%	131.0%
K						**1.838**	**100.0%**	**100.0%**
	433	125	5"	74.0	0.250	**2.564**	89.9%	139.5%
L						**2.853**	**100.0%**	**100.0%**
M						**3.600**	**100.0%**	**100.0%**
	433	150	6"	92.0	0.250	**3.963**	91.3%	110.1%
N						**4.340**	**100.0%**	**100.0%**

[1] There is no ASME approval for the LESER Modulate Action Series 433. In order to be able to still use the LEO and hence obtain compatibility to the orifice acc. to API 526, the K_{dr}/α_w-value (approval acc. to DIN EN ISO 4126-1 and AD 2000-Merkblatt A2) was brought into the calculation.

NACE

LESER

NACE-Compliant Safety Valves

General requirements for safety valves in sour gas service

Media such as sour gas, which is especially common in oil and gas production, can have a corrosive effect on safety valves. The National Association of Corrosion Engineers (NACE) is a global association that deals with the development of corrosion control measures and defines these in standards such as NACE MR0175 and NACE MR0103. Both of these standards identify requirements for metallic materials used for piping and related components, to include safety valves, in the oil and gas industry.

The aim here is to protect the environment from escaping media. The focus is on the prevention of various types of corrosion (e.g. sulfur-induced stress corrosion cracking) of used materials that can be caused by acidic media.

Both standards define the maximum material hardness for prevention of corrosion damage because hardness increases corrosion resistance. NACE MR0175 provides requirements for materials used in oil and gas extraction (upstream) whereas NACE MR0103 specifies less stringent requirements for materials used in refinery processes (downstream).

Various components of LESER safety valves can be constructed in corrosion resistant materials using a level concept. This way, LESER can offer efficient safety valve solutions according to the requirements of NACE MR0175 and NACE MR0103 for different application conditions.

Norms

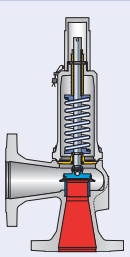
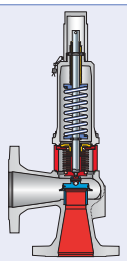
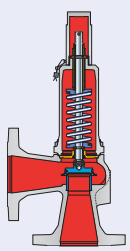
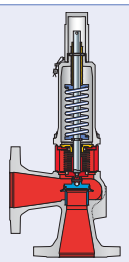
NACE MR0175/ISO15156 – 2003

1 Scope: This part of NACE MR0175/ISO 15156 describes general principles and gives requirements and recommendations for the selection and qualification of metallic materials for service in equipment used in oil and gas production and in natural gas sweetening plants in H_2S-containing environments, where the failure of such equipment could pose a risk to the health and safety of the public and personnel or to the environment.

NACE MR0103 – 2012

- 1.1.1: This standard establishes material requirements for resistance to SSC in sour petroleum refining and related processing environments containing H_2S either as a gas or dissolved in an aqueous (liquid water) phase with or without the presence of hydrocarbon.
- 1.1.2: Specifically, this standard is directed at the prevention of SSC of equipment (including pressure vessels, heat exchangers, piping, valve bodies, and pump and compressor cases) and components used in the refining industry.

Works standard: LDeS 3001.91

	Level 1		Level 2	
Part definition	Contact with the medium in closed position		Contact with the medium in opened position	
	Conventional	Balanced bellows	Conventional	Balanced bellows
Contact surfaces				
Safety valve operation	closed		opened	
Parts concerned	Body, seat, disc	Body, seat, disc	all	Body, seat, disc, bonnet spacer, bellows

LESER already uses NACE compliant materials as standard for many of its components. This means that material adjustments are required for only certain components – these are listed in the table below.

Necessary material modification NACE MR0175/ISO 15156 – 2003 (Option code N78) and NACE MR0103 – 2012 (Option code N77)

Type	Body material	Design	Part	Material	Option code	Material	Option code
4292 4332 4332 PN 160	1.0619 (WCB)	Conventional	Disc	1.4404 / 316L stellited	L44 / J25	1.4404 / 316L stellited	L44 / J25
			Spring	No adjustment required		Please select balanced bellows design, as Inconel spring is not available	–
		Balanced bellows	Disc	1.4404 / 316L stellited	L44 / J25	1.4404 / 316L stellited	L44 / J25
			Balanced bellows	1.4571 / 316Ti	J78	1.4571 / 316Ti	J78
4294 4334 4334 PN 160	1.4408 (CF8M)	Conventional	Spring	No adjustment required		Please select balanced bellows design, as Inconel spring is not available	–
		Balanced bellows	Balanced bellows	1.4571 / 316Ti	J78	1.4571 / 316Ti	J78

Type 431
Plain lever H3
Open bonnet
Conventional design

Type 431, 433

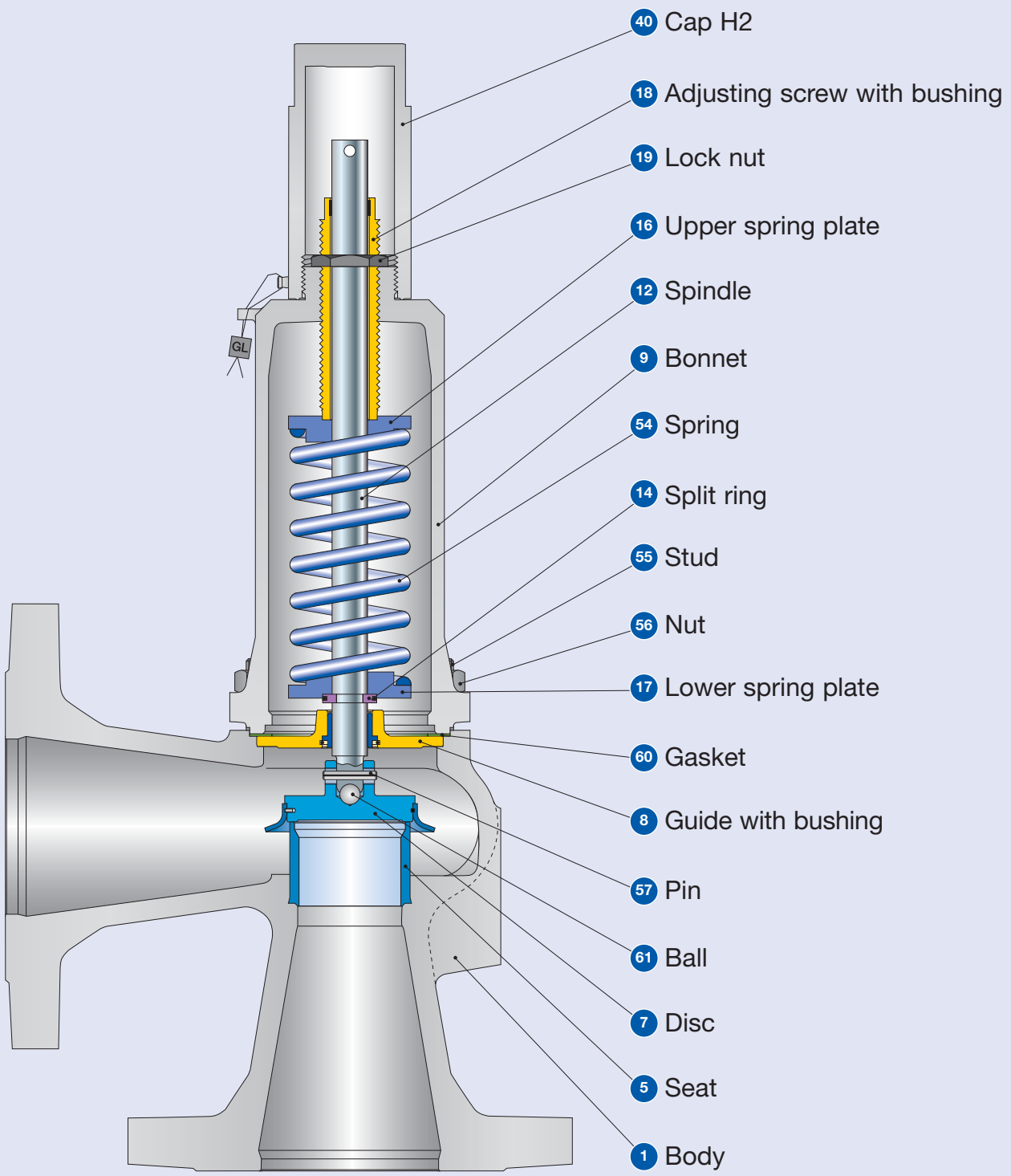
Flanged Safety Relief Valves - spring loaded

Type 433
Cap H2
Closed bonnet
Conventional design

Contents

LESER

Conventional design



Conventional design

Materials

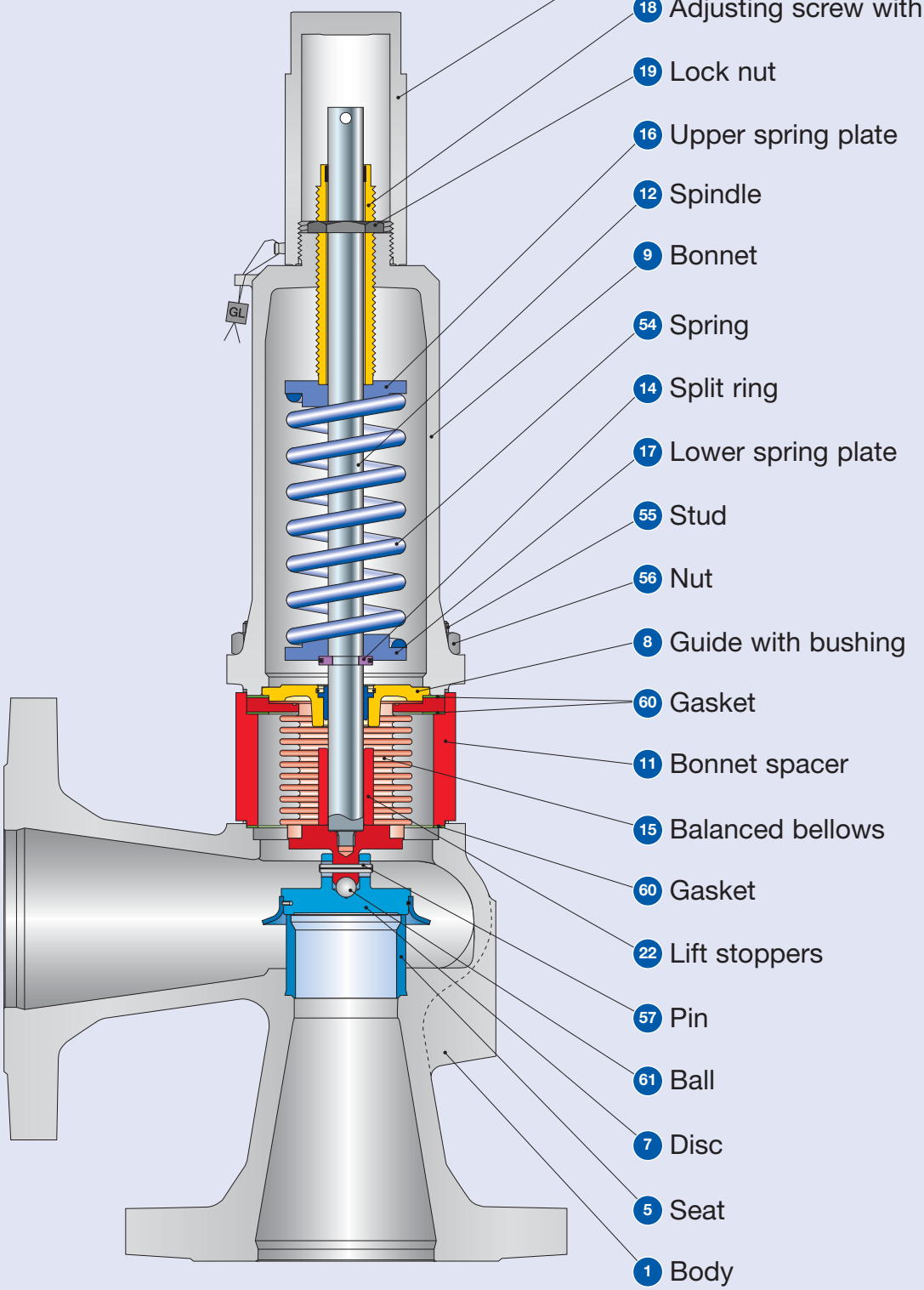
Item	Component	Type 4311 / 4331	Type 4315 / 4335	Type 4312 / 4332	Type 4334
1	**Body**	0.6025 Cast iron	0.7043 Ductile Gr. 60-40-18	1.0619 SA 216 WCB	1.4408 SA 351 CF8M
5	Seat	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
7	Disc	1.4122 Hardened stainless steel	1.4122 Hardened stainless steel	1.4122 Hardened stainless steel	1.4404 316L
8	Guide	1.4104, 1.0501 Chrome or carbon steel	1.4104, 1.0501 Chrome or carbon steel	1.4104, 1.0501, 1.0570 Chrome or carbon steel	1.4404 316L
	with bushing	1.4104 tenifer Chrome steel tenifer	1.4104 tenifer Chrome steel tenifer	1.4104 tenifer Chrome steel tenifer	– –
9	**Bonnet**	0.7040 Ductile Gr. 60-40-18	0.7040 Ductile Gr. 60-40-18	0.7040 Ductile Gr. 60-40-18	1.4408 SA 351 CF8M
12	Spindle	1.4021 420	1.4021 420	1.4021 420	1.4404 316L
14	Split ring	1.4104 Chrome steel	1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L
16/17	Spring plate	1.0718 Steel	1.0718 Steel	1.0718 Steel	1.4404 316L
18	Adjusting screw with bushing	1.4104 PTFE Chrome steel PTFE	1.4104 PTFE Chrome steel PTFE	1.4104 PTFE Chrome steel PTFE	1.4404 PTFE 316L PTFE
19	Lock nut	1.0718 Steel	1.0718 Steel	1.0718 Steel	1.4404 316L
40	Cap H2	1.0460 SA 105	1.0460 SA 105	1.0460 SA 105	1.4404 316L
54	Spring, standard	1.1200, 1.8159, 1.7102 Carbon steel	1.1200, 1.8159, 1.7102 Carbon steel	1.1200, 1.8159, 1.7102 Carbon steel	1.4310 Stainless steel
	Spring, optional	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel	– –
55	Stud	1.1181 Steel	1.1181 Steel	1.1181 Steel	1.4401 B8M
56	Nut	1.0501 2H	1.0501 2H	1.0501 2H	1.4401 8M
57	Pin	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel
60	Gasket	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316
61	Ball	1.3541 Hardened stainless steel	1.3541 Hardened stainless steel	1.3541 Hardened stainless steel	1.4401 316

Please note:

- LESER reserves the right to make changes.
- If several materials are specified LESER defines the material.
- LESER may use higher quality materials without giving prior notice.
- Each component can be constructed of another material according to the customer's specification.
- All components exposed to pressure are highlighted in bold. The material will be specified according to DIN and ASTM here.

LESER

Balanced bellows design



40 Cap H2
18 Adjusting screw with bushing
19 Lock nut
16 Upper spring plate
12 Spindle
9 Bonnet
54 Spring
14 Split ring
17 Lower spring plate
55 Stud
56 Nut
8 Guide with bushing
60 Gasket
11 Bonnet spacer
15 Balanced bellows
60 Gasket
22 Lift stoppers
57 Pin
61 Ball
7 Disc
5 Seat
1 Body

LESER

Balanced bellows design

Materials

Item	Component	Type 4311 / 4331	Type 4315 / 4335	Type 4312 / 4332	Type 4334
1	**Body**	0.6025 Cast iron	0.7043 Ductile Gr. 60-40-18	1.0619 SA 216 WCB	1.4408 SA 351 CF8M
5	Seat	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
7	Disc	1.4122 Hardened stainless steel	1.4122 Hardened stainless steel	1.4122 Hardened stainless steel	1.4404 316L
8	Guide	1.4104, 1.0501 Chrome or stainless steel	1.4104, 1.0501 Chrome or stainless steel	1.4104, 1.0501, 1.0570 Chrome or stainless steel	1.4404 316L
	with bushing	1.4104 tenifer Chrome steel	1.4104 tenifer Chrome steel	1.4104 tenifer Chrome steel	– –
9	**Bonnet**	0.7040 Ductile Gr. 60-40-18	0.7040 Ductile Gr. 60-40-18	0.7040 Ductile Gr. 60-40-18	1.4408 SA 351 CF8M
11	Bonnet spacer	1.4404 316L	1.4404 3316L	1.4404 316L	1.4404 316L
12	Spindle	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
14	Split ring	1.4104 Chrome steel	1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L
15	Balanced bellows	1.4571 316Ti	1.4571 316Ti	1.4571 316Ti	1.4571 316Ti
16/17	Spring plate	1.0718 Steel	1.0718 Steel	1.0718 Steel	1.4404 316L
18	Adjusting screw with bushing	1.4104 PTFE Chrome steel PTFE	1.4104 PTFE Chrome steel PTFE	1.4104 PTFE Chrome steel PTFE	1.4404 PTFE 316L PTFE
19	Lock nut	1.0718 Steel	1.0718 Steel	1.0718 Steel	1.4404 316L
22	Lift stoppers	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
40	Cap H2	1.0460 SA 105	1.0460 SA 105	1.0460 SA 105	1.4404 316L
54	Spring, standard	1.1200, 1.8159, 1.7102 Chrome steel	1.1200, 1.8159, 1.7102 Chrome steel	1.1200, 1.8159, 1.7102 Chrome steel	1.4310 Stainless steel
	Spring, optional	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel	– –
55	Stud	1.4401 B8M	1.4401 B8M	1.4401 B8M	1.4401 B8M
56	Nut	1.4401 8M	1.4401 8M	1.4401 8M	1.4401 8M
57	Pin	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel
60	Gasket	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316
61	Ball	1.3541 Hardened stainless steel	1.3541 Hardened stainless steel	1.3541 Hardened stainless steel	1.4401 316

Please note:

- LESER reserves the right to make changes.
- If several materials are specified LESER defines the material.
- LESER may use higher quality materials without giving prior notice.
- Each component can be constructed of another material according to the customer's specification.
- All components exposed to pressure are highlighted in bold. The material will be specified according to DIN and ASTM here.

LESER

How to order – Example for numbering system – Type 433

1 Article Number	2 Set Pressure	3 Connections	
4332.4192	5 bar_g	H45	

1	2	3	4
433	2	419	2

1 Valve type 431, 433

Type 433 – with closed bonnet

Type 431 – with open bonnet

2 Material code

Code	Body material
1	0.6025 (cast iron)
2	1.0619 (WCB)
4	1.4408 (CF8M)
5	0.7043 (Ductile Gr. 60-40-18)

3 Valve code

Automatically determines nominal diameter and body material (see page 01/09).

4

Code	Lifting device	
2	Gas-tight cap	H2
3	Plain lever	H3
4	Packed lever	H4
5	Plain lever with open bonnet	H3

Please enter the units (in gauge)!

The specified pressure range may not be exceeded!

See page 01/14.

LESER

4 Options

J22			

Type 431, 433		Option code
• O-ring disc		
CR	"K"	J21
EPDM	"D"	J22
FKM	"L"	J23
FFKM	"C"	J20
• Disc 1.4404 / 316L		L44
• Disc1.4404 / 316L stellited		J25
• Detachable lifting aid		J26
• Balanced bellows		
- Bonnet, open	(Type 431)	J68
- Bonnet, closed	(Type 433)	J78
• Elastomer bellows		J79
• High temperature alloy spring		X01
• Stainless steel spring		X04
• Adaptor for lift indicator	H4	J39
• Lift indicator		J93
• Test gag		
- Cap	H2	J70
- Packed lever	H4	J69
• Heating jacket		
- Couplings	G 3/8	H29
	G 3/4	H30
- Flange	DN 15	H31
	DN 25	H32
• Drain hole	G 1/4	J18
	G 1/2	J19
• Oil and grease free		J85
• Materials		
- NACE MR0175		N78
- NACE MR0103		N77

Option code applies only if not standard

5 Documentation

H01	L30	

Please select the necessary documentation:

Tests, Certifications:	Option code
DIN EN 10204-3.2: TÜV-Nord Certification for set pressure	M33
LESER CGA (Certificate for Global Application)	H03

- Acceptance test certificate 3.1 acc. to DIN EN 10204
- Declaration of conformity as per pressure equipment directive PED 97/23/EC

Material quality certificate:
DIN EN 10204-3.1

Component	Option code
Body	H01
Bonnet	L30
Cap / lever cover	L31
Disc	L23
Screws	N07
Nuts	N08

6 Code and Medium

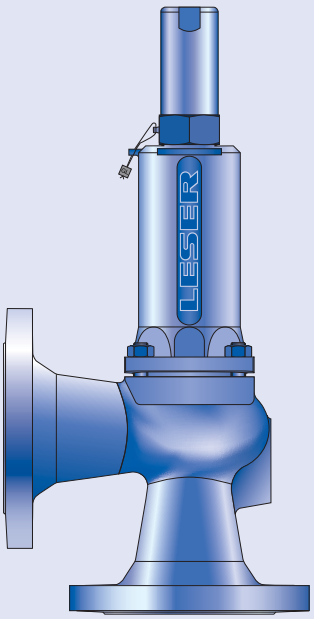
2.0

1	2
2	. 0

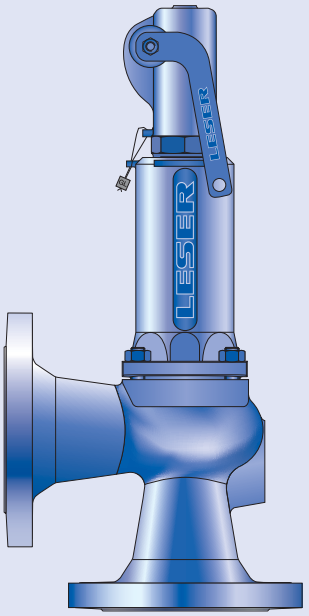
1 Code
2. CE / VdTUEV
3. ASME Section VIII + CE / VdTUEV

2 Medium
.0 steam / gases / liquids (only valid for CE / VdTUEV)

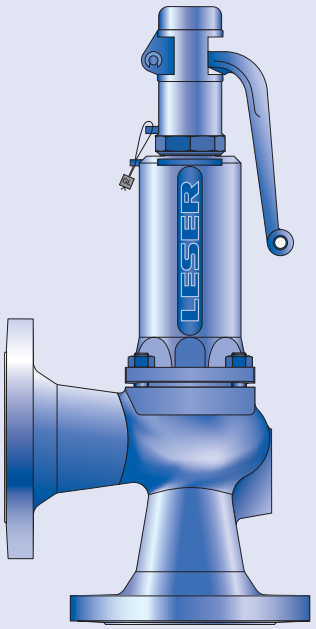
How to order – Article numbers



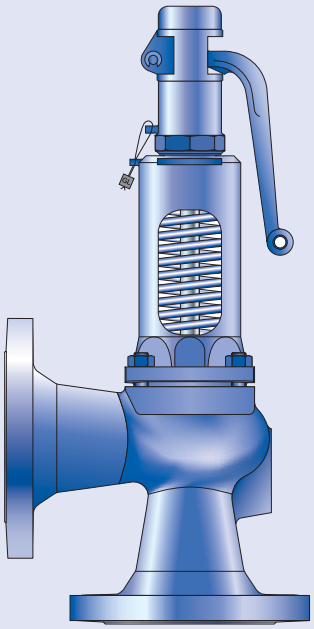
Type 433
Cap H2
Closed bonnet
Conventional design



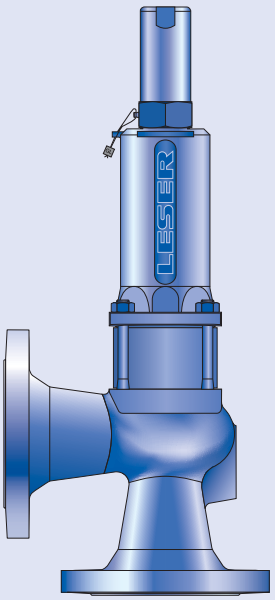
Type 433
Packed lever H4
Closed bonnet
Conventional design



Type 433
Plain lever H3
Closed bonnet
Conventional design



Type 431
Plain lever H3
Open bonnet
Conventional design



Type 433
Cap H2
Closed bonnet
Balanced bellows design

How to order – Article numbers

Article numbers

			O-ring disc	Metal disc										
		DN_I	15	15	20	25	32	40	50	65	80	100	125	150
		DN_O	15	15	20	25	32	40	50	65	80	100	125	150
		Actual orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
		Actual orifice area A_0 [mm²]	113	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 0.6025 (cast iron)														
Bonnet closed	**H2**	Art.-No. **4331.**	**8502**	**3992**	**4012**	**4022**	**4032**	**4042**	**4052**	**4062**	**4072**	**4082**	–	–
	H3	Art.-No. **4331.**	**8503**	**3993**	**4013**	**4023**	**4033**	**4043**	**4053**	**4063**	**4073**	**4083**	–	–
	H4	Art.-No. **4331.**	**8504**	**3994**	**4014**	**4024**	**4034**	**4044**	**4054**	**4064**	**4074**	**4084**	–	–
open	**H3**	Art.-No. **4311.**	**8505**	**3995**	**4015**	**4025**	**4035**	**4045**	**4055**	**4065**	**4075**	**4085**	–	–
Body material: 0.7043 (Ductile Gr. 60-40-18)														
Bonnet closed	**H2**	Art.-No. **4335.**	**8532**	**8752**	**8762**	**8772**	**8782**	**8792**	**8802**	**8812**	**8822**	**8832**	–	–
	H3	Art.-No. **4335.**	**8533**	**8753**	**8763**	**8773**	**8783**	**8793**	**8803**	**8813**	**8823**	**8833**	–	–
	H4	Art.-No. **4335.**	**8534**	**8754**	**8764**	**8774**	**8784**	**8794**	**8804**	**8814**	**8824**	**8834**	–	–
open	**H3**	Art.-No. **4315.**	**8535**	**8755**	**8765**	**8775**	**8785**	**8795**	**8805**	**8815**	**8825**	**8835**	–	–
Body material: 1.0619 (WCB)														
Bonnet closed	**H2**	Art.-No. **4332.**	**8512**	**4122**	**4142**	**4152**	**4162**	**4172**	**4182**	**4192**	**4202**	**4212**	**4222**	**4232**
	H3	Art.-No. **4332.**	**8513**	**4123**	**4143**	**4153**	**4163**	**4173**	**4183**	**4193**	**4203**	**4213**	**4223**	**4233**
	H4	Art.-No. **4332.**	**8514**	**4124**	**4144**	**4154**	**4164**	**4174**	**4184**	**4194**	**4204**	**4214**	**4224**	**4234**
open	**H3**	Art.-No. **4312.**	**8515**	**4125**	**4145**	**4155**	**4165**	**4175**	**4185**	**4195**	**4205**	**4215**	**4225**	**4235**
Body material: 1.4408 (CF8M)														
Bonnet closed	**H2**	Art.-No. **4334.**	**8522**	**4252**	**4272**	**4282**	**4292**	**4302**	**4312**	**4322**	**4332**	**4342**	–	–
	H4	Art.-No. **4334.**	**8524**	**4254**	**4274**	**4284**	**4294**	**4304**	**4314**	**4324**	**4334**	**4344**	–	–

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Pressure temperature ratings

Metric units

		O-ring disc	Metal disc										
DN_I		15	15	20	25	32	40	50	65	80	100	125	150
DN_O		15	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter d_0 [mm]		12	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area A_0 [mm²]		113	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 0.6025 (cast iron)													
DIN flange	Inlet						**PN 16**					–	–
	Outlet						**PN 16**					–	–
Minimum set pressure	p [bar_g] S/G/L	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	–	–
Min. set pressure[1] standard bellows	p [bar_g] S/G/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	–	–
Min. set pressure low pressure bellows	p [bar_g] S/G/L	–	–	2.0	2.0	2.0	1.8	1.9	1.8	1.8	1.2	–	–
Maximum set pressure	p [bar_g] S/G/L	16	16	16	16	16	16	16	16	16	16	–	–
Max. set pressure with special spring	p [bar_g] S/G/L	16	16	16	16	16	16	16	16	16	16	–	–
Temperature[2] acc. to DIN EN	min. [°C]	-10					-10					–	–
	max. [°C]	+150					+300					–	–
Body material: 0.7043 (Ductile Gr. 60-40-18)													
DIN flange	Inlet						**PN 40**					–	–
	Outlet						**PN 40**					–	–
Minimum set pressure	p [bar_g] S/G/L	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	–	–
Min. set pressure[1] standard bellows	p [bar_g] S/G/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	–	–
Min. set pressure low pressure bellows	p [bar_g] S/G/L	–	–	2.0	2.0	2.0	1.8	1.9	1.8	1.8	1.2	–	–
Maximum set pressure	p [bar_g] S/G/L	40	40	40	40	40	40	40	35	35	30	–	–
Max. set pressure with special spring	p [bar_g] S/G/L	40	40	40	40	40	40	40	40	35	30	–	–
Temperature[2] acc. to DIN EN	min. [°C]	-45					-60					–	–
	max. [°C]	+150					+350					–	–

[1] Min. set pressure of standard bellows = max. set pressure of bellows for low set pressure.

[2] The temperature is limited by the soft seal material (see page 99/10). The values given here are valid for EPDM. Between -10°C and the lowest specified application temperature, proceed acc. to AD 2000-Merkblatt W10.

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Pressure temperature ratings

Metric units

		O-ring disc	Metal disc										
DN_I		15	15	20	25	32	40	50	65	80	100	125	150
DN_O		15	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter d_0 [mm]		12	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area A_0 [mm²]		113	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 1.0619 (WCB)													
DIN flange	Inlet						**PN 40**						
	Outlet						**PN 40**						
Minimum set pressure	p [bar_g] S/G/L	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Min. set pressure[1] standard bellows	p [bar_g] S/G/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Min. set pressure low pressure bellows	p [bar_g] S/G/L	–	–	2.0	2.0	2.0	1.8	1.9	1.8	1.8	1.2	1.2	on request
Maximum set pressure	p [bar_g] S/G/L	40	40	40	40	40	40	40	35	35	30	32	16
Max. set pressure with special spring	p [bar_g] S/G/L	40	40	40	40	40	40	40	40	35	30	32	16
Temperature[2] acc. to DIN EN	min. [°C]	-45	-85									–	–
	max. [°C]	+150	+450									–	–
Body material: 1.4408 (CF8M)													
DIN flange	Inlet						**PN 40**					–	–
	Outlet						**PN 40**					–	–
Minimum set pressure	p [bar_g] S/G/L	0.3	0.3	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	–	–
Min. set pressure[1] standard bellows	p [bar_g] S/G/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	–	–
Min. set pressure low pressure bellows	p [bar_g] S/G/L	–	–	2.0	2.0	2.0	1.8	1.9	1.8	1.8	1.2	–	–
Maximum set pressure	p [bar_g] S/G/L	40	40	40	40	40	40	31.6	20.2	25	22	–	–
Max. set pressure with special spring	p [bar_g] S/G/L	40	40	40	40	40	40	40	26	25	22	–	–
Temperature[2] acc. to DIN EN	min. [°C]	-45	-270									–	–
	max. [°C]	+150	+400									–	–

[1] Min. set pressure of standard bellows = max. set pressure of bellows for low set pressure.

[2] The temperature is limited by the soft seal material (see page 99/10). The values given here are valid for EPDM. Between -10°C and the lowest specified application temperature, proceed acc. to AD 2000-Merkblatt W10.

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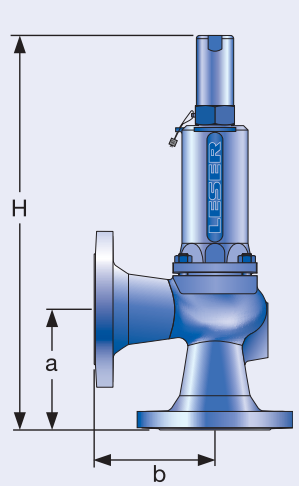
Dimensions and weights

Metric units

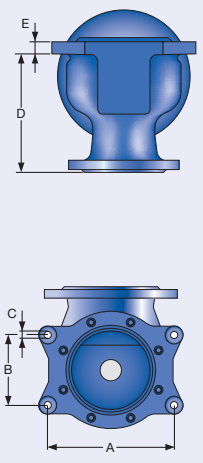
		O-ring disc	Metal disc										
	DN_I	15	15	20	25	32	40	50	65	80	100	125	150
	DN_O	15	15	20	25	32	40	50	65	80	100	125	150
	Actual orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
	Actual orifice area A_0 [mm²]	113	113	254	254	254	416	661	1075	1662	2827	4301	6648
Weight [kg]		5	5	6	6	8	9	12	15	20	33	48	65
	with bellows	6.3	6.3	6.4	6.4	8.4	9.6	13	16	21.6	35.6	52.1	78.4
Centre to face [mm]	Inlet a	90	90	95	100	105	115	125	145	155	175	200	225
	Outlet b	90	90	95	100	105	115	125	145	155	175	200	225
Height (H4) [mm]	Standard H max.	310	310	315	320	325	335	360	475	530	605	745	870
	Bellows H max.	362	362	345	350	360	390	425	535	600	680	825	965
Support brackets [mm]	A												277
	B												160
(Drilled only on request,	C												Ø 18
option code H42)	D												278
	E												21

Body material: 0.6025 (cast iron)				
DIN flange[1)]	Inlet	PN 16	–	–
	Outlet	PN 16	–	–
Body material: 0.7043 (Ductile Gr. 60-40-18)				
DIN flange[1)]	Inlet	PN 40	–	–
	Outlet	PN 40	–	–
Body material: 1.0619 (WCB)				
DIN flange[1)]	Inlet	PN 40		
	Outlet	PN 40		
Body material: 1.4408 (CF8M)				
DIN flange[1)]	Inlet	PN 40	–	–
	Outlet	PN 40	–	–

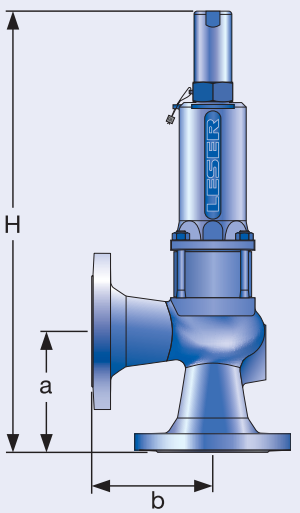
[1)] Standard flange class For other flange drillings, refer to page 01/14 and 01/15.



Conventional design



Support brackets



Balanced bellows design

Approvals

Approvals

		O-ring disc	Metal disc		
DN_I		15	15	20	25 – 150
DN_O		15	15	20	25 – 150
Actual orifice diameter d_0 [mm]		12	12	18	18 – 92
Actual orifice area A_0 [mm²]		113	113	254	254 – 6648
Europe			**Coefficient of discharge K_{dr}**		
PED / DIN EN ISO 4126-1	Approval-No.		07202011Z0008/0/06		
	S/G	0.59	0.62	0.29	0.38
	L	0.47	0.48	0.19	0.25
Germany			**Coefficient of discharge α_w**		
PED / AD 2000-Merkblatt A2 Standard safety valve	Approval-No.		TÜV SV 577		
	S/G	0.59	0.62	0.29	0.38
	L	0.47	0.48	0.19	0.25
China			**Coefficient of discharge α_w**		
AQSIQ	Approval-No.		For current Approval-No. see www.leser.com		
	S/G	0.59	0.62	0.29	0.38
	L	0.47	0.48	0.19	0.25
Eurasian Custom Union			**Coefficient of discharge α_w**		
EAC	Approval-No.		For current Approval-No. see www.leser.com		
	S/G	0.59	0.62	0.29	038
	L	0.47	0.48	0.19	0.25

Classification societies		**Homepage**
Bureau Veritas	BV	www.bureauveritas.com
ClassNK NIPPON Kaiji Kyokai	NK	www.classnk.or.jp
Det Norske Veritas	DNV	www.dnv.com
Germanischer Lloyd	GL	www.gl-group.com
Lloyd's Register EMEA	LREMEA	www.lr.org
Registro Italiano Navale	RINA	www.rina.org

The valid Approval-No. changes with each renewal of the approval.

For a sample certificate including the valid certification number see www.leser.com

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Flange drillings

Flange drillings

			O-ring disc	Metal disc										
		DN_I	15	15	20	25	32	40	50	65	80	100	125	150
		DN_O	15	15	20	25	32	40	50	65	80	100	125	150
		Valve size	1/2" x 1/2"	1/2" x 1/2"	3/4" x 3/4"	1" x 1"	1 1/4"x1 1/4"	1 1/2"x1 1/2"	2" x 2"	2 1/2" x 2 1/2"	3" x 3"	4" x 4"	5" x 5"	6" x 6"
		Actual orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
		Actual orifice area A_0 [mm²]	113	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 0.6025 (cast iron)														
Inlet	**DIN EN 1092**	PN 10	*	*	*	*	*	*	*	*	*	*	*	*
		PN 16	*	*	*	*	*	*	*	*	*	*	*	*
		PN 25	–	–	–	–	–	–	–	–	–	–	–	–
		PN 40	–	–	–	–	–	–	–	–	–	–	–	–
Outlet	**DIN EN 1092**	PN 10	*	*	*	*	*	*	*	*	*	*	*	*
		PN 16	*	*	*	*	*	*	*	*	*	*	*	*
Body material: 0.7043 (Ductile Gr. 60-40-18), 1.0619 (WCB), 1.4408 (CF8M)														
Inlet	**DIN EN 1092**	PN 10	*	*	*	*	*	*	*	H44	H44	H44	H44	H44
		PN 16	*	*	*	*	*	*	*	H45	H45	H45	H45	H45
		PN 25	*	*	*	*	*	*	*	*	*	*	*	*
		PN 40	*	*	*	*	*	*	*	*	*	*	*	*
	ASME B16.5	CL150	H64	H64	H64	H64	H64	H64	H64	H64	H64	[H64]	H64	H64
		CL300	[H65]	[H65]	–	H65	H65	–	[H65]	[H65]	–	–	–	–
Outlet	**DIN EN 1092**	PN 10	*	*	*	*	*	*	*	H50	H50	H50	H50	H50
		PN 16	*	*	*	*	*	*	*	H51	H51	H51	H51	H51
		PN 25	*	*	*	*	*	*	*	*	*	*	*	*
		PN 40	*	*	*	*	*	*	*	*	*	*	*	*
	ASME B16.5	CL150	H79	H79	H79	H79	H79	H79	H79	H79	H79	[H79]	H79	H79
		CL300	H80	H80	–	H80	H80	–	[H80]	[H80]	–	–	–	–

For an explanation of the characters and symbols, refer to page 00/07.
Note: Flange drillings and facings always meet the requirements of the given flange standards.
Flange thickness and outside diameter may deviate from the standard.

Flange facings

Flange facings

Information	Standard	Inlet	Outlet	Remark
General				
Flange, undrilled	–	H38	H39	
Linde-V-Nut, Form V48	Linde Standard 420-08 LDeS 3313.36	J07	J08	Groove: Rz = 16
Linde-V-Nut, Form V48A		J05	J06	Groove: Rz = 4, e.g. for hydrogen
Lens-shape seal form L (without lens-shape seal)	DIN 2696 LDeS 3313.35	J11	J12	
According to DIN EN 1092				
Flange facings		**Inlet**	**Outlet**	**Remark**
DIN EN 1092 (also see LDeS 3313.40)		PN 10 – PN 40	PN 10 – PN 40	Rz specification acc. to DIN EN 1092 in µm
Raised face	Form B1	*	*	Facing: Rz = 12.5 – 50
	Form B2	L36	L38	Facing: Rz = 3.2 – 12.5
Tongue, Form C[1]		H94	H92	
Groove, Form D[1]		H93	H91	
Male, Form E		H96	H98	
Female, Form F		H97	H99	
O-ring Male, Form G		J01	J02	
O-ring Female, Form H		J03	J04	

only for steel flange

According to ASME B16.5

Body material	Inlet	Outlet	Smooth Finish[2]		Serrated Finish		RTJ-Groove			
			Inlet	Outlet	Inlet	Outlet	Inlet		Outlet	
			Option code		Option code		ANSI Class	Option code	ANSI Class	Option code
0.7043	all	all	L52	L53	*	*	–	–	–	–
1.0619, 1.4408	all	all	L52	L53	*	*	150	H62	150	H63

[1] LESER manufactures the groove at flanged valves by milling. If a customer demands a turned surface in the soil of the groove according to DIN EN 1092-1 an additional option code is necessary: “S01: soil of the groove drilled”.
[2] Smooth Finish is not defined in the effective standards.

For signs and symbols refer to page 00/07
Note: Flange drillings and facings meet always the requirements of mentioned flange standards.
Flange thickness and outer diameter may vary from flange standard.

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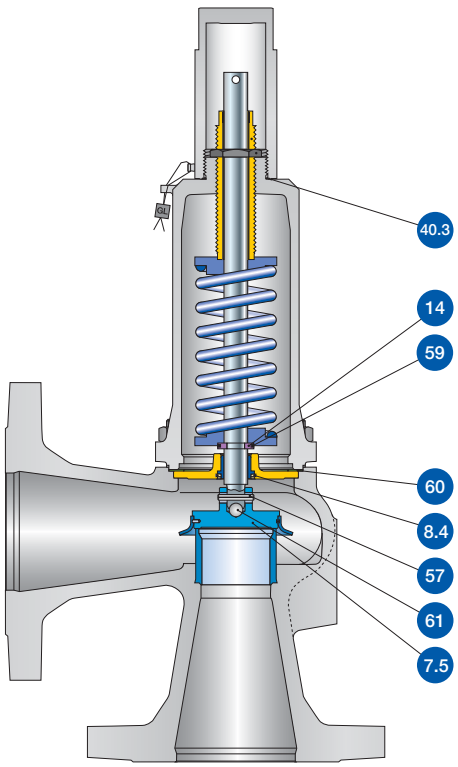
LESER Original Spare Parts Kits



The LESER Spare Parts Kits contain all the spare parts recommended for the regular maintenance of a LESER safety valve.

Contents

Item	Component	Material	Quantity
7.5	Securing ring (Disc)	1.4571 / 316Ti	1
8.4	Securing ring (Guide)	1.4571 / 316Ti	1
14	Split ring	1.4404 / 316L	2
40.3	Spacer	1.4571 / 316Ti	3
57	Pin	1.4310 / Stainless steel	1
59	Securing ring (Split ring)	1.4571 / 316Ti	1
60	Gasket	Graphite / 1.4401 Graphite / 316	3
61	Ball	1.4401 / 316	1
1.9	O-ring (Lifting device H4)	FKM	1

LESER Original Spare Parts Kits

Article numbers										
DN	15 – 20	25	32	40	50	65	80	100	125	150
Art.-No. **5012.**	**1201**	**1201**	**1201**	**1201**	**1212**	**1213**	**1204**	**1214**	**1215**	**1216**

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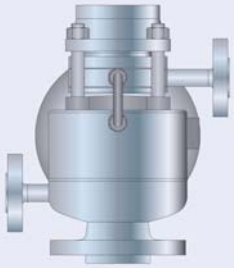
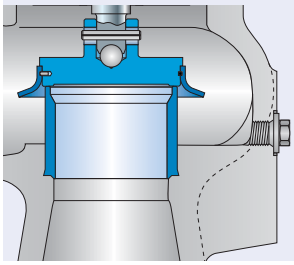
Available options

For more information, also see
“Accessories and Options” as of page 99/01.

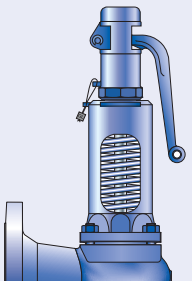
Heating jacket
H29, H30: Coupling G $^3/_8$, G $^3/_4$
H31, H32: Flange DN15, DN25



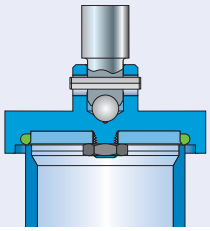
Drain hole
J18: G $^1/_4$
J19: G $^1/_2$



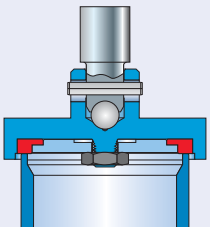
Open bonnet
See Art.-No.



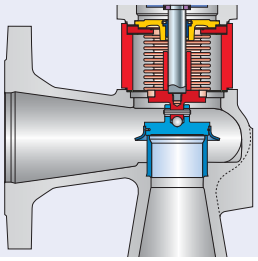
O-ring disc
J20: FFKM "C"
J21: CR "K"
J22: EPDM "D"
J23: FKM "L"



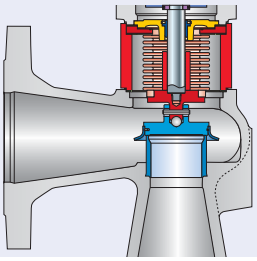
Disc with sealing plate
J44: PTFE-FDA
J48: PCTFE
J49: SP



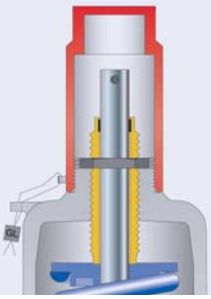
Balanced bellows
J68: Open bonnet
J78: Closed bonnet



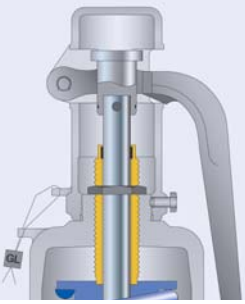
Conversion kit for balanced bellows bellows
Art.-No. see page 01/14



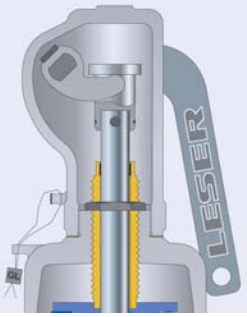
Screwed cap H2
H2



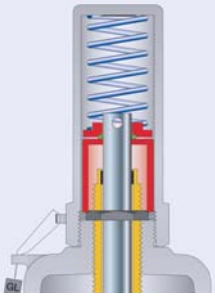
Plain lever H3
H3



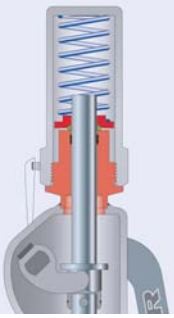
Packed lever H4
H4



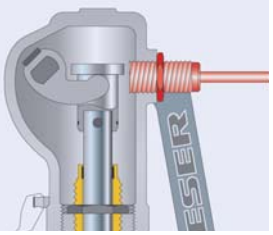
O-ring damper H2
J65



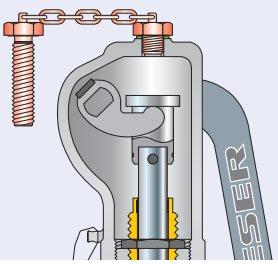
O-ring damper H4
J66



Lift indicator
J39: Adaptor H4
J93: Lift indicator



Test gag
J69: H4
J70: H4



Capacities – steam

Calculation of the capacity for saturated steam acc. to AD 2000-Merkblatt A2 with 10% overpressure.
Capacities at 1 bar and lower are calculated at 0.1 bar overpressure.

Metric units — **AD 2000-Merkblatt A2** [kg/h]

	O-ring disc	Metal disc										
DN_I	15	15	20	25	32	40	50	65	80	100	125	150
DN_O	15	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area A_0 [mm²]	113	113	254	254	254	416	661	1075	1662	2827	4301	6648
$LEO_{S/G}$*) [inch²]	0.106	0.111	0.117	0.154	0.154	0.251	0.399	0.650	1.004	1.708	2.598	4.016
Set pressure [bar]	**Capacity** [kg/h]											
0.2				34	34	55	88	142	220	375	570	880
0.5	52	55	30	63	63	102	163	265	410	697	1060	1638
1	74	78	67	101	101	165	263	428	661	1125	1711	2645
2	118	125	129	170	170	278	442	720	1113	1893	2880	4452
3	161	168	177	232	232	379	603	981	1517	2581	3926	6068
4	200	210	221	290	290	473	752	1224	1892	3218	4895	7567
5		251	265	347	347	566	900	1465	2265	3853	5861	9058
6		293	308	404	404	659	1048	1706	2636	4485	6823	10545
7		333	350	459	459	750	1192	1940	2999	5102	7761	11996
8		374	394	516	516	842	1339	2179	3368	5730	8717	13473
9		415	437	572	572	934	1485	2418	3737	6358	9671	14948
10		456	480	629	629	1026	1632	2656	4105	6984	10624	16421
12		538	566	741	741	1210	1924	3132	4842	8237	12530	19366
14		618	650	852	852	1391	2211	3599	5563	9464	14395	22250
16		699	736	964	964	1574	2503	4074	6297	10714	16296	25189
18		781	822	1077	1077	1758	2795	4550	7033	11965	18200	28131
20		863	908	1190	1190	1942	3088	5027	7770	13218	20107	
22		942	991	1299	1299	2121	3372	5489	8484	14434	21956	
24		1024	1078	1412	1412	2306	3665	5967	9222	15690	23866	
26		1106	1164	1525	1525	2491	3959	6445	9962	16949		
28		1189	1251	1639	1639	2676	4254	6925	10704	18211		
30		1271	1338	1753	1753	2862	4550	7407	11449	19478		
32		1354	1425	1867	1867	3049	4847	7890	12195	20748		
34												
36												
38												
40												

*) $LEO_{S/G}$ = LESER Effective Orifice steam/gases please refer to page 00/11
"How to use" capacity tables, refer to page 00/09

LESER

Capacity table – air

Calculation of the capacity for air acc. to AD 2000-Merkblatt A2 with 10% overpressure.
Capacities at 1 bar and lower are calculated at 0.1 bar overpressure.

Metric units **AD 2000-Merkblatt A2** [m_n^3/h]

	O-ring disc	Metal disc										
DN_I	15	15	20	25	32	40	50	65	80	100	125	150
DN_O	15	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area A_0 [mm^2]	113	113	254	254	254	416	661	1075	1662	2827	4301	6648
$LEO_{S/G}$*) [$inch^2$]	0.106	0.111	0.117	0.154	0.154	0.251	0.399	0.650	1.004	1.708	2.598	4.016
Set pressure [bar]	**Capacity** [m_n^3/h]											
0.2				39	39	63	101	165	255	431	660	1019
0.5	64	67	35	74	74	120	191	311	481	819	1245	1925
1	93	93	80	121	121	197	313	510	788	1341	2039	3152
2	151	151	156	206	206	336	534	870	1344	2287	3478	5377
3	206	206	217	284	284	463	737	1199	1854	3153	4797	7414
4	246	258	272	356	356	582	925	1505	2327	3958	6021	9306
5	296	311	327	429	429	700	1113	1811	2800	4763	7245	11198
6	346	363	382	501	501	818	1301	2117	3273	5568	8469	13091
7	396	416	438	574	574	936	1489	2423	3746	6373	9694	14983
8	446	468	493	646	646	1055	1677	2729	4219	7177	10918	16875
9	496	521	548	718	718	1173	1865	3035	4692	7982	12142	18767
10	546	573	604	791	791	1291	2053	3342	5165	8787	13366	20659
12	646	679	714	936	936	1528	2429	3954	6111	10397	15815	24444
14	746	784	825	1081	1081	1764	2805	4566	7057	12006	18263	28228
16	846	889	935	1225	1225	2001	3181	5178	8003	13616	20711	32013
18	946	994	1046	1370	1370	2237	3557	5790	8949	15226	23160	
20	1046	1099	1156	1515	1515	2474	3933	6402	9895	16835	25608	
22	1146	1204	1267	1660	1660	2710	4309	7014	10842	18445	28057	
24	1245	1309	1377	1805	1805	2947	4685	7626	11788	20055	30505	
26	1345	1414	1488	1950	1950	3183	5061	8238	12734	21664	32954	
28	1445	1519	1599	2095	2095	3420	5437	8851	13680	23274	35402	
30	1545	1624	1709	2240	2240	3656	5813	9463	14626	24883	37850	
32	1645	1729	1820	2384	2384	3893	6189	10075	15572		40299	
34	1745	1834	1930	2529	2529	4130	6565	10687	16518			
36	1845	1939	2041	2674	2674	4366	6941	11299				
38	1945	2044	2151	2819	2819	4603	7317	11911				
40	2045	2149	2262	2964	2964	4839	7693	12523				

*) $LEO_{S/G}$ = LESER Effective Orifice steam/gases please refer to page 00/11
"How to use" capacity tables, refer to page 00/09

Capacity table – water

Calculation of the capacity for water acc. to AD 2000-Merkblatt A2 with 10% overpressure at 20 °C.
Capacities at 1 bar and lower are calculated at 0.1 bar overpressure.

Metric units — **AD 2000-Merkblatt A2** [10^3kg/h]

	O-ring disc	Metal disc										
DN_I	15	15	20	25	32	40	50	65	80	100	125	150
DN_O	15	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area A_0 [mm²]	113	113	254	254	254	416	661	1075	1662	2827	4301	6648
LEO_L*) [inch²]	0.127	0.129	0.115	0.152	0.152	0.248	0.394	0.641	0.991	1.686	2.564	3.963
Set pressure [bar]	**Capacity** [10^3kg/h]											
0.2				1.77	1.77	2.89	4.60	7.50	11.6	19.7	30.0	46.3
0.5	2.09	2.14	1.90	2.51	2.51	4.09	6.51	10.6	16.4	27.8	42.4	65.5
1	2.84	2.90	2.58	3.39	3.39	5.54	8.81	14.3	22.2	37.7	57.4	88.7
2	4.01	4.10	3.65	4.80	4.80	7.84	12.5	20.3	31.3	53.3	81.1	125
3	4.91	5.02	4.47	5.88	5.88	9.60	15.3	24.8	38.4	65.3	99.3	154
4	5.67	5.79	5.16	6.79	6.79	11.1	17.6	28.7	44.3	75.4	115	177
5	6.34	6.48	5.77	7.59	7.59	12.4	19.7	32.1	49.6	84.3	128	198
6	6.95	7.09	6.32	8.31	8.31	13.6	21.6	35.1	54.3	92.4	140	217
7	7.50	7.66	6.82	8.98	8.98	14.7	23.3	37.9	58.6	99.8	152	235
8	8.02	8.19	7.30	9.60	9.60	15.7	24.9	40.6	62.7	107	162	251
9	8.51	8.69	7.74	10.2	10.2	16.6	26.4	43.0	66.5	113	172	266
10	8.97	9.16	8.16	10.7	10.7	17.5	27.9	45.3	70.1	119	181	280
12	9.82	10.0	8.93	11.8	11.8	19.2	30.5	49.7	76.8	131	199	307
14	10.6	10.8	9.65	12.7	12.7	20.7	33.0	53.7	82.9	141	215	332
16	11.3	11.6	10.3	13.6	13.6	22.2	35.2	57.4	88.7	151	229	355
18	12.0	12.3	10.9	14.4	14.4	23.5	37.4	60.8	94.0	160	243	
20	12.7	13.0	11.5	15.2	15.2	24.8	39.4	64.1	99.1	169	257	
22	13.3	13.6	12.1	15.9	15.9	26.0	41.3	67.3	104	177	269	
24	13.9	14.2	12.6	16.6	16.6	27.1	43.2	70.2	109	185	281	
26	14.5	14.8	13.2	17.3	17.3	28.3	44.9	73.1	113	192	292	
28	15.0	15.3	13.6	18.0	18.0	29.3	46.6	75.9	117	200	304	
30	15.5	15.9	14.1	18.6	18.6	30.3	48.2	78.5	121	207	314	
32	16.0	16.4	14.6	19.2	19.2	31.3	49.8	81.1	125		324	
34	16.5	16.9	15.0	19.8	19.8	32.3	51.4	83.6	129			
36	17.0	17.4	15.5	20.4	20.4	33.2	52.9	86.0				
38	17.5	17.9	15.9	20.9	20.9	34.2	54.3	88.4				
40	17.9	18.3	16.3	21.5	21.5	35.0	55.7	90.7				

*) LEO_L = LESER Effective Orifice liquids, please refer to page 00/11
"How to use" capacity tables, refer to page 00/09

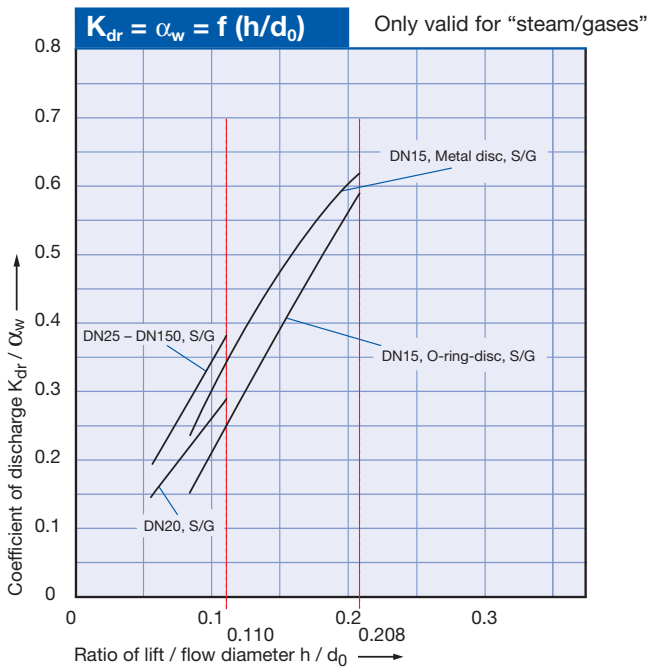
LESER

Determination of coefficient of discharge in case of lift restriction or back pressure

h	=	Lift [mm]
d_0	=	Flow diameter [mm] of selected safety valve see “Article Numbers” table
h/d_0	=	Ratio of lift / flow diameter
p_{a0}	=	Back pressure [bar_a]
p_0	=	Set pressure [bar_a]
p_{a0}/p_0	=	Ratio of back pressure / set pressure
K_{dr}	=	Coefficient of discharge acc. to DIN EN ISO 4126-1
α_w	=	Coefficient of discharge acc. to AD 2000-Merkblatt A2
K_b	=	Back pressure correction factor acc. to API 520 Section 3.3

“How to use” refer to page 00/08

Diagram for evaluation of ratio of lift / flow diameter (h/d_0) in reference to the coefficient of discharge (K_{dr}/α_w)



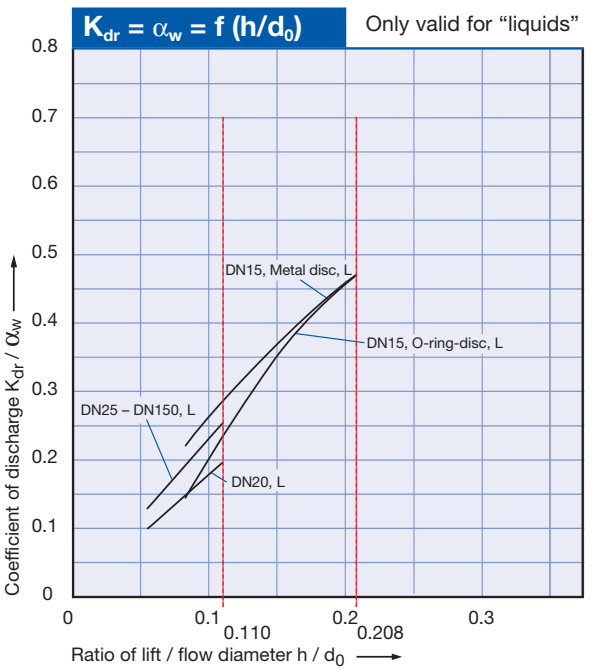
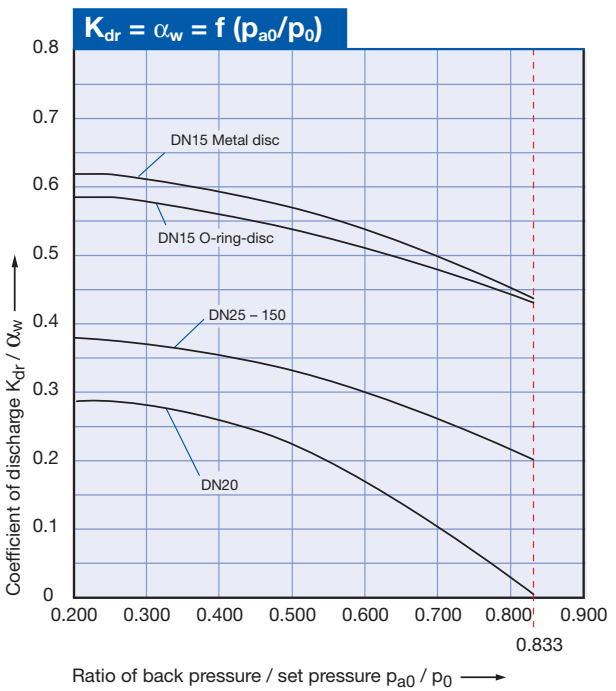


Diagram for evaluation of coefficient of discharge (K_{dr}/α_w) or K_b in reference to the ratio of back pressure / set pressure (p_{a0}/p_0)



LESER

Type 431 PN 160
Packed lever H4
Open bonnet
Conventional design

Type 431, 433 PN 160

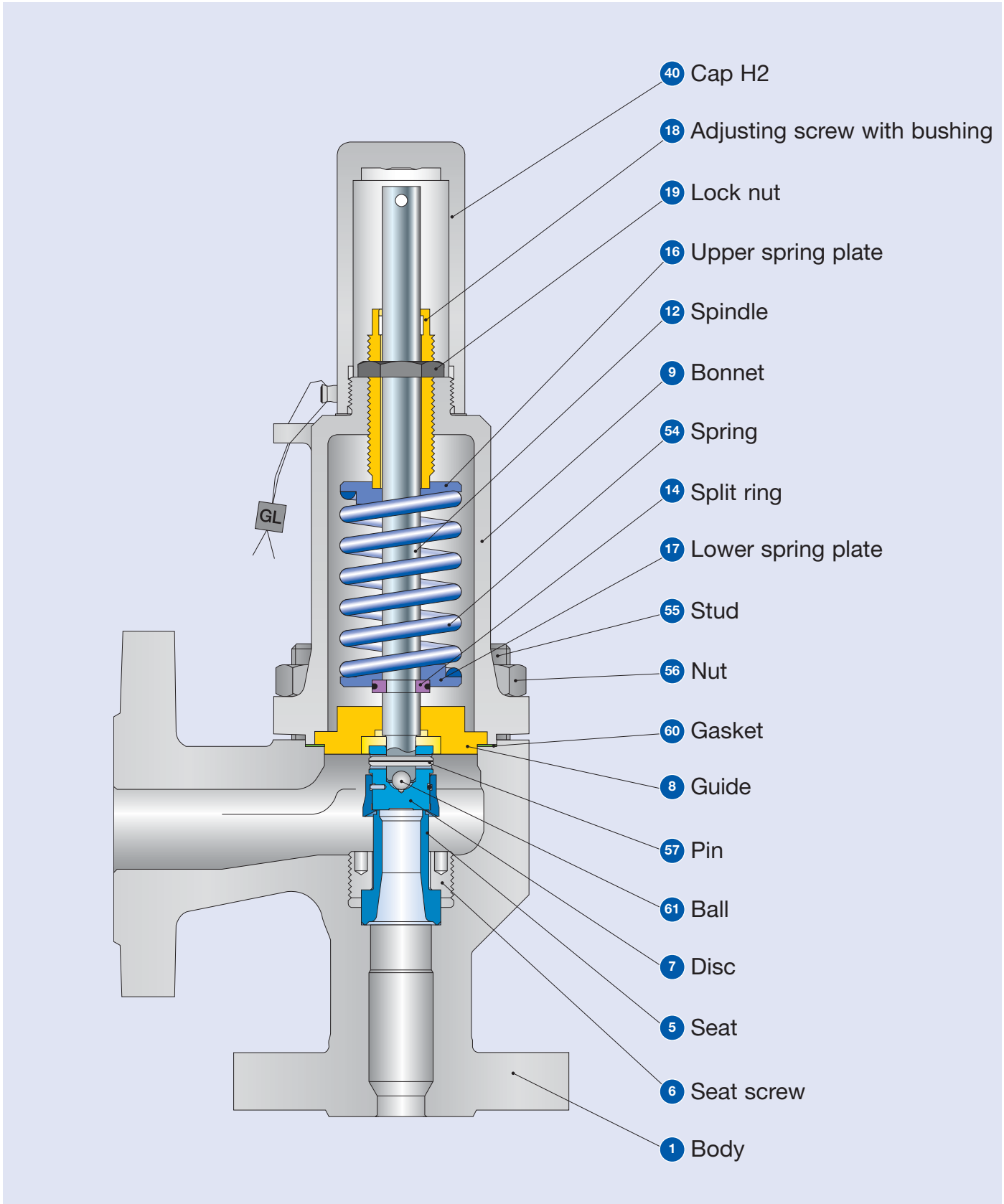
Flanged Safety Relief Valves - spring loaded

Type 433 PN 160
Cap H2
Closed bonnet
Conventional design

Contents — Chapter/Page

Type 431, 433 PN 160

Conventional design



Conventional design

Materials

Item	Component	O-ring disc Type 4312 / 4332	Metal disc Type 4312 / 4332	O-ring disc Type 4334	Metal disc Type 4334
1	**Body**	1.0619 SA 216 WCB	1.0619 SA 216 WCB	1.4408 SA 351 CF8M	1.4408 SA 351 CF8M
5	Seat	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
6	Seat screw	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
7	Disc	1.4404 316L	1.4122 Hardened stainless steel	1.4404 316L	1.4404 316L
8	Guide	1.4104 tenifer Chrome steel tenifer	1.4104, 1.0501, 1.0570 Chrome or stainless steel	1.4404 316L	1.4404 316L
9	**Bonnet**	0.7040 Ductile Gr. 60-40-18	0.7040 Ductile Gr. 60-40-18	1.4408 SA 351 CF8M	1.4408 SA 351 CF8M
12	Spindle	1.4021 420	1.4021 420	1.4404 316L	1.4404 316L
14	Split ring	1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L	1.4404 316L
16/17	Spring plate	1.0718 Steel	1.0718 Steel	1.4404 316L	1.4404 316L
18	Adjusting screw with bushing	1.4104 PTFE Chrome steel PTFE	1.4104 PTFE Chrome steel PTFE	1.4404 PTFE 316L PTFE	1.4404 PTFE 316L PTFE
19	Lock nut	1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L	1.4404 316L
40	Cap H2	1.0460 SA 105	1.0460 SA 105	1.4404 316L	1.4404 316L
54	Spring, standard	1.1200, 1.8159, 1.7102 Steel	1.1200, 1.8159, 1.7102 Steel	1.4310 Stainless steel	1.4310 Stainless steel
	Spring, optional	1.4310 Stainless steel	1.4310 Stainless steel	– –	– –
55	Stud	1.1181 Steel	1.1181 Steel	1.4401 B8M	1.4401 B8M
56	Nut	1.0501 2H	1.0501 2H	1.4401 8M	1.4401 8M
57	Pin	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel
60	Gasket	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316
61	Ball	1.3541 Hardened stainless steel	1.3541 Hardened stainless steel	1.4401 316	1.4401 316

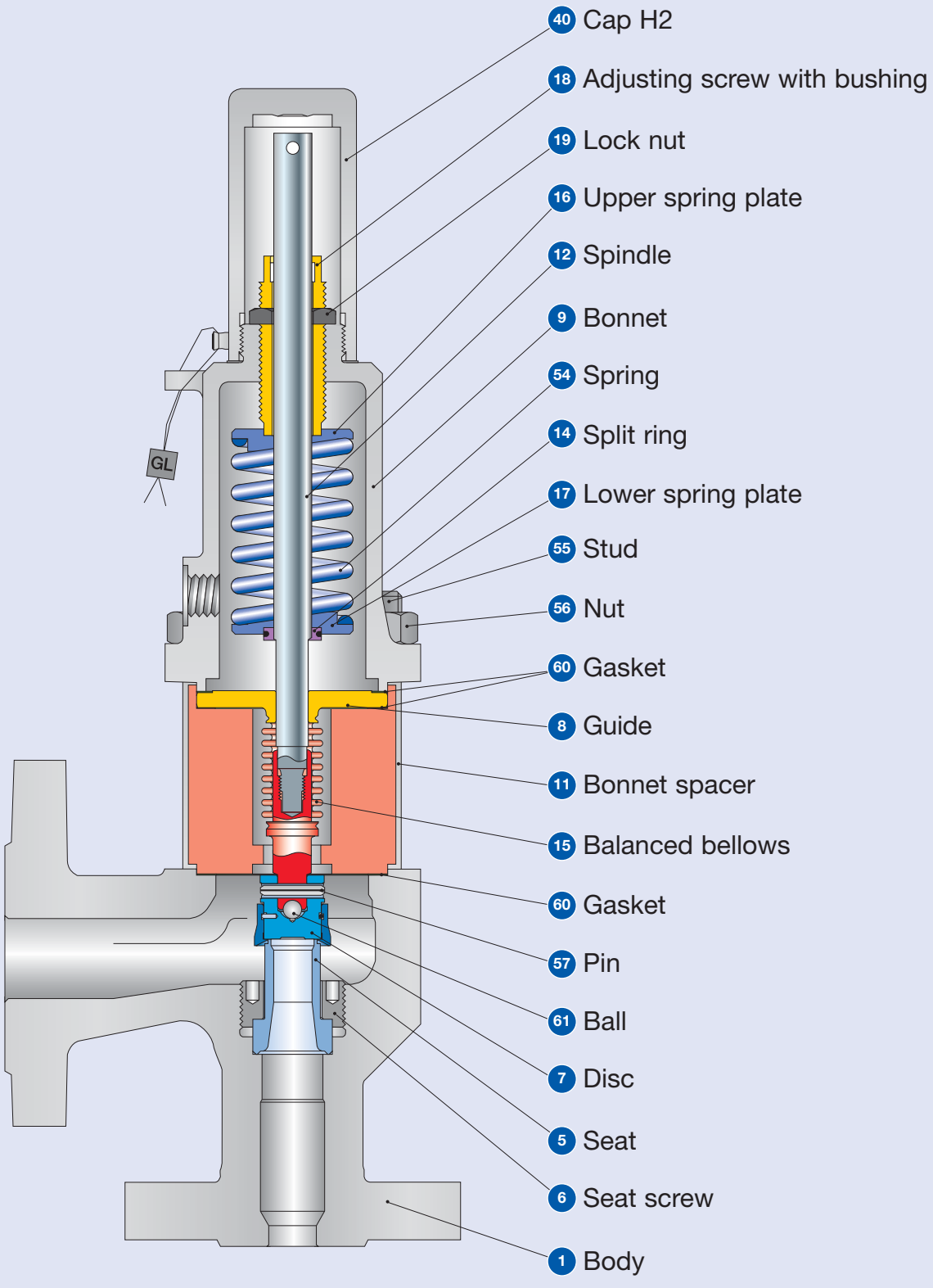
Note:

- LESER reserves the right to make changes.
- If several materials are specified LESER defines the material.
- LESER may use higher quality materials without giving prior notice.
- Each component can be constructed of another material according to the customer's specification.
- All components exposed to pressure are highlighted in bold. The material will be specified according to DIN and ASTM here.

Type 431, 433 PN 160

LESER

Balanced bellows design



Balanced bellows design

Materials

		O-ring disc	Metal disc	O-ring disc	Metal disc
Item	**Component**	**Type 4312 / 4332**	**Type 4312 / 4332**	**Type 4334**	**Type 4334**
1	**Body**	1.0619 SA 216 WCB	1.0619 SA 216 WCB	1.4408 SA 351 CF8M	1.4408 SA 351 CF8M
5	Seat	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
6	Seat screw	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
7	Disc	1.4404 316L	1.4122 Hardened stainless steel	1.4404 316L	1.4404 316L
8	Guide Upper connection of balanced bellows	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
9	**Bonnet**	0.7040 Ductile Gr. 60-40-18	0.7040 Ductile Gr. 60-40-18	1.4408 SA 351 CF8M	1.4408 SA 351 CF8M
11	Bonnet spacer	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
12	Spindle	1.4404 316L	1.4404 316L	1.4404 316L	1.4404 316L
14	Split ring	1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L	1.4404 316L
15	Balanced bellows	1.4571 316Ti	1.4571 316Ti	1.4571 316Ti	1.4571 316Ti
16/17	Spring plate	1.0718 Steel	1.0718 Steel	1.4404 316L	1.4404 316L
18	Adjusting screw with bushing	1.4104 PTFE Chrome steel PTFE	1.4104 PTFE Chrome steel PTFE	1.4404 PTFE 316L PTFE	1.4404 PTFE 316L PTFE
19	Lock nut	1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L	1.4404 316L
40	Cap H2	1.0460 SA 105	1.0460 SA 105	1.4404 316L	1.4404 316L
54	Spring, standard	1.1200, 1.8159, 1.7102 Steel	1.1200, 1.8159, 1.7102 Steel	1.4310 Stainless steel	1.4310 Stainless steel
	Spring, optional	1.4310 Stainless steel	1.4310 Stainless steel	– –	– –
55	Stud	1.4401 8M	1.4401 8M	1.4401 B8M	1.4401 B8M
56	Hex nut	1.4401 8M	1.4401 8M	1.4401 B8M	1.4401 B8M
57	Roll pin	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel
60	Gasket	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316
61	Ball	1.3541 Hardened stainless steel	1.3541 Hardened stainless steel	1.4401 316	1.4401 316

Note:

- LESER reserves the right to make changes.
- If several materials are specified LESER defines the material.
- LESER may use higher quality materials without giving prior notice.
- Each component can be constructed of another material according to the customer's specification.
- All components exposed to pressure are highlighted in bold. The material will be specified according to DIN and ASTM here.

How to order – Example for numbering system – Type 433 PN 160

1 Article Number	2 Set Pressure	3 Connections	
4332.8552	60 bar	H47	

1	2	3	4
433	2	855	2

1 Valve type 431, 433 PN 160

Type 433 – with closed bonnet

Type 431 – with open bonnet

2 Material code

Code	Body material
2	1.0619 (WCB)
4	1.4408 (CF8M)

3 Valve code

Automatically determines nominal diameter and body material (see page 02/08).

4

Code	Lifting device	
2	Gas-tight cap	H2
3	Plain lever	H3
4	Packed lever	H4
5	Plain lever with open bonnet	H3

Please enter the units (in gauge)!

The specified pressure range may not be exceeded!

Please refer to page 02/11.

LESER

4 Options

J22 | | | |

Type 431, 433 PN 160 — **Option code**

- O-ring disc
  - CR "K" **J21**
  - EPDM "D" **J22**
  - FKM "L" **J23**
  - FFKM "C" **J20**
- Disc 1.4404 / 316L **L44**
- Disc 1.4404 / 316L stellited **J25**
- Detachable lifting aid **J26**
- Balanced bellows
  - Bonnet, open (Type 431) **J68**
  - Bonnet, closed (Type 433) **J78**
- High temperature alloy spring **X01**
- Stainless steel spring **X04**
- Adaptor for lift indicator H4 **J39**
- Lift indicator **J93**
- Test gag
  - Cap H2 **J70**
  - Packed lever H4 **J69**
- Heating jacket
  - Couplings G 3/8 **H29**
    G 3/4 **H30**
  - Flange DN 15 **H31**
    DN 25 **H32**
- Heating jacket - Bonnet spacer **H33**
- Drain hole G 1/4 **J18**
  G 1/2 **J19**
- Oil and grease free **J85**
- Materials
  - NACE MR0175 **N78**
  - NACE MR0103 **N77**

Option code applies only if not standard

5 Documentation

H01 | L30 | |

Please select the necessary documentation:

Tests, Certifications: **Option code**

DIN EN 10204-3.2: TÜV-Nord
Certification for set pressure **M33**

LESER CGA (Certificate for Global Application) **H03**

- Acceptance test certificate 3.1 acc. to DIN EN 10204
- Declaration of conformity as per pressure equipment directive PED 97/23/EC

Material quality certificate:
DIN EN 10204-3.1

Component	Option code
Body	**H01**
Nozzle	**L59**
Bonnet	**L30**
Disc	**L23**
Screws	**N07**
Nuts	**N08**

6 Code and Medium

2.0

1 2
2 . 0

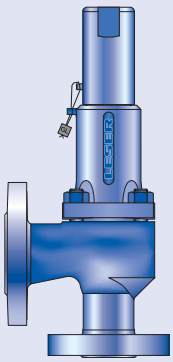
1 Code
2. CE / VdTUEV
3. ASME Section VIII + CE / VdTUEV

2 Medium
.0 steam / gases / liquids (only valid for CE / VdTUEV)

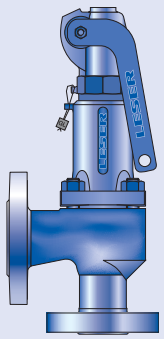
How to order – article numbers

Article numbers

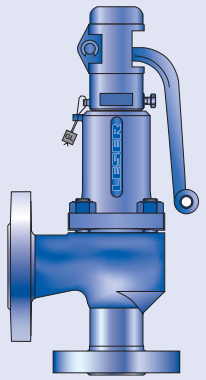
			O-ring disc	Metal disc
		DN_I	15	15
		DN_O	25	25
		Actual orifice diameter d_0 [mm]	12	12
		Actual orifice area A_0 [mm²]	113	113
Body material: 1.0619 (WCB)				
Bonnet closed	**H2**	Art.-No. **4332.**	**8572**	**8552**
	H3	Art.-No. **4332.**	**8573**	**8553**
	H4	Art.-No. **4332.**	**8574**	**8554**
open	**H3**	Art.-No. **4312.**	**8575**	**8555**
Body material: 1.4408 (CF8M)				
Bonnet closed	**H2**	Art.-No. **4334.**	**8582**	**8562**
	H4	Art.-No. **4334.**	**8584**	**8564**



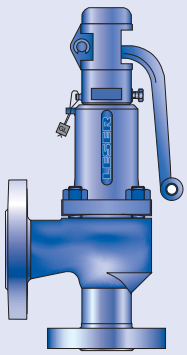
Type 433 PN 160
Cap H2
Closed bonnet
Conventional design



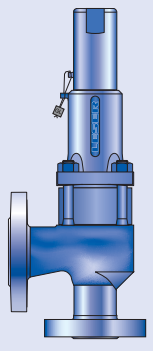
Type 433 PN 160
Packed lever H4
Closed bonnet
Conventional design



Type 433 PN 160
Plain lever H3
Closed bonnet
Conventional design



Type 431 PN 160
Plain lever H3
Open bonnet
Conventional design



Type 431 PN 160
Plain lever H3
Closed bonnet
Balanced bellows design

Pressure temperature ratings

Metric units

				O-ring disc				Metal disc
			DN_I		15			15
			DN_O		25			25
			Actual orifice diameter d_0 [mm]		12			12
			Actual orifice area A_0 [mm²]		113			113
Body material: 1.0619 (WCB)								
DIN flange		Inlet			**PN 160**			
		Outlet			**PN 40**			
Minimum set pressure	p [bar_g]	S/G/L			0.3			0.3
Min. set pressure[1] standard bellows	p [bar_g]	S/G/L			3			3
Maximum set pressure	p [bar_g]	S/G/L	"K" "D" "L"	142	"C"	85		144
Max. set pressure with special spring	p [bar_g]	S/G/L	"K" "D" "L"	160	"C"	85		160
Temperature[2] acc. to DIN EN		min. [°C]			-45			-60
		max. [°C]			+150			+450

Body material: 1.4408 (CF8M)								
DIN flange		Inlet			**PN 160**			
		Outlet			**PN 40**			
Minimum set pressure	p [bar_g]	S/G/L			0.3			0.3
Min. set pressure[1] standard bellows	p [bar_g]	S/G/L			3			3
Max. set pressure	p [bar_g]	S/G/L			85			85
Max. set pressure with special spring	p [bar_g]	S/G/L	"K" "D" "L"	150	"C"	85		160
Temperature[2] acc. to DIN EN		min. [°C]			-45			-270
		max. [°C]			+150			+400

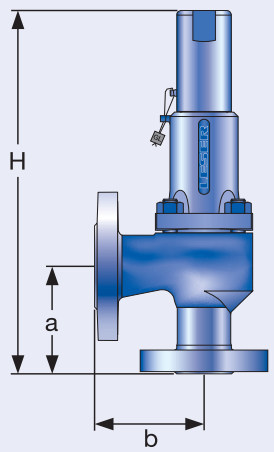
[1] Min. set pressure of standard bellows = max. set pressure of bellows for low set pressure.

[2] The temperature is limited by the soft seal material (see page 99/10). The values given here are valid for EPDM. Between -10°C and the lowest specified application temperature, proceed as per AD 2000-Merkblatt W10.

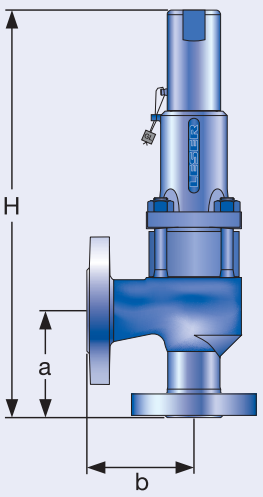
Dimensions and weights

Metric units		
	DN_I	15
	DN_O	25
	Actual orifice diameter d_0 [mm]	12
	Actual orifice area A_0 [mm²]	113
Weight [kg]		7
	with bellows	8.4
Centre to face [mm]	Inlet a	90
	Outlet b	90
Height (H4) [mm]	Standard H max.	307
	Bellows H max.	359
Body material: 1.0619 (WCB)		
DIN flange[1)]	Inlet	PN 160
	Outlet	PN 40
Body material: 1.4408 (CF8M)		
DIN flange[1)]	Inlet	PN 160
	Outlet	PN 40

[1)] Standard flange class. For other flange drillings, see page 02/11.



Conventional design



Balanced bellows design

Flange drillings and facings

Flange drillings

		DN_I	15
		DN_O	25
		Valve size	$^1/_2$" x 1"
		Actual orifice diameter d_0 [mm]	12
		Actual orifice area A_0 [mm²]	113
Body material: 1.0619 (WCB), 1.4408 (CF8M)			
Inlet	**DIN EN 1092**	PN 16	H47
		PN 40	H47
		PN 63	*
		PN 160	*
	ASME B 16.5	CL300	H65
		CL600	H67
Outlet	**DIN EN 1092**	PN 16	*
		PN 40	*
	ASME B16.5[1)]	CL150	H79
		CL300	H80

Flange facings

Information	Standard	Inlet	Outlet	Remark
General				
Flange, undrilled	–	H38	H39	
Linde-V-Nut, Form V48	Linde Standard 420-08 LDeS 3313.36	J07	J08	Groove: Rz = 16
Linde-V-Nut, Form V48A		J05	J06	Groove: Rz = 4, e.g. for hydrogen
Lens-shape seal form L (without lens-shape seal)	DIN 2696 LDeS 3313.35	J11	J12	
According to DIN EN 1092				
Flange facings		**Inlet**	**Outlet**	**Remark**
DIN EN 1092 (also see LDeS 3313.40)		PN 63 – PN 160	PN 40	Rz specification acc. to DIN EN 1092 in µm
Raised face	Form B1	–	*	Facing: Rz = 12.5 – 50
	Form B2	*	L38	Facing: Rz = 3.2 – 12.5
Tongue, Form C[1)]		H94	H92	
Groove, Form D[1)]		H93	H91	
Male, Form E		H96	H98	
Female, Form F		H97	H99	
O-ring Male, Form G		J01	J02	
O-ring Female, Form H		J03	J04	

only for steel flange

According to ASME B16.5

Body material	Inlet	Outlet	Smooth Finish[2)]		Serrated Finish		RTJ-Groove			
			Inlet	Outlet	Inlet	Outlet	Inlet		Outlet	
			Option code		Option code		ANSI Class	Option code	ANSI Class	Option code
1.0619, 1.4408	all	all	L52	L53	*	*	150	H62	150	H63

[1)] LESER manufactures the groove at flanged valves by milling. If a customer demands a turned surface in the soil of the groove according to DIN EN 1092-1 an additional option code is necessary: “S01: soil of the groove drilled”.
[2)] Smooth Finish is not defined in the effective standards.

For signs and symbols refer to page 00/07
Note: Flange drillings and facings meet always the requirements of mentioned flange standards.
Flange thickness and outer diameter may vary from flange standard.

Order information – spare parts

Spare parts

			O-ring disc	Metal disc
		DN_I	15	15
		DN_O	25	25
		Actual orifice diameter d_0 [mm]	12	12
		Actual orifice area A_0 [mm²]	113	113
Disc (item 7): Metal seat			**Material-No. / Art.-No.**	
Disc Detachable lifting aid		1.4122	–	230.9339.9000
		1.4404	–	230.9349.9000
Disc (item 7): Soft seal			**Material-No. / Art.-No.**	
Disc	CR	“K”	230.2949.9053	–
	EPDM	“D”	230.2949.9042	–
	FKM	“L”	230.2949.9073	–
	FFKM	“C”	230.2949.9091	–
O-ring (item 7.4): Soft seal			**Material-No. / Art.-No.**	
O-Ring	CR	“K”	502.0107.2653	–
	EPDM	“D”	502.0107.2642	–
	FKM	“L”	502.0107.2673	–
	FFKM	“C”	502.0107.2691	–
Bellows (item 15): 1.4571			**Material-No. / Art.-No.**	
Standard bellows			400.6349.0000	400.6349.0000
Conversion kit, standard[1)]			Please specify application conditions	
Low pressure bellows			–	–
Conversion kit low pressure[1)]			–	–
Gasket – body / bonnet (item 60)			**Material-No. / Art.-No.**	
Gasket	Graphite + 1.4401		500.0407.0000	500.0407.0000
Option code L68 Gylon (PTFE compliance)			500.0405.0000	500.0405.0000
Ball (item 61):			**Material-No. / Art.-No.**	
Ball		Ball Ø [mm]	6	6
		1.4404	510.0104.0000	510.0104.0000
Split ring (item 14):			**Material-No. / Art.-No.**	
Split ring		Spindle Ø [mm]	12	12
		1.4404	251.0149.0000	251.0149.0000
Pin (item 57)			**Material-No. / Art.-No.**	
Pin		1.4310	480.0505.0000	480.0505.0000
O-ring damper			**Material-No. / Art.-No.**	
		Conversion kit H2	5021.1060	5021.1060
		Conversion kit H4	5021.1064	5021.1064

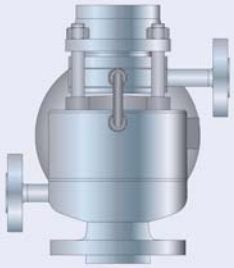
Item.	Components	No.
8	Guide; upper connection of balanced bellows	1
11	Bonnet spacer	1
12	Spindle	1
15	Bellows	1
55	Stud	4
60	Gasket	2
	Instruction guide WI 3037.05	1

Refer to page page 02/04

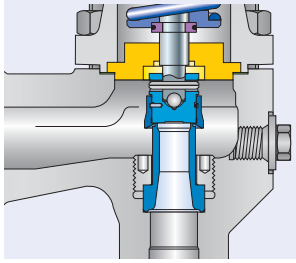
Available options

For more information, also see
“Accessories and Options” as of page 99/01.

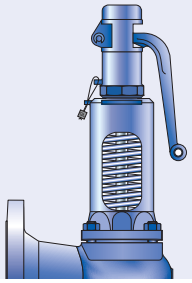
Heating jacket
H29, H30: Coupling G $^{3}/_{8}$, G $^{3}/_{4}$
H31, H32: Flange DN15, DN25



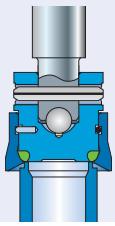
Drain hole
J18: G $^{1}/_{4}$
J19: G $^{1}/_{2}$



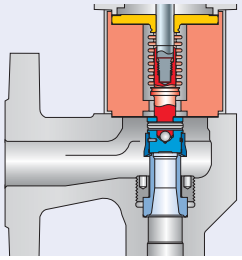
Open bonnet
See Art.-No.



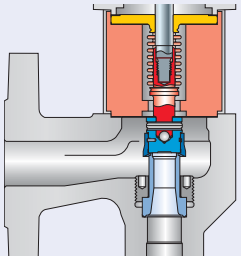
O-ring disc
J20: FFKM “C”
J21: CR “K”
J22: EPDM “D”
J23: FKM “L”



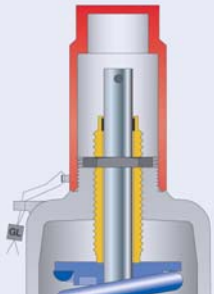
Balanced bellows
J68: Open bonnet
J78: Closed bonnet



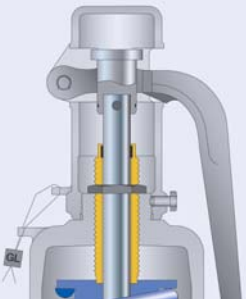
Conversion kit for balanced bellows
Art.-No. see page 02/14



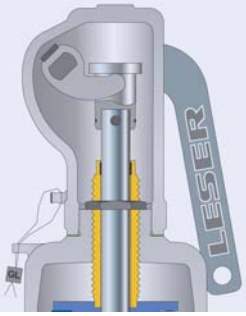
Screwed cap H2
H2



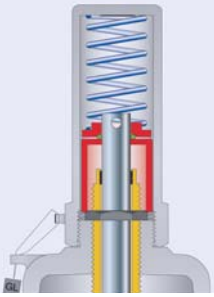
Plain lever H3
H3



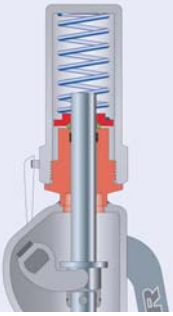
Packed lever H4
H4



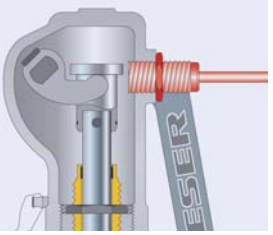
O-ring damper H2
J65



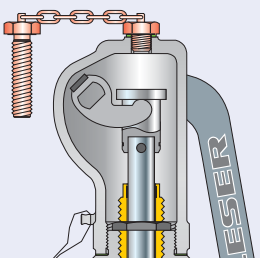
O-ring damper H4
J66



Lift indicator
J39: Adaptor H4
J93: Lift indicator



Test gag
J69: H4
J70: H4



Approvals

Approvals

		O-ring disc	Metal disc
	DN_I	15	15
	DN_O	25	25
	Actual orifice diameter d_0 [mm]	12	12
	Actual orifice area A_0 [mm^2]	113	113
Europe		**Coefficient of discharge K_{dr}**	
PED / DIN EN ISO 4126-1	Approval-No.	072020111Z0008/0/06	
	S/G	0.59	0.62
	L	0.47	0.48
Germany		**Coefficient of discharge α_w**	
PED / AD 2000-Merkblatt A2 Standard safety valve	Approval-No.	TÜV SV 577	
	S/G	0.59	0.62
	L	0.47	0.48
China		**Coefficient of discharge α_w**	
AQSIQ	Approval-No.	For current Approval-No. see www.leser.com	
	S/G	0.59	0.62
	L	0.47	0.48
Eurasian Custom Union		**Coefficient of discharge α_w**	
EAC	Approval-No.	For current Approval-No. see www.leser.com	
	S/G	0.59	0.62
	L	0.47	0.48

Classification societies		**Homepage**	
Bureau Veritas	BV	www.bureauveritas.com	The valid Approval-No. changes with each renewal of the approval.
ClassNK NIPPON Kaiji Kyokai	NK	www.classnk.or.jp	
Det Norske Veritas	DNV	www.dnv.com	
Germanischer Lloyd	GL	www.gl-group.com	For a sample certificate including the valid certification number see www.leser.com
Lloyd's Register EMEA	LREMEA	www.lr.org	
Registro Italiano Navale	RINA	www.rina.org	

Capacities

Calculation of the capacity for steam, gases, and liquids acc. to AD 2000-Merkblatt A2 with 10% overpressure.
Capacities at 1 bar and lower are calculated at 0.1 bar overpressure.

Metric units — **AD 2000-Merkblatt A2**

	O-ring disc	Metal disc	O-ring disc	Metal disc	O-ring disc	Metal disc
DN	15	15	15	15	15	15
DN_O	25	25	25	25	25	25
Actual orifice diameter d_0 [mm]	12	12	12	12	12	12
Actual orifice area A_0 [mm²]	113	113	113	113	113	113
$LEO_{S/G/L}$*) [inch²]	0.106	0.111	0.106	0.111	0.127	0.129
Set pressure	**Capacities**		**Capacities**		**Capacities**	
[bar]	**Steam** saturated [kg/h]		**Air** 0°C and 1013 mbar [m_n^3/h]		**Water** 20°C [10^3 kg/h]	
0.2						
0.5	52	55	64	67	2.09	2.14
1	74	78	93	93	2.84	2.90
2	118	125	151	151	4.01	4.10
3	161	168	206	206	4.91	5.02
4	200	210	246	258	5.67	5.79
5		251	296	311	6.34	6.48
6		293	346	363	6.95	7.09
7		333	396	416	7.50	7.66
8		374	446	468	8.02	8.19
9		415	496	521	8.51	8.69
10		456	546	573	8.97	9.16
12		538	646	679	9.82	10.0
14		618	746	784	10.6	10.8
16		699	846	889	11.3	11.6
18		781	946	994	12.0	12.3
20		863	1046	1099	12.7	13.0
22		942	1146	1204	13.3	13.6
24		1024	1245	1309	13.9	14.2
26		1106	1345	1414	14.5	14.8
28		1189	1445	1519	15.0	15.3
30		1271	1545	1624	15.5	15.9
32		1354	1645	1729	16.0	16.4
34		1433	1745	1834	16.5	16.9
36		1517	1845	1939	17.0	17.4
38		1600	1945	2044	17.5	17.9
40		1684	2045	2149	17.9	18.3
50		2109	2545	2674	20.1	20.5
60		2537	3045	3200	22.0	22.4
70		2981	3545	3725	23.7	24.2
80		3430	4045	4250	25.4	25.9
90		3901	4544	4775	26.9	27.5
100			5044	5301	28.4	29.0
120			6044	6351	31.1	31.7
140			7044	7402	33.6	34.3
160			8043	8452	35.9	36.6

*) $LEO_{S/G/L}$ = LESER Effective Orifice for steam, gases, and liquids, please refer to page 00/11
"How to use" capacity tables, refer to page 00/09

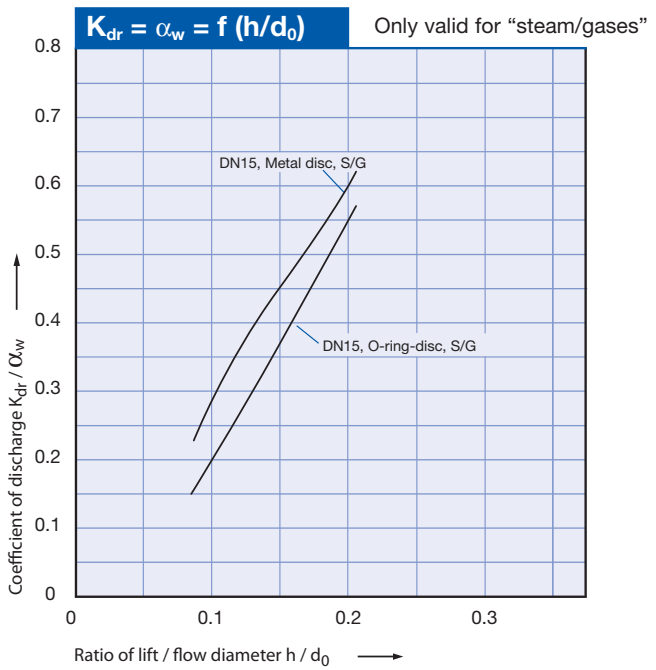
LESER

Determination of coefficient of discharge in case of lift restriction or back pressure

h = Lift [mm]
d_0 = Flow diameter [mm] of selected safety valve see “Article Numbers” table
h/d_0 = Ratio of lift / flow diameter
p_{a0} = Back pressure [bar_a]
p_0 = Set pressure [bar_a]
p_{a0}/p_0 = Ratio of back pressure / set pressure
K_{dr} = Coefficient of discharge acc. to DIN EN ISO 4126-1
α_w = Coefficient of discharge acc. to AD 2000-Merkblatt A2
K_b = Back pressure correction factor acc. to API 520 Section 3.3

"How to use" refer to page 00/08

Diagram for evaluation of ratio of lift / flow diameter (h/d_0) in reference to the coefficient of discharge K_{dr}/α_w)



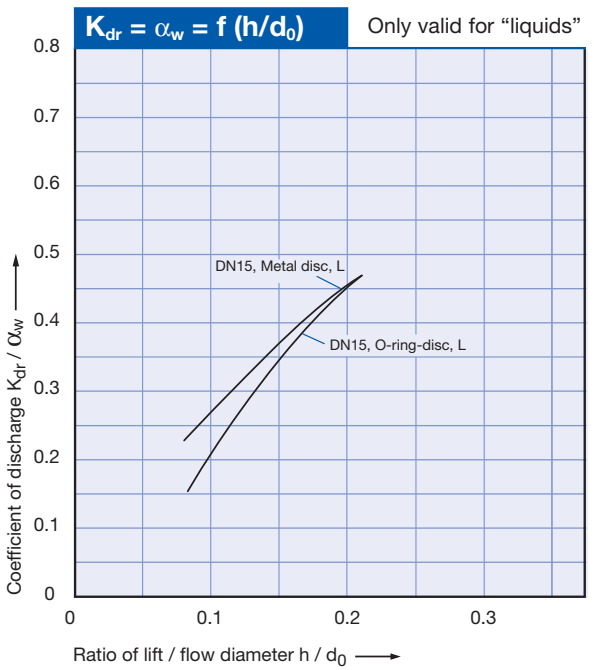
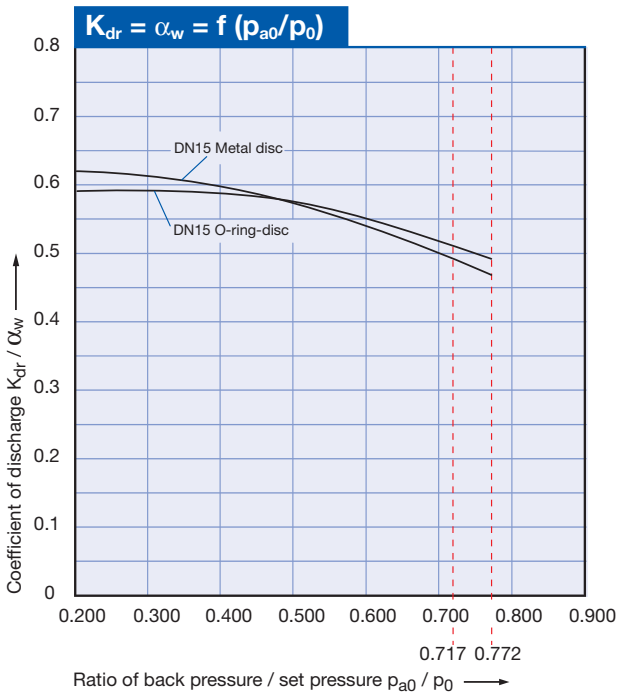


Diagram for evaluation of coefficient of discharge (K_{dr}/α_w) or K_b in reference to the ratio of back pressure / set pressure (p_{a0}/p_0)



LESER

Type 427, 429

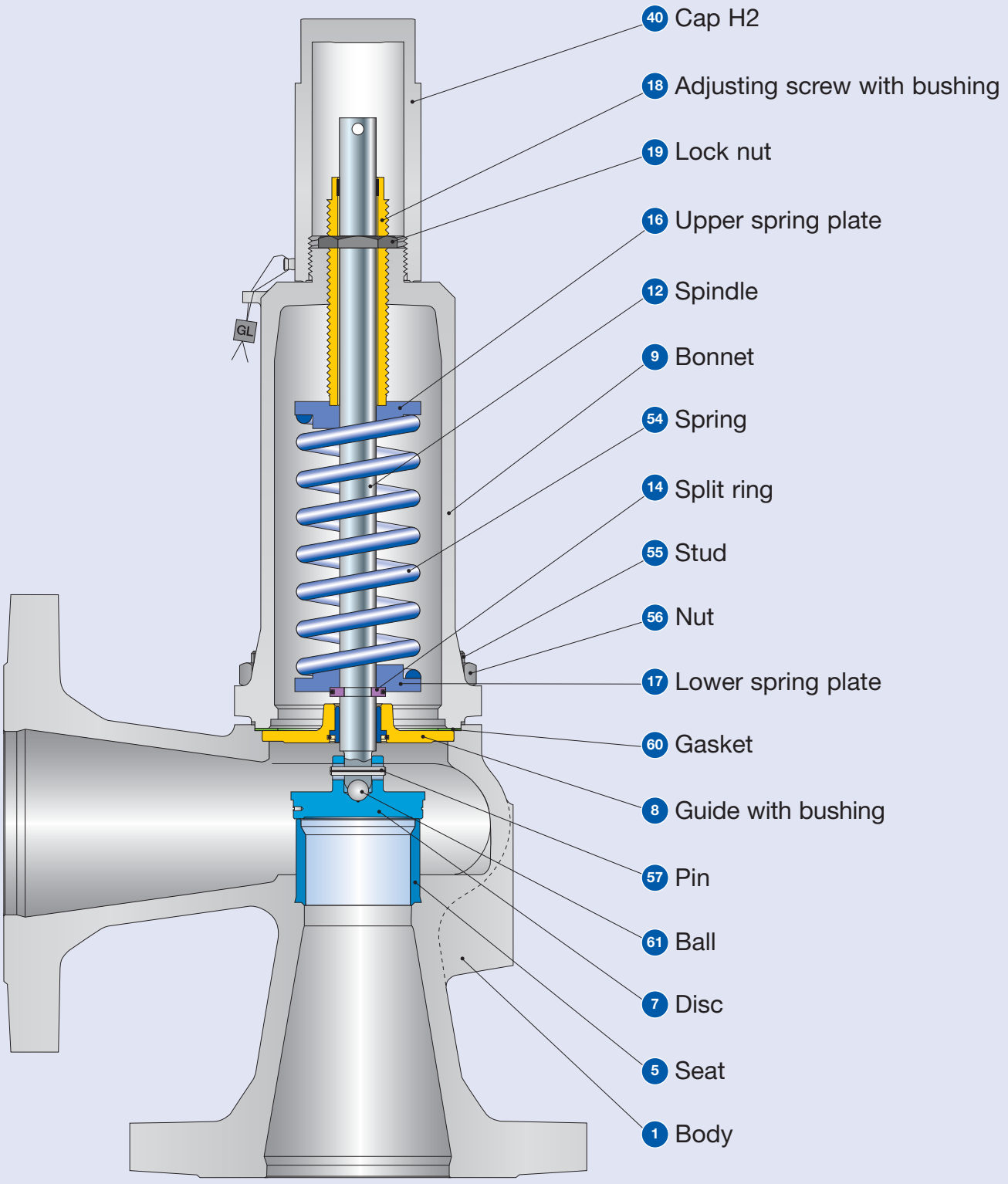
Type 427
Plain lever H3
Open bonnet
Conventional design

Flanged Safety Relief Valves – spring loaded

Type 429
Cap H2
Closed bonnet
Conventional design

Contents

Conventional design



Conventional design

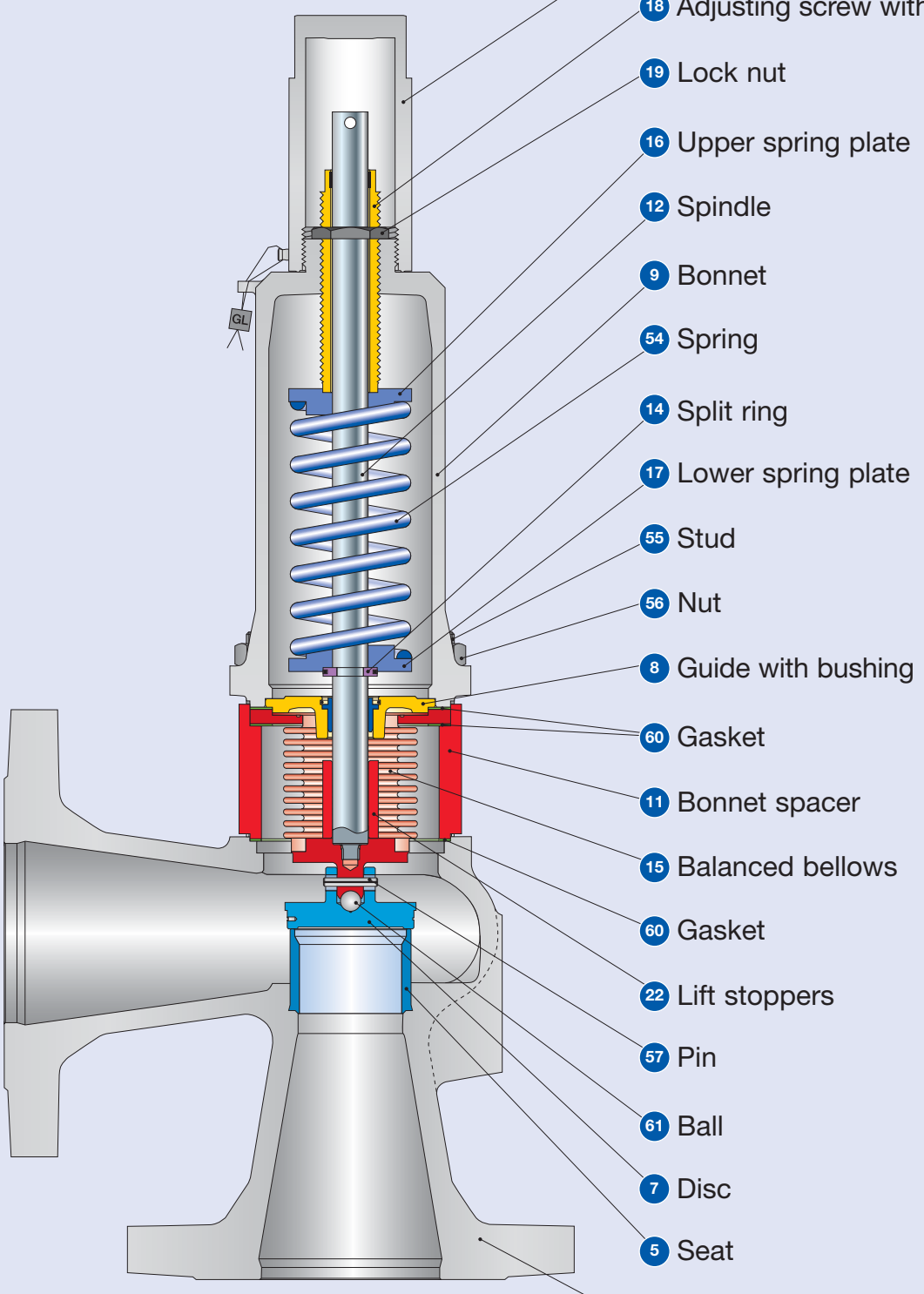
Materials

Item	Component	Type 4275 / 4295	Type 4272 / 4292	Type 4294
1	**Body**	0.7043 Ductile Gr. 60-40-18	1.0619 SA 216 WCB	1.4408 SA 351 CF8M
5	Seat	1.4404 316L	1.4404 316L	1.4404 316L
7	Disc	1.4122 Hardened stainless steel	1.4122 Hardened stainless steel	1.4404 316L
8	Guide	1.4104, 1.0501 Chrome steel or steel	1.4104, 1.0501, 1.0570 Chrome steel or steel	1.4404 316L
	with bushing	1.4104 tenifer Chrome steel tenifer	1.4104 tenifer Chrome steel tenifer	– –
9	**Bonnet**	0.7040 Ductile Gr. 60-40-18	0.7040 Ductile Gr. 60-40-18	1.4408 SA 351 CF8M
12	Spindle	1.4021 420	1.4021 420	1.4404 316L
14	Split ring	1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L
16/17	Spring plate	1.0718 Steel	1.0718 Steel	1.4404 316L
18	Adjusting screw with bushing	1.4104 PTFE Chrome steel PTFE	1.4104 PTFE Chrome steel PTFE	1.4404 PTFE 316L PTFE
19	Lock nut	1.0718 Steel	1.0718 Steel	1.4404 316L
40	Cap H2	1.0460 SA 105	1.0460 SA 105	1.4404 316L
54	Spring, standard	1.1200, 1.8159, 1.7102 Steel	1.1200, 1.8159, 1.7102 Steel	1.4310 Stainless steel
	Spring, optional	1.4310 Stainless steel	1.4310 Stainless steel	– –
55	Stud	1.1181 Steel	1.1181 Steel	1.4401 B8M
56	Nut	1.0501 2H	1.0501 2H	1.4401 8M
57	Pin	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel
60	Gasket	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316
61	Ball	1.3541 Hardened stainless steel	1.3541 Hardened stainless steel	1.4401 316

Note:

- LESER reserves the right to make changes.
- If several materials are specified LESER defines the material.
- LESER may use higher quality materials without giving prior notice
- Each component can be constructed of another material according to the customer's specification.
- All components exposed to pressure are highlighted in bold. The material will be specified according to DIN and ASTM here.

Balanced bellows design



Balanced bellows design

Materials

Item	Component	Type 4275 / 4295	Type 4272 / 4292	Type 4294
1	**Body**	0.7043 Ductile Gr. 60-40-18	1.0619 SA 216 WCB	1.4408 SA 351 CF8M
5	Seat	1.4404 316L	1.4404 316L	1.4404 316L
7	Disc	1.4122 Hardened stainless steel	1.4122 Hardened stainless steel	1.4404 316L
8	Guide	1.4104, 1.0501 Chrome steel or steel	1.4104, 1.0501, 1.0570 Chrome steel or steel	1.4404 316L
	with bushing	1.4104 tenifer Chrome steel tenifer	1.4104 tenifer Chrome steel tenifer	– –
9	Bonnet	0.7040 Ductile Gr. 60-40-18	0.7040 Ductile Gr. 60-40-18	1.4408 SA 351 CF8M
11	Bonnet spacer	1.4404 316L	1.4404 316L	1.4404 316L
12	Spindle	1.4404 316L	1.4404 316L	1.4404 316L
14	Split ring	1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L
15	Balanced bellows	1.4571 316Ti	1.4571 316Ti	1.4571 316Ti
16/17	Spring plate	1.0718 Steel	1.0718 Steel	1.4404 316L
18	Adjusting screw with bushing	1.4104 PTFE Chrome steel PTFE	1.4104 PTFE Chrome steel PTFE	1.4404 PTFE 316L PTFE
19	Lock nut	1.0718 Steel	1.0718 Steel	1.4404 316L
22	Lift stoppers	1.4404 316L	1.4404 316L	1.4404 316L
40	Cap H2	1.0460 SA 105	1.0460 SA 105	1.4404 316L
54	Spring, standard	1.1200, 1.8159, 1.7102 Steel	1.1200, 1.8159, 1.7102 Steel	1.4310 Stainless steel
	Spring, optional	1.4310 Stainless steel	1.4310 Stainless steel	– –
55	Stud	1.4401 8M	1.4401 B8M	1.4401 B8M
56	Nut	1.4401 8M	1.4401 B8M	1.4401 B8M
57	Pin	1.4310 Stainless steel	1.4310 Stainless steel	1.4310 Stainless steel
60	Gasket	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316	Graphite / 1.4401 Graphite / 316
61	Ball	1.3541 Hardened stainless steel	1.3541 Hardened stainless steel	1.4401 316

Note:

- LESER reserves the right to make changes.
- If several materials are specified LESER defines the material.
- LESER may use higher quality materials without giving prior notice
- Each component can be constructed of another material according to the customer's specification.
- All components exposed to pressure are highlighted in bold. The material will be specified according to DIN and ASTM here.

How to order – Example for numbering system – Type 429

1 Article Number	2 Set Pressure	3 Connections	
4292.7172	5 bar	H45	

1	2	3	4
429	2	717	2

1 Valve type 427, 429

Type 429 – with closed bonnet

Type 427 – with open bonnet

2 Material code

Code	Body material
2	1.0619 (WCB)
4	1.4408 (CF8M)
5	0.7043 (Ductile Gr. 60-40-18)

3 Valve code

Automatically determines nominal diameter and body material (see page 03/09).

4

Code	Lifting device	
2	Gas-tight cap	H2
3	Plain lever	H3
4	Packed lever	H4
5	Plain lever with open bonnet	H3

Please enter the units (in gauge)!

The specified pressure range may not be exceeded!

Please refer to page 03/13.

LESER

4 Options

J22			

Type 427, 429			Option code
• O-ring disc			
	CR	"K"	**J21**
	EPDM	"D"	**J22**
	FKM	"L"	**J23**
	FFKM	"C"	**J20**
• Disc 1.4404 / 316L			**L44**
• Disc 1.4404 / 316L stellited			**J25**
• Balanced bellows			
- Bonnet, open	(Type 427)		**J68**
- Bonnet, closed	(Type 429)		**J78**
• Elastomer bellows			**J79**
• High temperature alloy spring			**X01**
• Stainless steel spring			**X04**
• Adapter for lift indicator		H4	**J39**
• Lift indicator			**J93**
• Test gag			
- Cap		H2	**J70**
- Packed lever		H4	**J69**
• O-ring damper			
- Cap		H2	**J65**
- Packed lever		H4	**J66**
• Heating jacket			
- Couplings		G $^3/_8$	**H29**
		G $^3/_4$	**H30**
- Flange		DN 15	**H31**
		DN 25	**H32**
• Drain hole		G $^1/_4$	**J18**
		G $^1/_2$	**J19**
• Oil and grease free			**J85**
• Materials			
- NACE MR0175			**N78**
- NACE MR0103			**N77**

Option code applies only if not standard

5 Documentation

H01	L30	

Please select the necessary documentation:

Tests, Certifications:	**Option code**
DIN EN 10204-3.2: TÜV-Nord Certification for set pressure	**M33**
LESER CGA (Certificate for Global Application)	**H03**

- Acceptance test certificate 3.1 acc.to DIN EN 10204
- Declaration of conformity as per pressure equipment directive PED 97/23/EC

Material quality certificate:
DIN EN 10204-3.1

Component	**Option code**
Body	**H01**
Bonnet	**L30**
Cap / lever cover	**L31**
Disc	**L23**
Screws	**N07**
Nuts	**N08**

6 Code and Medium

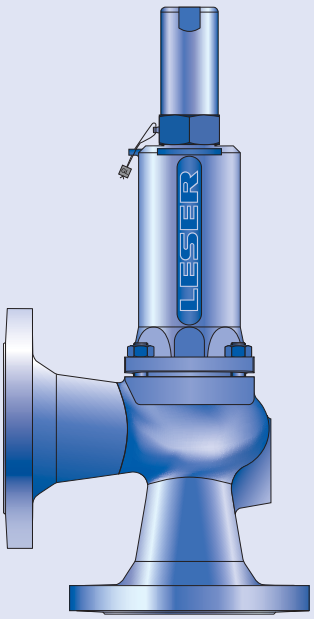
2.0

1	2
2	. 0

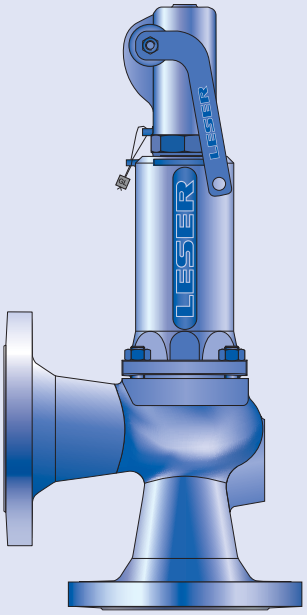
1 Code
2. CE / VdTUEV
3. ASME Section VIII + CE / VdTUEV

2 Medium
.0 steam / gases / liquids (only valid for CE / VdTUEV)

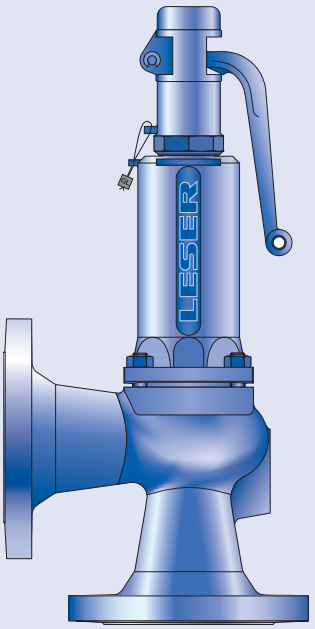
How to order – Article numbers



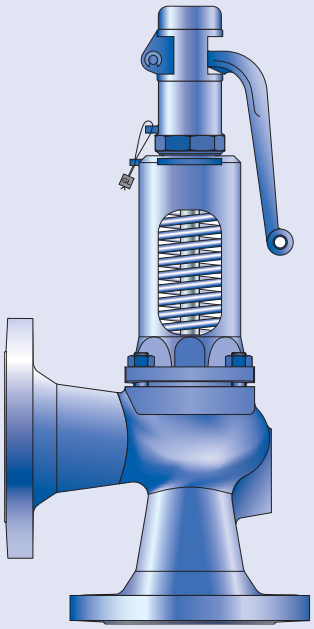
Type 429
Cap H2
Closed bonnet
Conventional design



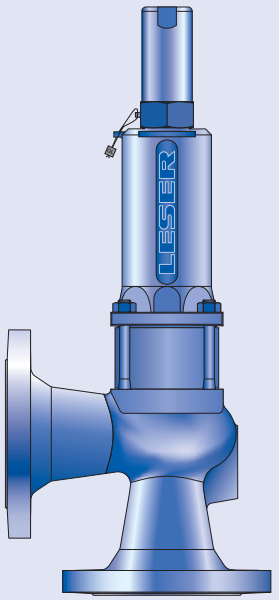
Type 429
Packed lever H4
Closed bonnet
Conventional design



Type 429
Plain lever H3
Closed bonnet
Conventional design



Type 427
Plain lever H3
Open bonnet
Conventional design



Type 429
Cap H2
Closed bonnet
Balanced bellows design

How to order – Article numbers

Article numbers

		DN_I	15	20	25	32	40	50	65	80	100	125	150
		DN_O	15	20	25	32	40	50	65	80	100	125	150
		Actual orifice diameter d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
		Actual orifice area A_0 [mm²]	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 0.7043 (Ductile Gr. 60-40-18)													
Bonnet closed	**H2**	Art.-No. **4295.**	**8612**	**8622**	**8632**	**8642**	**8652**	**8662**	**8672**	**8682**	**8692**	–	–
	H3	Art.-No. **4295.**	**8613**	**8623**	**8633**	**8643**	**8653**	**8663**	**8673**	**8683**	**8693**	–	–
	H4	Art.-No. **4295.**	**8614**	**8624**	**8634**	**8644**	**8654**	**8664**	**8674**	**8684**	**8694**	–	–
open	**H3**	Art.-No. **4275.**	**8615**	**8625**	**8635**	**8645**	**8655**	**8665**	**8675**	**8685**	**8695**	–	–
Body material: 1.0619 (WCB)													
Bonnet closed	**H2**	Art.-No. **4292.**	**7122**	**7132**	**7142**	**7152**	**7162**	**7172**	**7182**	**7192**	**7202**	**7212**	**7222**
	H3	Art.-No. **4292.**	**7123**	**7133**	**7143**	**7153**	**7163**	**7173**	**7183**	**7193**	**4203**	**7213**	**7223**
	H4	Art.-No. **4292.**	**7124**	**7134**	**7144**	**7154**	**7164**	**7174**	**7184**	**7194**	**4204**	**7214**	**7224**
open	**H3**	Art.-No. **4272.**	**7125**	**7135**	**7145**	**7155**	**7165**	**7175**	**7185**	**7195**	**4205**	**7215**	**7225**
Body material: 1.4408 (CF8M)													
Bonnet closed	**H2**	Art.-No. **4294.**	**7242**	**7252**	**7262**	**7272**	**7282**	**7292**	**7302**	**7312**	**7322**	–	–
	H4	Art.-No. **4294.**	**7244**	**7254**	**7264**	**7274**	**7284**	**7294**	**7304**	**7314**	**7324**	–	–

Pressure temperature ratings

Metric units

	DN_I	15	20	25	32	40	50	65	80	100	125	150
	DN_O	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter	d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area	A_0 [mm²]	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 0.7043 (Ductile Gr. 60-40-18)												
DIN flange	Inlet					**PN 16**					–	–
	Outlet					**PN 16**					–	–
Minimum set pressure	p [bar_g] S/G/L	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	–	–
Min. set pressure[1] standard bellows	p [bar_g] S/G/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	–	–
Min. set pressure low pressure bellows	p [bar_g] S/G/L	–	2.0	2.0	2.0	1.8	1.9	1.8	1.8	1.2	–	–
Maximum set pressure	p [bar_g] S/G/L	40	40	40	40	40	40	35	35	30	–	–
Max. set pressure with special spring	p [bar_g] S/G/L	40	40	40	40	40	40	40	35	30	–	–
Temperature[2] acc. to DIN EN	min. [°C]					-60					–	–
	max. [°C]					+350					–	–

[1] Min. set pressure of standard bellows = max. set pressure of bellows for low set pressure.

[2] The temperature is limited by the soft seal material (see page 99/10). The values given here are valid for EPDM. Between -10°C and the lowest specified application temperature, proceed acc. to AD 2000-Merkblatt W10.

Metric units

	DN_I	15	20	25	32	40	50	65	80	100	125	150
	DN_O	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter	d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area	A_0 [mm²]	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 1.0619 (WCB)												
DIN flange	Inlet						**PN 40**					
	Outlet						**PN 40**					
Minimum set pressure	p [bar_g] S/G/L	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
Min. set pressure[1] standard bellows	p [bar_g] S/G/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
Min. set pressure low pressure bellows	p [bar_g] S/G/L	–	2.0	2.0	2.0	1.8	1.9	1.8	1.8	1.2	1.2	on request
Maximum set pressure	p [bar_g] S/G/L	40	40	40	40	40	40	35	35	30	32	16
Max. set pressure with special spring	p [bar_g] S/G/L	40	40	40	40	40	40	40	35	30	32	16
Temperature[2] acc. to DIN EN	min. [°C]						-85					
	max. [°C]						+450					

Pressure temperature ratings

Metric units

	DN_I	15	20	25	32	40	50	65	80	100	125	150
	DN_O	15	20	25	32	40	50	65	80	100	125	150
	Actual orifice diameter d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
	Actual orifice area A_0 [mm²]	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 1.4408 (CF8M)												
DIN flange	Inlet										–	–
	Outlet										–	–
Minimum set pressure	p [bar_g] S/G/L	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	–	–
Min. set pressure[1] standard bellows	p [bar_g] S/G/L	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	–	–
Min. set pressure low pressure bellows	p [bar_g] S/G/L	–	2.0	2.0	2.0	1.8	1.9	1.8	1.8	1.2	–	–
Maximum set pressure	p [bar_g] S/G/L	40	40	40	40	40	31.6	31.0	30	22	–	–
Max. set pressure with special spring	p [bar_g] S/G/L	40	40	40	40	40	40	31	30	22	–	–
Temperature[2] acc. to DIN EN	min. [°C]	-270									–	–
	max. [°C]	+400									–	–

[1] Min. set pressure of standard bellows = max. set pressure of bellows for low set pressure.

[2] The temperature is limited by the soft seal material (see page 99/10). The values given here are valid for EPDM. Between -10°C and the lowest specified application temperature, proceed acc. to AD 2000-Merkblatt W10.

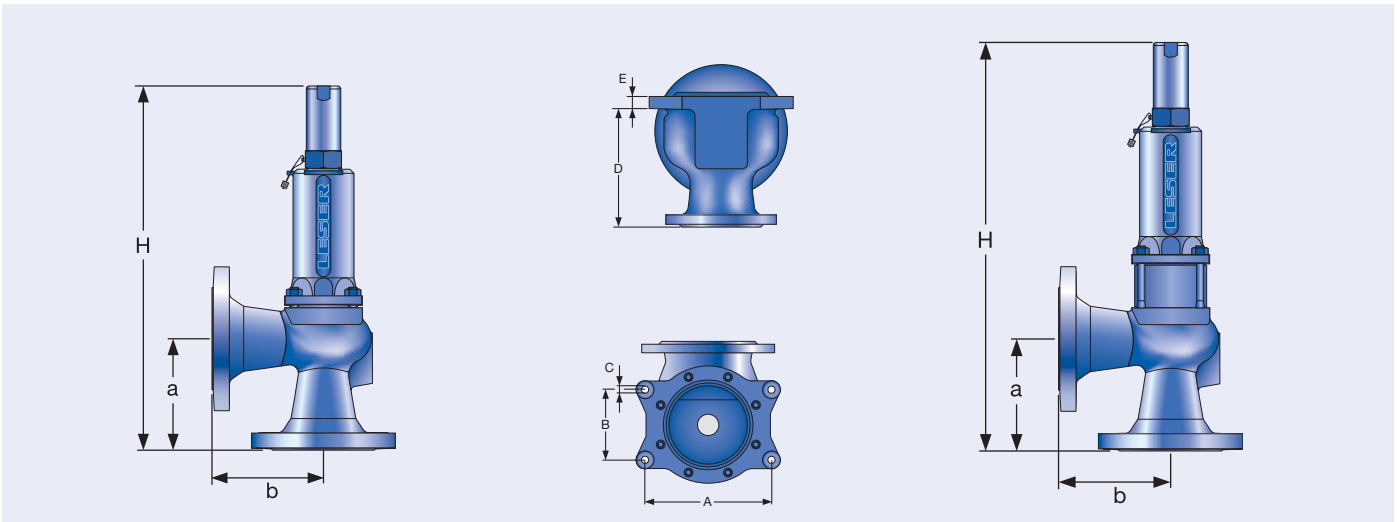
Dimensions and weights

Metric units

	DN_I	15	20	25	32	40	50	65	80	100	125	150
	DN_O	15	20	25	32	40	50	65	80	100	125	150
	Actual orifice diameter d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
	Actual orifice area A_0 [mm²]	113	254	254	254	416	661	1075	1662	2827	4301	6648
Weight [kg]		5	6	6	8	9	12	15	20	33	48	65
	with bellows	6.3	6.4	6.4	8.4	9.6	13	16	21.6	35.6	52.1	78.4
Centre to face [mm]	Inlet a	90	95	100	105	115	125	145	155	175	200	225
	Outlet b	90	95	100	105	115	125	145	155	175	200	225
Height (H4) [mm]	Standard H max.	310	307	311	320	320	360	476	525	609	743	865
	Bellows H max.	359	337	341	355	355	425	536	595	684	823	960
Support brackets [mm]	A											277
	B											160
(Drilled only on request,	C											Ø 18
option code H42)	D											278
	E											21

Body material: 0.7043 (Ductile Gr. 60-40-18)						
DIN flange[1)]	Inlet	**PN 40**			–	–
	Outlet	**PN 40**			–	–
Body material: 1.0619 (WCB)						
DIN flange[1)]	Inlet	**PN 40**				
	Outlet	**PN 40**				
Body material: 1.4408 (CF8M)						
DIN flange[1)]	Inlet	**PN 40**			–	–
	Outlet	**PN 40**			–	–

[1)] Standard flange class For other flange drillings, see page 03/13.



Conventional design | Support brackets | Balanced bellows design

Flange drillings

Flange drillings

		DN_I	15	20	25	32	40	50	65	80	100	125	150
		DN_O	15	20	25	32	40	50	65	80	100	125	150
		Valve size	1/2" x 1/2"	3/4" x 3/4"	1" x 1"	1 1/4"x1 1/4"	1 1/2"x1 1/2"	2" x 2"	2 1/2" x 2 1/2"	3" x 3"	4" x 4"	5" x 5"	6" x 6"
		Actual orifice diameter d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
		Actual orifice area A_0 [mm²]	113	254	254	254	416	661	1075	1662	2827	4301	6648
Body material: 0.7043 (Ductile Gr. 60-40-18), 1.0619 (WCB), 1.4408 (CF8M)													
Inlet	**DIN EN 1092**	PN 10	*	*	*	*	*	*	H44	H44	H44	H44	H44
		PN 16	*	*	*	*	*	*	H45	H45	H45	H45	H45
		PN 25	*	*	*	*	*	*	*	*	*	*	*
		PN 40	*	*	*	*	*	*	*	*	*	*	*
	ASME B16.5[1)]	CL150	H64	H64	H64	H64	H64	H64	H64	H64	[H64]	H64	H64
		CL300	[H65]	–	H65	H65	–	[H65]	[H65]	–	–	–	–
Outlet	**DIN EN 1092**	PN 10	*	*	*	*	*	*	H50	H50	H50	H50	H50
		PN 16	*	*	*	*	*	*	H51	H51	H51	H51	H51
		PN 25	*	*	*	*	*	*	*	*	*	*	*
		PN 40	*	*	*	*	*	*	*	*	*	*	*
	ASME B16.5[1)]	CL150	H79	H79	H79	H79	H79	H79	H79	H79	[H79]	H79	H79
		CL300	H80	–	H80	H80	–	[H80]	[H80]	–	–	–	–

Flange facings

Flange facings

Information	Standard	Inlet	Outlet	Remark
General				
Flange, undrilled	–	H38	H39	
Linde-V-Nut, Form V48	Linde Standard 420-08 LDeS 3313.36	J07	J08	Groove: Rz = 16
Linde-V-Nut, Form V48A		J05	J06	Groove: Rz = 4, e.g. for hydrogen
Lens-shape seal form L (without lens-shape seal)	DIN 2696 LDeS 3313.35	J11	J12	
According to DIN EN 1092				
Flange facings		**Inlet**	**Outlet**	**Remark**
DIN EN 1092 (also see LDeS 3313.40)		PN 10 – PN 40	PN 10 – PN 40	Rz specification acc. to DIN EN 1092 in µm
Raised face	Form B1	*	*	Facing: Rz = 12.5 – 50
	Form B2	L36	L38	Facing: Rz = 3.2 – 12.5 (only for steel flange)
Tongue, Form C[1]		H94	H92	
Groove, Form D[1]		H93	H91	
Male, Form E		H96	H98	
Female, Form F		H97	H99	
O-ring Male, Form G		J01	J02	
O-ring Female, Form H		J03	J04	

According to ASME B16.5

Body material	Inlet	Outlet	Smooth Finish[2]		Serrated Finish		RTJ-Groove			
			Inlet	Outlet	Inlet	Outlet	Inlet		Outlet	
			Option code		Option code		ANSI Class	Option code	ANSI Class	Option code
0.7043, 1.0619, 1.4408	all	all	L52	L53	*	*	–	–	–	–

[1] LESER manufactures the groove at flanged valves by milling. If a customer demands a turned surface in the soil of the groove according to DIN EN 1092-1 an additional option code is necessary: “S01: soil of the groove drilled”.
[2] Smooth finish is not defined in the effective standards.

For an explanation of signs and symbols, refere to page 00/07.
Note: Flange drillings and facings always meet the requirements of mentioned flange standards.
Flange thickness and outer diameter may deviate from flange standard.

LESER Original Spare Parts Kits

The LESER Spare Parts Kits contain all the spare parts recommended for the regular maintenance of a LESER safety valve.

Contents

Item	Component	Material	Quantity
7.5	Securing ring (Disc)	1.4571 / 316Ti	1
8.4	Securing ring (Guide)	1.4571 / 316Ti	1
14	Split ring	1.4404 / 316L	2
40.3	Spacer	1.4571 / 316Ti	3
57	Pin	1.4310 / Stainless steel	1
59	Securing ring (Split ring)	1.4571 / 316Ti	1
60	Gasket	Graphite / 1.4401 Graphite / 316	3
61	Ball	1.4401 / 316	1
1.9	O-ring (Lifting device H4)	FKM	1

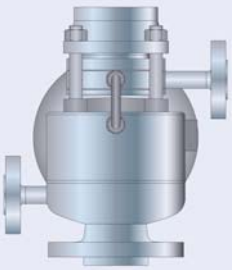
Article numbers

DN	15 – 20	25	32	40	50	65	80	100	125	150
Art.-No. **5012.**	**1201**	**1201**	**1201**	**1201**	**1212**	**1213**	**1204**	**1214**	**1215**	**1216**

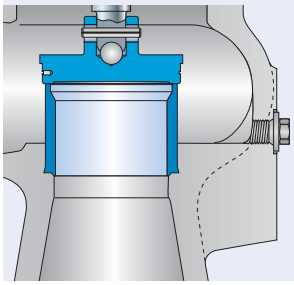
Available options

For more information, also see
“Accessories and options” as of page 99/01.

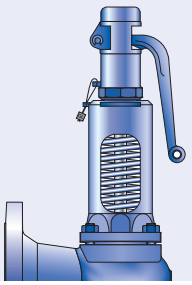
Heating jacket
H29, H30: Coupling G $^{3}/_{8}$, G $^{3}/_{4}$
H31, H32: Flange DN15, DN25



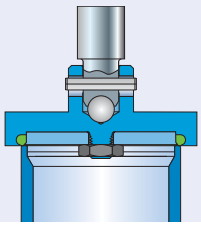
Drain hole
J18: G $^{1}/_{4}$
J19: G $^{1}/_{2}$



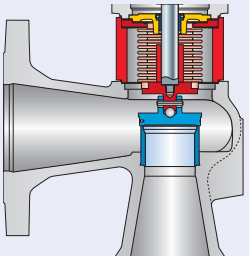
Open bonnet
See Art.-No.



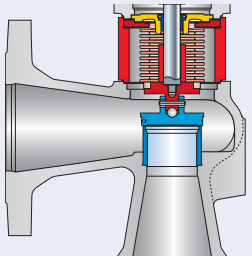
O-ring disc
J20: FFKM “C”
J21: CR “K”
J22: EPDM “D”
J23: FKM “L”



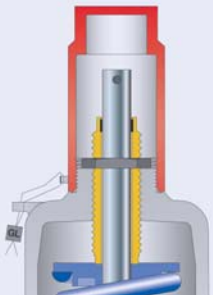
Balanced bellows
J68: Open bonnet
J78: Closed bonnet



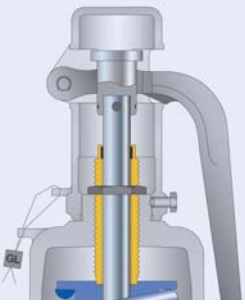
Conversion set for balanced bellows
Art.-No. see page 02/14



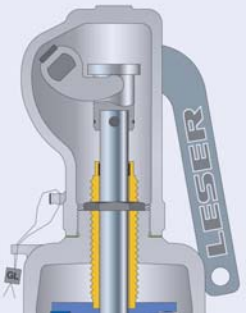
Screwed cap H2
H2



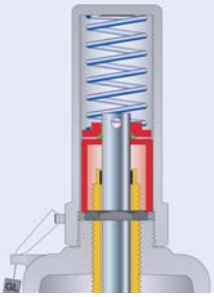
Plain lever H3
H3



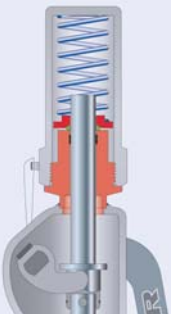
Packed lever H4
H4



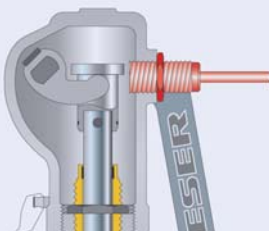
O-ring damper H2
J65



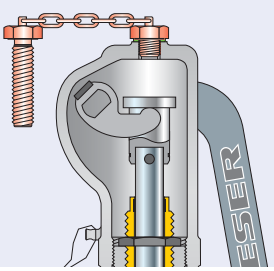
O-ring damper H4
J66



Lift indicator
J39: Adaptor H4
J93: Lift indicator



Test gag
J69: H4
J70: H4



Approvals

Approvals		
	DN_E	15 – 150
	DN_A	15 – 150
	Actual orifice diameter d_0 [mm]	12 – 92
	Actual orifice area A_0 [mm²]	113 – 6648
Europa		**Coefficient of discharge K_{dr}**
PED / DIN EN ISO 4126-1	Approval-No.	072020111Z0008/0/04
	S/G	0.13
	L	The valve is component tested for liquids with thermal expansion.
Germany		**Coefficient of discharge α_w**
PED / AD 2000-Merkblatt A2	Approval-No.	TÜV SV 610
Proportional safety valve	S/G	0.13
	L	The valve is component tested for liquids with thermal expansion.
China		**Coefficient of discharge α_w**
AQSIQ	Approval-No.	For current Approval-No. see www.leser.com
	S/G	0.13
	L	The valve is component tested for liquids with thermal expansion.
Eurasian Custom Union		**Coefficient of discharge α_w**
EAC	Approval-No.	For current Approval-No. see www.leser.com
	S/G	0.13
	L	The valve is component tested for liquids with thermal expansion.
Classification societies		
		on request

Information:
According to AD 2000-Merkblatt A2 Chap. 10.3, the discharge coefficient "... for normal or proportional safety valves, should not exceed the value α_w= 0.08 for S/G or the value α_w = 0.05 for L." Since the actual α_w value for liquids is below the requirements of the AD 2000-Merkblatt for the Series 429, it is not possible to accord a discharge coefficient α_w.

Capacities – Steam

Calculation of the capacity for saturated steam acc. to AD 2000-Merkblatt A2 with 10% overpressure.
Capacities at 1 bar and lower are calculated at 0.1 bar overpressure.

Metric units	**AD 2000-Merkblatt A2** [kg/h]										
DN_I	15	20	25	32	40	50	65	80	100	125	150
DN_O	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area A_0 [mm²]	113	254	254	254	416	661	1075	1662	2827	4301	6648
$LEO_{S/G}$*) [inch²]	0.023	0.053	0.053	0.053	0.086	0.137	0.222	0.343	0.584	0.889	1.374
Set pressure [bar]	**Capacity** [kg/h]										
1.5	22	50	50	50	81	130	211	326	555	843	1304
2	27	60	60	60	98	155	253	391	665	1012	1564
3	35	79	79	79	130	206	336	519	883	1343	2076
4	44	99	99	99	162	257	419	647	1101	1675	2589
5	53	119	119	119	194	308	501	775	1318	2005	3099
6	61	138	138	138	225	358	584	902	1534	2334	3608
7	70	157	157	157	256	408	664	1026	1746	2655	4104
8	78	176	176	176	288	458	746	1152	1960	2982	4609
9	87	196	196	196	320	508	827	1278	2175	3308	5114
10	96	215	215	215	351	558	909	1404	2389	3635	5618
12	113	254	254	254	414	658	1072	1656	2818	4286	6625
14	130	291	291	291	476	756	1231	1903	3238	4925	7612
16	147	330	330	330	539	856	1394	2154	3665	5575	8617
18	164	368	368	368	601	956	1557	2406	4093	6226	
20	181	407	407	407	665	1056	1720	2658	4522	6879	
22	198	444	444	444	726	1154	1878	2903	4938	7511	
24	215	483	483	483	789	1254	2041	3155	5368	8165	
26	232	522	522	522	852	1355	2205	3408	5798	8820	
28	249	561	561	561	915	1455	2369	3662	6230	9477	
30	267	600	600	600	979	1557	2534	3917	6663	10136	
32	284	639	639	639	1043	1658	2699	4172		10797	
34											
36											
38											
40											

*) LEO S/G = LESER Effective Orifice steam/gases please refer to page 00/11
“How to use” capacity tables, refer to page 00/09

Capacities – Air

Calculation of the capacity for air acc. to AD 2000-Merkblatt A2 with 10% overpressure at 0 °C and 1013 mbar.
Capacities at 1 bar and below are calculated with 0.1 bar overpressure.

Metric units	**AD 2000-Merkblatt A2** [m_n^3/h]										
DN_I	15	20	25	32	40	50	65	80	100	125	150
DN_O	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area A_0 [mm^2]	113	254	254	254	416	661	1075	1662	2827	4301	6648
$LEO_{S/G}$*) [$inch^2$]	0.023	0.053	0.053	0.053	0.086	0.137	0.222	0.343	0.584	0.889	1.374
Set pressure [bar]	**Capacity** [m_n^3/h]										
1.5	27	60	60	60	98	156	253	391	666	1013	1565
2	32	72	72	72	118	188	306	472	803	1222	1889
3	43	97	97	97	159	252	410	634	1079	1641	2536
4	54	122	122	122	199	316	515	796	1354	2060	3184
5	65	147	147	147	239	381	620	958	1629	2479	3831
6	76	171	171	171	280	445	724	1120	1905	2897	4478
7	87	196	196	196	320	509	829	1281	2180	3316	5126
8	98	221	221	221	361	574	934	1443	2455	3735	5773
9	109	246	246	246	401	638	1038	1605	2731	4154	6420
10	120	271	271	271	442	702	1143	1767	3006	4573	7068
12	142	320	320	320	523	831	1353	2091	3557	5410	8362
14	164	370	370	370	604	960	1562	2414	4107	6248	9657
16	186	419	419	419	684	1088	1771	2738	4658	7086	10952
18	208	469	469	469	765	1217	1981	3062	5209	7923	
20	230	518	518	518	846	1345	2190	3385	5759	8761	
22	252	568	568	568	927	1474	2400	3709	6310	9598	
24	274	617	617	617	1008	1603	2609	4033	6861	10436	
26	296	667	667	667	1089	1731	2818	4356	7411	11274	
28	318	717	717	717	1170	1860	3028	4680	7962	12111	
30	341	766	766	766	1251	1989	3237	5004	8513	12949	
32	363	816	816	816	1332	2117	3447	5327		13786	
34	385	865	865	865	1413	2246	3656	5651			
36	407	915	915	915	1494	2375	3865				
38	429	964	964	964	1575	2503	4075				
40	451	1014	1014	1014	1655	2632	4284				

*) LEO S/G = LESER Effective Orifice steam/gases please refer to page 00/11
“How to use” capacity tables, refer to page 00/09

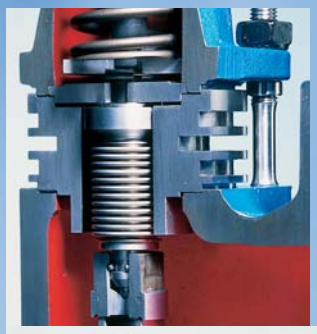
Capacities – water

Acc. to AD 2000-Merkblatt A2, the LESER safety valve type 427, 429 can be used for thermal expansion in spite of having no component testing for liquids. To calculate the water capacity table, a coefficient of discharge of α_w = 0.05 was used.

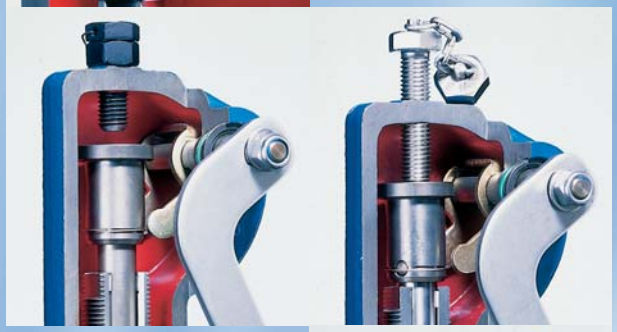
Calculation of the capacity for water as per AD 2000-Merkblatt A2 with 10% overpressure at 20 °C.
Capacities at 1 bar and below are calculated with 0.1 bar overpressure.

Metric units	**AD 2000-Merkblatt A2** [10^3kg/h]										
DN	15	20	25	32	40	50	65	80	100	125	150
DN_O	15	20	25	32	40	50	65	80	100	125	150
Actual orifice diameter d_0 [mm]	12	18	18	18	23	29	37	46	60	74	92
Actual orifice area A_0 [mm²]	113	254	254	254	416	661	1075	1662	2827	4301	6648
LEO_L*) [inch²]	0.009	0.020	0.020	0.020	0.033	0.053	0.085	0.132	0.225	0.342	0.528
Set pressure [bar]	**Capacity** [10^3kg/h]										
1.5	0.30	0.67	0.67	0.67	1.09	1.73	2.81	4.34	7.39	11.2	17.4
2	0.34	0.77	0.77	0.77	1.25	1.99	3.24	5.02	8.53	13.0	20.1
3	0.42	0.94	0.94	0.94	1.54	2.44	3.97	6.14	10.4	15.9	24.6
4	0.48	1.09	1.09	1.09	1.77	2.82	4.59	7.09	12.1	18.4	28.4
5	0.54	1.21	1.21	1.21	1.98	3.15	5.13	7.93	13.5	20.5	31.7
6	0.59	1.33	1.33	1.33	2.17	3.45	5.62	8.69	14.8	22.5	34.7
7	0.64	1.44	1.44	1.44	2.35	3.73	6.07	9.38	16.0	24.3	37.5
8	0.68	1.54	1.54	1.54	2.51	3.99	6.49	10.0	17.1	26.0	40.1
9	0.72	1.63	1.63	1.63	2.66	4.23	6.88	10.6	18.1	27.5	42.6
10	0.76	1.72	1.72	1.72	2.80	4.46	7.26	11.2	19.1	29.0	44.9
12	0.84	1.88	1.88	1.88	3.07	4.88	7.95	12.3	20.9	31.8	49.1
14	0.90	2.03	2.03	2.03	3.32	5.27	8.58	13.3	22.6	34.3	53.1
16	0.97	2.17	2.17	2.17	3.55	5.64	9.18	14.2	24.1	36.7	56.7
18	1.02	2.30	2.30	2.30	3.76	5.98	9.73	15.0	25.6	38.9	
20	1.08	2.43	2.43	2.43	3.96	6.30	10.3	15.9	27.0	41.0	
22	1.13	2.55	2.55	2.55	4.16	6.61	10.8	16.6	28.3	43.0	
24	1.18	2.66	2.66	2.66	4.34	6.90	11.2	17.4	29.6	45.0	
26	1.23	2.77	2.77	2.77	4.52	7.19	11.7	18.1	30.8	46.8	
28	1.28	2.87	2.87	2.87	4.69	7.46	12.1	18.8	31.9	48.6	
30	1.32	2.97	2.97	2.97	4.86	7.72	12.6	19.4	33.0	50.3	
32	1.37	3.07	3.07	3.07	5.02	7.97	13.0	20.1		51.9	
34	1.41	3.17	3.17	3.17	5.17	8.22	13.4	20.7			
36	1.45	3.26	3.26	3.26	5.32	8.46	13.8				
38	1.49	3.35	3.35	3.35	5.47	8.69	14.1				
40	1.53	3.43	3.43	3.43	5.61	8.91	14.5				

*) LEO_L = LESER Effective Orifice liquids please refer to page 00/11
"How to use" capacity tables, refer to page 00/09



Accessories and Options



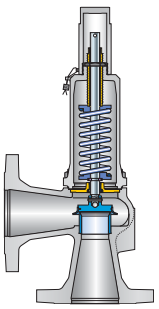
Contents

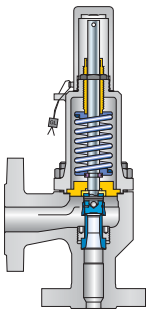
Chapter/Page

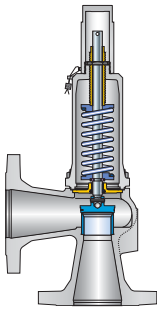
Accessories and Options

LESER

Overview







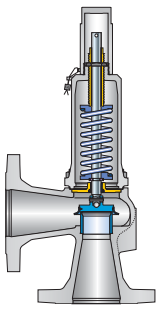
Options

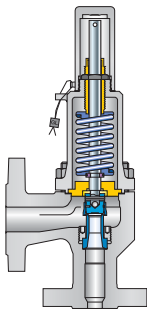
Type			Option code	431, 433	431, 433 PN 160	427, 429
Disc (item 7):						
		Bull race disc	**J24**	✓	✓	✓
Seal type (item 5 and 7)						
Metal seat		Disc 1.4404	**L44**	✓	✓	✓
		Disc 1.4404 stellited	**J25**	✓	✓	✓
Soft seal	O-Ring	CR “K”	**J21**	✓	✓	✓
		NBR “N”	**J30**	✓	✓	✓
		EPDM “D”	**J22**	✓	✓	✓
		FKM “L”	**J23**	✓	✓	✓
		FFKM “C”	**J20**	✓	✓	✓
	Sealing plate	SP “T”	**J49**	✓	on request	–
		PCTFE “G”	**J48**	✓	on request	–
		PTFE “A”	**J44**	✓	on request	–
Bellows (item 15, item 70)						
Open bonnet		Standard bellows	**J68**	✓	✓	✓
		Low pressure bellows	**J68J63**	✓	–	✓
Bonnet closed		Standard bellows	**J78**	✓	✓	✓
		Low pressure bellows	**J78J63**	✓	–	✓
		Other materials	**J25** + Material name	✓	✓	✓
Elastomer bellows		EPDM	**J79**	✓	–	✓
		NBR	**J87**	✓	–	✓
Caps and levers (item 40)						
		H2		✓	✓	✓
		H3		✓	✓	✓
		H4		✓	✓	✓
Spring (item 54)						
		High temperatue alloy 1.8159 / 1.7102	**X01**	✓	✓	✓
		Stainless steel 1.4310	**X04**	✓	✓	✓

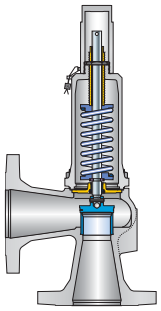
Accessories and Options

LESER

Overview





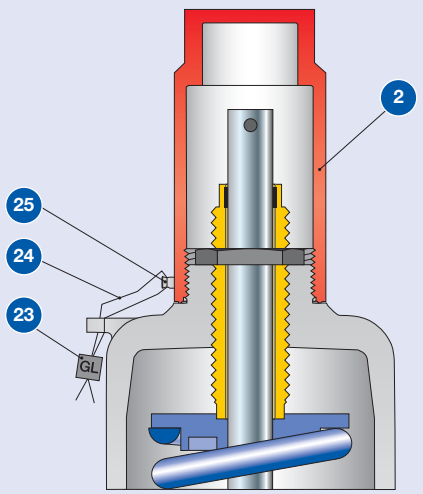


Options

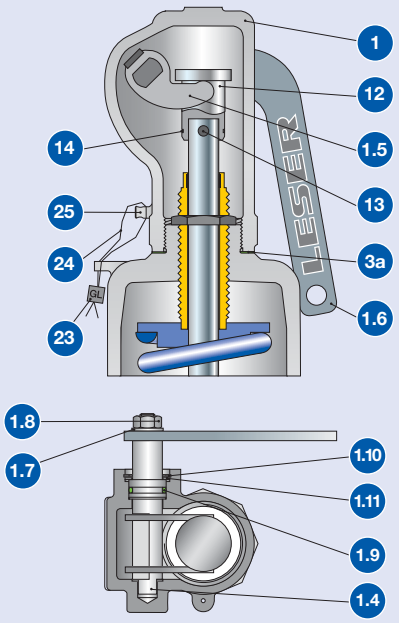
Type	Option code	431, 433	431, 433 PN 160	427, 429
Test gag				
H2	**J70**	✓	✓	✓
H4	**J69**	✓	✓	✓
Bonnet (item 9)				
closed		✓	✓	✓
open		✓	✓	✓
Heating jacket				
		✓	✓	✓
Lift indicator				
Lifting device H2, H4	**J39J93**	✓	✓	✓
Lift stoppers				
Bush	**J51**	✓	✓	✓
Gag H2	**J52**	✓	✓	✓
Gag H4	**J50**	✓	✓	✓
Drain hole				
G $^1/_4$	**J18**	✓	✓	✓
G $^1/_2$	**J19**	✓	✓	✓
O-ring damper (item 40)				
H2	**H65**	✓	✓	✓
H4	**H66**	✓	✓	✓
Bursting disc				
H2		✓	✓	✓

Caps and levers – subassembly item 40

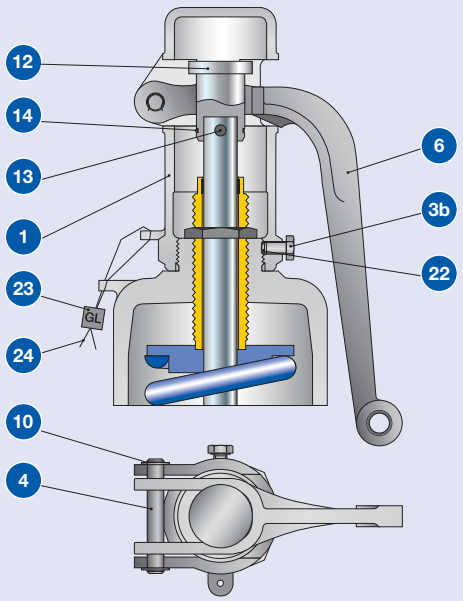
Cap H2



Packed lever H4

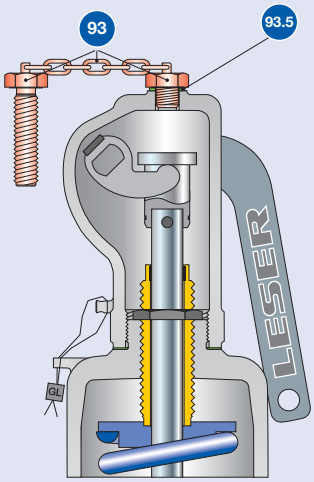


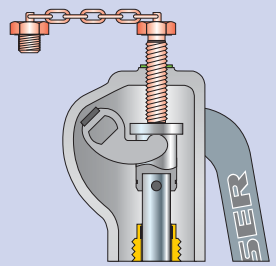
Plain lever H3



Test gag

Cap H2: J70
Packed lever H4: J69





BLOCKED
Remove screw
after testing

Test gag

The test gag prevents the spindle from lifting and keeps the safety valve tight while the system pressure exceeds the set pressure.

The test gag is used to:

– perform the pressure test in a system without disassembling the safety valve
– be able to make an adjustment to each individual valve in systems with multiple safety valves

The test gag must be removed after testing, otherwise the safety valve will not protect the system against impermissible overpressure.

Caps and levers – subassembly item 40

Materials

		Steel			Stainless steel	
Item.	Component	Cap H2	Plain lever H3	Packed lever H4	Cap H2	Packed lever H4
1	Lever cover	–	0.7040	0.7040	–	1.4408
		–	Gr. 60-40-18	Gr. 60-40-18	–	CF8M
2	Cap	1.0460	–	–	1.4404	–
		SA 105	–	–	316L	–
3a	Spacer	–	–	1.4571	–	1.4571
		–	–	316Ti	–	316Ti
3b	Hex screw	–	1.4401	–	–	–
		–	B8M	–	–	–
4 / 1.4	Shaft / bolt	–	1.4021	1.0718	–	1.4404
		–	420	Steel	–	316L
1.5	Lifting fork	–	–	1.0531	–	1.4571
		–	–	Steel	–	316Ti
6 / 1.6	Lever	–	0.7040	1.0036	–	1.4301
		–	Gr. 60-40-18	Steel	–	304
1.7	Washer	–	–	1.4401	–	1.4301
		–	–	316	–	304
1.8	Nut	–	–	A2/Poly	–	1.4401
		–	–	2H	–	8M
1.9	O-Ring	–	–	FKM	–	–
		–	–	FKM	–	–
1.9	Packing ring precast	–	–	–	–	Graphite
		–	–	–	–	Graphite
10 / 1.10	Retaining clip	–	Carbon steel	Carbon steel	–	–
		–	Carbon steel	Carbon steel	–	–
1.10	Nut	–	–	–	–	1.4104
		–	–	–	–	Chrome steel
1.10	Packing gland	–	–	–	–	1.4404
		–	–	–	–	316L
1.11	Support ring	–	–	Carbon steel	–	–
		–	–	Carbon steel	–	–
12	Spindle cap	–	1.0718	1.0718	–	1.4404
		–	Carbon steel	Carbon steel	–	316L
13	Pin	–	Steel	Steel	–	1.4401
		–	Steel	Steel	–	8M
14	Securing ring	–	1.4571	1.4571	–	1.4571
		–	316Ti	316Ti	–	316Ti
22	Plug	–	Plastic	–	–	–
		–	Plastic	–	–	–
23	Seal	Plastic	Plastic	Plastic	Plastic	Plastic
		Plastic	Plastic	Plastic	Plastic	Plastic
24	Seal wire	1.4541	1.4541	1.4541	1.4541	1.4541
		321	321	321	321	321
25	Sealing nose	1.4435	–	–	1.4435	1.4435
		316L	–	–	316L	316L
93	Test gag	1.4401	–	1.4401	1.4401	1.4401
		B8M	–	B8M	B8M	B8M
93.5	Washer	Fiber	–	Fiber	Fiber	Fiber
		Fiber	–	Fiber	Fiber	Fiber

Note:

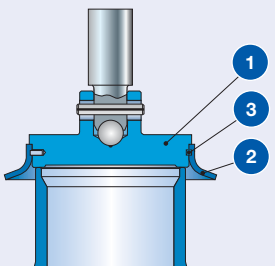
- LESER reserves the right to make changes
- LESER may use higher quality materials without giving prior information
- Each component can be constructed of another material according to the customer's specification.

Metal seat – seat / nozzle, item 5 and disc subassembly item 7

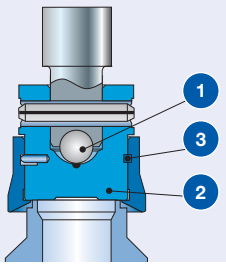
With LESER, the metal seat surfaces (disc and seat) are optically lapped planar to guarantee high seal tightness. LESER safety valves are delivered with a standard seal tightness acc. to API 527.

Improved tightness (Option code J86) is available on request.

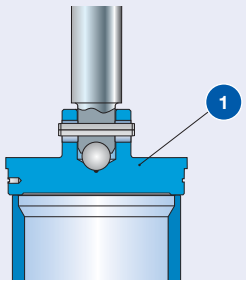
Type 431 / 433



Type 431 / 433 PN 160



Type 427 / 429



The detachable lifting aid is standard with safety valves of Type 431 / 433 and Type 431 / 433 PN 160. The benefit of the detachable lifting aid is the easy re-lapping of the disc sealing surface on one disc.

This makes it possible to have fast maintenance of the safety valve on site.

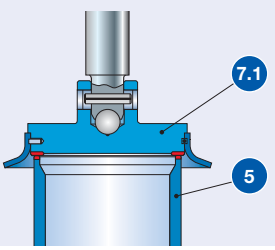
Stellited sealing surface

The sealing surfaces of stainless steel discs and seats / nozzles can be stellited by weld cladding. Stellite is a cobalt-chrome non-ferrous alloy with increased hardness, corrosion resistance, and abrasion resistance even at high temperatures.

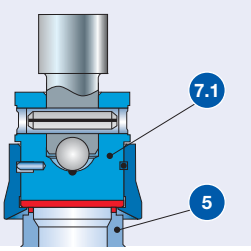
LESER recommends stellited sealing surfaces for Modulate Action safety valves (seat / nozzle and disc (1.4404 / 316L)) in the following applications:

- for high-pressure applications with highly stressed sealing surfaces
- for high-temperature applications in order to prevent permanent deformation of the sealing surface as a consequence of the material properties of the seat and disc
- use with abrasive media in order to increase the abrasion resistance of the sealing surface

Type 431 / 433



Type 431 / 433 PN 160



Materials for disc and seat / nozzle, see page 99/07.

Hardness **Metal seat**

Material		Hardness of the sealing surface		
EN	ASME	Value according to standard or manufacturer specification		Mean value LESER bearing material
EN 10088-3, 1.4122 hardened	Chrome steel, hardened	≥ 40 HRC	LDeS 4325.01 hardening process	42 – 46 HRC
EN 10272, 1.4404	SA 479 316L	≤ 215 HBW	EN 10272 Table 7	16 – 19 HRC[1)]
EN 10272, 1.4404 stellited	SA 479 316L stellited	≥ 35 HRC	Manufacturer specification	40 HRC

HBW: BRINELL hardness acc. to DIN EN ISO 6506-1 / HRC: ROCKWELL hardness acc. to DIN EN ISO 6508-1

[1)] Rockwell hardnesses less than 20 HRC are not approved by the standard. LESER gives these values for better comparability.

Metal seat – seat / nozzle, item 5 and disc subassembly item 7

Standard and corrosiv service

Materials — **Disc – subassembly item 7**

Item	Component	Steel			Stainless steel	
Type 431 / 433						
1	Disc	1.4122 hardened Hardened stainless steel			1.4404 316L	
2	Lifting aid	DN 15 1.4104 430F	DN 20 - 50 1.4404 316L	≥DN 65 1.4408 CF8M	DN 15 - 50 1.4404 316L	≥DN 65 1.4408 CF8M
3	Circlip	1.4571 316Ti			1.4571 316Ti	
Type 431 / 433 PN 160						
1	Teller	1.4122 hardened Hardened stainless steel			1.4404 316L	
2	Lifting aid	1.4104 430F			1.4404 316L	
3	Circlip	1.4571 316Ti			1.4571 316Ti	
Type 427 / 429						
1	Disc	1.4122 hardened Hardened stainless steel			1.4404 316L	

Materials — **Seat / nozzle item 5**

Item	Component	Steel	Stainless steel
All series			
5	Seat / nozzle	1.4404	

Stellited sealing surface

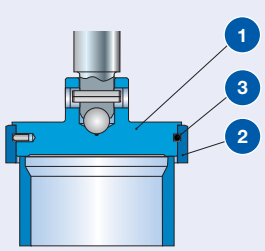
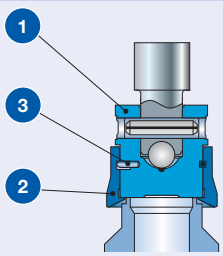
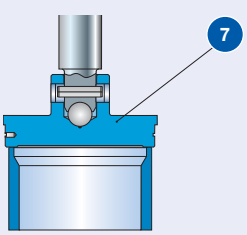
Materials — **Seat / nozzle item 5, disc item 7**

Item	Component	Option code	
Type 431 / 433, 431 / 433 PN 160			
7.1	Disc	J25	1.4404 stellited 316L stellited
5	Seat / nozzle	L61 / L62	1.4404 stellited 316L stellited

Bull race disc

To prevent damages to the sealing surfaces from frequent disassembly, in particular for safety valves with short or regular service intervals, the disc can be supplied in a bull race construction as a custom design.

Construction

Type	431, 433	431, 433 PN 160	427, 429
Construction			
Option code	J24	J24	J24

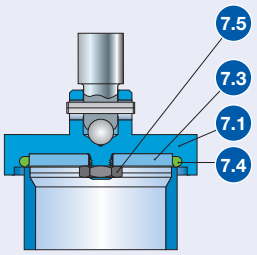
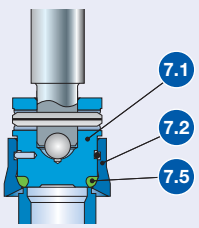
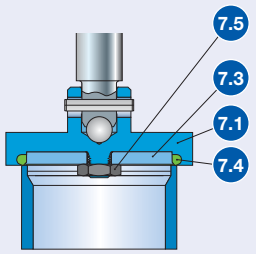
Disc with soft seal – subassembly item 7

Features and Benefits

LESER soft seal solutions allow for superior tightness.

- Two different designs with o-ring or sealing plate for a wide variety application
- Large selection of soft seal materials to best adapt to the application
- Increased service life of sealing surfaces compared to a metal to metal seat
- Simple replacement of the soft seal reduces maintenance costs
- Standard ARP O-ring sizes for easy worldwide procurement
- One standard durometer per O-ring material for all set pressures to reduce stocking expenses

Design of soft seal – O-ring disc

Type	431 / 433		433 PN 160	427 / 429
Nominal size	DN 15	DN 20 – DN 150	DN 15	DN 20 – DN 150
Pressure range	0.3 – 40 bar	0.2 – 20 bar	0.2 – 160 bar	1.5 – 40 bar
Option code				
CR “K” J21 EPDM “D” J22 FKM “L” J23 FFKM “C” J20				

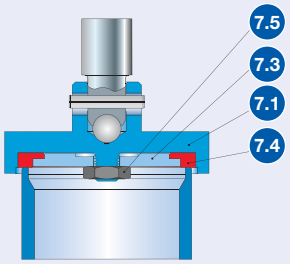
For temperature application limits, media resistance, and option codes, see selection table on page 99/10.
Materials for soft sealing disc, see page 99/09

Materials – Disc – subassembly item 7

Type	431 / 433		433 PN 160		427 / 429	
	DN 15 0.3 – 40 bar	DN 20 – DN 150 0.2 – 40 bar	DN 15 0.2 – 160 bar		DN 20 – DN 150 1.5 – 40 bar	
Disc	Item 7.1	1.4404 316L	Item 7.1	1.4404 316L	Item 7.1	1.4404 316L
Retainer	Item 7.3	1.4404 316L	–	–	Item 7.3	1.4404 316L
Soft seal Materials, see page 99/10	Item 7.4	O-ring	Item 7.5	O-ring	Item 7.4	O-ring
Lifting aid	see Item 7.1 –		Item 7.2	1.4404 316L	– –	
Nut	Item 7.5	1.4401 8M	–	–	Item 7.5	1.4401 8M

For temperature application limits, media resistance and option codes, see selection table on page 99/10.

Soft seal disc – subassembly item 7

Design of soft seal		Disc with sealing plate		
Type		431 / 433	433 PN 160	427 / 429
Option code		Pressure range		
SP "T"	J49	10 – 40 bar	–	–
PCTFE "G"	J48	1.0 – 30 bar	–	–
PTFE "A"	J44	1.0 – 10 bar	–	–
Design			On request	Not available

Materials		Disc – subassembly item 7			
Type		431 / 433		433 PN 160	427 / 429
		DN 15 0.3 – 40 bar	DN 20 – DN 150 0.2 – 40 bar	DN 15 0.2 – 160 bar	DN 20 – DN 150 1.5 – 40 bar
Disc	Item 7.1	1.4404		–	–
		316L		–	–
Retainer	Item 7.3	1.4404		–	–
		316L		–	–
Soft seal Materials, see page 99/11	Item 7.4	Sealing plate		–	–
				–	–
Lifting aid		see Item 7.1		–	–
		–		–	–
Nut	Item 7.5	1.4401		–	–
		8M		–	–

For temperature application limits, media resistance and option codes, see selection table on page 99/11.

Soft seal

Soft seal selection — **O-ring**

Abbrevation ASTM 14	Trade name (Designation)	Code letter[1]	Option code	T_{min} [°C]	T_{max} [°C]	Application[2]
O-ring						
CR	Neoprene®	K	J21	-40	100	Paraffins, mineral oils, silicon oils and greases, water and aqueous solutions, refrigerants, ozone
NBR	Buna-N® (Nitrile-Butadiene)	N	J30	-25	100	Hydraulic oils, plant and animal fats and oils
EPDM	Buna-EP (Ethylene-Propylene-Dine)	D	J22	-45	150	Hot water and hot steam up to 150 °C, 302 °F, many organic and inorganic acids, silicon oils and greases FDA conforming compound
FKM	Viton® (Fluorocarbon)	L	J23	20	180	High temperatures (not hot steam), mineral oils and greases, silicon oils and greases, plant and animal oils and fats, ozone FDA conforming compound on request
FFKM	Kalrez® (Perfluor)	C	J20	0	250	Almost all chemicals, standard compound is Kalrez® 6375 with steam resistance FDA conforming compound on request

[1] The code letters are stamped on the disc (Item 1)
[2] The pressure and temperature application range must be observed in all cases. The chemical resistance is based on specifications from the soft seal manufacturer. LESER assumes no guarantee.

Soft seal

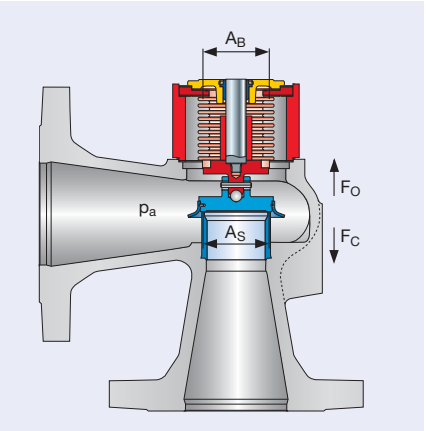
Soft seal selection — **Sealing plate**

Abbrevation ASTM 14	Trade name (Designation)	Code letter[1]	Option code	T_{min} [°C]	T_{max} [°C]	Application[2]
Sealing plate						
SP	VESPEL SP-1® [3] (Polyimide)	T	J49	-270	300	High-temperature and high-pressure applications (no steam), chemical resistance, see manufacturer's specifications
PCTFE	KEL-F® (Polychlorotri-fluoroethylene)	G	J48	-240	204	Low-temperature and refrigeration system applications, flammable media, gaseous acid up to 50 bar, 725 psig at 60 °C, 140 °F
PTFE	Teflon® (Polytetrafluoro-ethylene)	A	J44	-184	150	Almost all chemicals
Other not listed materials		X	For other materials, please contact your local representative or sales@leser.com.			

[1] The code letters are stamped on the disc (Item 1)
[2] The pressure and temperature application range must be observed in all cases. The chemical resistance is based on specifications from the soft seal manufacturer. LESER assumes no guarantee.
[3] Only for DN 25, 1" x 2".

Balanced bellows – subassembly item 15

Balanced bellows are generally used for two applications:
– to compensate for back pressure
– to seal off the bonnet from the outlet chamber



Compensation for back pressure

The back pressure acts on the reverse side of the disc, creating a force in the closing direction (F_C). The balanced bellows constitutes an area equal to the seat area, creating a force acting in the opening direction (F_O), thus compensating the force in closing direction.

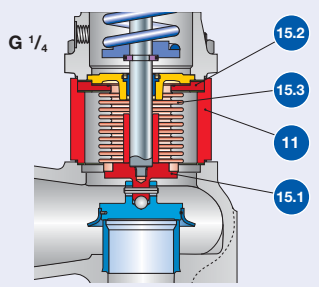
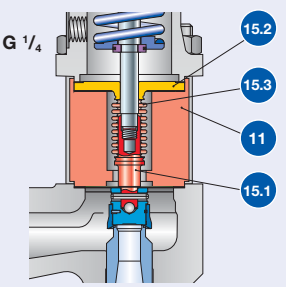
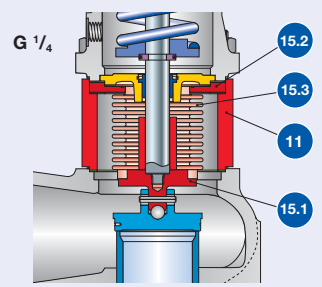
A quantitative representation is shown in the table below:

Actual area	Back pressure	Actual force	Direction of force	Compensation criteria
Seat area = A_S	p_a	$F_C = p_a \times A_S$	closing	$A_S = A_B$
Bellows area = A_B	p_a	$F_O = p_a \times A_B$	opening	$F_C = F_O$

Sealing the bonnet from the outlet chamber

LESER´s balanced bellows seal the spring chamber to the blow-off chamber. That way, they protect the guides, moving parts, and the spring against media-related affects such as dirt, corrosion, impurities, and also temperature.

Balanced bellows

Type		431 / 433	431 / 433 PN 160	427 / 429
Design				
Bonnet spacer		*	*	*
Bellows housing		–	*	–
The shield protects the bellows against flow turbulence when blowing off the valve. Vibrations in the bellows are reduced. This guarantees a longer service life of the bellows.				
Control thread	DIN ISO 228-1, G 1/4	*	*	*
	ASME B1.20.1 NPT 1/2"	✓	✓	✓
To check the effectiveness of the bellows, an inspection connection G 1/4 is inserted into the bonnet as per DIN ISO 228-1. For safe discharge, especially of aggressive, toxic media, a discharge pipe G 1/4 can be installed if necessary.				
Option code				
Bonnet open	Standard bellows	J68	J68	J68
	Low pressure bellows	J68, J63	–	J68, J63
	Special materials	S15 + material name	S15 + material name	S15 + material name
Bonnet closed	Standard bellows	J78	J78	J78
	Low pressure bellows	J78, J63	–	J78, J63
	Special materials	S15 + material name	S15 + material name	S15 + material name
	Control thread NPT 1/2"	J95	J95	J95

The following information can be found on the respective pages of the selected valve:
– dimensions and weights, see “Dimensions and weights” table
– set pressure, see “Pressure temperature ratings” table
– temperature ranges, see “Pressure temperature ratings” table

Balanced bellows – subassembly item 15

Materials		Standard bellows
Item	**Component**	**431 / 433, 431 / 433 PN 160, 427 / 429**
15.1	Lower adaptor	1.4404 316L
15.2	Upper adaptor	1.4404 316L
15.3	Bellows	1.4571 316Ti
11	Bonnet spacer	1.4404 316L
55	Stud	1.4401 B8M
60	Gasket	Graphite / 1.4401 Graphite / 316

Bellows made of Hasteloy® or other special materials are available on request.

Balanced bellows conversion kits

With the LESER bellows conversion set, conventional construction safety valves can be converted to a balanced bellows design quickly and easily. The conversion set contains all the components needed for the conversion as well as a conversion guide.

Conversion kits				
Item	**Component**	**No.**	**Materials**	**Remark**
8	Guide	1	1.4404 316L	
11	Bonnet spacer	1	1.4404 316L	
12	Spindle	1	1.4404 316L	
15	Bellows	1	1.4571 316Ti	
55	Stud	4, 8 dependant on valve size	1.4401 B8M	
60	Gasket	2, 3 dependant on valve size	Graphite / 1.4401 Graphite / 316	
	Installation Instructions	1		WI 3037.05

Heating jacket

Application and construction

To protect systems with viscous, crystallising or sticky media, LESER offers a heating jacket.

The heating jacket has a welded design and covers the angle type body such that it allows the hot media (steam, oil, and so on) to flow through the created space.

In order to protect the spindle and moving parts against sticking, a safety valve with a balanced bellows construction should be chosen for the heating jacket construction.

For safety valves with balanced bellows, the bonnet spacer needed to accommodate the bellows is equipped with an additional heating jacket. Both heating jackets are joined by a threaded pipe bend.

If there is no danger of the medium setting in the blowoff chamber of the valve, then the balanced bellows don't have to be used. The position of the heating connections is shown in figures 1 to 3.

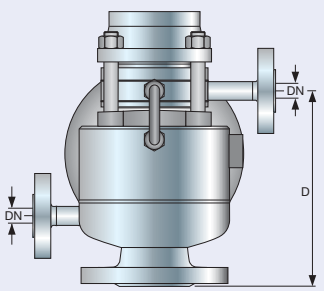
Specification for the heating jacket

The operating data of the heating jacket is placed on an additional heating jacket rating plate on the heating jacket.

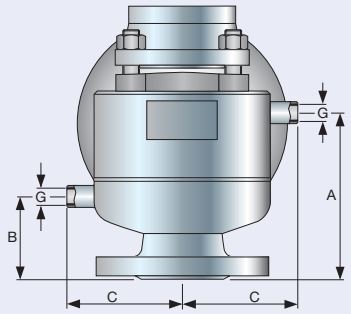
Slip-on flange

Heating connections with flanges are designed for better orientation than slip-on flanges

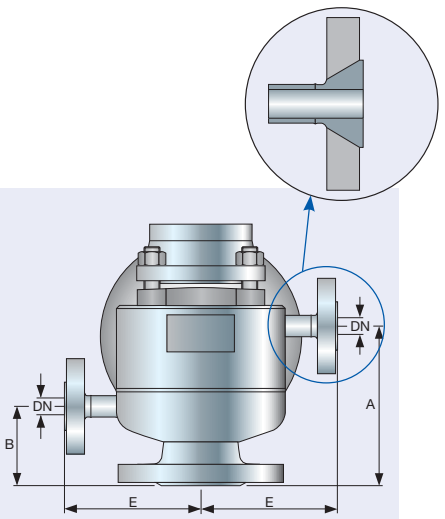
Nominal pressure rating: PN 25 as per EN 1092-1
Class 150 as per ANSI 16.5



1. Heating connection with flange for balanced bellows construction



2. Heating connection with coupling



3. Heating connection with flange

Heating jacket

Heating jacket

			DN$_I$	15	15	20	25	32	40	50	65	80	100	125	150
			Inlet valve size	1/2" x 1/2"	1/2" x 1/2"	3/4" x 3/4"	1" x 1"	1 1/4"x1 1/4"	1 1/2"x1 1/2"	2" x 2"	2 1/2"x2 1/2"	3" x 3"	4" x 4"	5" x 5"	6" x 6"
			Actual orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
Materials															
Body			Series 429, 433	1.4408	1.4408	1.4408	1.4408	1.4408	1.4408	1.4408	1.0619 optional 1.4408	1.0619 optional 1.4408	1.0619 optional 1.4408	–	–
Heating jacket				1.4541 321											
Connections															
Slip-on flange DIN	**Option code** **H 31**	DN 15, PN 25		1.4571, 1.4404 316Ti, 316L								–	–	–	–
	H 32	DN 25, PN 25		– –								1.4571, 1.4404 316Ti, 316L		–	–
Slip-on flange ANSI	**K 31**	1/2", CL150		1.4404 316L								–	–	–	–
	K 32	1", CL150		– –								1.4404 316L		–	–
Coupling DIN 2986	**H 29**	G 3/8"		1.4571 316Ti								–	–	–	–
	H 30	G 3/4"		– –								1.4571 316Ti		–	–
Heating jacket Bonnet spacer	**H 33**			1.4404 316L										–	–

Metric units

		DN$_E$	15	15	20	25	32	40	50	65	80	100	125	150
		Inlet valve size	1/2" x 1/2"	1/2" x 1/2"	3/4" x 3/4"	1" x 1"	1 1/4" x 1 1/4"	1 1/2" x 1 1/2"	2" x 2"	2 1/2" x 2 1/2"	3" x 3"	4" x 4"	5" x 5"	6" x 6"
		Actual orifice diameter d_0 [mm]	12	12	18	18	18	23	29	37	46	60	74	92
Series 433, 429		**Dimensions**												
[mm]	A		95	95	95	95	105	120	130	150	170	165	–	–
	B		65	65	65	65	65	75	75	80	80	80	–	–
	C		83	83	83	83	95	95	95	110	120	145	–	–
	D		131	131	130	134	142	163	180	209	224	300	–	–
	E		110	110	110	110	120	121	121	136	150	176	–	–
	Slip-on flange DN		15	15	15	15	15	15	15	15	25	25	–	–
[inch]	Coupling G		3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/8	3/4	3/4	–	–
Series 433, 429		**Operating pressure [bar]**												
Operating temperature	20°C		25	25	25	25	25	25	25	15	15	15	–	–
	300°C		18	18	18	18	18	18	18	11	11	11	–	–

O-ring damper – subassembly item 40

The O-ring damper successfully prevents or reduces the vibrations of the moving parts of a safety valve.

Background:

In each safety valve, the moving parts – the disc, spindle, bottom spring plate and spring – form a so-called spring-mass-system. As in all spring-mass-systems, the components can be stimulated to start vibrating under unfavourable conditions (e.g. loss of inlet pressure). Vibrations can also be triggered by external units and then transferred to the safety valve via the mechanical connection or the medium. In the event of resonances, the safety valve opens and closes in an uncontrolled way at a high frequency and can't discharge the accorded mass flow.

In general, there are two types of uncontrolled vibrations (definition as per ASME PTC 25-2001, Chapter 2.7):

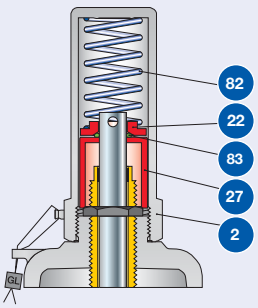
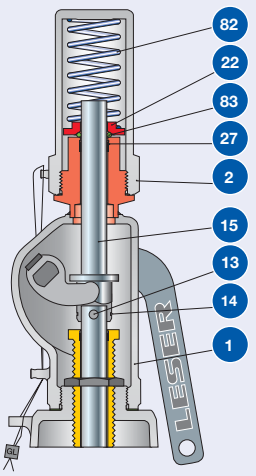
Chatter: "Abnormal rapid reciprocating motion of the movable parts of a pressure relief valve in which the disc contacts the seat." The reasons for chatter may include, among other things, too high inlet pressure loss, inadmissible back pressure, or operation in partial load ranges.

Flutter: "Abnormal rapid reciprocating motion of the movable parts of a pressure relief valve in which the disc does not contact the seat." The causes of flutter with small and difficult to measure amplitudes are vibrations coming from external sources. Possible external sources are piston compressors or pumps. The vibration can be transferred to the safety valve mechanically via the connections or through the medium.

Based on extensive experience with safety valves, LESER developed the o-ring damper on its certified test benches. The o-ring damper prevents the vibration of moving parts or reduces them to a non-critical frequency and amplitude. Nevertheless, the safety valve operates within the limits of the rules and regulations and standards. Through a special design, the o-ring damper can be used for any type of vibrations.

LESER offers the o-ring damper integrated in the cap H2 and as a modified lifting device H4. For applications with friction-reducing media, e.g. oil, a balanced bellows design is provided to protect the o-ring damper against the medium.

Available design

		Cap H2	Packed lever H4
Design			
Option code	Conventional design	J65	J66
	Balanced bellows design	J65, J78	J66, J78
O-ring temperature range			
		-20 °C to +180 °C	

O-ring damper – subassembly item 40

Availability

Cap H2 and Packed lever H4

Valve size	Pressure range
Series 433	
DN 15	0.5 – 40 bar
1/2"	7.25 – 580 psig
DN 20 – DN 50	0.5 – 40 bar
3/4" – 2"	7.25 – 580 psig
DN 65 – DN 80	0.5 – 35 bar
2 1/2" – 3"	7.25 – 508psig
DN 100	0.5 – 30 bar
4"	7.25 – 435 psig
DN 15 PN 160 O-ring disc	11.3 – 103 bar
1/2"	164 – 1494 psig
DN 15 PN 160 steel disc	9.01 – 100 bar
1/2"	131 – 1450 psig
Series 429	
DN 15 – DN 50	0.5 – 40 bar
1/2" – 2"	7.25 – 580 psig
DN 65 – DN 80	0.5 – 35 bar
2 1/2" – 3"	7.25 – 508 psig
DN 100	0.5 – 30 bar
4"	7.25 – 435 psig

LESER guarantees perfect operation of the o-ring damper through extensive testing on the certified test benches. If an o-ring damper is needed for a pressure level that is not given in the table, then further tests are necessary. This leads to longer delivery times. Please contact sales@leser.com.

Materials

Item.	Component	Cap H2	Packed lever H4
1	Lever cover	–	1.4408
		–	CF8M
2	Cap H2	1.4404	1.4404
		316L	316L
13	Cylindrical pin	–	1.4401
		–	B8M
14	Securing ring	–	1.4571
		–	316Ti
15	Spindle	–	1.4404
		–	316L
22	Clamping ring	1.4404	1.4404
		316L	316L
27	Bush	1.4404	–
		316L	–
27	Nozzle	–	PFTE 15% Glass
		–	PFTE 15% Glass
82	Spring	1.4310	1.4310
		Stainless steel	Stainless steel
83	O-Ring	FKM	FKM
		FKM	FKM

O-ring damper Conversion kit

see respective main parts list

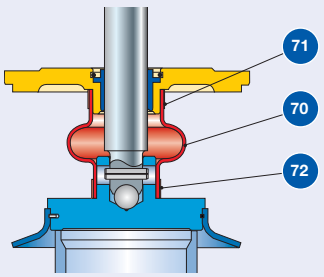
Elastomer bellows

Application

Bellows seal the spring chamber to the blow-off chamber. That way, they protect the guides, moving parts, and the spring against media-related affects such as dirt, corrosion, and impurities. The elastomer bellows provides a cost-effective alternative to the balanced bellows.

The range of applications for the elastomer bellows is limited by:
– Chemical resistance
– Medium temperature
– Set pressure
– Back pressure

Elastomer bellows

Design	
Construction	Easy, compact, and single-ply construction facilitates installation in small blow-off chambers. The one-piece design also facilitates easy replacement and extends the service life.
Flexibility	The special shape of the elastomer bellows provides good spindle mobility and prevents wear and tear.
Inspection hole	To check the effectiveness of the bellows, an inspection hole (Ø 10 mm) is put into the bonnet. This makes it possible to check the seal tightness of the bellows. In the event of a fault in the bellows, the medium leaks from this hole.
Construction height	No change

Materials

	Valve size	**DN 20 – 100**	**DN 20 – 150**
	Option code	J79	J87 (DN 100 J87 + S70)
Item	**Component**		
70	Elastomer bellows	70 EPDM 281	45 NBR 670
		70 EPDM 281	45 NBR 670
71	Hose clamp	1.4301	1.4301
		304	304
72	Hose clamp	1.4301	1.4301
		304	304

Operating conditions

Temperature ranges	[°C]	-50 to +130	-25 to +100
Set pressure	max. [bar_g]	10	
Built-up	[bar_g]	up to 3	

Lift indicator

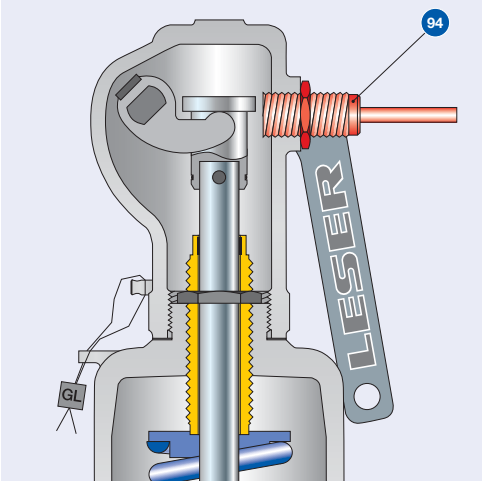
The lift indicator is used in the process technology to monitor the operating condition of a safety valve.

Depending on the type of valve, LESER equips the packed lever H4 or the bonnets with the receptacle for the lift indicator.

For safety valves with lift indicators, the opening of the valve during opening or the lifting operation is signalled as of a specific lift (min. 1mm).

LESER uses inductive DC lift indicators with two-wire technology Type DIN EN 60947-5-6 (NAMUR). The indicators are approved for use in explosion-prone areas of Zone 0 (Ex II 1 D Ex iaD 20 T6). Other indicators that meet customer specifications can be used.

Technical data for lift indicators can be found on the manufacturer's homepage:
www.pepperl-fuchs.com



Packed lever H4

Gas-tight construction on request

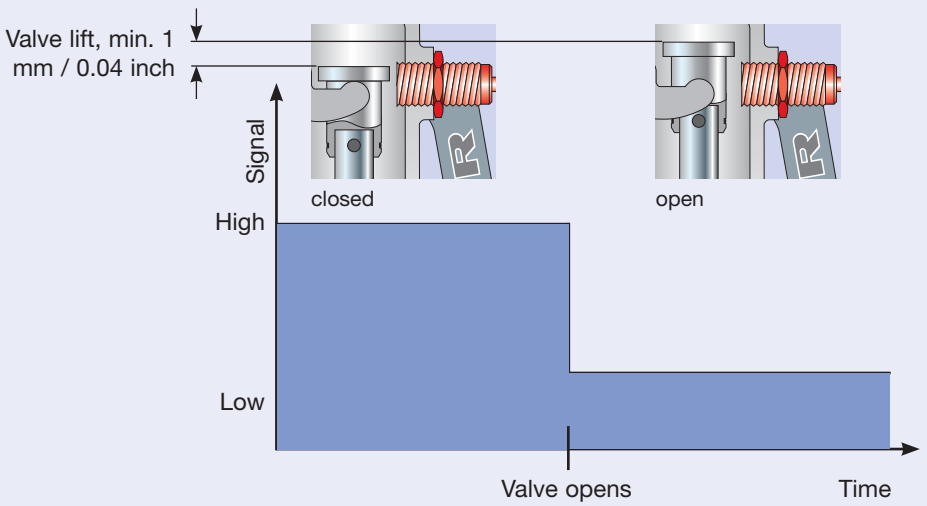
For installation instructions for lift indicators, see WI 3323.02.

Availability

Item.	Name	Option code
40	Packed lever H4 with receptacle for lift indicator M!8 x 1 [mm]	J39
94	Lift indicator M18 x 1, used type = PEPPERL+FUCHS NJ5-18GK-N	J93

Functional diagram

A, closed	B, open
For a closed valve, the lift indicator is positioned on the side, in front of the coupling or the control sleeve.	If the safety valve opens or if the safety valve is vented **(in both cases, min. 1 mm)** the lift indicator changes its state and switches. If the lift indicator unscrews, e.g. due to vibrations, there is also a switching operation.



Lift restriction

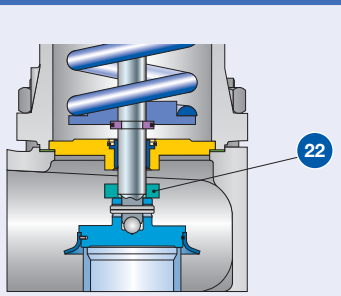
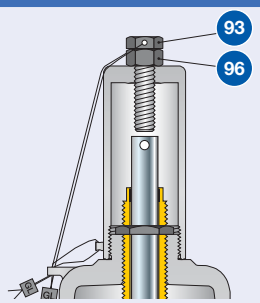
The Lift restriction is used to adjust the safety valve to the required discharge mass flow and does not affect the operation of the safety valve.

A lift stopper must meet the requirements of the following codes and standards.

Requirements

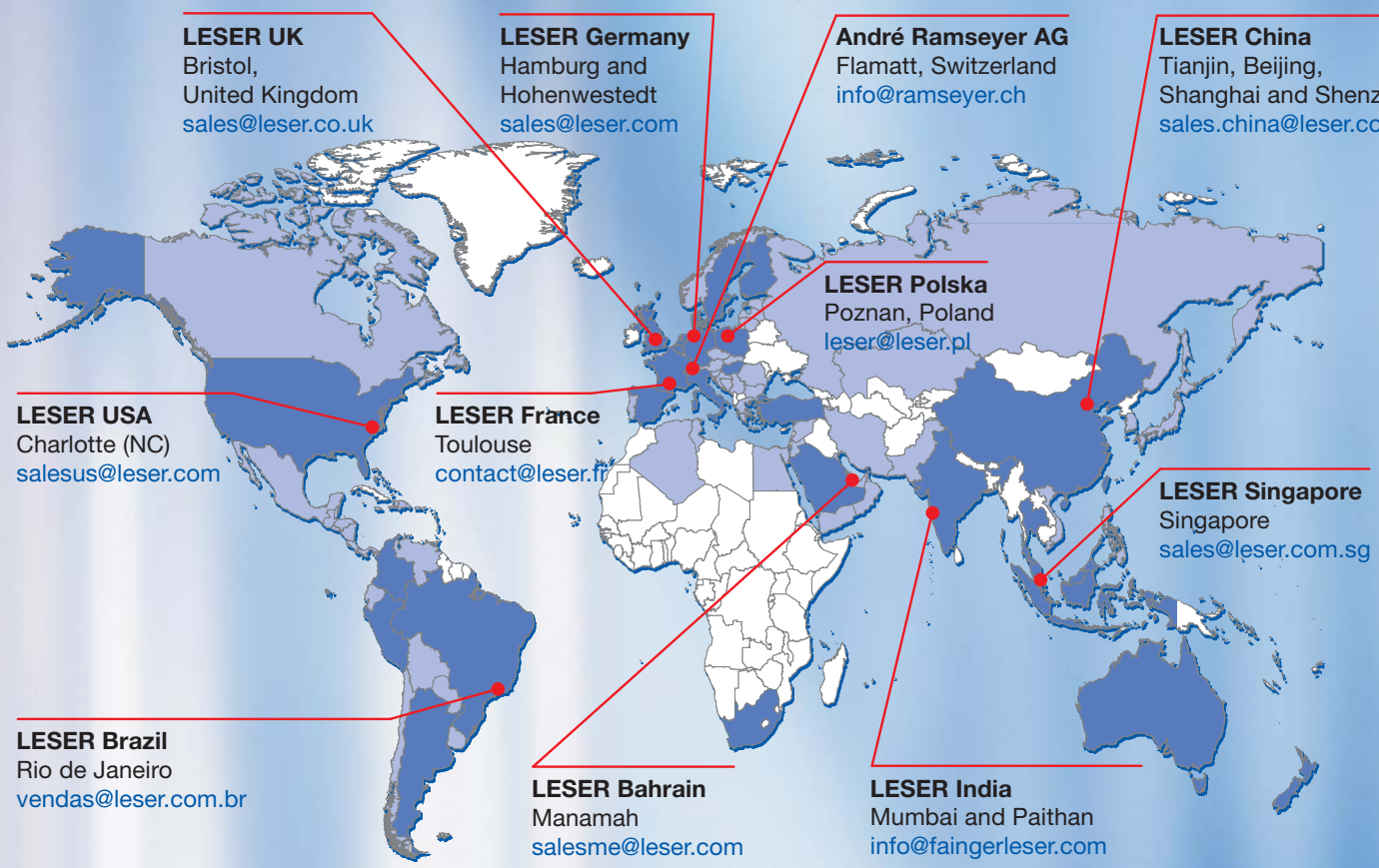
Code / Standards	EN ISO 4126-1, Section 5.1.3	ASME Code case 1945-4	AD 2000-Merkblatt A2, Section 10.3
Lift	≥ 30% of the full lift not less than 1.0 mm	≥ 30% of the full lift not less than 2.0 mm	not less than 1.0 mm
Coefficient of discharge	–	–	α_w [S/G] ≥ 0.08
	–	–	α_w [L] ≥ 0.05
Name plate marking	Identification of the reduced coefficient of discharge	– Capacity replaced by "Limited capacity" – Limited lift =____ mm	Identification of the reduced coefficient of discharge
Design according to EN ISO 4126-1	For valves with a lift stopper to adapt to the required discharge mass flow, this device must not have an adverse effect on the operation of the valve. If it is adjustable, the lift stopper device must be setup such that the adjustable part can be mechanically secured and sealed. The lift stopper device must be installed and sealed by the manufacturer.		

Lift restriction

	Lift restriction by bush	Lift restriction by gag
Design		
Option code	J51	Cap H2: J52 Packed lever H4: J50
Availability		
Series 433	✓	✓
Series 429	–	–
Materials		

Item.	Component		
22	Bush	1.4404	–
		316L	–
93	Stud	–	1.4401
		–	B8M
96	Nut	–	1.4401
		–	8M

LESER worldwide



Modulate Action
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LESER

The-Safety-Valve.com

LESER GmbH & Co. KG
20537 Hamburg, Wendenstr. 133-135
20506 Hamburg, P.O. Box 26 16 51
Fon +49 (40) 251 65-100
Fax +49 (40) 251 65-500
Email: sales@leser.com
www.leser.com