

High Performance

Flanged Safety Relief Valves

Series 441

Series XXL

Series 444



CATALOG 1

LESER

The-Safety-Valve.com

LESER Safety Valves for every industrial application



High Performance



Compact Performance

Series 441

Type 441, 442 DIN
Type 441, 442 ANSI



API

Series XXL

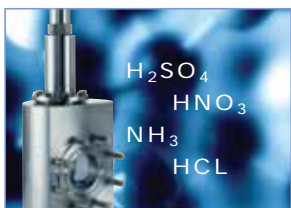
Type 441, 442 XXL



Clean Service

Series 444

Type 444 DIN
Type 444 ANSI



Critical Service

Series 441 Full nozzle

Type 441, 442 Full nozzle DIN
Type 441, 442 Full nozzle ANSI



Modulate Action



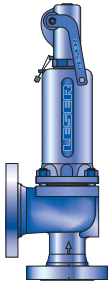
Best Availability

Series 458

Type 455, 456
Type 457, 458

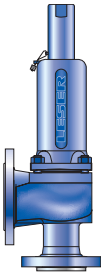
Please refer to High Performance Catalog 2

General



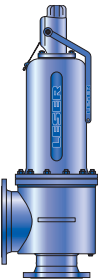
Type 441, 442 DIN

DN 20, 40, 50
Set pressure 0,1 – 40 bar, 1,5 – 580 psig
Flanges according to DIN EN 1092



Type 441, 442 ANSI

Valve size 1" – 4"
Set pressure 0,1 – 51 bar, 1,5 – 740 psig
Flanges according to ASME B16.5



Type 441, 442 XXL

DN 25 – 100, 1" – 4"
Set pressure 0,2 – 25 bar, 3 – 360 psig
Flanges according to DIN EN 1092 and ASME B16.5



Type 444 DIN

DN 25 – 80
Set pressure 0,1 – 16 bar, 1,5 – 232 psig
Flanges according to DIN EN 1092



Type 444 ANSI

Valve size 1" – 3"
Set pressure 0,1 – 16 bar, 1,5 – 232 psig
Flanges according to ASME B16.5



Options

Overview

Chapter/Page

General	00/01
Applications, General design features	00/02
Valve finder	00/03
Valve selection	00/05
How to use: Signs and symbols, Flange drillings and facings	00/07
How to use: Determination of coefficient of discharge K_{dr} / α_w	00/08
How to use: Capacity sheets	00/09
LESER Effective Orifice LEO_{SIG}	00/11
LESER Effective Orifice LEO_L	00/12
Sour gas service	00/13

Type 441, 442 ANSI

02/01

Materials		
• Conventional design		02/02
• Balanced bellows design		02/04
How to order		
• Numbering system		02/06
• Article numbers		02/08
Dimensions and weights		
• Metric Units		02/10
• US Units		02/11
Pressure temperature ratings		
• Metric Units		02/12
• US Units		02/13
Flange drillings and facings		02/14
Order information – Spare parts		02/15
Available options		02/16
Approvals		02/17
Capacities		
• Steam [Metric Units + US Units]		02/18
• Air [Metric Units + US Units]		02/19
• Water [Metric Units + US Units]		02/20
Determination of coefficient of discharge K_{dr} / α_w		02/21

LESER Type

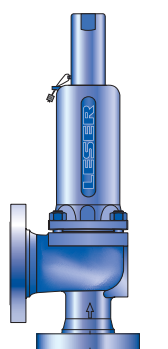
Chapter/Page

Type 441, 442 DIN	01/01
Materials	
• Conventional design	01/02
• Balanced bellows design	01/04
How to order	
• Numbering system	01/06
• Article numbers	01/08
Dimensions and weights	
• Metric Units	01/10
• US Units	01/11
Pressure temperature ratings	
• Metric Units	01/12
• US Units	01/14
Flange drillings and facings	01/16
Order information – Spare parts	01/18
Available options	01/20
Approvals	01/21
Capacities	
• Steam [Metric Units + US Units]	01/22
• Air [Metric Units + US Units]	01/24
• Water [Metric Units + US Units]	01/26
Determination of coefficient of discharge K_{dr} / α_w	01/28

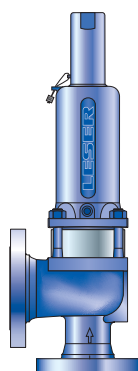
Type 441, 442 XXL

03/01

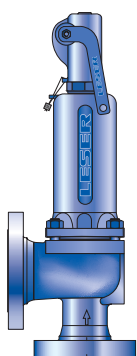
Materials		
• Conventional design		03/02
• Balanced bellows design		03/04
How to order		
• Numbering system		03/06
• Article numbers		03/08
Dimensions and weights		
• Metric Units		03/10
• US Units		03/11
Pressure temperature ratings		
• Metric Units		03/12
• US Units		03/13
Flange drillings and facings		03/14
Order information – Spare parts		03/15
Available options		03/16
Approvals		03/17
Capacities		
• Steam [Metric Units + US Units]		03/18
• Air [Metric Units + US Units]		03/19
• Water [Metric Units + US Units]		03/20
Determination of coefficient of discharge K_{dr} / α_w		03/21



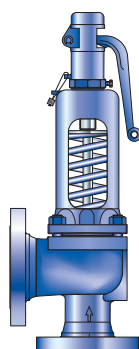
Type 441
Cap H2
Closed bonnet
Conventional design



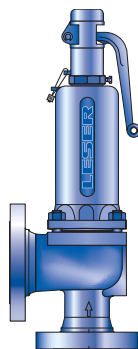
Type 441
Cap H2
Closed bonnet
Balanced bellows design



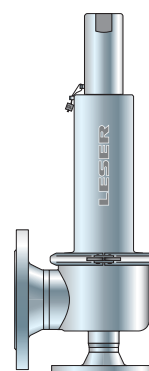
Type 441
Packed lever H4
Closed bonnet
Conventional design



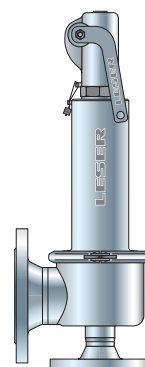
Type 442
Plain lever H3
Open bonnet
Conventional design



Type 441
Plain lever H3
Closed bonnet
Conventional design



Type 444
Cap H2
Closed bonnet
Conventional design



Type 444
Packed lever H4
Closed bonnet
Conventional design

Type 444 DIN	04/01
Materials	
• Conventional design	04/02
How to order	
• Numbering system	04/04
• Article numbers	04/06
Dimensions and weights	
• Metric Units + US Units	04/07
Pressure temperature ratings	
• Metric Units + US Units	04/08
Flange drillings and facings	04/09
Order information – Spare parts	04/10
Available options	04/11
Approvals	04/12
Capacities	
• Steam [Metric Units + US Units]	04/13
• Air [Metric Units + US Units]	04/14
• Water [Metric Units + US Units]	04/15
Determination of coefficient of discharge K_{dr} / α_w	04/16

Type 444 ANSI	05/01
Materials	
• Conventional design	05/02
How to order	
• Numbering system	05/04
• Article numbers	05/06
Dimensions and weights	
• Metric Units + US Units	05/07
Pressure temperature ratings	
• Metric Units + US Units	05/08
Flange drillings and facings	05/09
Order information – Spare parts	05/10
Available options	05/11
Approvals	05/12
Capacities	
• Steam [Metric Units + US Units]	05/13
• Air [Metric Units + US Units]	05/14
• Water [Metric Units + US Units]	05/15
Determination of coefficient of discharge K_{dr} / α_w	05/16

Options	99/01
Overview	99/02
Caps and Levers	99/04
Caps and Levers bolted	99/06
Metal seat	99/08
Soft seal disc	99/10

Options	
Soft seal	99/12
Balanced bellows	99/14
High temperature equipment	99/16
Elastomer bellows	99/17
Disc	99/18
Heating jacket	99/20
O-ring damper	99/22
Lift indicator	99/24
Lift restriction	99/25
First in safety	
Information tools	

Type 441, 442 Full nozzle	
Materials	
How to order	
Dimensions and weights	
Pressure temperature ratings	
Flange drillings and facings	
Order information – Spare parts	
Available options	
Approvals	
Capacities	
Determination of coefficient of discharge K_{dr} / α_w	

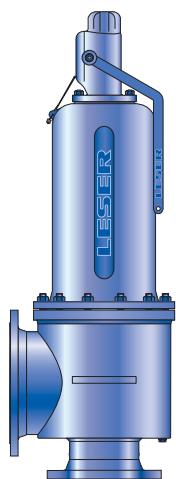
refer to catalog
Series 441 Full nozzle

Type 455, 456	
Materials	
How to order	
Dimensions and weights	
Pressure temperature ratings	
Flange drillings and facings	
Order information – Spare parts	
Available options	
Approvals	
Capacities	
Determination of coefficient of discharge K_{dr} / α_w	

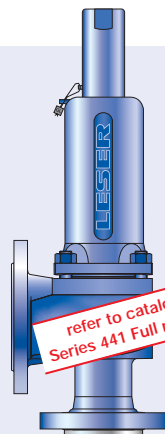
refer to catalog
Series 458

Type 457, 458	
Materials	
How to order	
Dimensions and weights	
Pressure temperature ratings	
Flange drillings and facings	
Order information – Spare parts	
Available options	
Approvals	
Capacities	
Determination of coefficient of discharge K_{dr} / α_w	

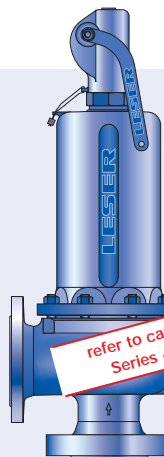
refer to catalog
Series 458



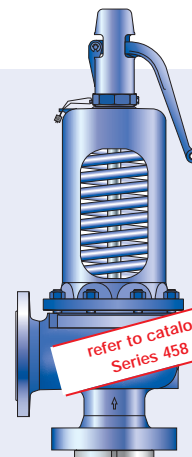
Type 441 XXL
Bolted lifting device H6
Closed bonnet
Conventional and balanced bellows design



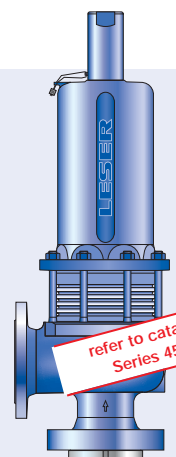
Type 441 Full Nozzle
Cap H2
Closed bonnet
Conventional design



Type 456
Packed lever H4
Closed bonnet
Conventional design



Type 457
Plain lever H3
Open bonnet
Conventional design



Type 458
Cap H2
Closed bonnet
Balanced bellows design



LESER – High Performance Safety Valves

The High Performance product group represents

- ✓ High capacity related to the safety valve size
- ✓ High adaptability
- ✓ Excellent price / performance ratio

LESER's High Performance Safety Valves

- Are designed to meet all industrial applications.
- Open rapidly with an overpressure of 5 % to the full design lift.
- Are used particularly for vapours and gases where the maximum mass flow has to be discharged rapidly.
- Have a maximum blowdown of minus 10 % for steam/gas service and minus 20 % for liquid service.
- Are one of the best selling spring loaded safety valve worldwide.
- Are developed in a close cooperation with plant engineers and service specialists.
- Serve for protection of processes and equipment.
- Are approved by all important approval organisations worldwide which ensures the worldwide applicability e.g.:
 - European Community: CE-marking acc. to Pressure Equipment Directive (PED) 97 / 23 / EC and EN ISO 4126-1
 - USA: UV-stamp acc. to ASME Section VIII Division 1, National Board certified capacities
 - Germany: VdTÜV approval acc. to PED, EN ISO 4126-1, TÜV SV 100 and AD 2000-Merkblatt A2
 - Canada: Canadian Registration Number acc. to the requirements of particular provinces
 - China: AQSIQ based on the approval acc. to ASME Section VIII Division 1 and AD 2000-Merkblatt A2

Furthermore, all LESER High Performance safety valves are designed, marked, produced and approved acc. 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 flanging
 ASME PTC 25, ASME-Code Sec. II, ASME B 16.34 and ASME B16.5- flanging, API Std. 527, API RP 576
 AD 2000-Merkblatt A4, AD 2000-Merkblatt HP0, TRD 110, TRD 421, TRD 721



Applications

LESER – High Performance Safety Valves

Are the ultimate solution for all industrial applications for steam, gas and liquid.

Typical applications for LESER High Performance Safety Valves are:

Series 441

- Protection of chemical processes and equipment (e.g. distillation columns)
- Heat exchangers
- Low and medium pressure steam
- Blowers and turbo compressors

Series XXL

- Low pressure steam at big power stations
- Capacities beyond the limits of API and Series 441

Series 444

- OEM in dying machines or filter constructions
- Stainless steel applications up to 16 bar / 232 psig

Series 441 Full Nozzle

- Same applications like Series 441 when full nozzle design is preferred.
- Special requirement for nozzle material

Series 458

- Power stations and industrial superheated steam generation
- Required flange classes \geq PN 63 / CL600
- Protection of high pressure Chemical processes, e.g. NH₃ synthesis, CO₂ extraction
- Desalination plants

General Design Features

LESER's High Performance Safety Valves

Offer a large variety of types, materials and options to suit any application:

- 14 valve sizes from DN 20 to DN 400 – ³/₄" to 16" provide a high connectivity to the application
- Inlet pressure ratings PN 16 to PN 400 / class 150 to class 2500 to fit all required design pressures
- Orifice sizes from E to > 3 x T cover all capacity requirements
- Large variety of body materials; e.g.

- 0.6025 / grey iron
- 0.7043 / ductile iron
- 1.0619 / WCB
- 1.4408 / CF8M
- 1.7357 / WC6

can be selected acc. to the application

- Set pressures from 0,1 to 300 bar / 1,5 to 4350 psig make this product group suitable for all industrial processes
- Operating temperatures from -270 to 550 °C / -454 to 1022 °F cover a wide range of applications
- One design and spring (single trim) for steam, gas and liquid applications reduces the number of spare parts and ensure an easier maintenance
- High capacity compared to the API requirements to reduce installation costs
- Ringless design needs no trim adjustments for easy maintenance
- One-piece spindle reduces friction which is leading to high operation accuracy
- Self-draining body design, avoids residues and reduces corrosion

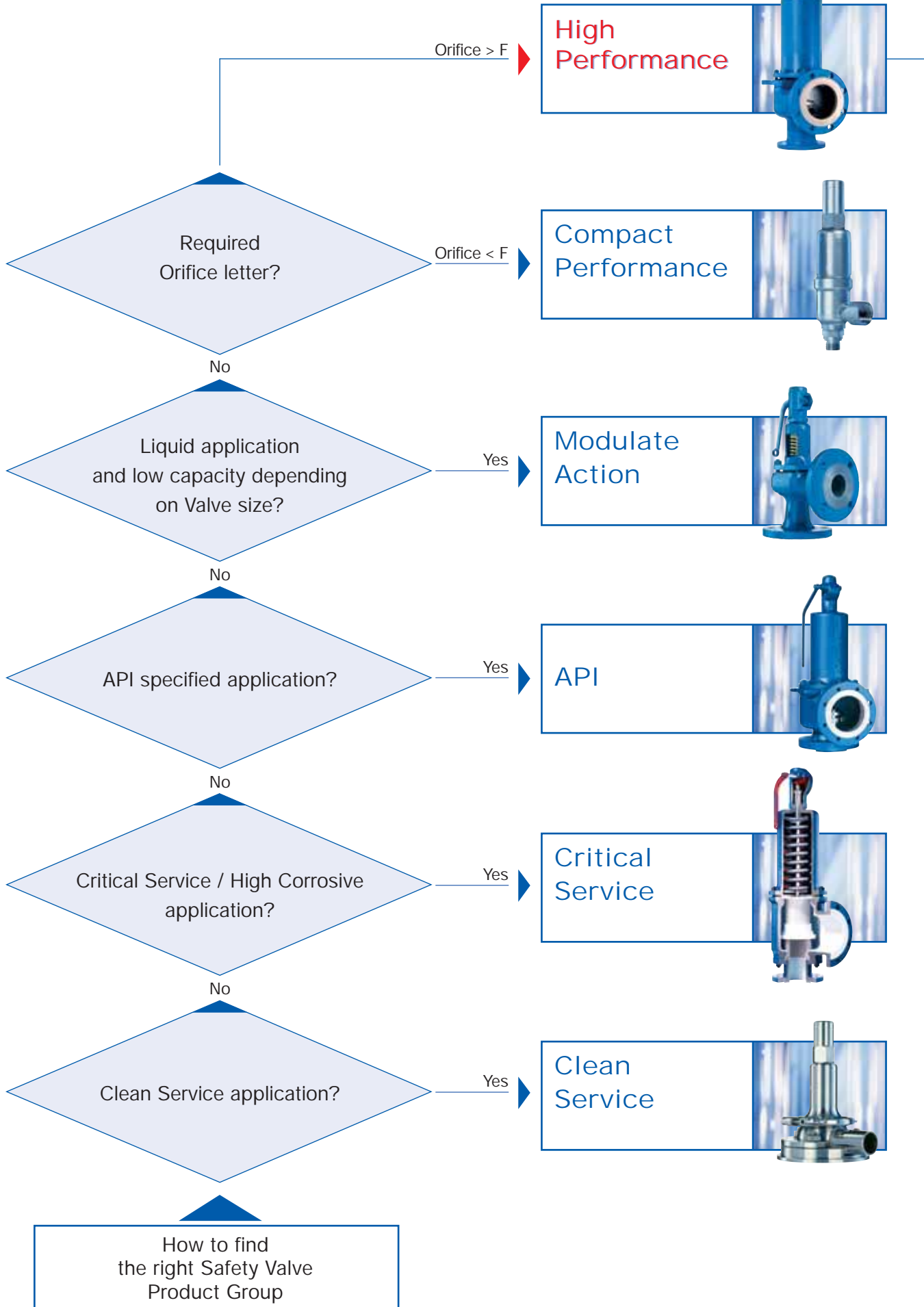
LESER's High Performance Safety Valves

can be customized with a great variety of options, e.g.

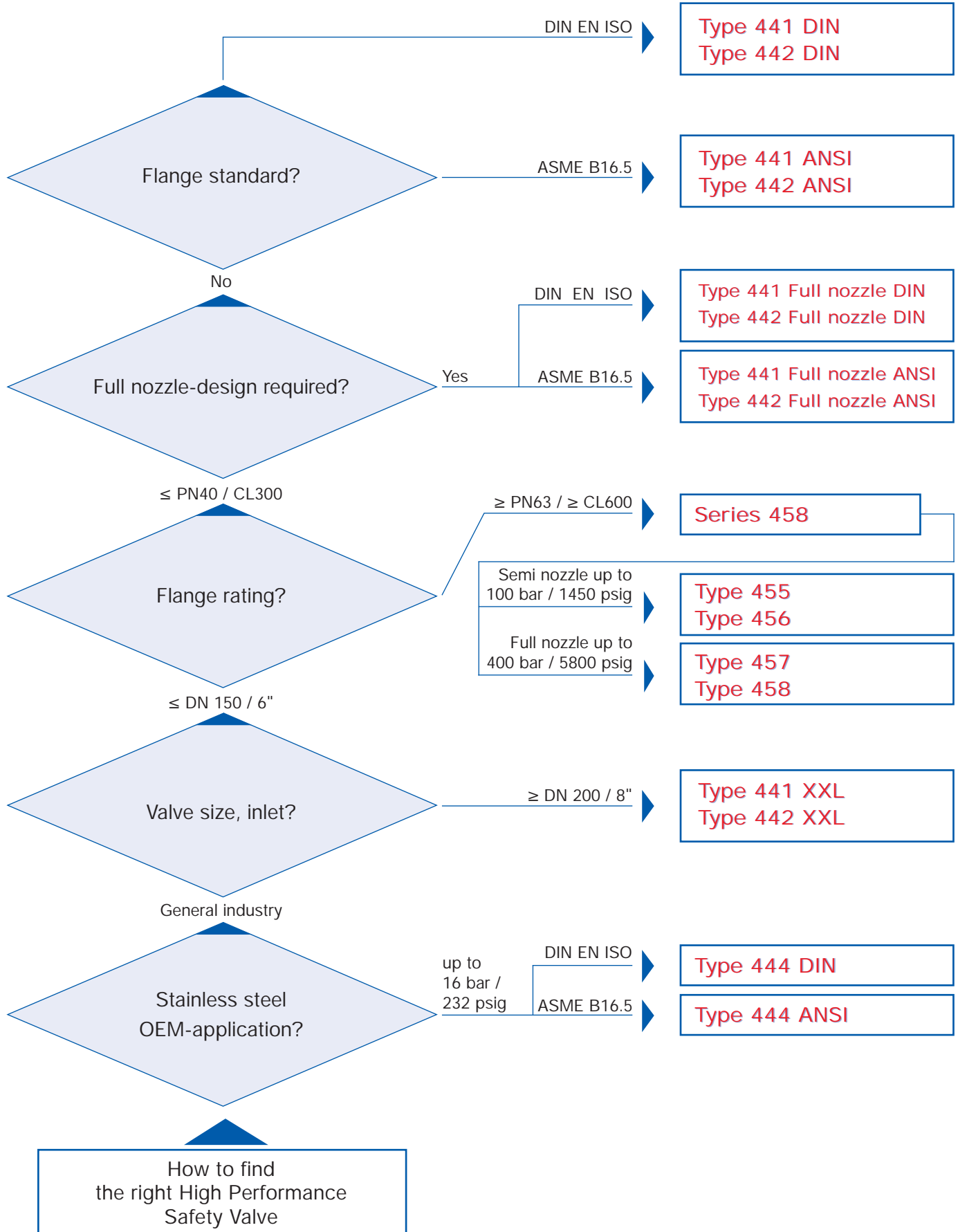
- O-ring disc for superior tightness
- Stellite or hardened metal sealing for longer product life
- Stainless steel bellows for back pressure compensation
- Heating jacket for applications with high viscosity fluids
- Every part can be replaced by other material acc. to customer specification

Valve finder

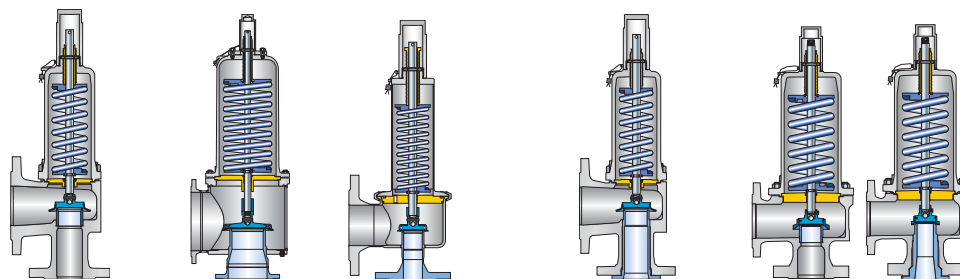
How to find the right Product Group



How to find the right Safety Valve



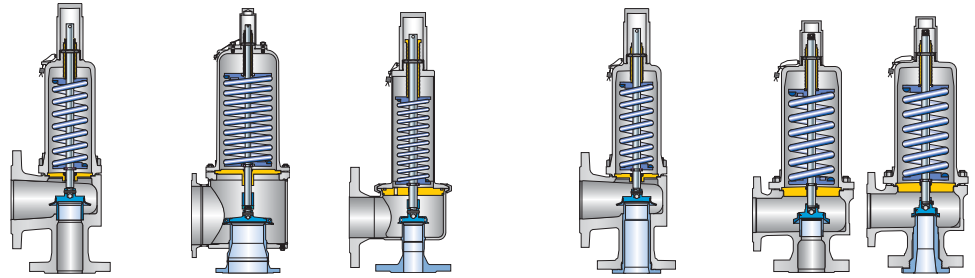
Valve selection



Valve size		Type	441, 442 DIN	441, 442 ANSI	441, 442 XXL	444 DIN	444 ANSI	441, 442 Full nozzle DIN	441, 442 Full nozzle ANSI	455, 456	457, 587
min.			DN 20 (¾")	(DN 25) 1"	DN 200 8"	DN 25 –	– 1"	DN 25 (1")	(DN 25) 1"	DN 25 1"	DN 25 1"
max.			DN 200 (8")	(DN 100) 4"	DN 400 16"	DN 80 –	– 3"	DN 50 (2")	(DN 100) 4"	DN 100 4"	DN 150 6"

Materials		Type	441, 442 DIN	441, 442 ANSI	441, 442 XXL	444 DIN	444 ANSI	441, 442 Full nozzle DIN	441, 442 Full nozzle ANSI	455, 456	457, 587
0.6025	Grey iron		✓	–	–	–	–	–	–	–	–
0.7043	Ductile Gr. 60-40-18		✓	–	–	–	–	–	–	–	–
1.0619	WCB		✓	✓	–	–	–	✓	✓	✓	✓
1.0460 / 1.0425	Carbon steel		–	–	✓	–	–	–	–	–	–
1.4408	CF8M		✓	✓	–	–	–	✓	✓	–	–
1.4404	316L		–	–	–	✓	✓	–	–	–	–
1.4581	CF10M		–	–	–	–	–	–	–	✓	✓
1.4571	316Ti		–	–	✓	–	–	–	–	–	–
1.7357	WC6		–	–	–	–	–	–	–	✓	✓

Set pressure		Type	441, 442 DIN	441, 442 ANSI	441, 442 XXL	444 DIN	444 ANSI	441, 442 Full nozzle DIN	441, 442 Full nozzle ANSI	455, 456	457, 458
Metric Units	min. [bar]		0,1	0,1	0,2	0,1	0,1	0,1	0,1	2,5	2,5
US Units	min. [psig]		1,5	3	3	1,5	1,5	1,5	1,5	36	36
Metric Units	max. [bar]		40	51	25	16	16	40	51	100	300
US Units	max. [psig]		580	740	360	232	232	580	740	1450	4350



Temperature range

Type		441, 442 DIN	441, 442 ANSI	441, 442 XXL	444 DIN	444 ANSI	441, 442 Full nozzle DIN	441, 442 Full nozzle ANSI	455, 456	457, 458
acc. to DIN EN	min. [°C]	-270	-270	-196	-45	-45	-270	-270	-85	-270
	max. [°C]	450	450	550	200	200	450	450	550	550
	min. [°F]	-454	-454	-321	-49	-49	-454	-454	-121	-454
	max. [°F]	842	842	1022	392	392	842	842	1022	1022
acc. to ASME	min. [°C]	-268	-268	-184	-45	-45	-268	-268	-129	-268
	max. [°C]	538	538	427	200	200	538	538	538	538
	min. [°F]	-450	-450	-300	-49	-49	-450	-450	-20	-450
	max. [°F]	1000	1000	800	392	392	1000	1000	1000	1000

Capacity

Type		441, 442 DIN	441, 442 ANSI	441, 442 XXL	444 DIN	444 ANSI	441, 442 Full nozzle DIN	441, 442 Full nozzle ANSI	455, 456	457, 458
LEO _{S/G}	min.	0,283	0,462	23,8	0,462	0,462	0,462	0,462	0,399	0,224
LEO _{S/G}	max.	23,8	7,39	76,0	4,78	4,78	1,85	7,39	5,46	11,4
Orifice _{S/G}	min.	1,4 x E	1,5 x F	1,5 x R	1,5 x F	1,5 x F	1,5 x F	1,5 x F	1,3 x F	1,1 x E
Orifice _{S/G}	max.	1,5 x R	1,2 x P	3,0 x T	1,1 x N	1,1 x N	1,0 x K	1,2 x P	1,3 x N	1,0 x Q
LEO _L	min.	0,316	0,516	26,6	0,516	0,516	0,516	0,516	0,429	0,241
LEO _L	max.	26,6	8,26	84,9	5,34	5,34	2,07	8,26	5,87	10,9
Orifice _L	min.	1,0 x F	1,0 x G	1,0 x T	1,0 x G	1,0 x G	1,0 x G	1,0 x G	1,4 x F	1,2 x E
Orifice _L	max.	1,0 x T	1,3 x P	33 x T	1,2 x N	1,2 x N	1,1 x K	1,3 x P	1,4 x N	1,7 x P

Approvals

Type			441, 442 DIN	441, 442 ANSI	441, 442 XXL	444 DIN	444 ANSI	441, 442 Full nozzle DIN	441, 442 Full nozzle ANSI	455, 456	457, 587
Country	Code	Media									
Europe	DIN EN ISO 4126-1 CE-marking	S/G/L	072020111Z 0008/0/08-2	072020111Z 0008/0/08-2	072020111Z 0008/0/08-2	072020111Z 0008/0/08-2	072020111Z 0008/0/08-2	072020111Z 0008/0/08-2	072020111Z 0008/0/08-2	072020111Z 0008/0/11	072020111Z 0008/0/11
Germany	AD 2000- Merkblatt A2	S/G/L	TÜV SV 576	TÜV SV 576	TÜV SV 576	TÜV SV 576	TÜV SV 576	TÜV SV 576	TÜV SV 576	TÜV SV 934	TÜV SV 934
United States	ASME VIII	S/G	M37044	M37044	M37044	M37044	M37044	M37044	M37044	M37066 M37088	M37066 M37088
		L	M37055	M37055	M37055	M37055	M37055	M37055	M37055	M37077 M37099	M37077 M37099
Canada	CRN	S/G/L	OG1182.9C	OG1182.9C	OG1182.9C	OG1182.9C	OG1182.9C	OG1182.9C	OG1182.9C	-	-
China	CSBQTS	S/G/L	02301T	02301T	02301T	02301T	02301T	02301T	02301T	02301T	02301T
Russia	DIN GOST GOSGOTTECHNADZOR		✓	✓	✓	✓	✓	✓	-	-	✓

Classification societies

Bureau Veritas	BV	✓	✓	✓	-	-	-	-	-	-	-
Det Norske Veritas	DNV	✓	✓	-	-	-	-	-	-	-	-
Germanischer Lloyd	GL	✓	✓	✓	-	-	-	-	-	-	-
Lloyd's register EMEA	LREMEA	✓	✓	✓	-	-	-	-	-	-	-
Registro Italiano Navale	RINA	✓	✓	up to DN 250	-	-	-	-	-	-	-

General signs and symbols

*	This option is covered by standard design
✓	Available
-	Not possible

Signs and symbols for flange drillings and flange facings

*	Standard design, no option code required
(*)	Flange dimensions except flange thickness are in accordance with flange standard (e.g. ASME B16.5) Flange thickness is smaller (max. 2 mm), see "Multiple pressure rating"
-	Flange drilling/facing is not possible

Option code for flange drilling and dimension, 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 standard Flange thickness is smaller (max. 2 mm), see "Multiple pressure rating"
[H50]	Flange drilling as specified in standard/flange thickness may be smaller Outer flange diameter is smaller than required, but complete back side facing for nut is assured

Option code for flange facing, e.g. L36

L36	Flange facing as specified in flange standard
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General information concerning flange drillings and flange facings

Dimensions	<p>Flange dimensions of LESER Series 458 exceed flange dimension as mentioned in ASME / ANSI B16.5 and DIN EN 1092. This exceedance is in accordance with API Standard 526, Section 2.4.</p> <p>Dimensions: "For some valve designs, the inlet raised face height may substantially exceed the nominal dimension specified in ASME / ANSI B16.5 (and DIN EN 1092). Consult the manufacturer for exact dimension." The reason for this exceedance is:</p> <ul style="list-style-type: none"> - height of nozzle placed in the inlet of valve - due to the outer diameter of the nozzle thread flange thickness has to be thicker than normal ASME / ANSI B16.5 and DIN EN 1092 dimension to achieve the required pressure rating
Multiple pressure rating	The flange standard shows the same drilling, facing and outer diameter for several pressure ratings, e.g. PN 16 up to PN 40 Due to the pressure rating of the casting LESER fulfills the requirements for flange thickness e.g. of PN 16 but not PN 40
Smooth finish	The effective MSS SP-6 (Edition 2001) does not mention "smooth finish" anymore. In MSS SP-6 (Edition 1980) "smooth finish" is defined for finishes of contact flanges as "250 µinch (6,3 µm) AARH max.". LESER supplies flange facings 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 µinch 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 purchase orders show "stock finish" LESER supplies standard facing according to DIN or ASME (marked with * in table "Flange facings" of each valve series).

Materials

Please find below a summary of material codes at LESER. Please note that

- for every body material an inspection certificate 3.1 according to EN 10204 is available
- many materials have a multiple inspection certificate 3.1.

Material code	Flanged safety valve body	Body material is certified with 3.1 (EN 10204) for the following materials	
		EN	ASME
1	Grey iron	0.6025	cast iron
2	Carbon steel	1.0619	WCB, WCC
4	Stainless steel	1.4408, 1.4581	CF8M (Charpy test at -196°C), CF10M
5	Nodular cast iron	0.7043	ductile Gr. 60-40-18
7	High temperature carbon steel	1.7357	WC6

Sample Determination of K_{dr}/α_w : Type 441, DIN, DN 25

Type 441, 442 DIN

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, refer to table article numbers
 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 topic 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)

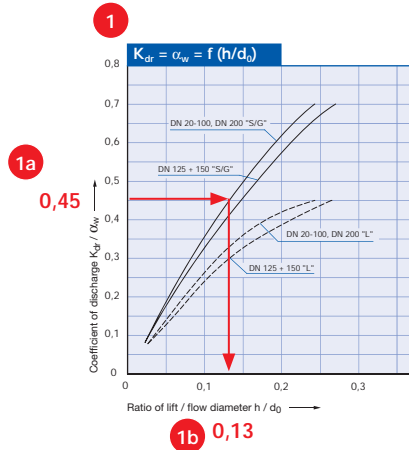
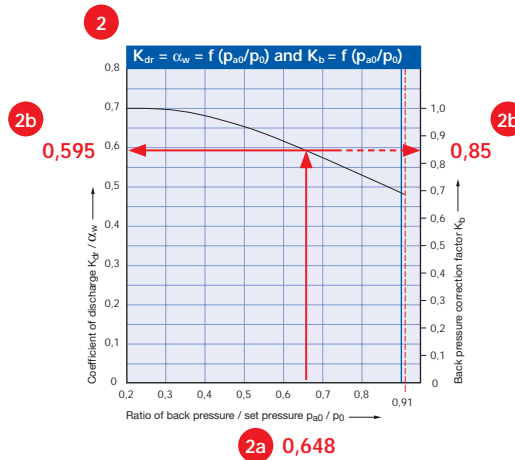


Diagram for evaluation of coefficient of discharge (K_{dr}/α_w) or K_b in reference to the ratio of back pressure / set pressure (p_{a0}/p_0)



Explanation

Sample – Type 441 DIN, DN 25, flow diameter $d_0 = 23$ mm, rated lift $h = 5,6$ mm, K_{dr}/α_w S/G = 0,7

1 Diagram 1 Determination of the restricted lift due to reduced K_{dr}/α_w			2 Diagram 2 Determination of reduced K_{dr}/α_w or K_b ¹⁾ due to back pressure		
Step	Description	Sample	Step	Description	Sample
1	Calculate the required coefficient of discharge of the selected safety valve. Applicable formulars are stated in codes and standards.	1a $K_{dr}/\alpha_w = 0,45$	1	Calculate the back pressure ratio p_{a0}/p_0 using the actual values for set pressure p_0 [bar _a] 0,45 and back pressure p_{a0} [bar _a] 0,292	2a $p_{a0}/p_0 = 0,648$
2	Select the starting point (0,45) at the Y-axis of the diagram.		2	Select the starting point (0,648) at the X-axis of the diagram.	
3	Lay a horizontal line onto the ratio graph to identify the intersection point.		3	Lay a vertical line onto the ratio graph to identify the intersection point.	
4	Lay a vertical line to the X-axis to identify the ratio of lift / flow diameter (h/d_0).	1b $h/d_0 = 0,13$	4	Lay a horizontal line to the Y-axis to identify the reduced K_{dr}/α_w or K_b .	2b $K_{dr}/\alpha_w = 0,595$ $K_b = 0,85$
5	Calculate the restricted lift using the formular $h = d_0 \times h/d_0$. (For ordering a lift restriction please use option code J51 refer to page 99/25)	$h = 23 \times 0,13$ $h = 3$ mm	5	Calculate the sizing with the established K_{dr}/α_w or K_b .	

Sample Capacity sheet –

How to select capacities for steam: Type 441 XXL DIN, DN 250

Capacities – Steam

Capacities for saturated steam according to AD 2000-Merkblatt A2, based on set pressure plus 10 % overpressure. **9**

Capacities at 1 bar (14,5 psig) and below are based on 0,1 bar (1,45 psig) overpressure.

Capacities for saturated steam according to ASME Section VIII (UV), based on set pressure plus 10% overpressure.

Capacities at 2,07 bar (30 psig) and below are based on 0,207 bar (3 psig) overpressure.

Metric Units		AD 2000-Merkblatt A2 [kg/h]			
DN _{I+O}		200 x 300	250 x 350	300 x 400	400 x 500
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
Act. Orifice dia. d ₀ [mm]		165	200	235	295
Act. Orifice area. d ₀ [mm]		21382	31416	43374	68349
LEO _{S/G} ^{*)} [inch ²]		23,761	34,910	48,198	75,952
Set pressure [bar]	Capacities [kg/h]				
0,1	0	0	0	0	0
0,2	7214	0	14633	0	0
0,5	11516	16920	23360	36811	0
1	16755	24617	33986	53556	0

US Units		ASME Section VIII [lb/h]			
DN _{I+O}		200 x 300	250 x 350	300 x 400	400 x 500
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
Act. Orifice dia. d ₀ [inch]		6,5	7,87	9,25	11,61
Act. Orifice area. d ₀ [inch ²]		33,14	48,69	67,23	105,94
LEO _{S/G} ^{*)} [inch ²]		23,761	34,910	48,198	75,952
Set pressure [psig]	Capacities [lb/h]				
15	38962	57245	79034	124543	0
20	44928	66009	91134	143612	0
30	56859	83539	115336	181749	0
40	69983	102821	141958	223700	0

^{*)} LEO_{S/G} = LESER Effective Orifice steam/gas please refer to page 00/11

Explanation		Type 441 XXL			
No.	Description		Metric Units	US Units	Example
1	Code				AD 2000-Merkblatt A2
2	Nominal diameter inlet x outlet	DN _{I+O}			250 x 350
3	Valve size				10" x 14"
4	Actual orifice diameter	d ₀	[mm]	[inch]	200
5	Actual orifice area	A ₀	[mm ²]	[inch ²]	31416
6	LESER Effective Orifice	LEO _{S/G}	[inch ²]	[inch ²]	34,910
7	Set pressure		[bar _g]	[psig]	1
8	Capacity		[kg/h]	[lb/h]	24617
9	Base of calculation				see table page 00/10

9

Base of calculation

		Metric Units		US Units	
Code		Capacity calculation according to AD 2000-Merkblatt A2		Capacity calculation according to ASME Section VIII (UV)	
STEAM (saturated steam)	Standard conditions	Steam table IAPWS-IF97 IAPWS Industrial Formulation for the Thermodynamic Properties of Water and Steam		Steam table IAPWS-IF97 IAPWS Industrial Formulation for the Thermodynamic Properties of Water and Steam	
		[kg/h]		[lb/h]	
AIR	Standard conditions	0 °C and 1013 mbar		16 °C (60 °F)	
		[m _n ³ /h]		[S.C.F.M.]	
WATER	Standard conditions	20 °C (68 °F)		21 °C (70 °F)	
		[10 ³ kg/h]		[US-G.P.M.]	
	Calculation pressure	Set pressure plus 10 % overpressure		Set pressure plus 10 % overpressure	
	Calculation pressure for low set pressure	Capacities at 1 bar (14,5 psig) and below are based on 0,1 bar (1,45 psig) overpressure.		Capacities at 2,07 bar (30 psig) and below are based on 0,207 bar (3 psig) overpressure.	

Example

Capacity calculation pressure

Metric Units		US Units	
Set pressure	Capacity calculation pressure	Set pressure	Capacity calculation pressure
10 bar	10 bar + 10% overpressure = 11 bar	145 psig	145 psig + 10% overpressure = 159,5 psig
0,5 bar	0,5 bar + 0,1 bar overpressure = 0,6 bar	20 psig	20 psig + 3 psig overpressure = 23 psig

6

LESER Effective Orifice

Pressure relief devices may be initially sized using the equations shown in API RP 520, sections 3.6 through 3.10 as appropriate for vapors, gases, liquids, or two phase flow. These equations utilize effective coefficient of discharge (S/G 0,975, L 0,650) and effective areas (acc. to API Std. 526, Fifth Edition, June 2002, table 1) which are independent of any specific

valve design. In this way the designer can determine a preliminary pressure relief valve size. By using the LESER Effective Orifice the designer can directly select a LESER safety relief valve after calculating the orifice letter. In this case, a verification of the sizing with the selected actual orifice and the rated coefficient of discharge is not necessary.

LEO _{S/G}	LESER Effective Orifice (for steam, gas and vapor)	[inch ²]	refer to page 00/11
LEO _L	LESER Effective Orifice (for liquid)	[inch ²]	refer to page 00/12

For further information refer to LESER Engineering Handbook.

This table is based on the rated coefficient of discharge for steams and gases of LESER safety valves certified by ASME. The appropriated K-values are shown in the column "K-value" of the table.

LEO _{S/G}		LESER Effective Orifice (for steam, gas and vapor)							
Orifice acc. API 526	LESER-Series	DN	Inlet size	d ₀ [inch]	d ₀ [mm]	K-value	LEO _{S/G} [inch ²]	% of higher orifice	% of lower orifice
D							0,110	100,0%	100,0%
E							0,196	100,0%	100,0%
	458	25	1"	0,591	15,0	0,798	0,224	73,0%	114,4%
	441	20	3/4"	0,709	18,0	0,699	0,283	92,1%	114,3%
F							0,307	100,0%	100,0%
	458	25	1"	0,787	20,0	0,798	0,399	79,2%	129,8%
	441	25	1"	0,906	23,0	0,699	0,462	91,8%	150,4%
	441 Full nozzle	25	1"	0,906	23,0	0,699	0,462	91,8%	150,4%
	444	25	1"	0,906	23,0	0,699	0,462	91,8%	150,4%
G							0,503	100,0%	100,0%
	441	32	1 1/2"	1,142	29,0	0,699	0,734	93,5%	145,9%
	441 Full nozzle	32	1 1/2"	1,142	29,0	0,699	0,734	93,5%	145,9%
H							0,785	100,0%	100,0%
	458	50	2"	1,181	30,0	0,798	0,897	69,7%	114,2%
	441	40	1 1/2"	1,457	37,0	0,699	1,195	92,8%	152,2%
	441 Full nozzle	40	1 1/2"	1,457	37,0	0,699	1,195	92,8%	152,2%
	444	40	1 1/2"	1,457	37,0	0,699	1,195	92,8%	152,2%
J							1,287	100,0%	100,0%
	457, 458	50	2"	1,575	40,0	0,798	1,594	86,7%	123,9%
K							1,838	100,0%	100,0%
	441	50	2"	1,811	46,0	0,699	1,847	64,7%	100,5%
	441 Full nozzle	50	2"	1,811	46,0	0,699	1,847	64,7%	100,5%
	444	50	2"	1,811	46,0	0,699	1,847	64,7%	100,5%
	458	80	3"	1,969	50,0	0,798	2,491	87,3%	135,5%
	458	100	4"	1,969	50,0	0,798	2,491	87,3%	135,5%
L							2,853	100,0%	100,0%
	441	65	3"	2,362	60,0	0,699	3,142	87,3%	110,1%
	441 Full nozzle	65	3"	2,362	60,0	0,699	3,142	87,3%	110,1%
	444	65	2 1/2"	2,362	60,0	0,699	3,142	87,3%	110,1%
	458	80	3"	2,362	60,0	0,754	3,389	94,1%	118,1%
	458	100	4"	2,362	60,0	0,798	3,587	99,6%	125,7%
M							3,600	100,0%	100,0%
N							4,340	100,0%	100,0%
	441	80	-	2,913	74,0	0,699	4,779	74,9%	110,1%
	444	80	3"	2,913	74,0	0,699	4,779	74,9%	110,1%
	458	100	4"	2,913	74,0	0,798	5,456	85,5%	125,7%
P							6,380	100,0%	100,0%
	458	100	4"	3,465	88,0	0,754	7,290	66,0%	114,3%
	441	100	4"	3,622	92,0	0,699	7,387	66,9%	115,8%
	441 Full nozzle	100	4"	3,622	92,0	0,699	7,387	66,9%	115,8%
	441	125	5"	3,858	98,0	0,699	8,382	75,9%	131,4%
Q							11,050	100,0%	100,0%
	458	150	6"	4,331	110,0	0,754	11,391	71,2%	103,1%
	441	150	6"	4,921	125,0	0,699	13,637	85,2%	123,4%
R							16,000	100,0%	100,0%
	441	200	8"	6,496	165,0	0,699	23,761	91,4%	148,5%
	XXL	200	8"	6,496	165,0	0,699	23,761	91,4%	148,5%
T							26,000	100,0%	100,0%
	XXL	250	10"	7,874	200,0	0,699	34,910		134,3%
	XXL	300	12"	9,252	235,0	0,699	48,198		185,4%
	XXL	400	16"	11,614	295,0	0,699	75,952		292,1%

This table is based on the rated coefficient of discharge for liquids of LESER safety valves certified by ASME.
The appropriated K-values are shown in the column "K-value" of the table.

LEOL		LESER Effective Orifice (for liquid)							
Orifice acc. API 526	LESER-Series	DN	Inlet size	d ₀ [inch]	d ₀ [mm]	K-value	LEOL [inch ²]	% of higher orifice	% of lower orifice
D							0,110	100,0%	100,0%
E							0,196	100,0%	100,0%
	458	25	1"	0,591	15	0,572	0,241	78,5%	123,0%
F							0,307	100,0%	100,0%
	441	20	3/4"	0,709	18	0,521	0,316	62,9%	103,0%
	458	25	1"	0,787	20	0,572	0,429	85,2%	139,6%
G							0,503	100,0%	100,0%
	441	25	1"	0,906	23	0,521	0,516	65,8%	102,6%
	441 Full nozzle	25	1"	0,906	23	0,521	0,516	65,8%	102,6%
	444	25	1"	0,906	23	0,521	0,516	65,8%	102,6%
H							0,785	100,0%	100,0%
	441	32	1 1/2"	1,142	29	0,521	0,821	6,38%	104,5%
	441 Full nozzle	32	1 1/2"	1,142	29	0,521	0,821	6,38%	104,5%
	458	50	1"	1,181	30	0,572	0,964	74,9%	122,8%
J							1,287	100,0%	100,0%
	441	40	1 1/2"	1,457	37	0,521	1,336	72,7%	103,8%
	441 Full nozzle	40	1 1/2"	1,457	37	0,521	1,336	72,7%	103,8%
	444	40	1 1/2"	1,457	37	0,521	1,336	72,7%	103,8%
	458	50	2"	1,575	40	0,572	1,714	93,3%	133,2%
K							1,838	100,0%	100,0%
	441	50	2"	1,811	46	0,521	2,065	72,4%	112,3%
	441 Full nozzle	50	2"	1,811	46	0,521	2,065	72,4%	112,3%
	444	50	2"	1,811	46	0,521	2,065	72,4%	112,3%
	458	80	3"	1,969	50	0,527	2,678	93,9%	145,7%
	458	100	4"	1,969	50	0,527	2,678	93,9%	145,7%
L							2,853	100,0%	100,0%
	458	80	3"	2,362	60	0,479	3,230	89,7%	113,2%
	441	65	3"	2,362	60	0,521	3,513	97,6%	123,1%
	441 Full nozzle	65	3"	2,362	60	0,521	3,513	97,6%	123,1%
	444	65	2 1/2"	2,362	60	0,521	3,513	97,6%	123,1%
M							3,600	100,0%	100,0%
	458	100	4"	2,362	60	0,572	3,857	88,9%	107,1%
N							4,340	100,0%	100,0%
	441	80	-	2,913	74	0,521	5,343	83,3%	123,1%
	444	80	3"	2,913	74	0,521	5,343	83,3%	123,1%
	458	100	4"	2,913	74	0,572	5,866	91,9%	135,2%
P							6,380	100,0%	100,0%
	458	100	4"	3,465	88	0,479	6,947	62,9%	108,9%
	441	100	4"	3,622	92	0,521	8,259	74,7%	129,4%
	441 Full nozzle	100	4"	3,622	92	0,521	8,259	74,7%	129,4%
	441	125	5"	3,858	98	0,521	9,371	84,8%	146,9%
	458	150	6"	4,331	110	0,479	10,855	98,2%	170,1%
Q							11,050	100,0%	100,0%
	441	150	6"	4,921	125	0,521	15,246	95,3%	138,0%
R							16,000	100,0%	100,0%
T							26,000	100,0%	100,0%
	441	200	8"	6,496	165	0,521	26,565		102,0%
	XXL	200	8"	6,496	165	0,521	39,031		102,0%
	XXL	250	10"	7,874	200	0,521	39,031		150,1%
	XXL	300	12"	9,252	235	0,521	53,887		207,3%
	XXL	400	16"	11,614	295	0,521	84,916		326,6%

Sour gas service (H₂S)

Normative basis

In accordance with NACE standard MR 0175-2003 sour gas service means the presence of H₂S in the following conditions:

Part 1.4.1.1.: All gas, gas condensate, and sour crude oil – When the partial pressure of H₂S in a wet (water as a liquid) gas phase of a gas, gas condensate, or crude oil system is equal to or exceeds 0,003 bar_a (0,05 psia)

Exceptions are:

Part 1.4.2.1.: **Low-pressure gas:** When the total pressure is lower than 4,5 bar_a (65 psia)

Part 1.4.2.2.: **Low-pressure oil and gas multiphase systems:** ...

Other Sour gas standards:

NACE MR 0103-2003: Materials resistance to sulfide stress cracking in corrosive petroleum refining environments.

DIN EN ISO 15156-1: Petroleum and natural gas industries – Materials for use in H₂S-containing environments in oil and gas production – Part 1: General principles for selection of cracking-resistant materials (ISO 15156-1:2001)

Miscellaneous

Workstandards: Please refer to LWN 001.91

General requirements for sour gas service

The above mentioned standards require a maximum hardness of 22 HRC for the most steels.

For the actual requirements of a specific material please refer to the applied standard.

LESER sour gas level

General: Sour gas material requirements must be fulfilled if pressure and partial pressure conditions according to the applied standard exist.

Based on these general statement LESER defines two sour gas level for safety valves:

Part definition	Level 1		Level 2	
	Contact with the medium in closed position		Contact with the medium in opened position	
	Conventional	Balanced bellows	Conventional	Balanced bellows
Contact area				
Pressure requirements	Set pressure ≥ 4,5 bar _a (65 psia)		Back pressure ≥ 4,5 bar _a (65 psia)	
Safety valve operation	closed		closed / opened	
Parts concerned	Conventional design	Body / Nozzle Disc	All	
	Balanced bellows design	Body / Nozzle Disc	Body / Nozzle Disc Bonnet spacer Bellows	

Necessary material modification

Type	Body material	Design	Part	Material	Option code	Material	Option code
4412 DIN 4412 ANSI 4412 Full nozzle DIN 4412 Full nozzle ANSI	1.0619 (WCB)	Conventional	Disc	1.4404 / 316L	L44	Please choose balanced bellows design	
Balanced bellows		Disc	1.4404 / 316L	L44	1.4404 / 316L	L44	
		Bellows	1.4571 / 316Ti	J78	1.4571 / 316Ti	J78	
4414 DIN 4414 ANSI 4414 Full nozzle DIN 4414 Full nozzle ANSI	1.4408 (CF8M)	Conventional		No modification required		No modification required	
Balanced bellows		Bellows	1.4571 / 316Ti	J78	1.4571 / 316Ti	J78	
4412 XXL	1.0460 / 1.0425 (Carbon steel)	Conventional	Disc	No modification required		Please choose balanced bellows design	
		Balanced bellows	Disc	No modification required		No modification required	
			Bellows	1.4571 / 316Ti	J78	1.4571 / 316Ti	J78
4414 XXL	1.4571 (316Ti)	Conventional		No modification required		No modification required	
		Balanced bellows	Bellows	1.4571 / 316Ti	J78	1.4571 / 316Ti	J78
4444 DIN 4444 ANSI	1.4404 (316L)	Conventional		No modification required		No modification required	
4562, 4582 4587	1.0619 (WCB)	Conventional	Disc	1.4404 / 316L	L44	Please choose balanced bellows design	
		Balanced bellows	Disc	1.4404 / 316L	L44	1.4404 / 316L	L44
			Bellows	1.4571 / 316Ti	J78	1.4571 / 316Ti	J78
4584	1.4581 (CF10M)	Conventional		No listed in NACE		No listed in NACE	
		Balanced bellows		No listed in NACE		No listed in NACE	



Type 442 DIN
Plain lever H3
Open bonnet
Conventional design



Type 441 DIN
Packed lever H4
Closed bonnet
Conventional design

Type 441 DIN 442 DIN

Type 441, 442 DIN

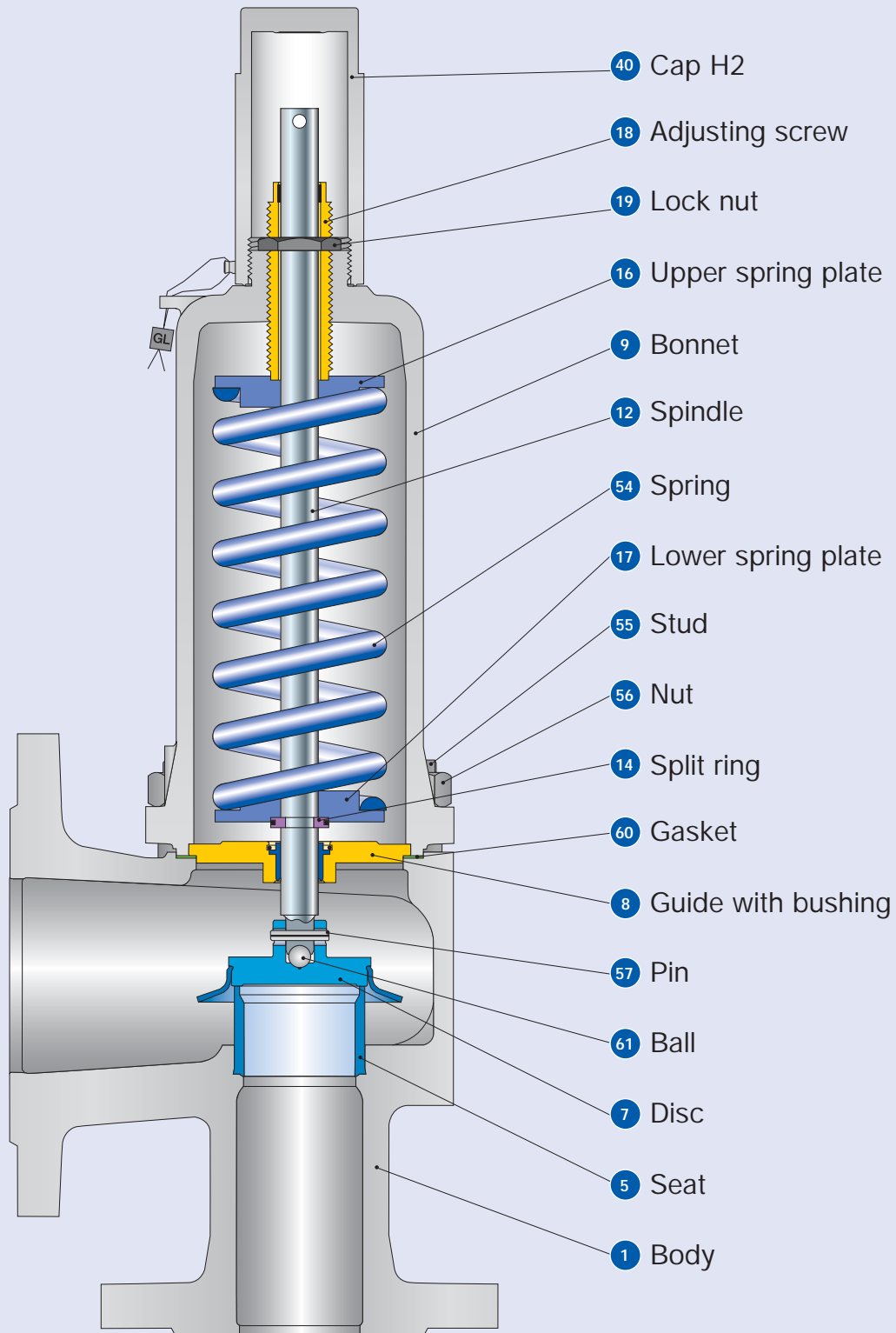
Flanged Safety Relief Valves – spring loaded

Contents	Chapter/Page
Materials	
• Conventional design	01/02
• Balanced bellows design	01/04
How to order	
• Numbering system	01/06
• Article numbers	01/08
Dimensions and weights	
• Metric Units	01/10
• US Units	01/11
Pressure temperature ratings	
• Metric Units	01/12
• US Units	01/14
Flange drillings and facings	01/16
Order information – Spare parts	01/18
Available options	01/20
Approvals	01/21
Capacities	
• Steam [Metric Units + US Units]	01/22
• Air [Metric Units + US Units]	01/24
• Water [Metric Units + US Units]	01/26
Determination of coefficient of discharge K_{dr}/α_w	01/28

Type 441, 442 DIN

Conventional design

Type 441, 442 DIN



Conventional design

Materials		Type 4411 / 4421 DIN	Type 4415 / 4425 DIN	Type 4412 / 4422 DIN	Type 4414 DIN
1	Body	0.6025	0.7043	1.0619	1.4408
		Cast iron	Ductile Gr. 60-40-18	SA 216 WCB	SA 351 CF8M
5	Seat	1.4404	1.4404	1.4404	1.4404
		316L	316L	316L	316L
7	Disc	1.4122	1.4122	1.4122	1.4404
		Hardened stainless steel	Hardened stainless steel	Hardened stainless steel	316L
8	Guide with bushing	1.4104, 1.0501, 0.7040	1.4104, 1.0501, 0.7040	1.4104, 1.0501, 0.7040	1.4404
		Chrome or carbon steel	Chrome or carbon steel	Chrome or carbon steel	316L
		1.4104 tenifer	1.4104 tenifer	1.4104 tenifer	-
		Chrome steel tenifer	Chrome steel tenifer	Chrome steel tenifer	-
9	Bonnet	0.7040, 0.7043, 1.0619	0.7040, 0.7043, 1.0619	0.7040, 0.7043, 1.0619	1.4408, 1.4404, 1.4571
		Ductile Gr. 60-40-18, SA 216 WCB	Ductile Gr. 60-40-18, SA 216 WCB	Ductile Gr. 60-40-18, SA 216 WCB	SA 351 CF8M, SA 479 316L, SA 479 316Ti
12	Spindle	1.4021	1.4021	1.4021	1.4404
		420	420	420	316L
14	Split ring	1.4104	1.4104	1.4104	1.4404
		Chrome steel	Chrome steel	Chrome steel	316L
16/17	Spring plate	1.0718	1.0718	1.0718	1.4404
		Steel	Steel	Steel	316L
18	Adjusting screw with bushing	1.4104 PTFE	1.4104 PTFE	1.4104 PTFE	1.4404 PTFE
		Chrome steel PTFE	Chrome steel PTFE	Chrome steel PTFE	316L PTFE
19	Lock nut	1.0718	1.0718	1.0718	1.4404
		Steel	Steel	Steel	316L
40	Cap H2	1.0718 or 0.7043	1.0718 or 0.7043	1.0718 or 0.7043	1.4404
		12L13 or Gr. 60-40-18	12L13 or Gr. 60-40-18	12L13 or Gr. 60-40-18	316L
54	Spring standard	1.1200, 1.8159, 1.7102	1.1200, 1.8159, 1.7102	1.1200, 1.8159, 1.7102	1.4310
		Carbon steel	Carbon steel	Carbon steel	Stainless steel
54	Spring optional	1.4310	1.4310	1.4310	-
		Stainless steel	Stainless steel	Stainless steel	-
55	Stud	1.1181	1.1181	1.1181	1.4401
		Steel	Steel	Steel	B8M
56	Nut	1.0501	1.0501	1.0501	1.4401
		2H	2H	2H	8M
57	Pin	1.4310	1.4310	1.4310	1.4310
		Stainless steel	Stainless steel	Stainless steel	Stainless steel
60	Gasket	Graphite / 1.4401	Graphite / 1.4401	Graphite / 1.4401	Graphite / 1.4401
		Graphite / 316	Graphite / 316	Graphite / 316	Graphite / 316
61	Ball	1.3541	1.3541	1.3541	1.4401
		Hardened stainless steel	Hardened stainless steel	Hardened stainless steel	316

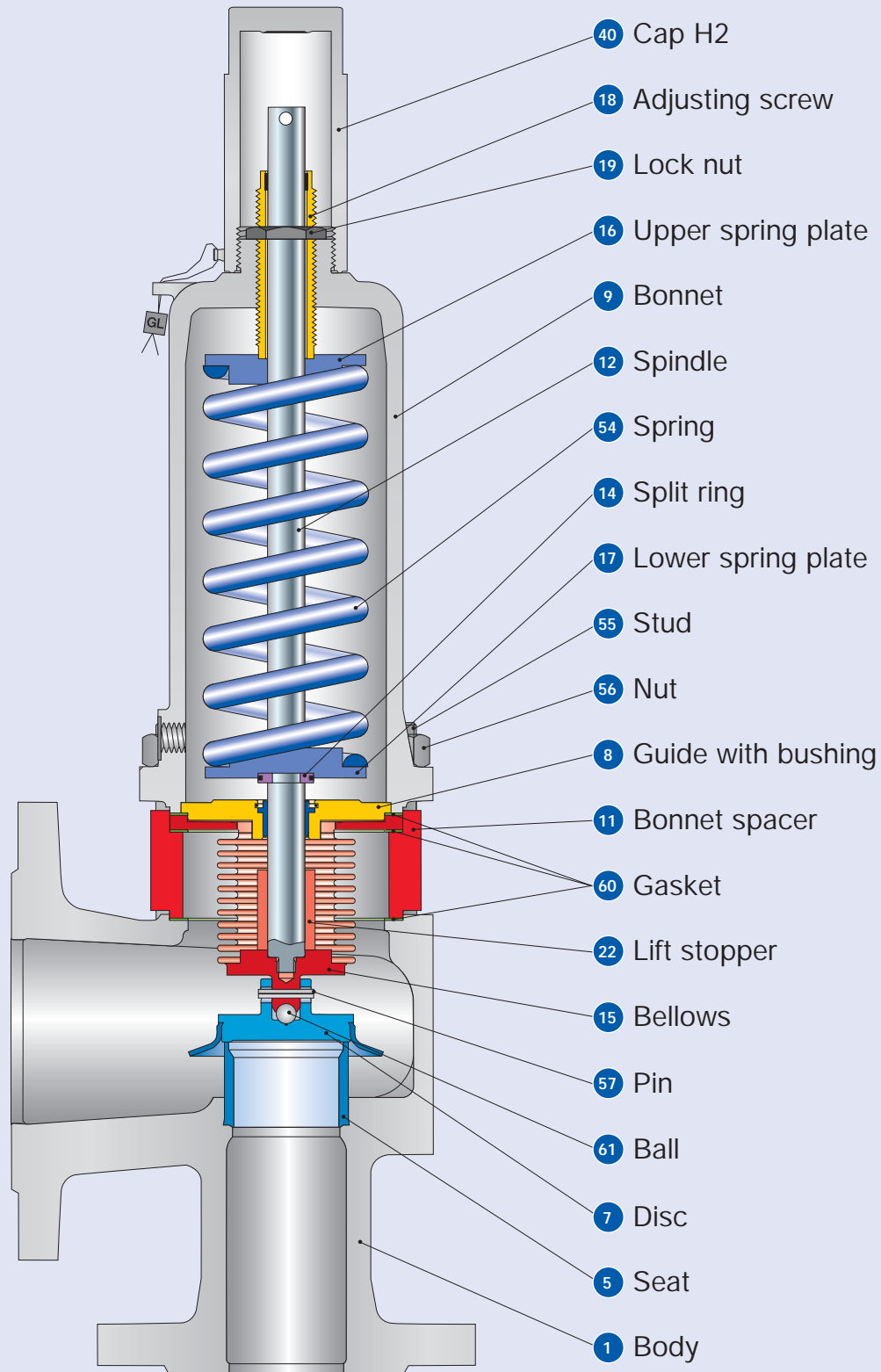
Please notice:

- Modifications reserved by LESER.
- LESER can upgrade materials without notice.
- Every part can be replaced by other material acc. to customer specification.

Type 441, 442 DIN

Balanced bellows design

Type 441, 442 DIN



Balanced bellows design

Materials					
Item	Component	Type 4411 / 4421 DIN	Type 4415 / 4425 DIN	Type 4412 / 4422 DIN	Type 4414 DIN
1	Body	0.6025	0.7043	1.0619	1.4408
		Cast iron	Ductile Gr. 60-40-18	SA 216 WCB	SA 351 CF8M
5	Seat	1.4404	1.4404	1.4404	1.4404
		316L	316L	316L	316L
7	Disc	1.4122	1.4122	1.4122	1.4404
		Hardened stainless steel	Hardened stainless steel	Hardened stainless steel	316L
8	Guide with bushing	1.4104, 1.0501, 0.7040	1.4104, 1.0501, 0.7040	1.4104, 1.0501, 0.7040	1.4404
		Chrome or carbon steel	Chrome or carbon steel	Chrome or carbon steel	316L
		1.4104 tenifer	1.4104 tenifer	1.4104 tenifer	-
		Chrome steel tenifer	Chrome steel tenifer	Chrome steel tenifer	-
9	Bonnet	0.7040, 0.7043, 1.0619	0.7040, 0.7043, 1.0619	0.7040, 0.7043, 1.0619	1.4408, 1.4404, 1.4571
		Ductile Gr. 60-40-18, SA 216 WCB	Ductile Gr. 60-40-18, SA 216 WCB	Ductile Gr. 60-40-18, SA 216 WCB	SA 351 CF8M, SA 479 316L, SA 479 316Ti
11	Bonnet spacer	1.0460	1.0460	1.0460	1.4404
		Carbon steel	Carbon steel	Carbon steel	316L
12	Spindle	1.4404	1.4404	1.4404	1.4404
		316L	316L	316L	316L
14	Split ring	1.4104	1.4104	1.4104	1.4404
		Chrome steel	Chrome steel	Chrome steel	316L
15	Bellows	1.4571	1.4571	1.4571	1.4571
		316Ti	316Ti	316Ti	316Ti
16/17	Spring plate	1.0718	1.0718	1.0718	1.4404
		Steel	Steel	Steel	316L
18	Adjusting screw with bushing	1.4104 PTFE	1.4104 PTFE	1.4104 PTFE	1.4404 PTFE
		Chrome steel PTFE	Chrome steel PTFE	Chrome steel PTFE	316L PTFE
19	Lock nut	1.0718	1.0718	1.0718	1.4404
		Steel	Steel	Steel	316L
22	Lift stopper	1.4404	1.4404	1.4104	1.4404
		316L	316L	Chrome steel	316L
40	Cap H2	1.0718 or 0.7043	1.0718 or 0.7043	1.0718 or 0.7043	1.4404
		12L13 or Gr. 60-40-18	12L13 or Gr. 60-40-18	12L13 or Gr. 60-40-18	316L
54	Spring standard	1.1200, 1.8159, 1.7102	1.1200, 1.8159, 1.7102	1.1200, 1.8159, 1.7102	1.4310
		Carbon steel	Carbon steel	Carbon steel	Stainless steel
54	Spring optional	1.4310	1.4310	1.4310	-
		Stainless steel	Stainless steel	Stainless steel	-
55	Stud	1.4401	1.4401	1.4401	1.4401
		B8M	B8M	B8M	B8M
56	Nut	1.4401	1.4401	1.4401	1.4401
		8M	8M	8M	8M
57	Pin	1.4310	1.4310	1.4310	1.4310
		Stainless steel	Stainless steel	Stainless steel	Stainless steel
60	Gasket	Graphite / 1.4401	Graphite / 1.4401	Graphite / 1.4401	Graphite / 1.4401
		Graphite / 316	Graphite / 316	Graphite / 316	Graphite / 316
61	Ball	1.3541	1.3541	1.3541	1.4401
		Hardened stainless steel	Hardened stainless steel	Hardened stainless steel	316

Please notice:

- Modifications reserved by LESER.
- LESER can upgrade materials without notice.
- Every part can be replaced by other material acc. to customer specification.

How to order – Numbering system

Type 441, 442 DIN

1

Article Number

1	2	3	4
441	2	451	2

1 Valve Type 441, 442 DIN
 Type 441 – with closed bonnet
 Type 442 – with open bonnet

2 Material code

Code	Lifting lever
1	0.6025 (cast iron)
2	1.0619 (WCB)
4	1.4408 (CF8M)
5	0.7043 (ductile Gr. 60-40-18)

3 Valve code
 Identifies valve size and body material, refer to page 01/09.

4

Code	Lifting lever	
2	screwed cap	H2
3	plain lever	H3
4	packed lever	H4
5	plain lever with open bonnet	H3

4412.4512

Article No.

2

Set Pressure

Please state unit (in gauge)!

Please do not exceed the pressure range defined in the spring charts.

5 barg

Set Pressure

3

Connections

Please refer to pages 01/16 and 01/17

H45

Connections

4 Options

Type 441, 442 DIN	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
• Stainless steel bellows	
- open bonnet (Type 442)	J68
- closed bonnet (Type 441)	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
- Flanges	DN 15 H31
	DN 25 H32
• Drain hole	G 1/4 J18
	G 1/2 J19
• Free of oil and grease	J85
• Materials	
- NACE	H01

Option code applies only if not standard

J22

Options

5 Documentation

Please select requested documentation:

Inspections, tests:	Option code
DIN EN 10204-3.2: TÜV-Nord Certificate for test pressure	M33
LESER Certificate for Global Application	H03
- Inspection certificate 3.1 acc. to DIN EN 10204	
- Declaration of conformity acc. to PED 97/23/EC	
Material test certificate:	
DIN EN 10204-3.1	
Part	Option code
Body	H01
Bonnet	L30
Cap / lever cover	L31
Disc	L23
Studs	N07
Nuts	N08

H01 L30

Documentation

6 Code and Medium

1	2	
2	.	0
1 Code	1. ASME Section VIII 2. CE / VdTUEV 3. ASME Section VIII + CE / VdTUEV	
2 Medium	.1 Gases .2 Liquids .3 Steam .0 Steam / Gases / Liquids (valid only for CE / VdTUEV)	

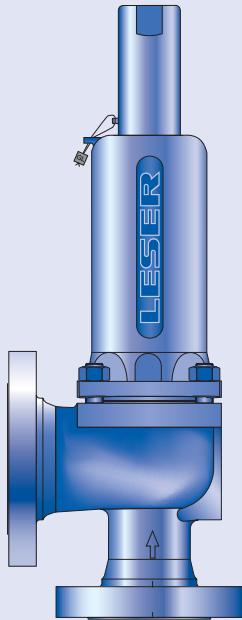
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Code and Medium

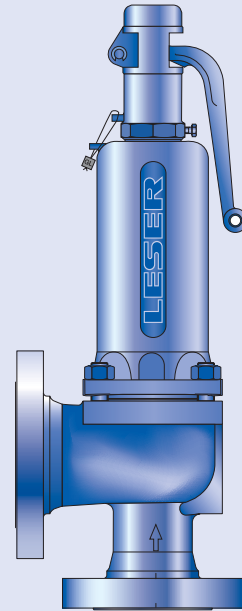
Type 441, 442 DIN

How to order – Article numbers

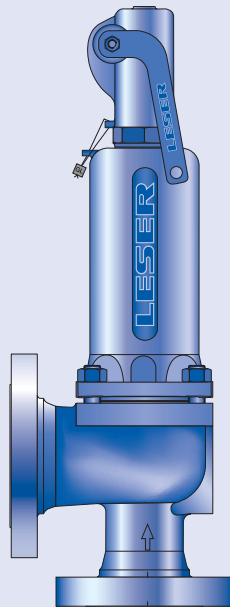
Type 441, 442 DIN



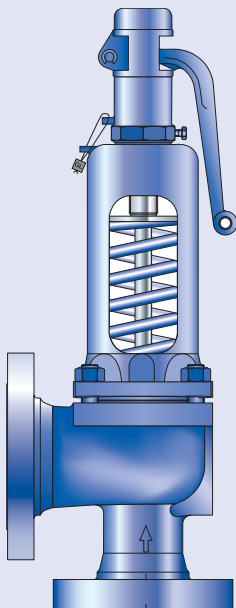
Type 441
Cap H2
Closed bonnet
Conventional design



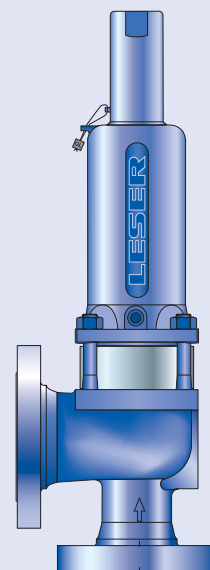
Type 441
Plain lever H3
Closed bonnet
Conventional design



Type 441
Packed lever H4
Closed bonnet
Conventional design



Type 442
Plain lever H3
Open bonnet
Conventional design



Type 441
Cap H2
Closed bonnet
Balanced bellows design

How to order – Article numbers

Article numbers			DN _i	20	20	25	32	40	50	65	80	100	125	150	200
			DN _o	32	40	40	50	65	80	100	125	150	200	250	300
Actual Orifice diameter d ₀ [mm]				18	18	23	29	37	46	60	74	92	98	125	165
Actual Orifice area A ₀ [mm ²]				254	254	416	661	1075	1662	2827	4301	6648	7543	12272	21382
Body material: 0.6025 (cast iron)															
Bonnet closed	H2	Art.-No. 4411.	4372	–	4382	4392	4402	4412	4422	4432	4442	4452	4462	–	–
	H3	Art.-No. 4411.	4373	–	4383	4393	4403	4413	4423	4433	4443	4453	–	–	–
	H4	Art.-No. 4411.	4374	–	4384	4394	4404	4414	4424	4434	4444	4454	4464	–	–
open	H3	Art.-No. 4421.	4375	–	4385	4395	4405	4415	4425	4435	4445	4455	4465	–	–
Body material: 0.7043 (ductile Gr. 60-40-18)															
Bonnet closed	H2	Art.-No. 4415.	–	–	7382	7392	7402	7412	7422	7432	7442	7452	7462	7472	–
	H3	Art.-No. 4415.	–	–	7383	7393	7403	7413	7423	7433	7443	7453	–	–	–
	H4	Art.-No. 4415.	–	–	7384	7394	7404	7414	7424	7434	7444	7454	7464	7474	–
open	H3	Art.-No. 4425.	–	–	7385	7395	7405	7415	7425	7435	7445	7455	7465	7475	–
Body material: 1.0619 (WCB)															
Bonnet closed	H2	Art.-No. 4412.	–	4502	4512	4522	4532	4542	4552	4562	4572	4582	4592	4612	–
	H3	Art.-No. 4412.	–	4503	4513	4523	4533	4543	4553	4563	4573	4583	–	–	–
	H4	Art.-No. 4412.	–	4504	4514	4524	4534	4544	4554	4564	4574	4584	4594	4614	–
open	H3	Art.-No. 4422.	–	4505	4515	4525	4535	4545	4555	4565	4575	4585	4595	4615	–
Body material: 1.4408 (CF8M)															
Bonnet closed	H2	Art.-No. 4414.	–	–	4642	4652	4662	4672	4682	4692	4702	4712	4722	–	–
	H4	Art.-No. 4414.	–	–	4644	4654	4664	4674	4684	4694	4704	4714	4724	–	–

Type 441, 442 DIN

Dimensions and weights

Metric Units

	DN _i	20	20	25	32	40	50	65	80	100	125	150	200
	DN _o	32	40	40	50	65	80	100	125	150	200	250	300
	Actual Orifice diameter d ₀ [mm]	18	18	23	29	37	46	60	74	92	98	125	165
	Actual Orifice area A ₀ [mm ²]	254	254	416	661	1075	1662	2827	4301	6648	7543	12272	21382
Weight [kg]		9	9	9	12	16	22	32	56	75	85	131	285
	with bellows	9,4	9,4	10	13	17	24	36	60	83	93	142	289
Center to face [mm]	Inlet a	85	85	105	115	140	150	170	195	220	250	285	400
	Outlet b	95	95	100	110	115	120	140	160	180	200	225	477
Height (H4) [mm]	Standard H max.	304	304	339	446	512	569	699	801	883	913	1083	1380
	Bellows H max.	337	337	378	488	550	615	769	860	939	969	1141	1380
Support brackets [mm] (drilled only on request)	A									277	277	320	490
	B									160	160	185	1)
	C									Ø 18	Ø 18	Ø 18	Ø 18
	D									293	318	392	1)
	E									21	21	28	1)

Body material: 0.6025 (cast iron)

DIN Flange²⁾	Inlet	PN 16	-										PN 16
	Outlet	PN 16	-										PN 16

Body material: 0.7043 (ductile Gr. 60-40-18)

DIN Flange²⁾	Inlet	-	-										PN 25
	Outlet	-	-										PN 10

Body material: 1.0619 (WCB)

DIN Flange²⁾	Inlet	-	-										PN 25
	Outlet	-	-										PN 16

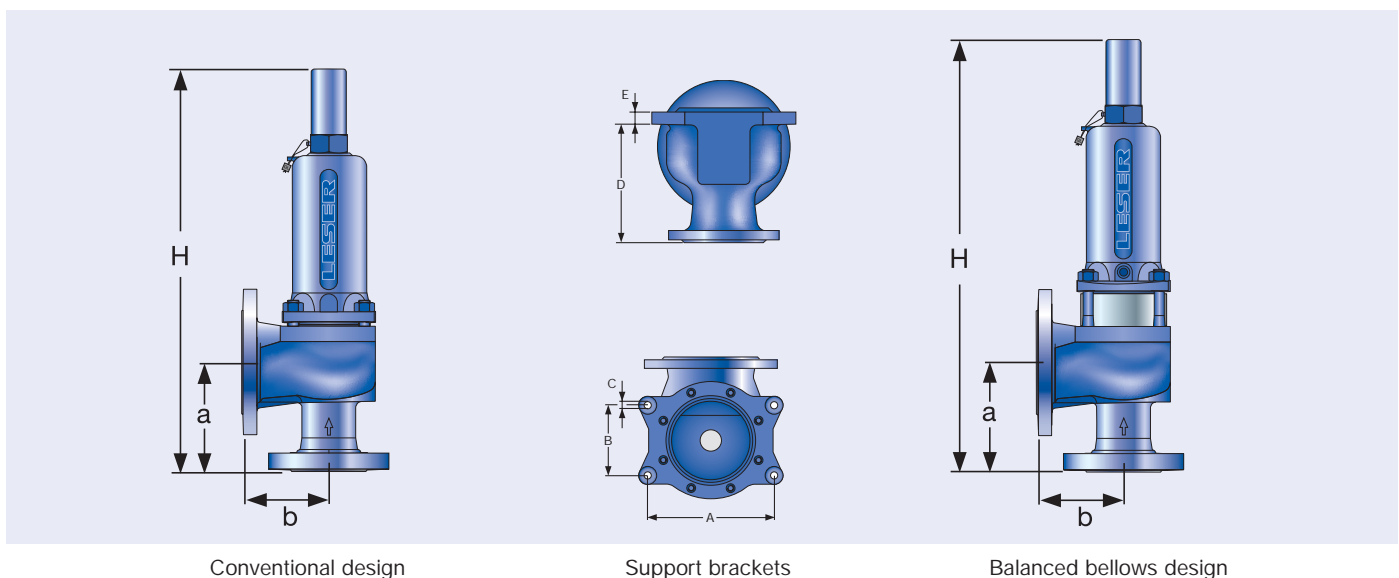
Body material: 1.4408 (CF8M)

DIN Flange²⁾	Inlet	-	-										PN 40
	Outlet	-	-										PN 16

1)

Body material	B [mm]	D [mm]	E [mm]
0.6025	150	290	16
0.7043	150	489	25
1.0619	160	489	25
1.4408	150	489	25

²⁾ Standard flange rating. For other flange drillings and facings please refer to page 01/16 and 01/17.



Dimensions and weights

US Units													
	DN _I	20	20	25	32	40	50	65	80	100	125	150	200
	DN _O	32	40	40	50	65	80	100	125	150	200	250	300
	Actual Orifice diameter d ₀ [inch]	0,71	0,71	0,91	1,14	1,46	1,81	2,36	2,91	3,62	3,86	4,92	6,5
	Actual Orifice area A ₀ [inch ²]	0,394	0,394	0,644	1,024	1,667	2,576	4,383	6,666	10,304	11,691	19,021	33,142
Weight [lbs]		20	20	20	26	35	49	71	123	165	187	289	628
	with bellows	21	21	21	28	38	52	79	132	183	205	313	637
Center to face [inch]	Inlet a	3 11/32	3 11/32	4 1/8	4 17/32	5 16/32	5 29/32	6 11/16	7 11/16	8 21/32	9 27/32	11 7/32	15 3/4
	Outlet b	3 3/4	3 3/4	3 15/16	4 11/32	4 17/32	4 23/32	5 16/32	6 5/16	7 3/32	7 7/8	8 27/32	8 25/32
Height (H4) [inch]	Standard H max.	11 13/16	11 13/16	13 11/32	17 9/16	20 5/32	22 13/32	27 17/32	31 17/32	34 3/4	35 15/16	42 5/8	54 11/32
	Bellows H max.	13 9/32	13 9/32	14 7/8	19 7/32	21 21/32	24 7/32	30 9/32	33 27/32	36 31/32	38 5/32	45	54 11/32
Support brackets [inch] (drilled only on request)	A									10 29/32	10 29/32	12 19/32	19 19/32
	B									6 1/4	6 1/4	7 9/32	1)
	C									Ø 3/4	Ø 3/4	Ø 3/4	Ø 3/4
	D									11 17/32	12 17/32	15 7/16	1)
	E									26/32	26/32	1 3/32	1)

Body material: 0.6025 (cast iron)

DIN Flange ²⁾	Inlet	PN 16	-										PN 16
	Outlet	PN 16	-										PN 16

Body material: 0.7043 (ductile Gr. 60-40-18)

DIN Flange ²⁾	Inlet	-	-										PN 40	PN 16	PN 25
	Outlet	-	-										PN 16		PN 10

Body material: 1.0619 (WCB)

DIN Flange ²⁾	Inlet	-	-										PN 40		PN 25
	Outlet	-	-										PN 16		

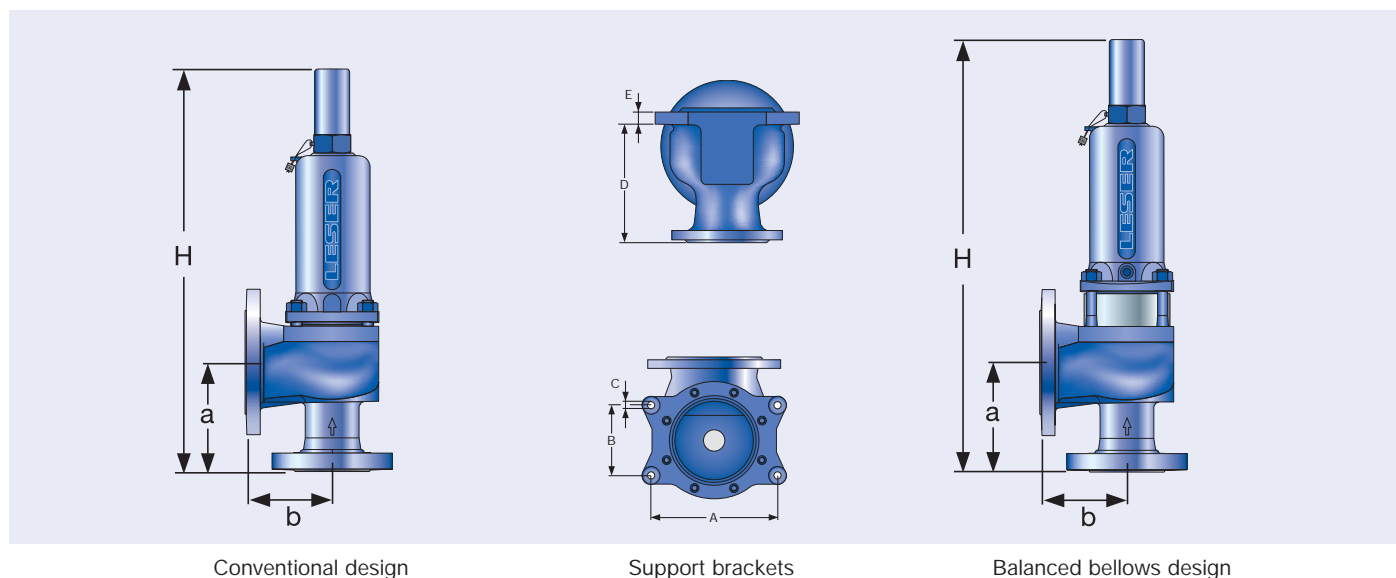
Body material: 1.4408 (CF8M)

DIN Flange ²⁾	Inlet	-	-										PN 40		
	Outlet	-	-										PN 16		

1)

Body material	B [inch]	D [inch]	E [inch]
0.6025	5 29/32	11 13/32	5/8
0.7043	5 29/32	11 17/32	13/16
1.0619	6 1/4	11 17/32	13/16
1.4408	5 29/32	11 17/32	13/16

2) Standard flange rating. For other flange drillings and facings please refer to page 01/16 and 01/17.



Pressure temperature ratings

Metric Units

	DN _I	20	20	25	32	40	50	65	80	100	125	150	200	
	DN _O	32	40	40	50	65	80	100	125	150	200	250	300	
	Actual Orifice diameter d ₀ [mm]	18	18	23	29	37	46	60	74	92	98	125	165	
	Actual Orifice area A ₀ [mm ²]	254	254	416	661	1075	1662	2827	4301	6648	7543	12272	21382	
Body material: 0.6025 (cast iron)														
DIN Flange	Inlet	PN 16	-	PN 16										-
	Outlet	PN 16	-	PN 16										-
Minimum set pressure	p [bar _g] S/G/L	0,1	-	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	-	
Min. set pressure¹⁾ standard bellows	p [bar _g] S/G/L	3	-	3	3	3	3	3	3	3	3	3	-	
Min. set pressure low press. bellows	p [bar _g] S/G/L	2,00	-	0,98	1,41	1,11	1,81	1,50	1,05	1,18	1,41	-	-	
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 acc. to DIN EN	min. [°C]	-10	-	-10										-
	max. [°C]	+300	-	+300										-
Temperature acc. to ASME	min. [°C]	-	-	-										-
	max. [°C]	-	-	-										-

Body material: 0.7043 (ductile Gr. 60-40-18)														
DIN Flange	Inlet	-	-	PN 40							PN 16		PN 25	
	Outlet	-	-	PN 16							PN 16		PN 10	
Minimum set pressure	p [bar _g] S/G/L	-	-	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	
Min. set pressure¹⁾ standard bellows	p [bar _g] S/G/L	-	-	3	3	3	3	3	3	3	3	3	3	
Min. set pressure low press. bellows	p [bar _g] S/G/L	-	-	0,98	1,41	1,11	1,81	1,50	1,05	1,18	1,41	-	-	
Maximum set pressure	p [bar _g] S/G/L	-	-	40	40	40	40	40	32	40	16	16	20	
Max. set pressure with special spring	p [bar _g] S/G/L	-	-	40	40	40	40	40	40	40	16	16	25	
Temperature acc. to DIN EN	min. [°C]	-	-	-60										
	max. [°C]	-	-	+350										
Temperature acc. to ASME	min. [°C]	-	-	-10										
	max. [°C]	-	-	+350										

¹⁾ Min. set pressure standard bellows = Max. set pressure low pressure bellows.

Pressure temperature ratings

Metric Units														
	DN _I	20	20	25	32	40	50	65	80	100	125	150	200	
	DN _O	32	40	40	50	65	80	100	125	150	200	250	300	
	Actual Orifice diameter d ₀ [mm]	18	18	23	29	37	46	60	74	92	98	125	165	
	Actual Orifice area A ₀ [mm ²]	254	254	416	661	1075	1662	2827	4301	6648	7543	12272	21382	
Body material: 1.0619 (WCB)														
DIN Flange	Inlet	-	PN 40										PN 25	
	Outlet	-	PN 16											
Minimum set pressure	p [bar _g] S/G/L	-	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	
Min. set pressure ¹⁾ standard bellows	p [bar _g] S/G/L	-	3	3	3	3	3	3	3	3	3	3	3	
Min. set pressure low press. bellows	p [bar _g] S/G/L	-	2,00	0,98	1,41	1,11	1,81	1,50	1,05	1,18	1,41	-	-	
Maximum set pressure	p [bar _g] S/G/L	-	40	40	40	40	40	40	32	40	28	17	20	
Max. set pressure with special spring	p [bar _g] S/G/L	-	40	40	40	40	40	40	40	40	28	25	25	
Temperature acc. to DIN EN	min. [°C]	-	-85											
	max. [°C]	-	+450											
Temperature acc. to ASME	min. [°C]	-	-29											
	max. [°C]	-	+427											
Body material: 1.4408 (CF8M)														
DIN Flange	Inlet	-	-	PN 40										-
	Outlet	-	-	PN 16										-
Minimum set pressure	p [bar _g] S/G/L	-	-	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	0,1	-	
Min. set pressure ¹⁾ standard bellows	p [bar _g] S/G/L	-	-	3	3	3	3	3	3	3	3	3	-	
Min. set pressure low press. bellows	p [bar _g] S/G/L	-	-	0,98	1,41	1,11	1,81	1,50	1,05	1,18	1,41	-	-	
Maximum set pressure	p [bar _g] S/G/L	-	-	40	40	40	33	28	13,6	15	15	7	-	
Max. set pressure with special spring	p [bar _g] S/G/L	-	-	40	40	40	37	28	25	26	24	10	-	
Temperature acc. to DIN EN	min. [°C]	-	-	-270										
	max. [°C]	-	-	+400										
Temperature acc. to ASME	min. [°C]	-	-	-268										
	max. [°C]	-	-	+538										

¹⁾ Min. set pressure standard bellows = Max. set pressure low pressure bellows.

Pressure temperature ratings

US Units

	DN _i	20	20	25	32	40	50	65	80	100	125	150	200	
	DN _o	32	40	40	50	65	80	100	125	150	200	250	300	
Actual Orifice diameter d ₀ [inch]		0,71	0,71	0,91	1,14	1,46	1,81	2,36	2,91	3,62	3,86	4,92	6,5	
Actual Orifice area A ₀ [inch ²]		0,394	0,394	0,644	1,024	1,667	2,576	4,383	6,666	10,304	11,691	19,021	33,142	
Body material: 0.6025 (cast iron)														
DIN Flange	Inlet	PN 16	-	PN 16										-
	Outlet	PN 16	-	PN 16										-
Minimum set pressure	p [psig] S/GL	1,5	-	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	-	
Min. set pressure¹⁾ standard bellows	p [psig] S/GL	43,5	-	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	-	
Min. set pressure low press. bellows	p [psig] S/GL	29	-	14	20	16	26	22	15	17	20	-	-	
Maximum set pressure	p [psig] S/GL	232	-	232	232	232	232	232	232	232	232	232	-	
Max. set pressure with special spring	p [psig] S/GL	232	-	232	232	232	232	232	232	232	232	232	-	
Temperature acc. to DIN EN	min. [°F]	+14	-	+14										-
	max. [°F]	+572	-	+572										-
Temperature acc. to ASME	min. [°F]	-	-	-										-
	max. [°F]	-	-	-										-

Body material: 0.7043 (ductile Gr. 60-40-18)														
DIN Flange	Inlet	-	-	PN 40						PN 16			PN 25	
	Outlet	-	-	PN 16						PN 16			PN 10	
Minimum set pressure	p [psig] S/GL	-	-	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	
Min. set pressure¹⁾ standard bellows	p [psig] S/GL	-	-	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	
Min. set pressure low press. bellows	p [psig] S/GL	-	-	14	20	16	26	22	15	17	20	-	-	
Maximum set pressure	p [psig] S/GL	-	-	580	580	580	580	580	464	580	232	232	290	
Max. set pressure with special spring	p [psig] S/GL	-	-	580	580	580	580	580	580	580	232	232	363	
Temperature acc. to DIN EN	min. [°F]	-	-	-						-76				
	max. [°F]	-	-	-						+662				
Temperature acc. to ASME	min. [°F]	-	-	-						+14				
	max. [°F]	-	-	-						+662				

¹⁾ Min. set pressure standard bellows = Max. set pressure low pressure bellows.

Pressure temperature ratings

US Units													
	DN _I	20	20	25	32	40	50	65	80	100	125	150	200
	DN _O	32	40	40	50	65	80	100	125	150	200	250	300
	Actual Orifice diameter d ₀ [inch]	0,71	0,71	0,91	1,14	1,46	1,81	2,36	2,91	3,62	3,86	4,92	6,5
	Actual Orifice area A ₀ [inch ²]	0,394	0,394	0,644	1,024	1,667	2,576	4,383	6,666	1,304	11,691	19,021	33,142
Body material: 1.0619 (WCB)													
DIN Flange	Inlet	-	PN 40										PN 25
	Outlet	-	PN 16										
Minimum set pressure	p [psig] S/GL	-	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 [psig] S/GL	-	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5
Min. set pressure low press. bellows	p [psig] S/GL	-	29	14	20	16	26	22	15	17	20	-	-
Maximum set pressure	p [psig] S/GL	-	580	580	580	580	580	580	464	580	406	247	290
Max. set pressure with special spring	p [psig] S/GL	-	580	580	580	580	580	580	580	580	406	363	363
Temperature acc. to DIN EN	min. [°F]	-	-121										
	max. [°F]	-	+842										
Temperature acc. to ASME	min. [°F]	-	-20										
	max. [°F]	-	+800										

Body material: 1.4408 (CF8M)														
DIN Flange	Inlet	-	-	PN 40										-
	Outlet	-	-	PN 16										-
Minimum set pressure	p [psig] S/GL	-	-	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 [psig] S/GL	-	-	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	43,5	-	
Min. set pressure low press. bellows	p [psig] S/GL	-	-	14	20	16	26	22	15	17	20	-	-	
Maximum set pressure	p [psig] S/GL	-	-	580	580	580	479	406	197	218	218	102	-	
Max. set pressure with special spring	p [psig] S/GL	-	-	580	580	580	537	406	363	377	348	145	-	
Temperature acc. to DIN EN	min. [°F]	-	-	-454										
	max. [°F]	-	-	+752										
Temperature acc. to ASME	min. [°F]	-	-	-450										
	max. [°F]	-	-	+1000										

¹⁾ Min. set pressure standard bellows = Max. set pressure low pressure bellows.

Flange drillings

Type 441, 442 DIN

Flange drillings															
	DN _i	20	20	25	32	40	50	65	80	100	125	150	200		
	DN _o	32	40	40	50	65	80	100	125	150	200	250	300		
	Valve size	–	¾" x 1½"	1" x 1½"	1" x 2"	1" x 2½"	2" x 3"	2" x 4"	3" x 5"	4" x 6"	5" x 8"	6" x 10"	8" x 12"		
	Actual Orifice diameter d ₀ [mm]	18	18	23	29	37	46	60	74	92	98	125	165		
	Actual Orifice area A ₀ [mm ²]	254	254	416	661	1075	1662	2827	4301	6648	7543	12272	21382		
Body material: 0.6025 (cast iron)															
Inlet	DIN EN 1092	PN 10	*	*	*	*	*	*	*	*	*	*	*		
		PN 16	*	*	*	*	*	*	*	*	*	*	*		
		PN 25	–	–	–	–	–	–	–	–	–	–	–		
		PN 40	–	–	–	–	–	–	–	–	–	–	–		
Outlet	DIN EN 1092	PN 10	*	*	*	*	*	*	*	*	H50	H50			
		PN 16	*	*	*	*	*	*	*	*	*	*	*		
		PN 25	–	–	–	–	–	–	–	–	–	–	–		
		PN 40	–	–	–	–	–	–	–	–	–	–	–		
Body material: 0.7043 (ductile Gr. 60-40-18)															
Inlet	DIN EN 1092	PN 10			*	*	*	*	H45	*	H45	*	*	H44	
		PN 16			*	*	*	*	*	*	*	*	*	H45	
		PN 25			–	–	–	–	–	–	–	–	–	*	
		PN 40			–	–	–	–	–	–	–	–	–	–	
Outlet	DIN EN 1092	PN 10			*	*	*	*	*	*	H50	H50	*		
		PN 16			*	*	*	*	*	*	*	*	(H51)		
		PN 25			*	(*)	(H15)	(*)	–	–	–	–	–		
		PN 40			*	(*)	(H15)	(*)	–	–	–	–	–		
Body material: 1.0619 (WCB), 1.4408 (CF8M)															
Inlet	DIN EN 1092	PN 10			*	*	*	*	H45	H45	H45	H45	H45	H44	
		PN 16			*	*	*	*	H45	H45	H45	H45	H45	H44	
		PN 25			*	*	*	*	*	*	*	*	*	*	
		PN 40			*	*	*	*	*	*	*	*	*	*	
	ASME B16.5 ¹⁾	CL150			H64	H64	H64	H64	H64	H64	H64	[H64]	H64	H64	H64
		CL300			–	–	H65	–	[H65]	–	–	–	–	–	–
Outlet	DIN EN 1092	PN 10			*	*	*	*	*	*	H50	H50	H50		
		PN 16			*	*	*	*	*	*	*	*	*		
		PN 25			*	*	*	(H15)	(*)	–	–	–	–	H52	
		PN 40			*	*	*	(H15)	(*)	–	–	–	–	H52	
	ASME B16.5 ¹⁾	CL150			H79	H79	H79	H79	H79	[H79]	H79	H79	H79	H79	
		CL300			–	–	[H80]	–	–	–	–	–	–	–	

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.

¹⁾ For drillings according to ASME B16.5 please use preferred Type 441, 442 ANSI.

Flange facings

Flange facings										
Indication	Standard	Nozzle	Outlet		Remark					
General										
Flange undrilled	–	H38	H39							
Linde-V-Nut, Form V48	Linde Standard 420-08	J07	J08		Groove: Rz 16					
Linde-V-Nut, Form V48A	LWN 313.36	J05	J06		Groove: Rz 4, e.g. with hydrogen					
Lens seal form L (without sealing lens)	DIN 2696 LWN 313.35	J11	J12							
Acc. to DIN EN										
Flange facing			Inlet		Outlet		Remark			
DIN EN 1092 (new)		DIN 2526 (old)	PN 10 – PN 40		PN 10 – PN 40		Rz-data according to DIN EN 1092 in µm			
(see also LWN 313.40)										
Raised face	Type B1	Type C	*		*		Facing: Rz = 12,5 – 50			
	Type B2	Type D								
Tongue face C ¹⁾		Tongue face F	L36		L38		Facing: Rz = 3,2 – 12,5			
Groove face D ¹⁾		Groove face N	H94		H92		Steel flanges only			
Male face E		Male face V13	H93		H91					
Female face F		Female face R13	H96		H98					
O-ring male face G		Male face V14	H96		H99					
O-ring female face H		Female face R14	J01		J02					
			J03		J04					
Acc. 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	Option code	Option code	RTJ-Class	Option code	RTJ-Class	Option code
1.0619, 1.4408	all	all	L51	L53	*	*	CL150	H62	CL150	H63

¹⁾ According to DIN EN 1092 groove depths and tongue heights increased compared to the formerly valid DIN (refer to LWN 313.40). 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 2512 and/or DIN EN 1092-1 an additional option code is necessary: "S01: bottom of the groove drilled". Groove and tongue for PN160 flanges refer to DIN 2512/LWN 313.32.

²⁾ Smooth finish is not defined in the effective standards. For LESER's definition for smooth finish see page 00/07.

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

	DN _i	20	20	25	32	40	50	65
	DN _o	32	40	40	50	65	80	100
	Actual Orifice diameter d ₀ [mm]	18	18	23	29	37	46	60
	Actual Orifice area A ₀ [mm ²]	254	254	416	661	1075	1662	2827
Disc (Item 7): Metal to metal seat								
Material-No. / Art.-No.								
Disc	1.4122	210.7039.9000	210.9739.9000	210.9839.9000	210.9939.9000	210.8739.9000	220.1639.9000	
detachable lifting aid	1.4404	–	210.9749.9000	210.9849.9000	210.9949.9000	210.8749.9000	220.1649.9000	
Disc (Item 7): Soft seal								
Material-No. / Art.-No.								
Disc	CR	"K"	200.4939.9051	200.5049.9051	200.5149.9051	200.5249.9051	200.5349.9051	200.5449.9051
	EPDM	"D"	200.4939.9041	200.5049.9041	200.5149.9041	200.5249.9041	200.5349.9041	200.5449.9041
	FKM	"L"	200.4939.9071	200.5049.9071	200.5149.9071	200.5249.9071	200.5349.9071	200.5449.9071
	FFKM	"C"	200.4939.9091	200.5049.9091	200.5149.9091	200.5249.9091	200.5349.9091	on request
O-ring (Item 7.4): Soft seal								
Material-No. / Art.-No.								
O-ring	CR	"K"	502.0171.2651	502.0249.3551	502.0313.3551	502.0408.3551	502.0503.3551	502.0660.5351
	EPDM	"D"	502.0171.2641	502.0249.3541	502.0313.3541	502.0408.3541	502.0503.3541	502.0660.5341
	FKM	"L"	502.0171.2671	502.0249.3571	502.0313.3571	502.0408.3571	502.0503.3571	502.0660.5371
	FFKM	"C"	502.0171.2691	502.0249.3591	502.0313.3591	502.0408.3591	502.0503.3591	on request
Bellows (Item 15): 1.4571								
Material-No. / Art.-No.								
Standard bellows			400.0149.0000	400.0949.0000	400.1049.0000	400.1149.0000	400.1249.0000	400.1349.0000
Conversion kit standard¹⁾			5021.1040	5021.1041	5021.1042	5021.1043	5021.1044	5021.1045
Low pressure bellows			400.0149.0021	400.0949.0021	400.1049.0021	400.1149.0021	400.1249.0021	400.1349.0021
Conversion kit low pressure¹⁾			please specify in writing					
Gasket – Body / bonnet (Item 60)								
Material-No. / Art.-No.								
Gasket	Graphite + 1.4401		500.0407.0000	500.0607.0000	500.0807.0000	500.1007.0000	500.1207.0000	500.1607.0000
Option code L68	Gylon (filled PTFE)		500.0405.0000	500.0605.0000	500.0805.0000	500.1005.0000	500.1205.0000	500.1605.0000
Ball (Item 61)								
Material-No. / Art.-No.								
Ball	Ball Ø [mm]		6	6	6	9	9	12
	1.4404		510.0104.0000	510.0104.0000	510.0104.0000	510.0204.0000	510.0204.0000	510.0304.0000
Split ring (Item 14)								
Material-No. / Art.-No.								
Split ring	Spindle Ø [mm]		12	12	16	16	16	20
	1.4404		251.0149.0000	251.0149.0000	251.0249.0000	251.0249.0000	251.0249.0000	251.0349.0000
Pin (Item 57)								
Material-No. / Art.-No.								
Pin	1.4310		480.0505.0000	480.0505.0000	480.0705.0000	480.0705.0000	480.0705.0000	480.1005.0000

¹⁾ For pressure range see page 01/12 – 01/15.
A conversion kit contains the following components:

Item	Component	No.
8	Guide	1
11	Bonnet spacer	1
12	Spindle	1
15	Bellows	1
55	Stud	4
60	Gasket	3
	Installation instruction LWN 037.05	1

Refer to page 01/04

Order information – Spare parts

Spare parts							
	DN _i	80	100	125	150	200	
	DN _o	125	150	200	250	300	
	Actual Orifice diameter d ₀ [mm]	74	92	98	125	165	
	Actual Orifice area A ₀ [mm ²]	4301	6648	7543	12272	21382	
Disc (Item 7): Metal to metal seat				Material-No. / Art.-No.			
Disc	1.4122	220.1739.9000	220.1839.9000	220.0439.9000	220.1949.9000	–	
detachable lifting aid	1.4404	220.1749.9000	220.1849.9000	220.0449.9000	220.1949.9000	230.1549.9000	
Disc (Item 7): Soft seal				Material-No. / Art.-No.			
Disc	CR	“K”	200.5549.9051	on request	on request	on request	–
	EPDM	“D”	200.5549.9041	200.5649.9041	200.5749.9041	200.5849.9041	–
	FKM	“L”	200.5549.9071	200.5649.9071	200.5749.9071	on request	–
	FFKM	“C”	on request	on request	on request	on request	–
O-ring (Item 7.4): Soft seal				Material-No. / Art.-No.			
O-ring	CR	“K”	502.0819.5351	on request	on request	on request	–
	EPDM	“D”	502.0819.5341	502.1041.5341	502.1041.5341	502.1295.5341	–
	FKM	“L”	502.0819.5371	502.1041.5371	502.1041.5371	on request	–
	FFKM	“C”	on request	on request	on request	on request	–
Bellows (Item 15): 1.4571				Material-No. / Art.-No.			
Standard bellows		400.1449.0000	400.0849.0000	400.0849.0000	400.3949.0000	400.5449.0000	
Conversion kit standard¹⁾		5021.1046	5021.1047	5021.1047	5021.1048	single parts	
Low pressure bellows		400.1449.0021	400.0849.0021	400.0849.0021	–	–	
Conversion kit low pressure¹⁾		please specify in writing			–	–	
Gasket – Body / bonnet (Item 60)				Material-No. / Art.-No.			
Gasket	Graphite + 1.4401	500.1907.0000	500.2107.0000	500.2107.0000	500.2207.0000	500.2807.0000	
	Option code L68 Gylon (filled PTFE)	500.1905.0000	500.2105.0000	500.2105.0000	500.2205.0000	500.2805.0000	
Ball (Item 61)				Material-No. / Art.-No.			
Ball	Ball Ø [mm]	12	15	15	15	18	
	1.4404	510.0304.0000	510.0404.0000	510.0404.0000	510.0404.0000	510.0505.0000	
Split ring (Item 14)				Material-No. / Art.-No.			
Split ring	Spindle Ø [mm]	24	24	24	30	35	
	1.4404	251.0449.0000	251.0449.0000	251.0449.0000	251.0549.0000	251.1949.0000	
Pin (Item 57)				Material-No. / Art.-No.			
Pin	1.4310	480.1005.0000	480.1105.0000	480.1105.0000	480.1205.0000	480.1405.0000	

¹⁾ For pressure range see page 01/12 – 01/15.
A conversion kit contains the following components:

Item	Component	No.
8	Guide	1
11	Bonnet spacer	1
12	Spindle	1
15	Bellows	1
55	Stud	8, 12 depends on valve size
60	Gasket	2, 3 depends on valve size
	Installation instruction LWN 037.05	1

Refer to page 01/04

Type 441, 442 DIN

LESER

Available Options

For further information refer to
"Accessories and Options", page 99/01

Type 441, 442 DIN

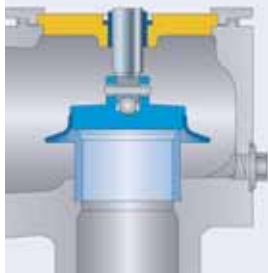
Heating jacket

H29, H30: Couplings G $\frac{3}{8}$, G $\frac{3}{4}$
H31, H32: Flanges DN 15, DN 25



Drain hole

J18: G $\frac{1}{4}$
J19: G $\frac{1}{2}$



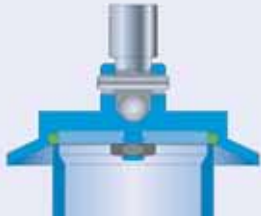
Open bonnet

See Art.-No.



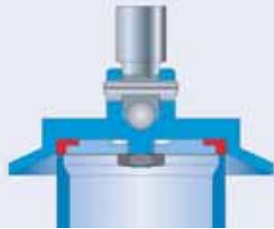
O-ring-disc

J20: FFKM "C"
J21: CR "K"
J22: EPDM "D"
J23: FKM "L"



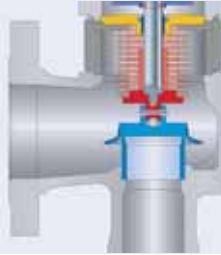
Disc with inserted sealing plate

J44: PTFE-FDA
J48: PCTFE
J49: SP



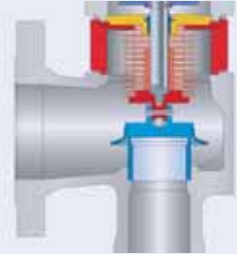
Stainless steel bellows

J68: Open bonnet
J78: Closed bonnet



Conversion kit for stainless steel bellows

See Art.-No. page 06/15



Screwed cap H2

H2



Plain lever H3

H3



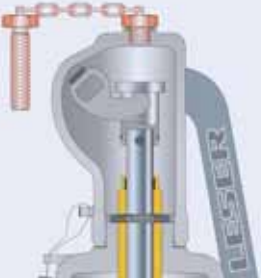
Packed lever H4

H4



Test gag

J69: H4
J70: H2



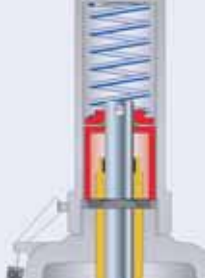
Lift indicator

J39: Adaptor H4
J93: Lift indicator



O-ring-damper H2

J65



O-ring-damper H4

J66



Approvals

Approvals		
	DN _i	20 – 200
	DN _o	32 – 300
	Actual Orifice diameter d ₀ [mm]	18 – 165
	Actual Orifice area A ₀ [mm ²]	254 – 21382
Europe		Coefficient of discharge K_{dr}
DIN EN ISO 4126-1	Approval No.	072020111Z0008/0/08-2
	S/G	0,7
	L	0,45
Germany		Coefficient of discharge α_w
AD 2000-Merkblatt A2	Approval No.	TÜV SV 576
	S/G	0,7
	L	0,45
United States		Coefficient of discharge K
ASME Sec. VIII	Approval No.	M37044
	S/G	0,699
	Approval No.	M37055
	L	0,521
Canada		Coefficient of discharge K
Canada: CRN	Approval No.	OG1182.9C
	S/G	0,699
	L	0,521
China		Coefficient of discharge α_w
CSBQTS	Approval No.	
	S/G	0,7
	L	0,45
Russia		Coefficient of discharge α_w
GGTN/ GOSGOTECHNADZOR GOST R	Approval No.	PPC 00-18458
	S/G	0,7
	L	0,45
Classification societies		Homepage
Bureau Veritas	BV	www.bureauveritas.com
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
<p>The valid certification number is changed with every renewal.</p> <p>A sample certificate including the valid certification number can be taken from the homepage of the classification societies.</p>		

Capacities – Steam

Capacities for saturated steam according to AD 2000-Merkblatt A2, based on set pressure plus 10 % overpressure.
 Capacities at 1 bar (14,5 psig) and below are based on 0,1 bar (1,45 psig) overpressure.

Metric Units		AD 2000-Merkblatt A2 [kg/h]											
DN _I	20	20	25	32	40	50	65	80	100	125	150	200	
DN _O	32	40	40	50	65	80	100	125	150	200	250	300	
Actual Orifice diameter d ₀ [mm]	18	18	23	29	37	46	60	74	92	98	125	165	
Actual Orifice area A ₀ [mm ²]	254	254	416	661	1075	1662	2827	4301	6648	7543	12272	21382	
LEO _{S/G} ^{*)} [inch ²]	0,283	0,283	0,462	0,734	1,195	1,847	3,142	4,779	7,387	8,382	13,637	23,761	
Set pressure [bar]	Capacities [kg/h]												
0,1	0	0	0	0	0	0	0	0	0	0	0	0	
0,2	86	86	140	223	363	561	954	1451	2243	2545	4140	7214	
0,5	137	137	224	356	579	895	1523	2316	3580	4062	6609	11516	
1	199	199	326	518	843	1302	2215	3370	5209	5910	9616	16755	
2	318	318	519	825	1343	2075	3531	5371	8302	9420	15326	26704	
3	428	428	699	1111	1808	2794	4754	7232	11178	12683	20635	35954	
4	534	534	871	1385	2254	3485	5928	9018	13938	15816	25731	44834	
5	639	639	1043	1658	2699	4172	7097	10796	16687	18934	30804	53673	
6	744	744	1214	1930	3142	4856	8262	12568	19426	22042	35861	62484	
7	846	846	1381	2196	3574	5525	9399	14297	22098	25074	40794	71080	
8	950	950	1551	2466	4014	6205	10556	16057	24818	28161	45816	79830	
9	1054	1054	1721	2736	4454	6884	11712	17815	27535	31244	50831	88569	
10	1158	1158	1891	3006	4893	7562	12866	19571	30250	34324	55842	97300	
12	1366	1366	2230	3545	5770	8919	15174	23081	35675	40480	65858	114751	
14	1569	1569	2562	4073	6629	10247	17433	26518	40987	46507	75664	131837	
16	1776	1776	2900	4610	7505	11600	19735	30020	46400	52650	85657	149249	
18	1984	1984	3239	5149	8382	12955	22041	33526	51820	58800	95663	166683	
20	2191	2191	3578	5688	9260	14312	24350	37039	57249	64960	105685	184145	
22	2393	2393	3907	6212	10111	15629	26590	40446	62515	70935	115407	201085	
24	2601	2601	4247	6752	10991	16988	28903	43964	67953	77106	125445	218576	
26	2810	2810	4588	7294	11873	18351	31222	47491	73405	83292			
28	3019	3019	4930	7837	12757	19718	33547	51029	78873	89496			
30	3229	3229	5272	8382	13644	21089	35880	54577	84358				
32	3440	3440	5616	8929	14534	22465	38220	58137	89860				
34	3641	3641	5945	9451	15384	23779	40455	61537	95115				
36	3853	3853	6290	10000	16278	25160	42806	65112	100641				
38	4065	4065	6637	10551	17175	26547	45165	68701	106188				
40	4278	4278	6985	11104	18076	27939	47533	72303	111756				

^{*)} LEO_{S/G} = LESER Effective Orifice steam/gas please refer to page 00/11
 How to use capacity-sheets refer to page 00/09

Capacities – Steam

Capacities for saturated steam according to ASME Section VIII (UV), based on set pressure plus 10% overpressure.
 Capacities at 2,07 bar (30 psig) and below are based on 0,207 bar (3 psig) overpressure.

US Units		ASME Section VIII [lb/ h]										
DN _i	20	20	25	32	40	50	65	80	100	125	150	200
DN _o	32	40	40	50	65	80	100	125	150	200	250	300
Actual Orifice diameter d ₀ [inch]	0,71	0,71	0,91	1,14	1,46	1,81	2,36	2,91	3,62	3,86	4,92	6,5
Actual Orifice area A ₀ [inch ²]	0,394	0,394	0,644	1,024	1,667	2,576	4,383	6,666	10,304	11,691	19,021	33,142
LEO _{S/G} ^{*)} [inch ²]	0,283	0,283	0,462	0,734	1,195	1,847	3,142	4,779	7,387	8,382	13,637	23,761
Set pressure [psig]	Capacities [lb/h]											
15			757	1204	1959	3028	5152	7837	12113	13744	22361	38962
20			873	1388	2259	3492	5941	9037	13968	15849	25785	44928
30			1105	1756	2859	4419	7519	11436	17677	20058	32632	56859
40			1360	2162	3519	5439	9254	14076	21757	24687	40165	69983
50			1615	2567	4179	6459	10989	16716	25837	29317	47697	83107
60			1870	2973	4839	7479	12725	19356	29917	33947	55229	96231
70			2125	3378	5499	8499	14460	21995	33997	38576	62761	109355
80			2380	3783	6159	9519	16196	24635	38078	43206	70293	122479
90			2635	4189	6819	10539	17931	27275	42158	47836	77825	135603
100			2890	4594	7479	11559	19666	29915	46238	52466	85357	148727
120			3400	5405	8799	13600	23137	35194	54398	61725	100422	174975
140			3910	6216	10118	15640	26608	40474	62558	70984	115486	201223
160			4420	7027	11438	17680	30079	45753	70719	80244	130550	227471
180			4930	7838	12758	19720	33550	51033	78879	89503	145615	253719
200			5440	8648	14078	21760	37020	56312	87039	98762	160679	279967
220			5950	9459	15398	23800	40491	61592	95200	108022	175743	306215
240			6460	10270	16718	25840	43962	66871	103360	117281	190808	332463
260			6970	11081	18038	27880	47433	72151	111520	126540	205872	358711
280			7480	11892	19358	29920	50904	77430	119680	135800	220936	384960
300			7990	12703	20677	31960	54375	82710	127841	145059	236001	411208
320			8500	13513	21997	34000	57845	87989	136001	154319	251065	437456
340			9010	14324	23317	36040	61316	93269	144161	163578	266129	463704
360			9520	15135	24637	38080	64787	98548	152321	172837	281194	489952
380			10030	15946	25957	40120	68258	103828	160482	182097		
400			10540	16757	27277	42161	71729	109107	168642	191356		
420			11050	17567	28597	44201	75199	114387	176802			
440			11560	18378	29917	46241	78670	119666	184963			
460			12070	19189	31236	48281	82141	124946	193123			
480			12580	20000	32556	50321	85612	130225	201283			
500			13090	20811	33876	52361	89083	135505	209443			
550			14365	22838	37176	57461	97760	148704	229844			
580			15130	24054	39156	60521	102966	156623	242085			

 Please select DN_i 25

^{*)} LEO_{S/G} = LESER Effective Orifice steam/gas please refer to page 00/11
 How to use capacity-sheets refer to page 00/09

Capacities – Air

Capacities for air according to AD 2000-Merkblatt A2, based on set pressure plus 10 % overpressure at 0 °C and 1013 mbar.
 Capacities at 1 bar (14,5 psig) and below are based on 0,1 bar (1,45 psig) overpressure.

Metric Units		AD 2000-Merkblatt A2 [m_n^3/h]											
DN _I		20	20	25	32	40	50	65	80	100	125	150	200
DN _O		32	40	40	50	65	80	100	125	150	200	250	300
Actual Orifice diameter d_0 [mm]		18	18	23	29	37	46	60	74	92	98	125	165
Actual Orifice area A_0 [mm ²]		254	254	416	661	1075	1662	2827	4301	6648	7543	12272	21382
LEO _{S/G} ^{*)} [inch ²]		0,283	0,283	0,462	0,734	1,195	1,847	3,142	4,779	7,387	8,382	13,637	23,761
Set pressure [bar]	Capacities [m_n^3/h]												
0,1	0	0	0	0	0	0	0	0	0	0	0	0	0
0,2	99	99	162	258	420	649	1105	1680	2597	2947	4794	8354	
0,5	161	161	263	418	680	1051	1789	2721	4206	4772	7764	13528	
1	238	238	388	617	1004	1552	2641	4017	6209	7045	11461	19970	
2	384	384	627	996	1622	2507	4265	6487	10026	11377	18509	32251	
3	523	523	854	1357	2209	3414	5809	8836	13657	15497	25212	43930	
4	656	656	1071	1703	2773	4286	7291	11091	17143	19452	31647	55142	
5	790	790	1289	2050	3337	5157	8774	13346	20629	23407	38082	66354	
6	923	923	1507	2396	3900	6029	10257	15601	24114	27362	44516	77565	
7	1057	1057	1725	2742	4464	6900	11739	17857	27600	31317	50951	88777	
8	1190	1190	1943	3089	5028	7771	13222	20112	31086	35273	57386	99989	
9	1323	1323	2161	3435	5592	8643	14704	22367	34571	39228	63821	111201	
10	1457	1457	2379	3781	6155	9514	16187	24622	38057	43183	70255	122413	
12	1724	1724	2814	4474	7283	11257	19152	29132	45028	51093	83125	144836	
14	1991	1991	3250	5167	8411	13000	22117	33642	52000	59003	95994	167260	
16	2257	2257	3686	5859	9538	14743	25082	38153	58971	66914	108863	189684	
18	2524	2524	4121	6552	10666	16486	28047	42663	65942	74824	121733	212107	
20	2791	2791	4557	7245	11793	18228	31012	47173	72913	82734	134602	234531	
22	3058	3058	4993	7938	12921	19971	33977	51683	79885	90644	147472	256954	
24	3325	3325	5429	8630	14048	21714	36943	56194	86856	98555	160341	279378	
26	3592	3592	5864	9323	15176	23457	39908	60704	93827	106465			
28	3859	3859	6300	10016	16304	25200	42873	65214	100799	114375			
30	4125	4125	6736	10708	17431	26942	45838	69725	107770				
32	4392	4392	7171	11401	18559	28685	48803	74235	114741				
34	4659	4659	7607	12094	19686	30428	51768	78745	121713				
36	4926	4926	8043	12786	20814	32171	54733	83255	128684				
38	5193	5193	8478	13479	21941	33914	57698	87766	135655				
40	5460	5460	8914	14172	23069	35657	60663	92276	142626				

^{*)} LEO_{S/G} = LESER Effective Orifice steam/gas please refer to page 00/11
 How to use capacity-sheets refer to page 00/09

Capacities – Air

Capacities for air according to ASME Section VIII (UV), based on set pressure plus 10 % overpressure at 16 °C (60 °F).
 Capacities at 2,07 bar (30 psig) and below are based on 0,207 bar (3 psig) overpressure.

US Units		ASME Section VIII [I.S.C.F.M.]										
DN _i	20	20	25	32	40	50	65	80	100	125	150	200
DN _o	32	40	40	50	65	80	100	125	150	200	250	300
Actual Orifice diameter d ₀ [inch]	0,71	0,71	0,91	1,14	1,46	1,81	2,36	2,91	3,62	3,86	4,92	6,5
Actual Orifice area A ₀ [inch ²]	0,394	0,394	0,644	1,024	1,667	2,576	4,383	6,666	10,304	11,691	19,021	33,142
LEO _{S/G} ^{*)} [inch ²]	0,283	0,283	0,462	0,734	1,195	1,847	3,142	4,779	7,387	8,382	13,637	23,761
Set pressure [psig]	Capacities [S.C.F.M.]											
15			270	429	698	1079	1835	2792	4315	4896	7965	2780
20			311	494	805	1244	2116	3219	4976	5646	9185	3142
30			394	626	1019	1574	2679	4074	6297	7145	11624	3764
40			484	770	1254	1938	3297	5014	7750	8794	14307	4346
50			575	915	1489	2301	3915	5954	9204	10444	16990	4859
60			666	1059	1724	2664	4533	6895	10657	12093	19673	5323
70			757	1204	1959	3028	5152	7835	12111	13742	22356	5749
80			848	1348	2194	3391	5770	8775	13564	15391	25039	6146
90			939	1492	2430	3754	6388	9715	15018	17041	27722	6519
100			1029	1637	2665	4118	7006	10656	16471	18690	30406	6872
120			1211	1926	3135	4845	8243	12536	19378	21988	35772	7528
140			1393	2215	3605	5571	9479	14417	22285	25287	41138	8131
160			1574	2504	4076	6298	10716	16298	25192	28585	46504	8692
180			1756	2792	4546	7025	11952	18178	28099	31884	51870	9220
200			1938	3081	5016	7751	13189	20059	31006	35182	57236	9718
220			2120	2120	5486	8478	14425	21939	33913	38481	62602	10193
240			2301	3659	5957	9205	15662	23820	36820	41779	67968	10646
260			2483	3948	6427	9932	16898	25700	39727	45078	73334	11081
280			2665	4237	6897	10658	18135	27581	42633	48376	78701	11499
300			2846	4526	7368	11385	19371	29462	45540	51675	84067	11902
320			3028	4815	7838	12112	20608	31342	48447	54973	89433	12293
340			3210	5104	8308	12839	21844	33223	51354	58272	94799	12671
360			3391	5392	8778	13565	23081	35103	54261	61570	100165	13039
380			3573	5681	9249	14292	24317	36984	57168	64869		
400			3755	5970	9719	15019	25554	38864	60075	68167		
420			3936	6259	10189	15745	26791	40745	62982			
440			4118	6548	110660	16472	28027	42626	65889			
460			4300	6837	11130	17199	29264	44506	68796			
480			4481	7126	11600	17926	30500	46387	71703			
500			4663	7415	12070	18652	31737	48267	74610			
550			5117	8137	13246	20469	34828	52969	81877			
580			5390	8570	13952	21559	36683	55790	86237			

 Please select DN_i 25

^{*)} LEO_{S/G} = LESER Effective Orifice steam/gas please refer to page 00/11
 How to use capacity-sheets refer to page 00/09

Capacities – Water

Capacities for water according to AD 2000-Merkblatt A2, based on set pressure plus 10 % overpressure at 20 °C (68 °F).
Capacities at 1 bar (14,5 psig) and below are based on 0,1 bar (1,45 psig) overpressure.

Metric Units		AD 2000-Merkblatt A2 [10^3 kg/h]											
DN _I		20	20	25	32	40	50	65	80	100	125	150	200
DN _O		32	40	40	50	65	80	100	125	150	200	250	300
Actual Orifice diameter d ₀ [mm]		18	18	23	29	37	46	60	74	92	98	125	165
Actual Orifice area A ₀ [mm ²]		254	254	416	661	1075	1662	2827	4301	6648	7543	12272	21382
LEO _L ^{*)} [inch ²]		0,316	0,316	0,516	0,821	1,336	2,062	3,513	5,343	8,259	9,371	15,246	26,565
Set pressure [bar]	Capacities [10^3 kg/h]												
0,1	2,60	2,60	4,25	6,76	11,0	17,0	28,9	44,0	68,0	77,2	126	219	
0,2	3,19	3,19	5,21	8,28	13,5	20,8	35,5	53,9	83,3	94,6	154	268	
0,5	4,51	4,51	7,37	11,7	19,1	29,5	50,1	76,3	118	134	218	379	
1	6,11	6,11	9,97	15,9	25,8	39,9	67,9	103	160	181	295	513	
2	8,64	8,64	14,1	22,4	36,5	56,4	96,0	146	226	256	417	726	
3	10,6	10,6	17,3	27,5	44,7	69,1	118	179	276	314	510	889	
4	12,2	12,2	19,9	31,7	51,6	79,8	136	206	319	362	589	1027	
5	13,7	13,7	22,3	35,5	57,7	89,2	152	231	357	405	659	1148	
6	15,0	15,0	24,4	38,8	63,2	97,7	166	253	391	444	722	1257	
7	16,2	16,2	26,4	42,0	68,3	106	180	273	422	479	779	1358	
8	17,3	17,3	28,2	44,8	73,0	113	192	292	451	512	833	1452	
9	18,3	18,3	29,9	47,6	77,4	120	204	310	479	543	884	1540	
10	19,3	19,3	31,5	50,1	81,6	126	215	326	505	573	932	1623	
12	21,2	21,2	34,6	54,9	89,4	138	235	358	553	627	1021	1778	
14	22,9	22,9	37,3	59,3	96,6	149	254	386	597	678	1102	1921	
16	24,4	24,4	39,9	63,4	103	160	272	413	638	724	1178	2053	
18	25,9	25,9	42,3	67,3	110	169	288	438	677	768	1250	2178	
20	27,3	27,3	44,6	70,9	115	178	304	462	714	810	1317	2296	
22	28,7	28,7	46,8	74,4	121	187	318	484	748	849	1382	2408	
24	29,9	29,9	48,9	77,7	126	195	333	506	782	887	1443	2515	
26	31,1	31,1	50,9	80,9	132	203	346	526	814	923			
28	32,3	32,3	52,8	83,9	137	211	359	546	844	958			
30	33,5	33,5	54,6	86,8	141	219	372	565	874				
32	34,6	34,6	56,4	89,7	146	226	384	584	903				
34	35,6	35,6	58,2	92,5	151	233	396	602	931				
36	36,7	36,7	59,8	95,1	155	239	407	619	957				
38	37,7	37,7	61,5	97,7	159	246	418	636	984				
40	38,6	38,6	63,1	100	163	252	429	653	1009				

^{*)} LEO_L = LESER Effective Orifice liquids please refer to page 00/12
How to use capacity-sheets refer to page 00/09

Type 441, 442 DIN



Capacities – Water

Capacities for water according to ASME Section VIII (UV), based on set pressure plus 10 % overpressure at 21 °C (70 °F).
Capacities at 2,07 bar (30 psig) and below are based on 0,207 bar (3 psig) overpressure.

US Units		ASME Section VIII [US-G.P.M.]											
	DN _i	20	20	25	32	40	50	65	80	100	125	150	200
	DN _o	32	40	40	50	65	80	100	125	150	200	250	300
	Actual Orifice diameter d _o [inch]	0,71	0,71	0,91	1,14	1,46	1,81	2,36	2,91	3,62	3,86	4,92	6,5
	Actual Orifice area A _o [inch ²]	0,394	0,394	0,644	1,024	1,667	2,576	4,383	6,666	10,304	11,691	19,021	33,142
	LEO _L ^{*)} [inch ²]	0,316	0,316	0,516	0,821	1,336	2,062	3,513	5,343	8,259	9,371	15,246	26,565
Set pressure [psig]		Capacities [US-G.P.M.]											
15				54,0	85,9	140	216	368	559	864	981	1595	2780
20				61,1	97,1	158	244	416	632	977	1109	1803	3142
30				73,1	116	189	293	498	757	1170	1328	2160	3764
40				84,5	134	219	338	575	874	1351	1533	2494	4346
50				94,4	150	244	378	643	977	1511	1714	2789	4859
60				103	164	268	414	704	1071	1655	1878	3055	5323
70				112	178	289	447	760	1156	1787	2028	3300	5749
80				119	190	309	478	813	1236	1911	2168	3527	6146
90				127	201	328	507	862	1311	2027	2300	3741	6519
100				134	212	346	534	909	1382	2136	2424	3944	6872
120				146	233	379	585	996	1514	2340	2656	4320	7528
140				158	251	409	632	1075	1635	2528	2868	4666	8131
160				169	269	437	676	1150	1748	2702	3066	4989	8692
180				179	285	464	717	1219	1854	2866	3252	5291	9220
200				189	300	489	755	1285	1955	3021	3428	5577	9718
220				198	315	513	792	1348	2050	3169	3596	5850	10193
240				207	329	535	827	1408	2141	3310	3756	6110	10646
260				215	342	557	861	1465	2229	3445	3909	6359	11081
280				223	355	578	894	1521	2313	3575	4057	6599	11499
300				231	368	599	925	1574	2394	3700	4199	6831	11902
320				239	380	618	955	1626	2472	3822	4337	7055	12293
340				246	391	637	985	1676	2549	3939	4470	7272	12671
360				253	403	656	1013	1724	2622	4054	4600	7483	13039
380				260	414	674	1041	1772	2694	4165	4726		
400				267	425	691	1068	1818	2764	4273	4848		
420				274	435	708	1095	1862	2833	4378			
440				280	445	725	1120	1906	2899	4481			
460				286	455	741	1146	1949	2964	4582			
480				293	465	757	1170	1991	3028	4681			
500				299	475	773	1194	2032	3091	4777			
550				313	498	811	1253	2131	3241	5010			
580				322	511	832	1286	2189	3329	5145			

Please select DN_i 25

^{*)} LEO_L = LESER Effective Orifice liquids please refer to page 00/12
How to use capacity-sheets refer to page 00/09

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, refer to table article numbers
- 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 topic 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)

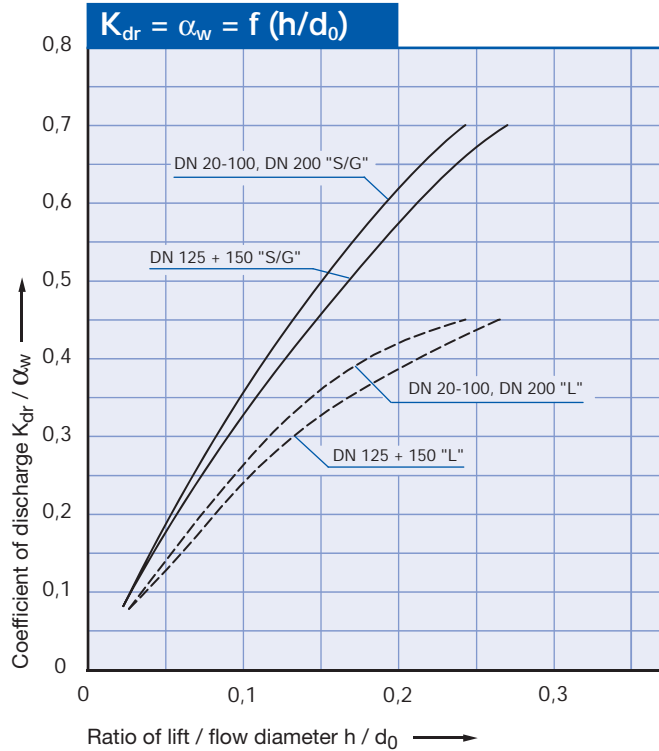
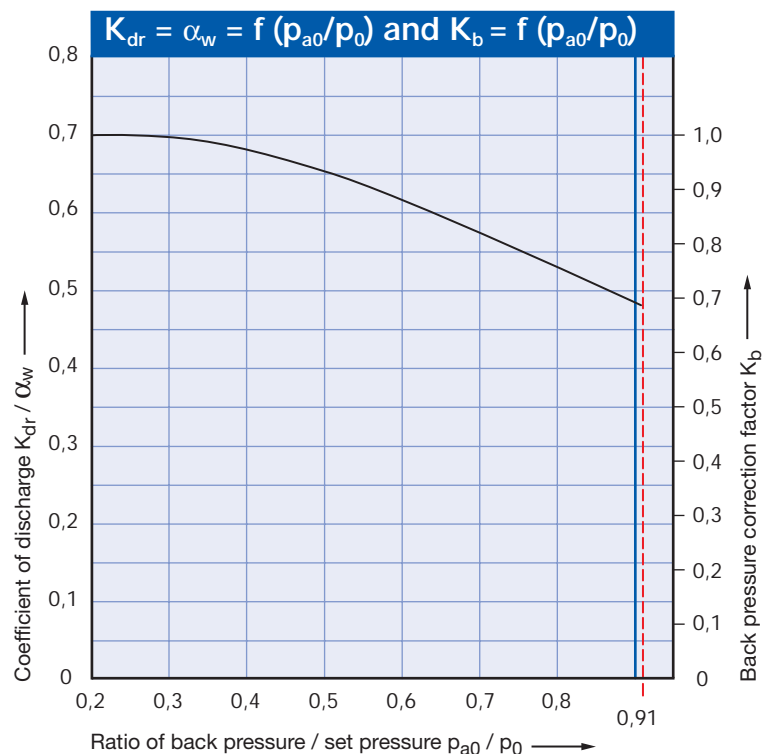


Diagram for evaluation of coefficient of discharge (K_{dr}/α_w) or K_b in reference to the ratio of back pressure / set pressure (p_{a0}/p_0)



How to use please refer to page 00/08