Compact Performance

Safety Relief Valves
Series 437
Series 459

CATALOG

LESER

The-Safety-Valve.com

Valve Finder

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

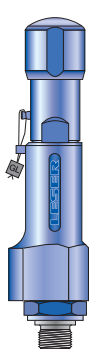
Safety Relief Valves

Change-over valve

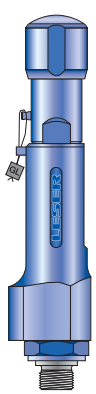
Bursting disc

LESER

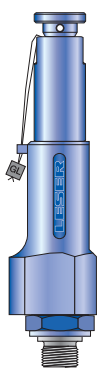
Contents



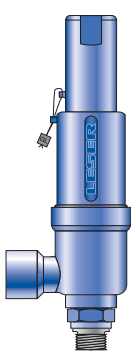
Type 437
Packed knob H4



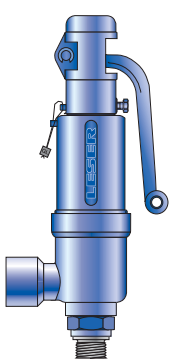
Type 437
Packed knob H4
Long version



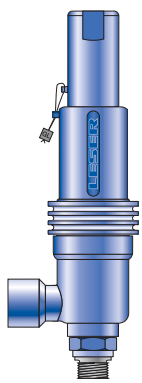
Type 437
Pull button H3



Type 459
Cap H2



Type 459
Plain lever H3



Type 459
Cap H2
Balanced bellows design

General Information

The Compact Performance product group stands for

☑ compact dimensions with high capacity relative
☑ great variety of threaded and flanged connections
☑ wide pressure range

LESER Compact Performance Safety Valves

- are designed to meet all industrial applications up to F orifice
- open rapidly with an overpressure of max. 5 % (Series 459) resp. 10 % (Series 437) to the full design lift
- have a maximum blowdown of minus 10 % for steam/gas service and minus 20 % for liquid service
- 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, for example:

  - European Community: CE-marking according to the Pressure Equipment Directive (PED) 2014/68/EU and EN ISO 4126-1
  - USA: UV-stamp according to ASME Section VIII Division 1, National Board certified capacities
  - Germany: VdTÜV approval according to PED, EN ISO 4126-1, TÜV SV 100 and AD 2000-Merkblatt A2
  - Canada: Canadian Registration Number according to the requirements of particular provinces
  - China: AQSIQ based on the approval according to ASME Section VIII Division 1 and AD 2000-Merkblatt A2
  - Eurasian Custom Union: Approval acc. to Eurasian Custom Union (EAC - Eurasian Conformity)

Furthermore, all LESER Compact Performance 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 flanging, ASME PTC 25, ASME-Code Sec. II, ASME B 16.34, ASME B16.5 flanging, API Std. 527, API RP 576, AD 2000-Merkblatt A4, AD 2000-Merkblatt HP0.

General Information

Applications

LESER Compact Performance Safety Valves offer ultimate protection against unallowable overpressures in all applications for steam, gases and liquids where smaller capacities are required.

Typical applications for LESER Compact Performance Safety Valves are:

- air/gas compressors and pumps
- technical gases and CO_2 plants
- cylinder filling stations
- chemical equipment and piping
- pressure vessels and piping systems containing gas, air, liquid or steam
- LPG / LNG terminals, carriers etc.
- cryogenic systems and oxygen applications
- thermal relief
- high pressure extraction plants

General Design Features

LESER Compact Performance Safety Valves cover a large variety of types, materials and options to fit any application:

- connection sizes from $^3/_8$" to 1 $^1/_2$" and 5 orifices (D through F) provide high suitability to the application
- Threaded connections, male and female, according to all international standards guarantee worldwide applicability
- Flanged connections according ANSI, DIN and JIS guarantee a worldwide applicability
- Inlet pressure ratings up to PN 850 to fit all required design pressures
- 2 standard based / inlet body materials, Chrome steel and stainless steel as well as 3 standard body materials, ductile iron, steel and stainless steel can be selected according to the application
- All parts can be machined from bar materials to cover special material requirements such as Hastelloy®, Duplex, Super Duplex, Tantalum or Titanium within unrivalled lead time
- Set pressures from 0.1 to 850 bar / 1.5 to 12325 psig make Compact Performance safety valves suitable for all industrial processes
- Operating temperatures from -273 °C bis +450 °C / -454 °F to 1022 °F (acc. to DIN EN) cover a wide range of applications
- LESER Nanotightness as standard for metal-to-metal sealings. The nanotightness exceeds the requirements for functional tightness of API 527 by 50% which means e.g. less pollution when discharge to atmosphere, 50% reduction in medium loss and increased plant efficiency
- One design and spring (single trim) for steam, gas and liquid applications reduces the number of spare parts and ensures low cost maintenance management
- Ringless design needs no trim adjustments for easy maintenance
- One-piece spindle reduces friction which leads to high operation accuracy
- Self-draining body design, avoids residues and reduces corrosion

Options

- Special connections specified by the customer for optimised adaptation to the plant
- Stellited or hardened metal sealing for longer product life
- Soft seat solutions for superior tightness
- Stainless steel bellows for back pressure compensation
- Heating jackets for applications with high viscosity fluids
- Base / inlet body, body, bonnet and all internal parts can be produced in special materials exactly to meet customer specification requirements

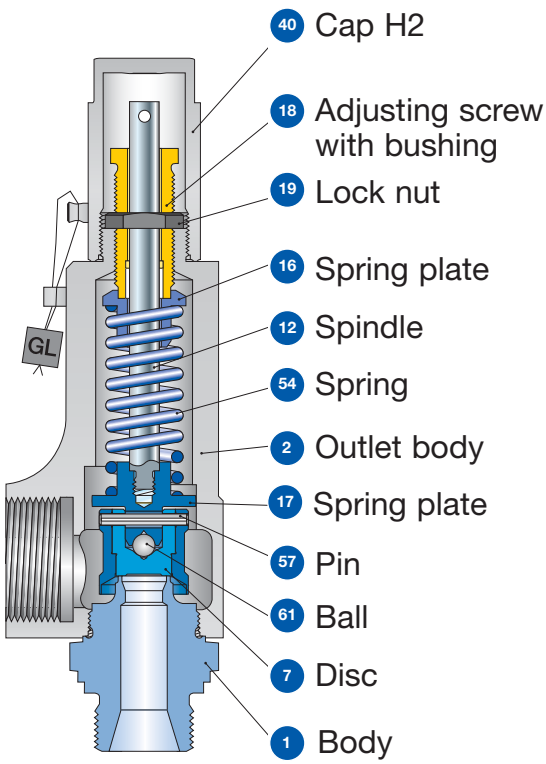
Type 437
Packed knob H4
Conventional design

Type 437
Packed knob H4
Flanged connection

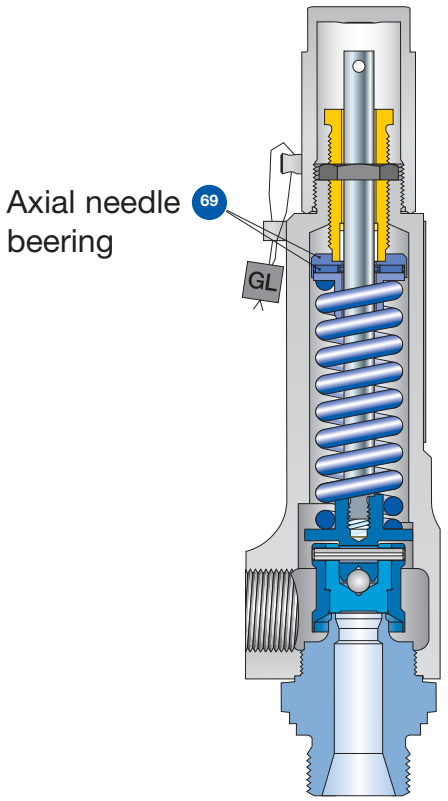
Type 437
Cap H2
Long version

Type 437
Safety Relief Valves

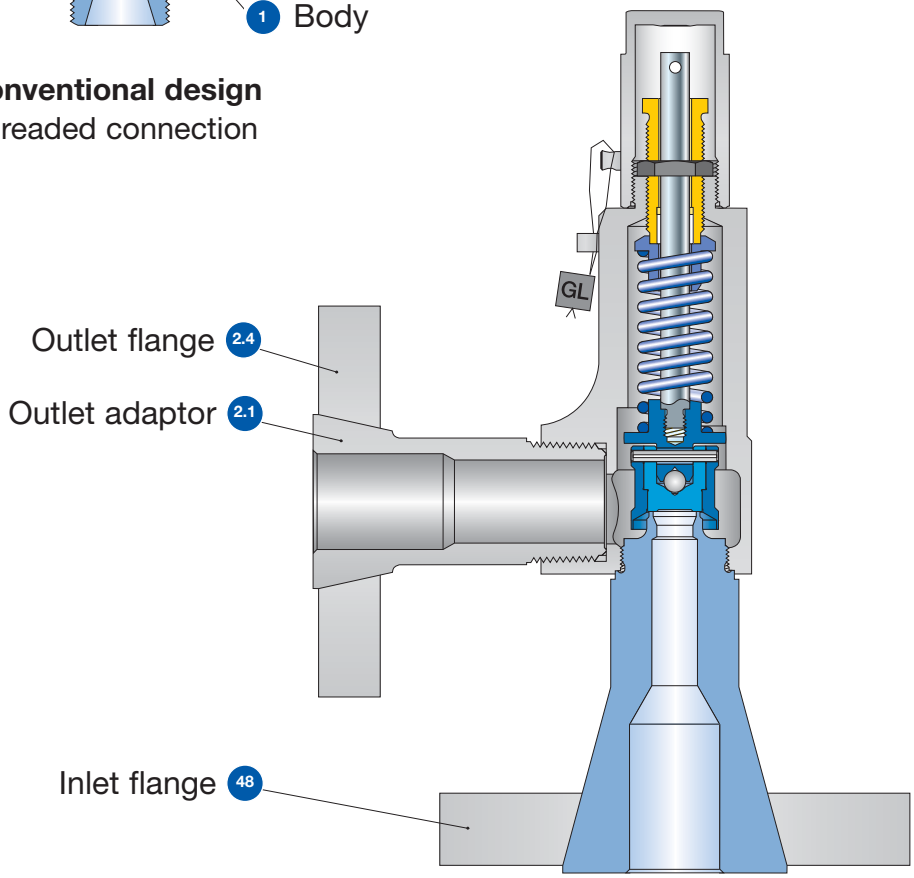
Type 437
Designs



Conventional design
Threaded connection



Long version
Threaded connection



Conventional design
Flange connection

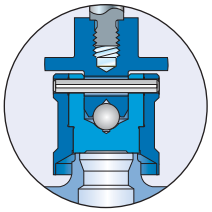
Type 437
Materials

Item	Component	Design	Type 4373		Type 4374	
1	Base/Inlet body	Threaded connection	1.4104[1) 4)], 1.4404		1.4404	
			SA 479 430[1) 4)], SA 479 316L		SA 479 316L	
		Flange connection	1.4404		1.4404	
			SA 479 316L		SA 479 316L	
		Long version	1.4104[2)], 1.4404 stellited		1.4404 stellited	
			SA 479 430[2)], SA 479 316L stellited		SA 479 316L stellited	
2	Outlet body		1.4104[4)]		1.4404	
			SA 479 430[4)]		SA 479 316L	
2.1	Outlet adaptor	Flange connection	1.4404		1.4404	
			316L		316L	
2.4	Outlet flange	Flange connection	1.4404		1.4404	
			316L		316L	
7	Disc		1.4122		1.4404	
			Hardened stainless steel		SA 316L	
		Long version	d_0 6: 1.4404 stellited	d_0 10: 1.4122	d_0 6: 1.4404 stellited	d_0 10: 1.4404
			d_0 6: 316L stellited	d_0 10: HSS[5)]	d_0 6: 316L stellited	d_0 10: 316L
12	Spindle[3)]		1.4021		1.4404	
			420		316L	
		Long Version	1.4404		1.4404	
			316L		316L	
16/17	Spring plate[3)]		1.4104		1.4404	
			Chrome steel		316L	
		Long version	1.4404		1.4404	
			316L		316L	
18	Adjusting screw with bushing		1.4104 / PTFE		1.4104 / PTFE	
			Chrome steel / PTFE		1.4104 / PTFE	
19	Lock nut		1.0718		1.4404	
			steel		316L	
40	Cap H2		1.0460		1.4404	
			SA 105		316L	
48	Inlet flange	Flange connection	1.4404		1.4404	
			316L		316L	
54	Spring		1.4310		1.4310	
			Stainless steel		Stainless steel	
57	Pin		1.4310		1.4310	
			Stainless steel		Stainless steel	
61	Ball		1.3541		1.4401	
			Hardened stainless steel		316	
69	Axial needle beering	Long version	1.4404		1.4404	
			316L		316L	

Please notice:
- Modifications reserved by LESER.
- LESER can upgrade materials without notice.
- Every part can be replaced by other material acc. to customer specification.
- The materials shall meet the requirements of the relevant regulations (Pressure Equipment Directive (PED), acc. to PED applied harmonized standards, AD 2000-Merkblätter, VdTÜV (Werkstoffblätter) as well as further materials listed in Section 8 of the Type-Examination.

[1)] Only for male thread DIN ISO 228-1 $G^3/8$, $G^1/_2$, $G^3/_4$ (Option Codes V49, V54, V55).
[2)] Only for d_0 10 with male thread DIN ISO 228-1 $G^3/_8$, $G^1/_2$, $G^3/_4$ (Option Codes V49, V54, V55).
[3)] The items 12 and 17 are combined to one unit.
[4)] Material 1.4404/316L for ASME application (Option code N68 or N70)
[5)] Hardened stainless steel

Type 437
Article numbers



Metal seat

	Conventional design	Long version	
Actual Orifice diameter d_0 [mm]	10	6	10
Actual Orifice area A_0 [mm²]	78.5	28.3	78.5
Actual Orifice diameter d_0 [inch]	0.394	0.236	0.394
Actual Orifice area A_0 [inch²]	0.122	0.044	0.122
Base / Inlet body material: 1.4104 (430)[1)]			
H2 Art. No. **4373.**[2)]	**2602**	**2622**	**2612**
H3 Art. No. **4373.**[2)] $p_{max.}$ = 16 bar_g	**2603**	**–**	**–**
H4 Art. No. **4373.**[2)]	**2604**	**2624**	**2614**
p [bar_g]	**S/G/L 0.1 – 93**	**S/G 180 – 365**	**S/G/L 93 –180**
p [psig]	**S/G/L 1.5 – 1349**	**S/G 2611 – 5294**	**S/G/L 1349 – 2611**
Base / Inlet body material: 1.4404 (316L)			
H2 Art. No. **4374.**	**3142**	**3122**	**3152**
H4 Art. No. **4374.**	**3144**	**3124**	**3154**
p [bar_g]	**S/G/L 0.1 – 68**	**S/G 180 – 330**	**S/G/L 68 –180**
p [psig]	**S/G/L 1.5 – 986**	**S/G 2611 – 4786**	**S/G/L 986 – 2611**

[1)] Material 1.4404/316L for ASME application (Option code N68 or N70).
[2)] Type 4373 should not be selected when a „stainless steel“ valve is required due to corrosive medium.

Type 437

Dimensions and weights

Threaded connections [Metric units]

Size Outlet body	Conventional design			Long version					
	1/2"	3/4"	1"	1/2"	3/4"	1"	1/2"	3/4"	1"
Actual Orifice diameter d_0 [mm]	10	10	10	6	6	6	10	10	10
Actual Orifice area A_0 [mm²]	78.5	78.5	78.5	28.3	28.3	28.3	78.5	78.5	78.5
Weight [kg]	1.2	1.6	1.6	1.4	2.1	2.1	1.4	2.1	2.1
Required installation diameter d [mm]	65	80	80	65	80	80	65	80	80

Inlet thread female

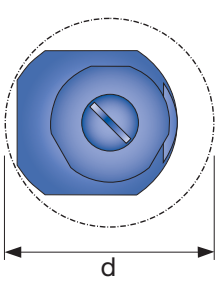
		Size outlet body	Conventional design			Long version					
			1/2"	3/4"	1"	1/2"	3/4"	1"	1/2"	3/4"	1"
Center to face [mm]											
DIN ISO 228-1	**G**	Inlet 1/2" a	46	46	49	46	46	49	46	46	49
ISO 7-1/BS 21	**Rc**										
ASME B1.20.1	**NPT**	Inlet 3/4", 1" a	56	56	59	56	56	59	56	56	59
		Outlet b	30	37	37	30	37	37	30	37	37
Height [mm]											
		Inlet 1/2" H max.	209	209	212	230	230	233	230	230	233
		Inlet 3/4", 1" H max.	219	219	222	240	240	243	240	240	243

Inlet thread male

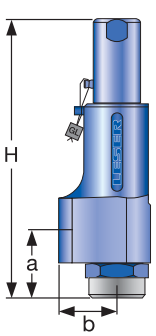
		Size outlet body	Conventional design			Long version					
			1/2"	3/4"	1"	1/2"	3/4"	1"	1/2"	3/4"	1"
Center to face [mm]											
DIN ISO 228-1	**G**	Inlet a	33	33	36	33	33	36	33	33	36
		Outlet b	30	37	37	30	37	37	30	37	37
ISO 7-1/BS 21	**R**	Inlet a	31	31	34	31	31	34	31	31	34
ASME B1.20.1	**NPT**										
		Outlet b	30	37	37	30	37	37	30	37	37
Height [mm]											

		Size inlet thread	Conventional design				Long version			
			3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**	H max.	208	210	212	217	229	231	233	238
ISO 7-1/BS 21	**R**	H max.	–	213	214	220	–	234	235	241
ASME B1.20.1	**NPT**	H max.	–	216	216	224	–	237	237	245

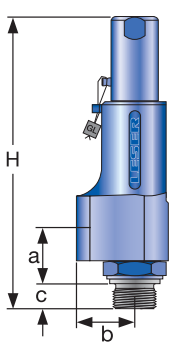
Length of screwed end c [mm]					
	Size inlet thread	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**	12	14	16	18
ISO 7-1/BS 21	**R**	–	19	20	23
ASME B1.20.1	**NPT**	–	22	22	27



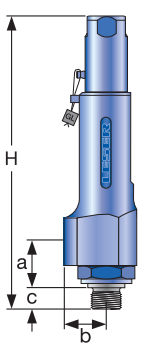
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Long version – male thread

Type 437
Dimensions and weights
Threaded connections [US units]

		Conventional design			Long version					
Size Outlet body		1/2"	3/4"	1"	1/2"	3/4"	1"	1/2"	3/4"	1"
Actual Orifice diameter d_0 [inch]		0.394	0.394	0.394	0.236	0.236	0.236	0.394	0.394	0.394
Actual Orifice area A_0 [inch²]		0.122	0.122	0.122	0.044	0.044	0.044	0.122	0.122	0.122
Weight	[lbs]	2.6	3.5	3.5	3.1	4.6	4.6	3.1	4.6	4.6
Required installation diameter d	[inch]	$2^{9}/_{16}$	$3^{5}/_{32}$	$3^{5}/_{32}$	$2^{9}/_{16}$	$3^{5}/_{32}$	$3^{5}/_{32}$	$2^{9}/_{16}$	$3^{5}/_{32}$	$3^{5}/_{32}$

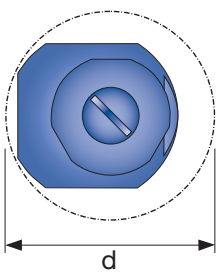
Inlet thread female

		Size outlet body	Conventional design			Long version					
			1/2"	3/4"	1"	1/2"	3/4"	1"	1/2"	3/4"	1"
Center to face [inch]											
DIN ISO 228-1	**G**	Inlet 1/2" a	$1^{13}/_{16}$	$1^{13}/_{16}$	$1^{15}/_{16}$	$1^{13}/_{16}$	$1^{13}/_{16}$	$1^{15}/_{16}$	$1^{13}/_{16}$	$1^{13}/_{16}$	$1^{15}/_{16}$
ISO 7-1/BS 21	**Rc**	Inlet 3/4", 1" a	$2^{7}/_{32}$	$2^{7}/_{32}$	$2^{5}/_{16}$	$2^{7}/_{32}$	$2^{7}/_{32}$	$2^{5}/_{16}$	$2^{7}/_{32}$	$2^{7}/_{32}$	$2^{5}/_{16}$
ASME B1.20.1	**NPT**	Outlet b	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$
Height [inch]											
		Inlet 1/2" H max.	$8^{7}/_{32}$	$8^{7}/_{32}$	$8^{11}/_{32}$	$9^{1}/_{16}$	$9^{1}/_{16}$	$9^{3}/_{16}$	$9^{1}/_{16}$	$9^{1}/_{16}$	$9^{3}/_{16}$
		Inlet 3/4", 1" H max.	$8^{5}/_{8}$	$8^{5}/_{8}$	$8^{3}/_{4}$	$9^{7}/_{16}$	$9^{7}/_{16}$	$9^{9}/_{16}$	$9^{7}/_{16}$	$9^{7}/_{16}$	$9^{9}/_{16}$

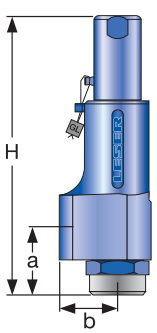
Inlet thread male

		Size outlet body	Conventional design			Long version					
			1/2"	3/4"	1"	1/2"	3/4"	1"	1/2"	3/4"	1"
Center to face [inch]											
DIN ISO 228-1	**G**	Inlet a	$1^{5}/_{16}$	$1^{5}/_{16}$	$1^{13}/_{32}$	$1^{5}/_{16}$	$1^{5}/_{16}$	$1^{13}/_{32}$	$1^{5}/_{16}$	$1^{5}/_{16}$	$1^{13}/_{32}$
		Outlet b	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$
ISO 7-1/BS 21	**R**	Inlet a	$1^{7}/_{32}$	$1^{7}/_{32}$	$1^{11}/_{32}$	$1^{7}/_{32}$	$1^{7}/_{32}$	$1^{11}/_{32}$	$1^{7}/_{32}$	$1^{7}/_{32}$	$1^{11}/_{32}$
ASME B1.20.1	**NPT**	Outlet b	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$

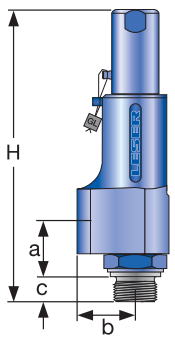
		Size inlet thread	Conventional design				Long version			
			3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
Height [inch]										
DIN ISO 228-1	**G**	H max.	$8^{3}/_{16}$	$8^{1}/_{4}$	$8^{11}/_{32}$	$8^{17}/_{32}$	9	$9^{3}/_{32}$	$9^{5}/_{32}$	$9^{3}/_{8}$
ISO 7-1/BS 21	**R**	H max.	–	$8^{3}/_{8}$	$8^{13}/_{32}$	$8^{21}/_{32}$	–	$9^{7}/_{32}$	$9^{1}/_{4}$	$9^{15}/_{32}$
ASME B1.20.1	**NPT**	H max.	–	$8^{1}/_{2}$	$8^{1}/_{2}$	$8^{13}/_{16}$	–	$9^{5}/_{16}$	$9^{5}/_{16}$	$9^{21}/_{32}$
Length of screwed end c [inch]										
		Size inlet thread	3/8"		1/2"		3/4"		1"	
DIN ISO 228-1	**G**		$^{15}/_{32}$		$^{9}/_{16}$		$^{5}/_{8}$		$^{23}/_{32}$	
ISO 7-1/BS 21	**R**		–		$^{3}/_{4}$		$^{25}/_{32}$		$^{29}/_{32}$	
ASME B1.20.1	**NPT**		–		$^{7}/_{8}$		$^{7}/_{8}$		$1^{1}/_{16}$	



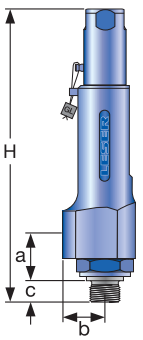
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Long version – male thread

Type 437
Dimensions and weights
Flanged connections [Metric units]

			Conventional design	Long version	
Actual Orifice diameter d_0 [mm]			10	6	10
Actual Orifice area A_0 [mm²]			78.5	28.3	78.5
DIN EN 1092-1 (Available flange sizes refer to page 04/05)					
				Flange rating class PN 40	
Center to face	[mm]	Inlet a	103	103	103
		Outlet b	100	100	100
Height	[mm]	H max.	263	284	284
				Flange rating class ≥ PN 160	
Center to face	[mm]	Inlet a	103	103	103
		Outlet b	100	100	100
Height	[mm]	H max.	266	287	287
ASME B 16.5 (Available flange sizes refer to page 04/05)					
				Flange rating class 150	
Center to face	[mm]	Inlet a	103	103	103
		Outlet b	100	100	100
Height	[mm]	H max.	263	284	284
				Flange rating class ≥ 300	
Center to face	[mm]	Inlet a	103	103	103
		Outlet b	100	100	100
Height	[mm]	H max.	266	287	287

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com

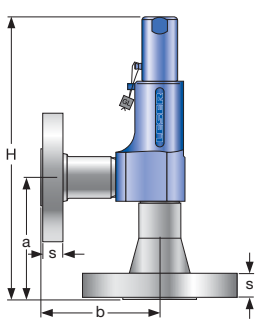
Weight

To calculate the total weight use the formula: $mT = m_N + m_F(\text{Inlet}) + m_F(\text{Outlet})$

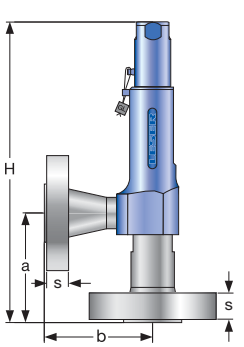
Weight net (without inlet and outlet flange)	[kg]	m_N	2.4	2.8	2.8

Flange dimensions

			DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating						
		Size	40	100	160	250	320	400	Size	150	300	600	900	1500	2500
DN 15									**NPS 1/2"**						
Flange thickness	[mm]	s	18	–	22	28	28	30		14	18	18	26	26	30.2
Weight slip on flange	[kg]	m_F	0.8	–	1.2	2.5	2.5	3.6		0.6	0.9	0.9	2.1	2.1	3
DN 20									**NPS 3/4"**						
Flange thickness	[mm]	s	20	22	–	–	–	–		15	18	18	25.4	25.4	32
Weight slip on flange	[kg]	m_F	1.1	1.3	–	–	–	–		0.8	1.4	1.4	2.3	2.3	3.5
DN 25									**NPS 1"**						
Flange thickness	[mm]	s	22	–	26	30	36	40		17	21.5	21.5	32.5	32.5	40
Weight slip on flange	[kg]	m_F	1.3	–	2.6	3.5	5	7.5		1	2.1	21	4.1	4.1	5.1



Conventional design



Long version

Type 437
Dimensions and weights
Flanged connections [US units]

			Conventional design	Long version	
Actual Orifice diameter d_0 [inch]			0.394	0.236	0.394
Actual Orifice area A_0 [inch^2]			0.122	0.044	0.122
DIN EN 1092-1 (Available flange sizes refer to page 39)					
			Flange rating PN 40		
Center to face	[inch]	Inlet a	$4^{1}/_{16}$	$4^{1}/_{16}$	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{11}/_{32}$	$11^{3}/_{16}$	$11^{3}/_{16}$
			Flange rating ≥ PN 160		
Center to face	[inch]	Inlet a	$4^{1}/_{16}$	$4^{1}/_{16}$	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{15}/_{32}$	$11^{5}/_{16}$	$11^{5}/_{16}$
ASME B 16.5 (Available flange sizes refer to page 39)					
			Flange rating class 150		
Center to face	[inch]	Inlet a	$4^{1}/_{16}$	$4^{1}/_{16}$	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{11}/_{32}$	$11^{3}/_{16}$	$11^{3}/_{16}$
			Flange rating class ≥ 300		
Center to face	[inch]	Inlet a	$4^{1}/_{16}$	$4^{1}/_{16}$	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{15}/_{32}$	$11^{5}/_{16}$	$11^{5}/_{16}$

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com

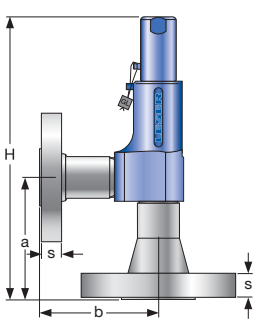
Weight

To calculate the total weight use the formula: $mT = m_N + m_F$ (Inlet) + m_F (Outlet)

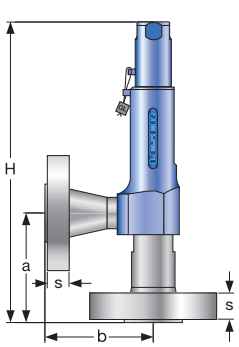
Weight net (without inlet and outlet flange)	[lbs]	m_N	5.3	6.2	6.2

Flange dimensions

			DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating						
		Size	40	100	160	250	320	400	Size	150	300	600	900	1500	2500
DN 15									**NPS $^{1}/_{2}$"**						
Flange thickness	[inch]	s	$^{23}/_{32}$	–	$^{7}/_{8}$	$^{23}/_{32}$	$1^{3}/_{32}$	$1^{3}/_{16}$		$^{9}/_{16}$	$^{23}/_{32}$	$^{23}/_{32}$	$1^{3}/_{32}$	$1^{3}/_{32}$	$1^{3}/_{16}$
Weight slip on flange	[lbs]	m_F	1.8	–	2.6	5.5	5.5	7.9		1.3	2.0	2.0	4.6	4.6	6.6
DN 20									**NPS $^{3}/_{4}$"**						
Flange thickness	[inch]	s	$^{25}/_{32}$	$^{7}/_{8}$	–	–	–	–		$^{19}/_{32}$	$^{23}/_{32}$	$^{23}/_{32}$	1	1	$1^{1}/_{4}$
Weight slip on flange	[lbs]	m_F	2.4	2.9	–	–	–	–		1.8	3.1	3.1	5.0	5.0	7.7
DN 25									**NPS 1"**						
Flange thickness	[inch]	s	$^{7}/_{8}$	–	$1^{1}/_{32}$	$1^{3}/_{16}$	$1^{13}/_{32}$	$1^{9}/_{16}$		$^{21}/_{32}$	$^{27}/_{32}$	$^{27}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{16}$
Weight slip on flange	[lbs]	m_F	2.9	–	5.7	7.7	11.0	16.5		2.2	4.6	4.6	9.0	9.0	11.2



Conventional design



Long version

Type 437
Pressure/temperature ratings
[Metric units + US units]

Metric units

Actual Orifice diameter d_0 [mm]		6				10			
Actual Orifice area A_0 [mm²]		28.3				78.5			
Body material: 1.4104 (430)									
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
	Pressure rating	PN 400				PN 320			
Outlet body	Pressure rating	PN 160				PN 160			
Minimum set pressure	p [barg] S/G/L	180 [S/G only]				0.1			
Maximum set pressure	p [barg] S/G/L	365 [S/G only]				16 [only H3] 180			
Temperature acc. to DIN EN	min [°C]	-10							
	max [°C]	+220							
Temperature acc. to ASME	min [°C]	-29							
	max [°C]	+220							
Body material: 1.4404 (316L)									
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
	Pressure rating	PN 400				PN 320			
Outlet body	Pressure rating	PN 160				PN 160			
Minimum set pressure	p [barg] S/G/L	180 [S/G only]				0.1			
Maximum set pressure	p [barg] S/G/L	365 [S/G only]				180			
Temperature acc. to DIN EN	min [°C]	-270							
	max [°C]	+280							
Temperature acc. to ASME	min [°C]	-268							
	max [°C]	+280							

US units

Actual Orifice diameter d_0 [inch]		0,236				0,394			
Actual Orifice area A_0 [inch²]		0,044				0,122			
Body material: 1.4104 (430)									
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
Minimum set pressure	p [psig] S/G/L	2611				1.5			
Maximum set pressure	p [psig] S/G/L	5294				145 [only H3] 2611			
Temperature acc. to DIN EN	min [°F]	+14							
	max [°F]	+428							
Temperature acc. to ASME	min [°F]	-20							
	max [°F]	+428							
Body material: 1.4404 (316L)									
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
Minimum set pressure	p [psig] S/G/L	2611				1.5			
Maximum set pressure	p [psig] S/G/L	5294				2611			
Temperature acc. to DIN EN	min [°F]	-450							
	max [°F]	+536							
Temperature acc. to ASME	min [°F]	-450							
	max [°F]	+536							

Type 437
Approvals

Actual Orifice diameter d_0 [mm]		6	10
Actual Orifice area A_0 [mm²]		28.3	78.5
Actual Orifice diameter d_0 [inch]		0.236	0.394
Actual Orifice area A_0 [inch²]		0.044	0.122
Europe		**Coefficient of discharge K_{dr}**	
PED/DIN EN ISO 4126-1	Approval No.	072020111Z0008/0/21	
	S/G	0.72	0.50
	L	–	0.35
Germany		**Coefficient of discharge α_w**	
PED/AD 2000-Merkblatt A2	Approval No.	TÜV SV 980	
	S/G	0.72	0.50
	L	–	0.35
United States		**Coefficient of discharge K**	
ASME Sec. VIII Div. 1	Zulassungs-Nr.	–	M 37213
	D/G	–	0.458
	Zulassungs-Nr.	–	M 37189
	F	–	0.333
Canada		**Coefficient of discharge K**	
CRN	Approval No.	The current approval no. can be found at www.leser.com	
	S/G	–	0.458
	L	–	0.333
China		**Coefficient of discharge α_w**	
AQSIQ	Approval No.	The current approval no. can be found at www.leser.com	
	S/G	0.72	0.50
	L	–	0.35
Eurasian Custom Union		**Coefficient of discharge α_w**	
EAC	Approval No.	The current approval no. can be found at www.leser.com	
	S/G	0.72	0.50
	L	–	0.35

Classification societies		**Homepage**	
Bureau Veritas	BV	www.bureauveritas.com	The valid certification number is changed with every reneval. A sample certificate including the valid certification number can be found at www.leser.com
DNV GL		www.dnvgl.com	
Lloyd's Register EMEA	LREMEA	www.lr.org	
Registro Italiano Navale	RINA	www.rina.org	
U.S. Coast Guard	U.S.C.G	www.uscg.org	

Rated slope
Within the capacity certification according to ASME Sec. VIII Div. 1 the coefficients of discharge for Series 437 are issued as "rated slope values" instead of K values. Rated slope values can be converted into K values. The table above shows the converted K values. The original rated slope values are listed in the table below.

Fluid	Rated slope Type 437
S	2.86 lb / hr / PSIA
G	1.02 SCFM / PSIA
L	1.54 GPM $\sqrt{PSID}$

Type 438
Packed knob H4
Conventional design

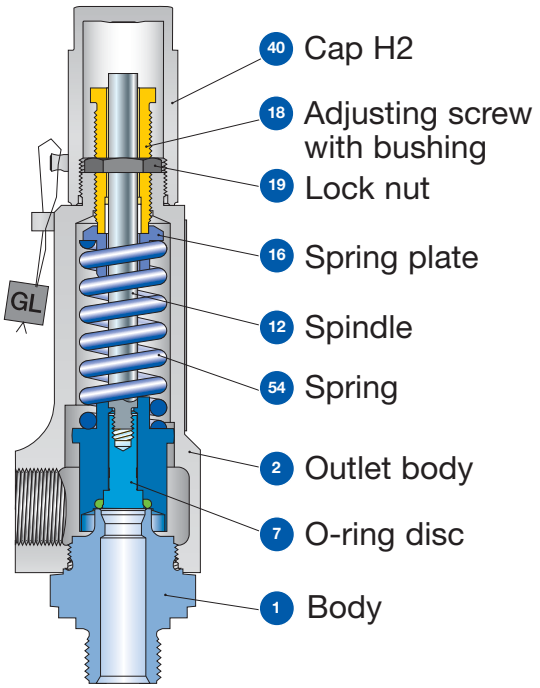
Type 438
Packed knob H4
Flanged connection

Type 438
Cap H2
Long version

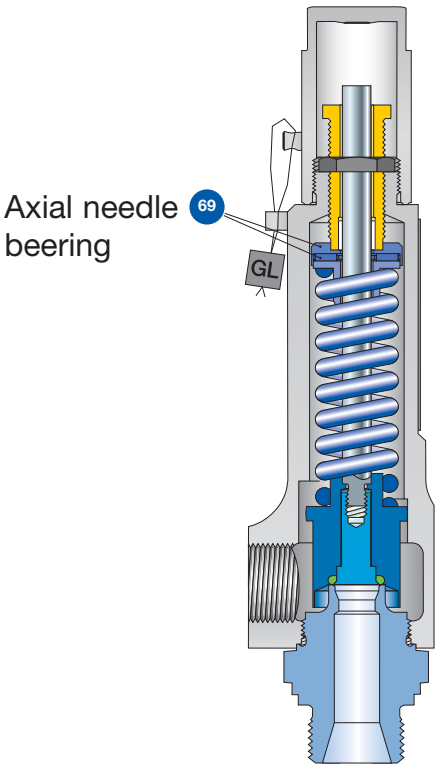
Type 438
Safety Relief Valves

Contents **Page**

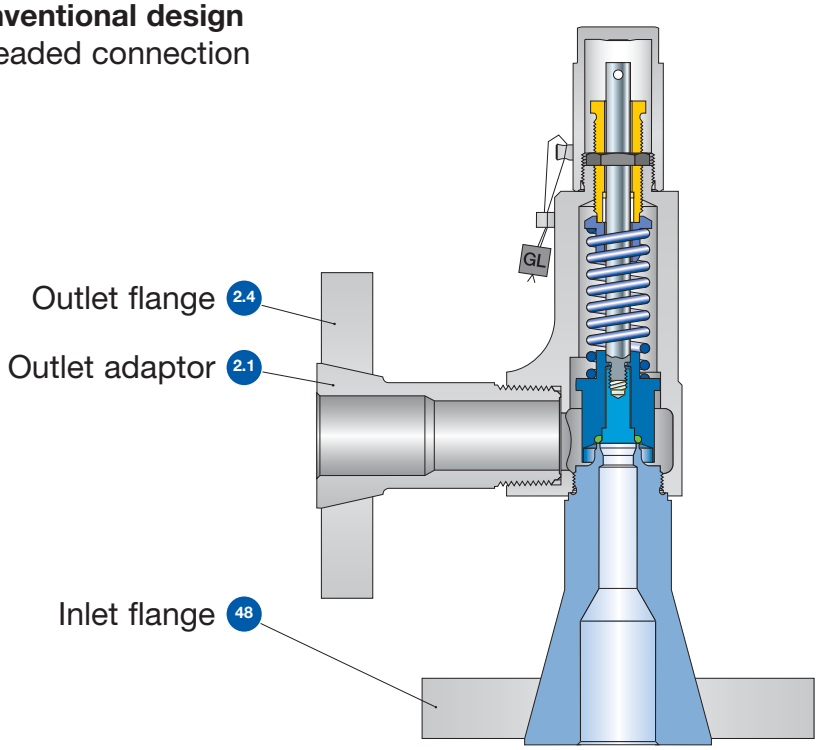
Type 438
Designs



Conventional design
Threaded connection



Long version
Threaded connection



Conventional design
Flange connection

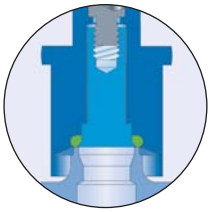
Type 438
Materials

Item	Component	Design	Type 4383	Type 4384
1	Base / Inlet body	Threaded connection	1.4104[1) 2)], 1.4404 SA 479 430[1) 2)], SA 479 316L	1.4404 SA 479 316L
		Flange connection	1.4404 SA 479 316L	1.4404 SA 479 316L
		Long version	1.4104[1)], 1.4404 SA 479 430[1)], SA 479 316L	1.4404 SA 479 316L
2	Outlet body		1.4104[2)] SA 479 430[2)]	1.4404 SA 479 316L
2.1	Outlet adaptor	Flange connection	1.4404 316L	1.4404 316L
2.4	Outlet flange	Flange connection	1.4404 316L	1.4404 316L
7	O-ring disc		1.4404 SA 479 316L	1.4404 SA 479 316L
7.4	Soft seal O-ring	“N”[3)]	NBR Nitrile-Butadiene	NBR Nitrile-Butadiene
		“K”[3)]	CR Chloroprene	CR Chloroprene
		“D”[3)]	EPDM Ethylen-Propylene-Diene	EPDM Ethylen-Propylene-Diene
		“L”[3)]	FKM Fluorocarbon	FKM Fluorocarbon
		“C”[4)]	FFKM Perfluor	FFKM Perfluor
12	Spindle		1.4021 420	1.4404 316L
		Long version	1.4404 316L	1.4404 316L
16	Spring plate		1.4104 Chrome steel	1.4404 316L
		Long version	1.4404 316L	1.4404 316L
18	Adjusting screw with bushing		1.4104 / PTFE Chrome steel / PTFE	1.4404 / PTFE 316L / PTFE
19	Lock nut		1.0718 Steel	1.4404 316L
40	Cap H2		1.0460 SA 105	1.4404 316L
48	Inlet flange	Flange connection	1.4404 316L	1.4404 316L
54	Spring		1.4310 Stainless steel	1.4310 Stainless steel
69	Axial needle beering	Long version	1.4404 316L	1.4404 316L

Please notice:
- Modifications reserved by LESER.
- LESER can upgrade materials without notice.
- Every part can be replaced by other material acc. to customer specification.
- The materials shall meet the requirements of the relevant regulations (Pressure Equipment Directive (PED), acc. to PED applied harmonized standards, AD 2000-Merkblätter, VdTÜV (Werkstoffblätter) as well as further materials listed in Section 8 of the Type-Examination.

[1)] Only for male thread DIN ISO 228-1 $G^3/_8$, $G^1/_2$, $G^3/_4$ (Option codes V49, V54, V55).
[2)] Material 1.4404/316L for ASME application (Option code N68 or N70)
[3)] Long version: O-ring 90 Shore for set pressures > 120 bar
[4)] O-ring 90 Shore for set pressures > 40 bar

Type 438
Article numbers



O-ring disc

		Conventional design	Long version
Actual Orifice diameter d_0 [mm]		10	10
Actual Orifice area A_0 [mm²]		78.5	78.5
Actual Orifice diameter d_0 [inch]		0.394	0.394
Actual Orifice area A_0 [inch²]		0.122	0.122
O-ring material		NBR “N” J30	NBR “N” J30[3]
		CR “K” J21	CR “K” J21[3]
		EPDM “D” J22	EPDM “D” J22[3]
		FKM “L” J23	FKM “L” J23[3]
		FFKM “C” J20[4]	FFKM “C” J20[4]
Base/Inlet body material: 1.4104 (430)[1]			
H2	Art. No. **4383.**[2]	**2862**	**2872**
H3 p_{max} = 16 bar_g	Art. No. **4383.**[2]	**2863**	**–**
H4	Art. No. **4383.**[2]	**2864**	**2874**
p [bar_g]	S/G/L	**5 – 93**	**93 – 180**
p [psig]	S/G/L	**72.5 – 1349**	**1349 – 2611**
Base/Inlet body material: 1.4404 (316L)			
H2	Art. No. **4384.**	**2982**	**2992**
H4	Art. No. **4384.**	**2984**	**2994**
p [bar_g]	S/G/L	**5 – 68**	**68 – 180**
p [psig]	S/G/L	**72.5 – 986**	**986 – 2611**

[1] Material 1.4404/316L for ASME application (Option code N68 or N70)
[2] Type 4383 should not be selected when a „stainless steel“ valve is required due to corrosive medium.
[3] O-ring 90 Shore for set pressures > 120 bar
[4] O-ring 90 Shore for set pressures > 40 bar

Type 438
Dimensions and weights
Threaded connections [Metric units]

Size Outlet body	Conventional design			Long version		
	1/2"	3/4"	1"	1/2"	3/4"	1"
Actual Orifice diameter d_0 [mm]	10	10	10	10	10	10
Actual Orifice area A_0 [mm²]	78.5	78.5	78.5	78.5	78.5	78.5
Weight [kg]	1.2	1.6	1.6	1.4	2.1	2.1
Required installation diameter d [mm]	65	80	80	65	80	80

Inlet thread female

		Size outlet body	Conventional design			Long version		
			1/2"	3/4"	1"	1/2"	3/4"	1"
Center to face [mm]								
DIN ISO 228-1	**G**	Inlet 1/2" a	46	46	49	46	46	49
ISO 7-1/BS 21	**Rc**							
ASME B1.20.1	**NPT**	Inlet 3/4", 1" a	56	56	59	56	56	59
		Outlet b	30	37	37	30	37	37
Height [mm]								
		Inlet 1/2" H max.	209	209	212	230	230	233
		Inlet 3/4", 1" H max.	219	219	222	240	240	243

Inlet thread male

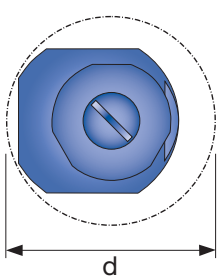
		Size outlet body	Conventional design			Long version		
			1/2"	3/4"	1"	1/2"	3/4"	1"
Center to face [mm]								
DIN ISO 228-1	**G**	Inlet a	33	33	36	33	33	36
		Outlet b	30	37	37	30	37	37
ISO 7-1/BS 21	**R**	Inlet a	31	31	34	31	31	34
ASME B1.20.1	**NPT**							
		Outlet b	30	37	37	30	37	37

Height [mm]

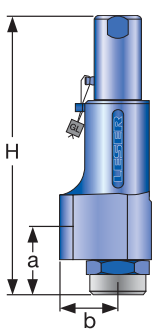
		Size inlet thread	Conventional design				Long version			
			3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**	H max.	208	210	212	217	229	231	233	238
ISO 7-1/BS 21	**R**	H max.	–	213	214	220	–	234	235	241
ASME B1.20.1	**NPT**	H max.	–	216	216	224	–	237	237	245

Length of screwed end c [mm]

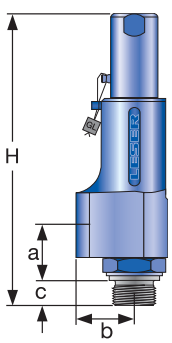
		Size inlet thread	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**		12	14	16	18
ISO 7-1/BS 21	**R**		–	19	20	23
ASME B1.20.1	**NPT**		–	22	22	27



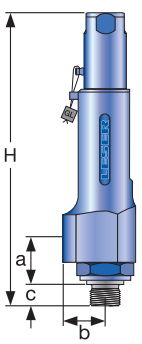
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Long version – male thread

Type 438
Dimensions and weights
Threaded connections [US units]

	Size Outlet body	Conventional design			Long version		
		1/2"	3/4"	1"	1/2"	3/4"	1"
Actual Orifice diameter d_0 [inch]		0.394	0.394	0.394	0.394	0.394	0.394
Actual Orifice area A_0 [inch²]		0.122	0.122	0.122	0.122	0.122	0.122
Weight	[lbs]	2.6	3.5	3.5	3.1	4.6	4.6
Required installation diameter d	[inch]	2 9/16	3 5/32	3 5/32	2 9/16	3 5/32	3 5/32

Inlet thread female

		Size outlet body	Conventional design			Long version		
			1/2"	3/4"	1"	1/2"	3/4"	1"
Center to face [inch]								
DIN ISO 228-1	**G**	Inlet 1/2" a	1 13/16	1 13/16	1 15/16	1 13/16	1 13/16	1 15/16
ISO 7-1/BS 21	**Rc**							
ASME B1.20.1	**NPT**	Inlet 3/4", 1" a	2 7/32	2 7/32	2 5/16	2 7/32	2 7/32	2 5/16
		Outlet b	1 3/16	1 15/32	1 15/32	1 3/16	1 15/32	1 15/32
Height [inch]								
		Inlet 1/2" H max.	8 7/32	8 7/32	8 11/32	9 1/16	9 1/16	9 3/16
		Inlet 3/4", 1" H max.	8 5/8	8 5/8	8 3/4	9 7/16	9 7/16	9 9/16

Inlet thread male

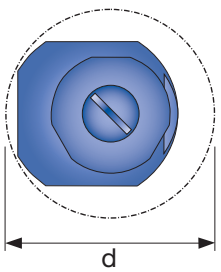
		Size outlet body	Conventional design			Long version		
			1/2"	3/4"	1"	1/2"	3/4"	1"
Center to face [inch]								
DIN ISO 228-1	**G**	Inlet a	1 5/16	1 5/16	1 13/32	1 5/16	1 5/16	1 13/32
		Outlet b	1 3/16	1 15/32	1 15/32	1 3/16	1 15/32	1 15/32
ISO 7-1/BS 21	**R**	Inlet a	1 7/32	1 7/32	1 11/32	1 7/32	1 7/32	1 11/32
ASME B1.20.1	**NPT**	Outlet b	1 3/16	1 15/32	1 15/32	1 3/16	1 15/32	1 15/32

Height [inch]

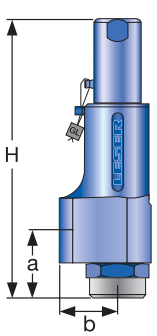
		Size inlet thread	Conventional design				Long version			
			3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**	H max.	8 3/16	8 1/4	8 11/32	8 17/32	9	9 3/32	9 5/32	9 3/8
ISO 7-1/BS 21	**R**	H max.	–	8 3/8	8 13/32	8 21/32	–	9 7/32	9 1/4	9 15/32
ASME B1.20.1	**NPT**	H max.	–	8 1/2	8 1/2	8 13/16	–	9 5/16	9 5/16	9 21/32

Length of screwed end c [inch]

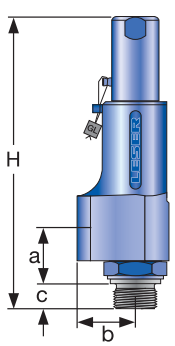
		Size inlet thread	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**		15/32	9/16	5/8	23/32
ISO 7-1/BS 21	**R**		–	3/4	25/32	29/32
ASME B1.20.1	**NPT**		–	7/8	7/8	11/16



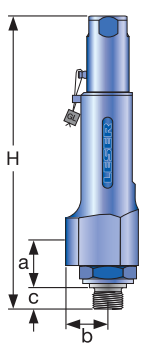
Required installation diameter



Conventional design – female thread



Conventional design – male thread

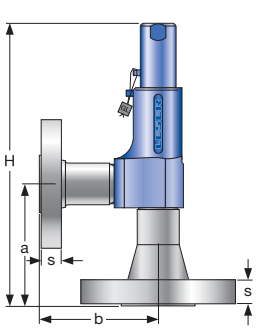


Long version – male thread

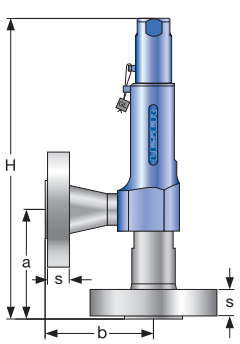
Type 438
Dimensions and weights
Flanged connections [Metric units]

			Conventional design	Long version
Actual Orifice diameter d_0 [mm]			10	10
Actual Orifice area A_0 [mm²]			78.5	78.5
DIN EN 1092-1				
			Flange rating PN 40	
Center to face	[mm]	Inlet a	103	103
		Outlet b	100	100
Height	[mm]	H max.	263	284
			Flange rating ≥ PN 160	
Center to face	[mm]	Inlet a	103	103
		Outlet b	100	100
Height	[mm]	H max.	266	287
ASME B 16.5				
			Flange rating class 150	
Center to face	[mm]	Inlet a	103	103
		Outlet b	100	100
Height	[mm]	H max.	263	284
			Flange rating class ≥ 300	
Center to face	[mm]	Inlet a	103	103
		Outlet b	100	100
Height	[mm]	H max.	266	287
Weight				
For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)				
Weight net (without inlet and outlet flange)	[kg]	W_N	2.4	2.8

Flange dimensions and availability															
			DIN EN 1092-1 / Flange rating PN						**ASME B16.5 / Flange rating class**						
		Size	40	100	160	250	320	400	**Size**	150	300	600	900	1500	2500
DN 15									**NPS 1/2"**						
Flange thickness	[mm]	s	18	–	22	28	28	30		14	18	18	26	26	30.2
Weight slip on flange	[kg]	W_F	0.8	–	1.2	2.5	2.5	3.6		0.6	0.9	2.0	2.1	2.1	3
DN 20									**NPS 3/4"**						
Flange thickness	[mm]	s	20	22	–	–	–	–		15	18	18	25.4	25.4	32
Weight slip on flange	[kg]	W_F	1.1	1.3	–	–	–	–		0.8	1.4	1.4	2.3	2.3	3.5
DN 25									**NPS 1"**						
Flange thickness	[mm]	s	22	–	26	30	36	40		17	21.5	21.5	32.5	32.5	40
Weight slip on flange	[kg]	W_F	1.3	–	2.6	3.5	5	7.5		1	2.1	2.1	4.1	4.1	5.1



Conventional design

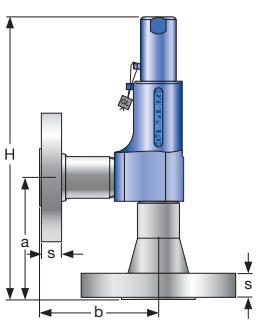


Long version

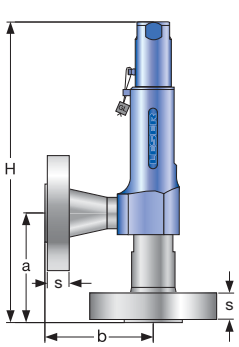
Type 438
Dimensions and weights
Flanged connections [US units]

			Conventional design	Long version
Actual Orifice diameter d_0 [inch]			0.394	0.394
Actual Orifice area A_0 [inch²]			0.122	0.122
DIN EN 1092-1 (Available flange sizes refer to page 04/05)				
			Flange rating PN 40	
Center to face	[inch]	Inlet a	$4^{1}/_{16}$	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{11}/_{32}$	$10^{3}/_{16}$
			Flange rating ≥ PN 160	
Center to face	[inch]	Inlet a	$4^{1}/_{16}$	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{15}/_{32}$	$11^{5}/_{16}$
ASME B 16.5 (Available flange sizes refer to page 04/05)				
			Flange rating class 150	
Center to face	[inch]	Inlet a	$4^{1}/_{16}$	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{11}/_{32}$	$11^{3}/_{16}$
			Flange rating class ≥ 300	
Center to face	[inch]	Inlet a	$4^{1}/_{16}$	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{15}/_{32}$	$11^{5}/_{16}$
Weight				
For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)				
Weight net (without inlet and outlet flange)	[lbs]	W_N	5.3	6.2

Flange dimensions and availability															
			DIN EN 1092-1 / Flange rating PN						**ASME B16.5 / Flange rating class**						
		Size	40	100	160	250	320	400	**Size**	150	300	600	900	1500	2500
DN 15									**NPS $^{1}/_{2}$"**						
Flange thickness	[inch]	s	$^{23}/_{32}$	–	$^{7}/_{8}$	$1^{3}/_{32}$	$1^{3}/_{32}$	$1^{6}/_{32}$		$^{9}/_{16}$	$^{23}/_{32}$	$^{23}/_{32}$	$1^{1}/_{32}$	$1^{1}/_{32}$	$1^{6}/_{32}$
Weight slip on flange	[lbs]	W_F	1.8	–	2.6	5.5	5.5	7.9		1.3	2.0	2.0	4.6	4.6	6.6
DN 20									**NPS $^{3}/_{4}$"**						
Flange thickness	[inch]	s	$^{25}/_{32}$	$^{28}/_{32}$	–	–	–	–		$^{19}/_{32}$	$^{23}/_{32}$	$^{23}/_{32}$	1	1	$1^{8}/_{32}$
Weight slip on flange	[lbs]	W_F	2.4	2.9	–	–	–	–		1.8	3.1	3.1	5.0	5.0	7.7
DN 25									**NPS 1"**						
Flange thickness	[inch]	s	$^{7}/_{8}$	–	$1^{1}/_{32}$	$1^{6}/_{32}$	$1^{13}/_{32}$	$1^{18}/_{32}$		$^{21}/_{32}$	$^{27}/_{32}$	$^{27}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{32}$	$1^{18}/_{32}$
Weight slip on flange	[lbs]	W_F	2.9	–	5.7	7.7	11.0	16.5		2.2	4.6	4.6	9.0	9.0	11.2



Conventional design



Long version

Type 438

Pressure/temperature ratings

[Metric units + US units]

Metric units

		Conventional design				Long version			
Actual Orifice diameter d_0 [mm]		10				10			
Actual Orifice Area A_0 [mm²]		78.5				78.5			
Body material: 1.4104 (430)									
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
	Pressure rating	PN 250				PN 250			
Outlet body	Pressure rating	PN 160				PN 160			
Minimum set pressure	p [bar_g] S/G/L	5				93			
Maximum set pressure	p [bar_g] S/G/L	16 [only H3] 93				180			
Temperature acc. to DIN EN	min [°C]	-10				-10			
	max [°C]	+150				+150			
Temperature acc. to ASME	min [°C]	-29				-29			
	max [°C]	+150				+150			
Body material: 1.4404 (316L)									
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
	Pressure rating	PN 250				PN 250			
Outlet body	Pressure rating	PN 160				PN 160			
Minimum set pressure	p [bar_g] S/G/L	5				68			
Maximum set pressure	p [bar_g] S/G/L	68				180			
Temperature acc. to DIN EN	min [°C]	-45				-45			
	max [°C]	+150				+150			
Temperature acc. to ASME	min [°C]	-45				-45			
	max [°C]	+150				+150			

US units

		Conventional design				Long version			
Actual Orifice diameter d_0 [inch]		0.394				0.394			
Actual Orifice area A_0 [inch²]		0.122				0.122			
Body material: 1.4104 (430)									
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
Minimum set pressure	p [psig] S/G/L	72.5				1349			
Maximum set pressure	p [psig] S/G/L	232 [only H3] 1349				2611			
Temperature acc. to DIN EN	min [°F]	+14				+14			
	max [°F]	+302				+302			
Temperature acc. to ASME	min [°F]	-20				-20			
	max [°F]	+302				+302			
Body material: 1.4404 (316L)									
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"	3/8"	1/2"	3/4"	1"
Minimum set pressure	p [psig] S/G/L	72.5				986			
Maximum set pressure	p [psig] S/G/L	986				2611			
Temperature acc. to DIN EN	min [°F]	-49				-49			
	max [°F]	+302				+302			
Temperature acc. to ASME	min [°F]	-49				-49			
	max [°F]	+302				+302			

[1] The temperature is limited by soft seal material. The stated values are valid for EPDM.

Type 438
Approvals

Actual Orifice diameter d_0 [mm]		10
Actual Orifice area A_0 [mm²]		78.5
Actual Orifice diameter d_0 [inch]		0.394
Actual Orifice area A_0 [inch²]		0.122
Europe		**Coefficient of discharge K_{dr}**
PED / DIN EN ISO 4126-1	Approval No.	072020111Z0008/0/21
	S/G	0.40
	L	0.33
Germany		**Coefficient of discharge α_w**
PED / AD 2000-Merkblatt A2	Approval No.	TÜV SV 980
	S/G	0.40
	L	0.33
United States		**Coefficient of discharge K**
ASME Sec. VIII Div. 1	Approval No.	M 37190
	S/G	0.406
	Approval No.	M 371202
	L	0.322
Canada		**Coefficient of discharge K**
CRN	Approval No.	The current approval no. can be found at www.leser.com.
	S/G	0.406
	L	0.322
China		**Coefficient of discharge α_w**
AQSIQ	Approval No.	The current approval no. can be found at www.leser.com.
	S/G	0.40
	L	0.33
Eurasian Custom Union		**Coefficient of discharge α_w**
EAC	Approval No.	The current approval no. can be found at www.leser.com.
	S/G	0.40
	L	0.33

Classification societies		**Homepage**	
Bureau Veritas	BV	www.bureauveritas.com	The valid certification number is changed with every reneval. A sample certificate including the valid certification number can be found at www.leser.com
DNV GL		www.dnvgl.com	
Lloyd's Register EMEA	LREMEA	www.lr.org	
Registro Italiano Navale	RINA	www.rina.org	
U.S. Coast Guard	U.S.C.G	www.uscg.org	

Rated slope
Within the capacity certification according to ASME Sec. VIII Div. 1 the coefficients of discharge for Series 437 are issued as "rated slope values" instead of K values. Rated slope values can be converted into K values. The table above shows the converted K values. The original rated slope values are listed in the table below.

Fluid	Rated slope Type 438
S	2.55 lb / hr / PSIA
G	0.904 SCFM / PSIA
L	1.49 GPM $\sqrt{PSID}$

Type 439
Packed knob H4
Conventional design

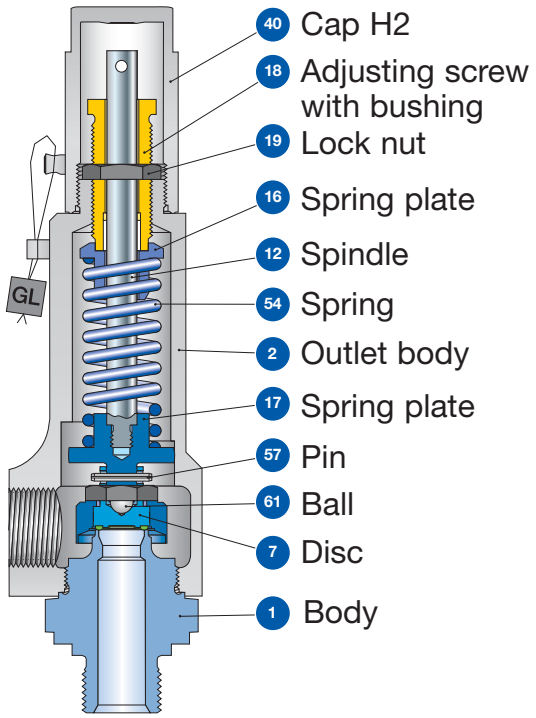
Type 439
Packed knob H4
Flanged connection

Type 439
Cap H2
Long version

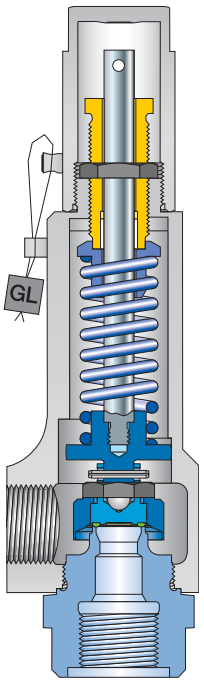
Type 439
Safety Relief Valves

Series 437

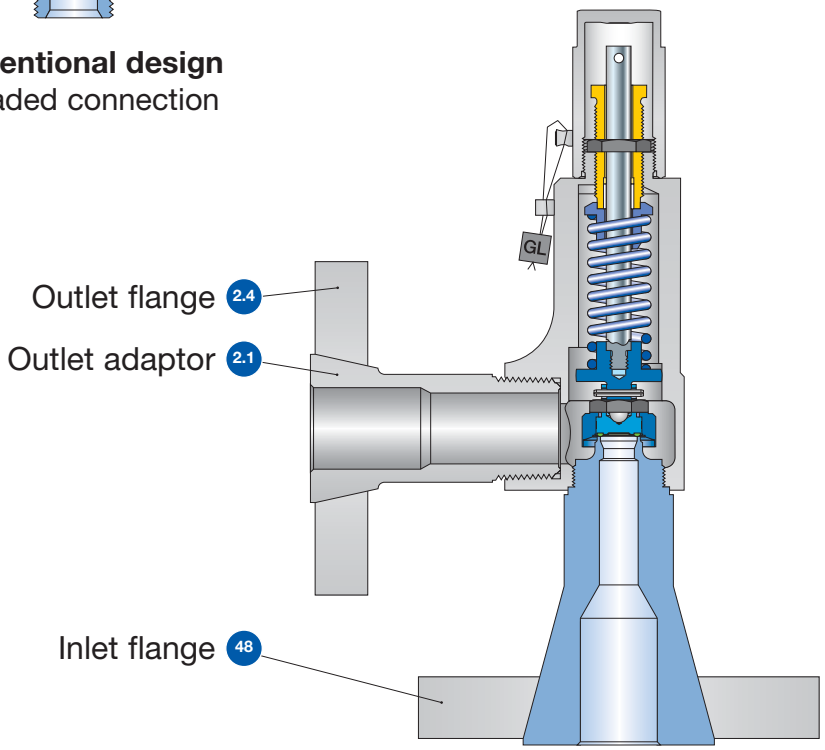
Type 439
Designs



Conventional design
Threaded connection



Conventional design
Threaded connection



Conventional design
Flange connection

Type 439
Materials

Item	Component	Design	Type 4393	Type 4394
1	Base / Inlet body	Threaded connection	1.4104[1) 3)], 1.4404 SA 479 430[1) 3)], SA 479 316L	1.4404 SA 479 316L
		Flange connection	1.4404 SA 479 316L	1.4404 SA 479 316L
2	Outlet body		1.4104[3)] SA 479 430[3)]	1.4404 SA 479 316L
2.1	Outlet adaptor	Flange connection	1.4404 316L	1.4404 316L
2.4	Outlet flange	Flange connection	1.4404 316L	1.4404 316L
7	Vulcanized soft seal disc		1.4404 SA 479 316L	1.4404 SA 479 316L
7.1	Disc with vulcanized soft seal	"N"	NBR Nitrile-Butadiene	NBR Nitrile-Butadiene
		"K"	CR Chloroprene	CR Chloroprene
		"D"	EPDM Ethylen-Propylene-Diene	EPDM Ethylen-Propylene-Diene
		"L"	FKM Fluorocarbon	FKM Fluorocarbon
		"C"	FFKM Perfluor	FFKM Perfluor
12	Spindle[2)]		1.4021 420	1.4404 316L
16/17	Spring plate[2)]		1.4104 Chrome steel	1.4404 316L
18	Adjusting screw with bushing		1.4104 / PTFE Chrome steel / PTFE	1.4404 / PTFE 316L / PTFE
19	Lock nut		1.0718 Steel	1.4404 316L
40	Cap H2		1.0460 SA 105	1.4404 316L
48	Inlet flange	Flange connection	1.4404 316L	1.4404 316L
54	Spring		1.4310 Stainless steel	1.4310 Stainless steel
57	Pin		1.4310 Stainless steel	1.4310 Stainless steel
61	Ball		1.3541 Hardened stainless steel	1.4401 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.
- The materials shall meet the requirements of the relevant regulations (Pressure Equipment Directive (PED), acc. to PED applied harmonized standards, AD 2000-Merkblätter, VdTÜV (Werkstoffblätter) as well as further materials listed in Section 8 of the Type-Examination.

[1)] Only for male thread DIN ISO 228-1 G3/8, G1/2, G3/4 (Option codes V49, V54, V55).
[2)] The items 12 and 17 are combined to one unit.
[3)] Material 1.4404/316L for ASME application (Option code N68 or N70)

Type 439
Article numbers

Vulcanized soft seat

Actual Orifice diameter d_0 [mm]			10
Actual Orifice area A_0 [mm²]			78.5
Actual Orifice diameter d_0 [inch]			0.394
Actual Orifice area A_0 [inch²]			0.122
Soft seal material		NBR “N” J30	
		CR “K” J21	
		EPDM “D” J22	
		FKM “L” J23	
		FFKM “C” J20	
Base / Inlet body material: 1.4104 (430)[1]			
H2	Art. No. **4393.**[2]	**2882**	
H3 p_{max} = 10 bar_g	Art. No. **4393.**[2]	**2883**	
H4	Art. No. **4393.**[2]	**2884**	
p [bar_g]	S/G/L	**0.1 – 16**	
p [psig]	S/G/L	**1.5 – 232**	
Base / Inlet body material: 1.4404 (316L)			
H2	Art. No. **4394.**	**2892**	
H4	Art. No. **4394.**	**2894**	
p [bar_g]	S/G/L	**0.1 – 16**	
p [psig]	S/G/L	**1.5 – 232**	

[1] Material 1.4404/316L for ASME application (Option code N68 or N70)
[2] Type 4393 should not be selected when a „stainless steel“ valve is required due to corrosive medium.

Type 439
Dimensions and weights
Threaded connections [Metric units]

Size Outlet body		1/2"	3/4"	1"
Actual Orifice diameter d_0 [mm]		10	10	10
Actual Orifice area A_0 [mm²]		78.5	78.5	78.5
Weight	[kg]	1.2	1.6	1.6
Required installation diameter d	[mm]	65	80	80

Inlet thread female

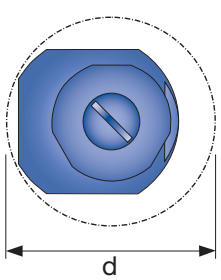
		Size outlet body	1/2"	3/4"	1"
Center to face [mm]					
DIN ISO 228-1	**G**	Inlet 1/2" a	46	46	49
ISO 7-1/BS 21	**Rc**				
ASME B1.20.1	**NPT**	Inlet 3/4", 1" a	56	56	59
		Outlet b	30	37	37
Height [mm]					
		Inlet 1/2" H max.	209	209	212
		Inlet 3/4", 1" H max.	219	219	222

Inlet thread male

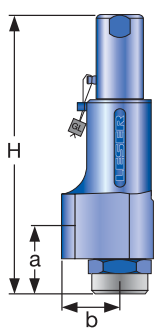
		Size outlet body	1/2"	3/4"	1"
Center to face [mm]					
DIN ISO 228-1	**G**	Inlet a	33	33	36
		Outlet b	30	37	37
ISO 7-1/BS 21	**R**	Inlet a	31	31	34
ASME B1.20.1	**NPT**				
		Outlet b	30	37	37

Height [mm]						
		Size inlet thread	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**	H max.	208	210	212	217
ISO 7-1/BS 21	**R**	H max.	–	213	214	220
ASME B1.20.1	**NPT**	H max.	–	216	216	224

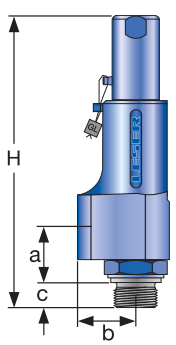
Length of screwed end c [mm]						
		Size inlet thread	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**		12	14	16	18
ISO 7-1/BS 21	**R**		–	19	20	23
ASME B1.20.1	**NPT**		–	22	22	27



Required installation diameter



Conventional design – Female thread



Conventional design – Male thread

Type 439
Dimensions and weights
Threaded connections [US units]

Size Outlet body		1/2"	3/4"	1"
Actual Orifice diameter d_0 [inch]		0.394	0.394	0.394
Actual Orifice area A_0 [inch^2]		0.122	0.122	0.122
Weight	[lbs]	2.6	3.5	3.5
Required installation diameter d	[inch]	$2^{9}/_{16}$	$3^{5}/_{32}$	$3^{5}/_{32}$

Inlet thread female

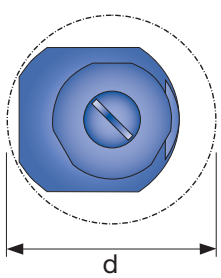
		Size outlet body	1/2"	3/4"	1"
Center to face [inch]					
DIN ISO 228-1	**G**	Inlet 1/2" a	$1^{13}/_{16}$	$1^{13}/_{16}$	$1^{15}/_{16}$
ISO 7-1/BS 21	**Rc**	Inlet 3/4", 1" a	$2^{7}/_{32}$	$2^{7}/_{32}$	$2^{5}/_{16}$
ASME B1.20.1	**NPT**	Outlet b	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$
Height [inch]					
		Inlet 1/2" H max.	$8^{7}/_{32}$	$8^{7}/_{32}$	$8^{11}/_{32}$
		Inlet 3/4", 1" H max.	$8^{5}/_{8}$	$8^{5}/_{8}$	$8^{3}/_{4}$

Inlet thread male

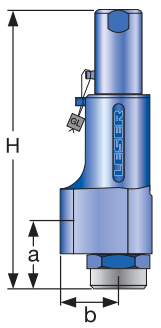
		Size outlet body	1/2"	3/4"	1"
Center to face [inch]					
DIN ISO 228-1	**G**	Inlet a	$1^{5}/_{16}$	$1^{5}/_{16}$	$1^{13}/_{32}$
		Outlet b	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$
ISO 7-1/BS 21	**R**	Inlet a	$1^{7}/_{32}$	$1^{7}/_{32}$	$1^{11}/_{32}$
ASME B1.20.1	**NPT**	Outlet b	$1^{3}/_{16}$	$1^{15}/_{32}$	$1^{15}/_{32}$

Height [inch]						
		Size inlet thread	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**	H max.	$8^{3}/_{16}$	$8^{1}/_{4}$	$8^{11}/_{32}$	$8^{17}/_{32}$
ISO 7-1/BS 21	**R**	H max.	–	$8^{3}/_{8}$	$8^{13}/_{32}$	$8^{21}/_{32}$
ASME B1.20.1	**NPT**	H max.	–	$8^{1}/_{2}$	$8^{1}/_{2}$	$8^{13}/_{16}$

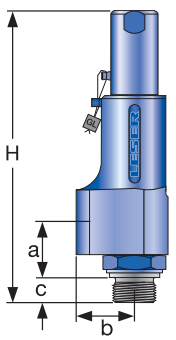
Length of screwed end c [inch]						
		Size inlet thread	3/8"	1/2"	3/4"	1"
DIN ISO 228-1	**G**		$^{15}/_{32}$	$^{9}/_{16}$	$^{5}/_{8}$	$^{23}/_{32}$
ISO 7-1/BS 21	**R**		–	$^{3}/_{4}$	$^{25}/_{32}$	$^{29}/_{32}$
ASME B1.20.1	**NPT**		–	$^{7}/_{8}$	$^{7}/_{8}$	$1^{1}/_{16}$



Required installation diameter



Conventional design – Female thread



Conventional design – Male thread

Type 439
Dimensions and weights
Flanged connections [Metric units]

Actual Orifice diameter d_0 [mm]			10
Actual Orifice area A_0 [mm²]			78.5
DIN EN 1092-1			
			Flange rating PN 40
Center to face	[mm]	Inlet a	103
		Outlet b	100
Height	[mm]	H max.	263
			Flange rating ≥ PN 160
Center to face	[mm]	Inlet a	103
		Outlet b	100
Height	[mm]	H max.	266
ASME B 16.5			
			Flange rating class 150
Center to face	[mm]	Inlet a	103
		Outlet b	100
Height	[mm]	H max.	263
			Flange rating class ≥ 300
Center to face	[mm]	Inlet a	103
		Outlet b	100
Height	[mm]	H max.	266

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

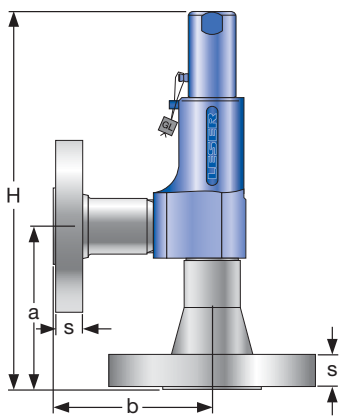
Weight

To calculate the total weight use the formula: $m_T = m_N + m_F$ (Inlet) + m_F (Outlet)

Weight net (without inlet and outlet flange)	[kg]	m_N	2.4

Flange dimensions

			DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating						
		Size	40	100	160	250	320	400	**Size**	150	300	600	900	1500	2500
DN 15									**NPS 1/2"**						
Flange thickness	[mm]	s	18	–	22	28	28	30		14	18	18	26	26	30.2
Weight slip on flange	[kg]	m_F	0.8	–	1.2	2.5	2.5	3.6		0.6	0.9	0.9	2.1	2.1	3
DN 20									**NPS 3/4"**						
Flange thickness	[mm]	s	20	22	–	–	–	–		15	18	18	25.4	25.4	32
Weight slip on flange	[kg]	m_F	1.1	1.3	–	–	–	–		0.8	1.4	1.4	2.3	2.3	3.5
DN 25									**NPS 1"**						
Flange thickness	[mm]	s	22	–	26	30	36	40		17	21.5	21.5	32.5	32.5	40
Weight slip on flange	[kg]	m_F	1.3	–	2.6	3.5	5	7.5		1	2.1	2.1	4.1	4.1	5.1



Conventional design

Type 439
Dimensions and weights
Flanged connections [US units]

Actual Orifice diameter d_0 [inch]			0.394
Actual Orifice area A_0 [inch^2]			0.122
DIN ISO 1092-1			
			Flange rating PN 40
Center to face	[inch]	Inlet a	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{11}/_{32}$
			Flange rating ≥ PN 160
Center to face	[inch]	Inlet a	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{15}/_{32}$
ASME B 16.5			
			Flange rating class 150
Center to face	[inch]	Inlet a	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{11}/_{32}$
			Flange rating class ≥ 300
Center to face	[inch]	Inlet a	$4^{1}/_{16}$
		Outlet b	$3^{15}/_{16}$
Height	[inch]	H max.	$10^{15}/_{32}$

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

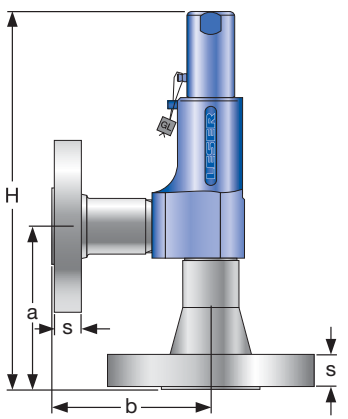
Weight

To calculate the total weight use the formula: $m_T = m_N + m_F$ (Inlet) + m_F (Outlet)

Weight net (without inlet and outlet flange)	[lbs]	m_N	5.3

Flange dimensions

			DIN ISO 1092-1 / Flange rating PN						ASME B16.5 / Flange rating						
		Size	40	100	160	250	320	400	**Size**	150	300	600	900	1500	2500
		DN 15							**NPS $^1/_2$"**						
Flange thickness	[inch]	s	$^{23}/_{32}$	–	$^{7}/_{8}$	$1^{3}/_{32}$	$1^{3}/_{32}$	$1^{3}/_{16}$		$^{9}/_{16}$	$^{23}/_{32}$	$^{23}/_{32}$	$1^{1}/_{32}$	$1^{1}/_{32}$	$1^{3}/_{16}$
Weight slip on flange	[lbs]	m_F	1.8	–	2.6	5.5	5.5	8.0		1.3	2.0	2.0	4.6	4.6	6.6
		DN 20							**NPS $^3/_4$"**						
Flange thickness	[inch]	s	$^{25}/_{32}$	$^{7}/_{8}$	–	–	–	–		$^{19}/_{32}$	$^{23}/_{32}$	$^{23}/_{32}$	1	1	$1^{1}/_{4}$
Weight slip on flange	[lbs]	m_F	2.4	2.9	–	–	–	–		1.8	3.1	3.1	5.0	5.0	7.7
		DN 25							**NPS 1"**						
Flange thickness	[inch]	s	$^{7}/_{8}$	–	$1^{1}/_{32}$	$1^{3}/_{16}$	$1^{13}/_{32}$	$1^{9}/_{16}$		$^{21}/_{32}$	$^{27}/_{32}$	$^{27}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{16}$
Weight slip on flange	[lbs]	m_F	2.9	–	5.7	7.7	11.0	16.5		2.2	4.6	4.6	9.0	9.0	11.2



Conventional design

Type 439

Pressure/temperature ratings

[Metric units + US units]

Metric units

Actual Orifice diameter d_0 [mm]		10			
Actual Orifice Area A_0 [mm²]		78.5			
Body material: 1.4104 (430)					
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"
	Pressure rating	PN 250			
Outlet body	Pressure rating	PN 160			
Minimum set pressure	p [bar_g] S/G/L	0.1			
Maximum set pressure	p [bar_g] S/G/L	16			
Temperature acc. to DIN EN	min. [°C]	-10			
	max. [°C]	+150			
Temperature acc. to ASME	min. [°C]	-29			
	max. [°C]	+150			
Body material: 1.4404 (316L)					
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"
	Pressure rating	PN 250			
Outlet body	Pressure rating	PN 160			
Minimum set pressure	p [bar_g] S/G/L	0.1			
Maximum set pressure	p [bar_g] S/G/L	16			
Temperature acc. to DIN EN	min. [°C]	-45			
	max. [°C]	+150			
Temperature acc. to ASME	min. [°C]	-45			
	max. [°C]	+150			

US units

Actual Orifice diameter d_0 [inch]		0.394			
Actual Orifice area A_0 [inch²]		0.122			
Body material: 1.4104 (430)					
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"
Minimum set pressure	p [psig] S/G/L	1.5			
Maximum set pressure	p [psig] S/G/L	232			
Temperature acc. to DIN EN	min [°F]	+14			
	max [°F]	+302			
Temperature acc. to ASME	min [°F]	-20			
	max [°F]	+302			
Body material: 1.4404 (316L)					
Base / Inlet Body	Connection size	3/8"	1/2"	3/4"	1"
Minimum set pressure	p [psig] S/G/L	1.5			
Maximum set pressure	p [psig] S/G/L	232			
Temperature acc. to DIN EN	min [°F]	-49			
	max [°F]	+302			
Temperature acc. to ASME	min [°F]	-49			
	max [°F]	+302			

Type 439
Approvals

Actual Orifice diameter d_0 [mm]		10
Actual Orifice area A_0 [mm²]		78.5
Actual Orifice diameter d_0 [inch]		0.394
Actual Orifice area A_0 [inch²]		0.122
Europa		**Coefficient of discharge K_{dr}**
PED / DIN EN ISO 4126-1	Approval No.	072020111Z0008/0/21
	S/G	0.45
	L	0.37
Germany		**Coefficient of discharge α_w**
PED / AD 2000-Merkblatt A2	Approval No.	TÜV SV 980
	S/G	0.45
	L	0.37
United States		**Coefficient of discharge K**
ASME Sec. VIII Div. 1	Approval No.	M 37190
	S/G	0.406
	Approval No.	M 37202
	L	0.322
Canada		**Coefficient of discharge K**
CRN	Approval No.	The current approval no. can be found at www.leser.com
	S/G	0.406
	L	0.322
China		**Coefficient of discharge α_w**
AQSIQ	Approval No.	The current approval no. can be found at www.leser.com
	S/G	0.45
	L	0.37
Eurasian Custom Union		**Coefficient of discharge α_w**
EAC	Approval No.	The current approval no. can be found at www.leser.com
	S/G	0.45
	L	0.37

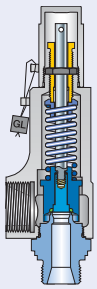
Classification societies		Homepage	
Bureau Veritas	BV	www.bureauveritas.com	The valid certification number is changed with every reneval. A sample certificate including the valid certification number can be found at www.leser.com
DNV GL		www.dnvgl.com	
Lloyd‘ s Register EMEA	LREMEA	www.lr.org	
Registro Italiano Navale	RINA	www.rina.org	
U.S. Coast Guard	U.S.C.G	www.uscg.org	

Rated slope
Within the capacity certification according to ASME Sec. VIII Div. 1 the coefficients of discharge for Series 437 are issued as “rated slope values” instead of K values. Rated slope values can be converted into K values. The table above shows the converted K values. The original rated slope values are listed below.

Fluid	Rated slope Type 439
S	2.55 lb / hr / PSIA
G	0.904 SCFM / PSIA
L	1.49 GPM √PSID

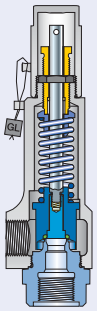
Series 437
Available options

Male thread



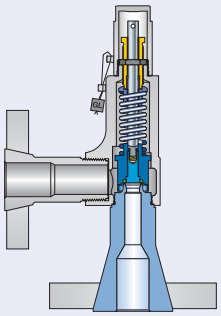
Type 437

Female thread



Type 437

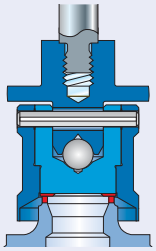
Flanged version



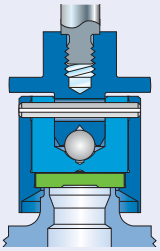
Type 438

Type 439

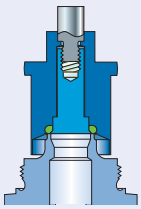
Stellited sealing surface
J25: Disc stellited
L20: Base/inlet body



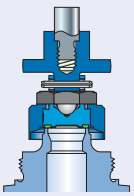
Disc with inserted sealing plate
J44: PTFE-FDA “A”
J48: PCTFE “G”
J49: VESPEL-SP1 “T”



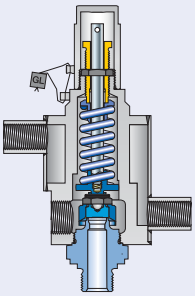
Soft seal o-ring disc
J30: NBR “N”
J21: CR “K”
J22: EPDM “D”
J23: FKM “L”
J20: FFKM “C”



Vulcanized soft seal disc
J30: NBR “N”
J21: CR “K”
J22: EPDM “D”
J23: FKM “L”
J20: FFKM “C”

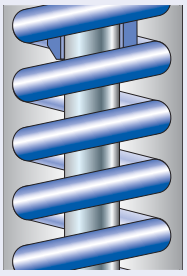


Heating jacket
H29

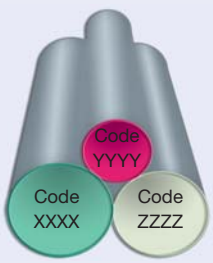


Test gag
J70: H2

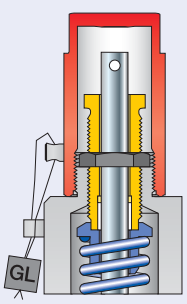
INCONEL X-750 spring
X08



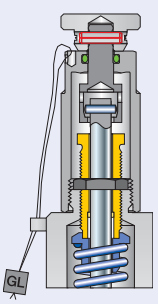
Special material
2.4610 Hastelloy® C4
2.4360 Monel® 400
1.4462 Duplex



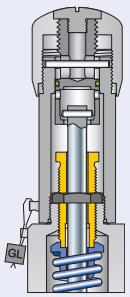
Cap H2



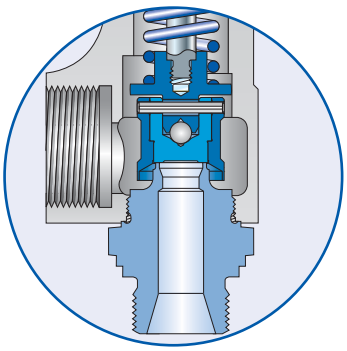
Pull button H3



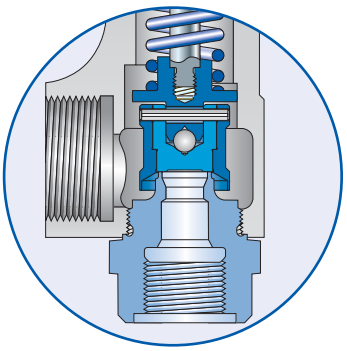
Gastight lifting device H4



Series 437
Available connections



Male thread



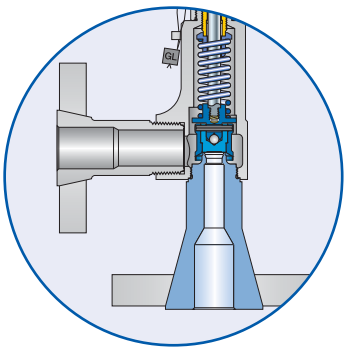
Female thread

Threaded connections

	Valve size	d_0 6 mm		d_0 10 mm	
		Inlet	Outlet	Inlet	Outlet
		Option code	Option code	Option code	Option code
Male thread DIN ISO 228-1					
G	3/8"	V49	–	V49	–
	1/2 "	V54	–	V54	–
	3/4"	V55	–	V55	–
	1"	V56	–	V56	–
Female thread DIN ISO 228-1					
G	1/2"	V50	V65	V50	V65
	3/4"	V51	V76	V51	V76
	1"	V52	V66	V52	V66
Male thread ISO 7- 1 / BS 21					
R/BSPT	1/2"	V30	–	V30	–
	3/4"	V31	–	V31	–
	1"	V32	–	V32	–
Female thread ISO 7- 1 / BS 21					
Rc/BSPT	1/2"	V38	V34	V38	V34
	3/4"	V39	V35	V39	V35
	1"	V40	V36	V40	V36
Male thread ANSI / ASME B1.20.1					
NPT	1/2"	V61	–	V61	–
	3/4"	V62	–	V62	–
	1"	V63	–	V63	–
Female thread ANSI / ASME B1.20.1					
NPT	1/2"	V58	V70	V58	V70
	3/4"	V59	V77	V59	V77
	1"	V60	V71	V60	V71

Flanged and threaded connections can be combined.
Threads according to other standards are available.
Please specify in writing (diameter, pressure rating, standard).

Series 437
Available connections



Flanged version

Flanged connections

Nominal diameter	Pressure rating	d_0 6 mm		d_0 10 mm	
DIN EN 1092-1					
		Option code		Option code	
DN	**PN**	**Inlet**	**Outlet**	**Inlet**	**Outlet**
15	40		I40	I21	I40
	160		I41	I22	I41
	250	I23	I42	I23	I42
	320	I24	–	I24	–
	400	I25	–	I25	–
20	40	I26	I43	I26	I43
	100	I27	I44	I27	I44
25	40		I46	I31	I46
	160		I47	I32	I47
	250	I33	I48	I33	I48
	320	I34	–	I34	–
	400	I35	–	I35	–
ANSI/ASME B16.5					
		Option code		Option code	
NPS	**CL**	**Inlet**	**Outlet**	**Inlet**	**Outlet**
1/2"	150		V24	V01	V24
	300		V13	V02	V13
	600		V13	V02	V13
	900	V03	V14	V03	V14
	1500	V03	–	V03	–
	2500	V04	–	V04	–
3/4"	150		V15	V05	V15
	300		V16	V06	V16
	600		V16	V06	V16
	900	V07	V17	V07	V17
	1500	V07	–	V07	–
	2500	V08	–	V08	–
1"	150		V18	V09	V18
	300		V19	V10	V19
	600		V19	V10	V19
	900	V11	V20	V11	V20
	1500	V11	–	V11	–
	2500	V12	–	V12	–

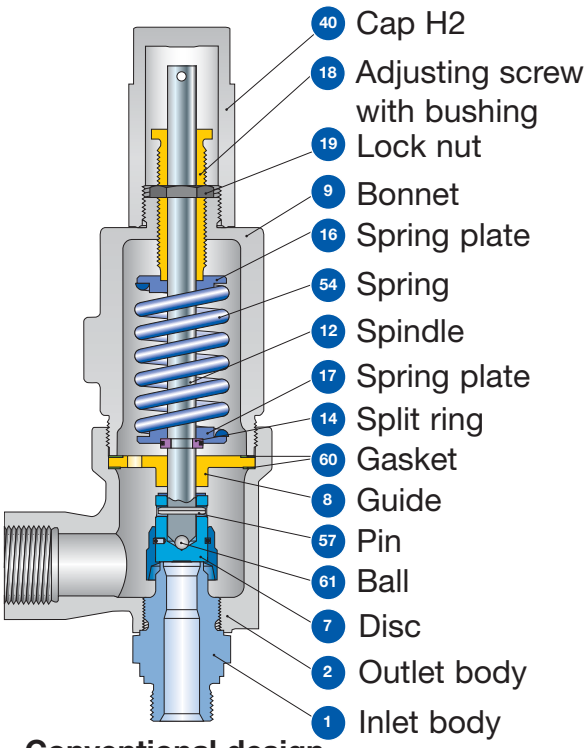
Flanged and threaded connections can be combined.
Threads according to other standards are available.
Please specify in writing (diameter, pressure rating, standard).

Type 459
Plain lever H3

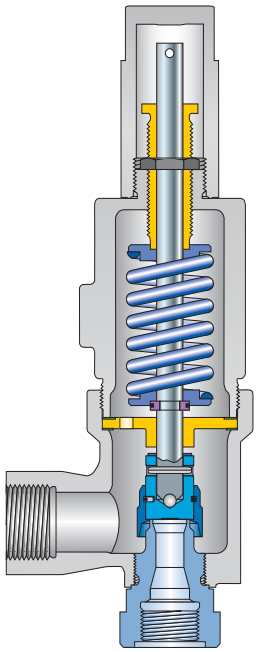
Type 459
Safety Relief Valves

Type 459
Cap H2

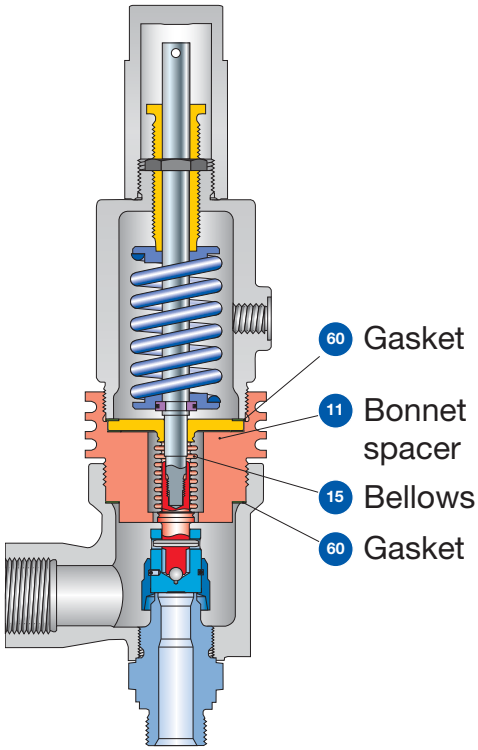
Type 459
Designs



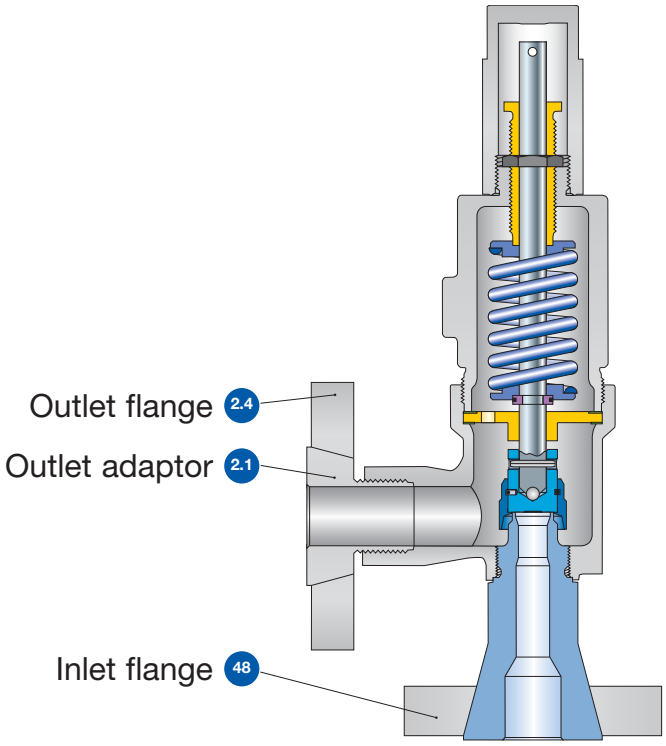
Conventional design
Threaded connection



Conventional design
Threaded connection



Balanced bellows
Threaded connection



Conventional design
Flange connection

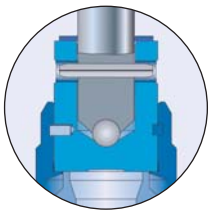
Type 459
Materials

Item	Component	Design	Type 4593	Type 4592	Type 4594
1	Base / Inlet body	Threaded connection	1.4104[1], 1.4404 SA 479 430[1], SA 479 316L	1.4404 SA 479 316L	1.4404 SA 479 316L
		Flange connection	1.4404 SA 479 316L	1.4404 SA 479 316L	1.4404 SA 479 316L
2	Outlet body		1.0619 WCB	1.0619 WCB	1.4408 CF8M
2.1	Outlet adaptor	Flange connection	1.4404 316L	1.4404 316L	1.4404 316L
2.4	Outlet flange	Flange connection	1.4404 316L	1.4404 316L	1.4404 316L
7	Disc	Metal seat	1.4122 Hardened stainless steel	1.4122 Hardened stainless steel	1.4404 316L
8	Guide		1.4104 tenifer Chrome steel tenifer	1.4104 tenifer Chrome steel tenifer	1.4404 316L
		Balanced bellows design	1.4404 / SA 316L Upper conn. part of balanced bellows	1.4404 / SA 316L Upper conn. part of balanced bellows	1.4404 / SA 316L Upper conn. part of balanced bellows
9	Bonnet		0.7043 Ductile Gr. 60-40-18	1.0619 WCB	1.4408 CF8M
		Balanced bellows design	1.0619 WCB	1.0619 WCB	1.4408 CF8M
11	Bonnet spacer	Balanced bellows design	1.0460 Carbon steel	1.0460 Carbon steel	1.4404 316L
12	Spindle		1.4021 420	1.4021 420	1.4404 316L
		Balanced bellows design	1.4404 316L	1.4404 316L	1.4404 316L
14	Split ring		1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L
15	Bellows	Balanced bellows design	1.4571 SA 316Ti	1.4571 316Ti	1.4571 316Ti
16/17	Spring plate		1.0718 Steel	1.0718 Steel	1.4404 316L
18	Adjusting screw with bushung		1.4104 / PTFE Chrome steel / PTFE	1.4104 / PTFE Chrome steel / PTFE	1.4404 / PTFE 316L / PTFE
19	Lock nut		1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L
40	Cap H2		1.0460 SA 105	1.0460 SA 105	1.4404 316L
48	Inlet flange	Flange connection	1.4404 316L	1.4404 316L	1.4404 316L
54	Spring	Standard	1.1200 / 1.8159 / 1.7107 Carbon steel	1.1200 / 1.8159 / 1.7107 Carbon steel	1.4310 Stainless steel
		Optional	1.4310 Stainless steel	1.4310 Stainless steel	– –
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

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

[1] only valid for male thread DIN ISO 228-1 G¾, G1, G1½ (Option codes V55, V56, V57) (please note availability regarding d_0)

Type 459
Article numbers



Metal seat

			Actual Orifice diameter d_0 [mm]	9	13	17.5
			Actual Orifice area A_0 [mm²]	63.6	133	241
			Actual Orifice diameter d_0 [inch]	0.354	0.512	0.689
			Actual Orifice area A_0 [inch²]	0.099	0.206	0.374
Outlet body casted						
Inlet body	**1.4104**	**H2**	Art. No. **4593.**	**2502**	**2512**	**2522**
Outlet body	**1.0619 WCB**	**H3**	Art. No. **4593.**	**2503**	**2513**	**2523**
Bonnet	**0.7043**	**H4**	Art. No. **4593.**	**2504**	**2514**	**2524**
	p [bar_g]		S/G/L	**1.5 – 250[1)]**	**0.2 – 200[1)]**	**0.2 – 100[1)]**
	p [psig]			**21.7 – 3625[1)]**	**2.9 – 2900[1)]**	**2.9 – 1450[1)]**
Outlet body investment casted						
Inlet body	**1.4404**	**H2**	Art. No. **4592.**	**2472**	**2482**	**2492**
Outlet body	**1.0619 WCB**	**H3**	Art. No. **4592.**	**2473**	**2483**	**2493**
Bonnet	**1.0619**	**H4**	Art. No. **4592.**	**2474**	**2484**	**2494**
	p [bar_g]		S/G/L	**1.5 – 250**	**0.2 – 200**	**0.2 – 100**
	p [psig]			**21.7 – 3625**	**2.9 – 2900**	**2.9 – 1450**
Outlet body investment casted						
Inlet body	**1.4404**	**H2**	Art. No. **4594.**	**2162**	**2172**	**2182**
Outlet body	**1.4408 (CF8M)**					
Bonnet	**1.4408**	**H4**	Art. No. **4594.**	**2164**	**2174**	**2184**
	p [bar_g]		S/G/L	**1.5 – 250**	**0.2 – 200**	**0.2 – 100**
	p [psig]			**21.7 – 3625**	**2.9 – 2900**	**2.9 – 1450**

[1)] Max. set pressure 69 bar / 1000 psig for Type 4593 acc. to ASME-Code Sec. VIII, Div. 1 with UV-Stamp.
The design of Type 4593 is permitted with limitations acc. to ASME-Code Sec. VIII, Div. 1, UCD-2, UCD-3.
Type 4593 shall not be used for lethal substances, irrespective of their state of aggregation.

Type 459

Dimensions and weights

Threaded connections [Metric units]

Size Outlet body			1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"	3/4" x 1 1/2"	1" x 1 1/2"	1 1/4" x 1 1/2"	1 1/2" x 1 1/2"
Actual Orifice diameter d_0 [mm]			9	9	9	13	13	13	17.5	17.5	17.5	17.5
Actual Orifice area A_0 [mm²]			63.6	63.6	63.6	133	133	133	241	241	241	241
Weight		[kg]	3.1	3.1	3.1	3.1	3.1	3.1	3.9	3.9	3.9	3.9
	Balanced bellows	[kg]	3.9	3.9	3.9	3.9	3.9	4.7	4.7	4.7	4.7	4.7
Required installation diameter d		[mm]	165	165	165	165	165	165	165	165	165	165

Inlet thread female

Size outlet body			1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"	3/4" x 1 1/2"	1" x 1 1/2"	1 1/4" x 1 1/2"	1 1/2" x 1 1/2"
Actual Orifice diameter d_0 [mm]			9	9	9	13	13	13	17.5	17.5	17.5	17.5
Center to face / Height												
DIN ISO 228-1 / **ASME B1.20.1**	**G** / **NPT**	Inlet a	53	56	62	53	56	62	60	66	67	73
Center to face [mm]		Outlet b	75	75	75	75	75	75	75	75	75	75
Height [mm]		H max	283	286	292	283	286	292	287	293	294	300
	Balanced bellows	H max	315	318	324	315	318	324	319	325	326	332
ISO 7-1/BS 21	**Rc**	Inlet a	53	56	64	53	56	64	60	68	–	77
Center to face [mm]		Outlet b	75	75	75	75	75	75	75	75	–	75
Height [mm]		H max	283	286	294	283	286	294	287	295	–	304
	Balanced bellows	H max	315	318	326	315	318	326	319	327	–	336

Inlet thread male

Size outlet body			1" – 1 1/2"	1" – 1 1/2"	1 1/2"	2"
Actual Orifice diameter d_0 [mm]			9	13	17.5	17.5
Center to face [mm]						
DIN ISO 228-1	**G**	Inlet 1/2" – 1" a	52	52	–	–
		Inlet 1"– 1 1/2" a	–	–	56	–
		Outlet b	75	75	75	–
ISO 7-1/BS 21	**R**	Inlet 1/2" – 1" a	49	49	–	–
ASME B1.20.1	**NPT**	Inlet 1" – 2" a[1)]	–	–	53	53
		Outlet b	75	75	75	100

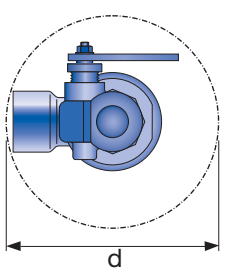
Height [mm]

			Conventional design						Balanced bellows					
Size inlet thread			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
DIN ISO 228-1	**G**	H max.	296	298	301	303	305	–	328	330	333	335	337	–
ISO 7-1/BS 21	**R**	H max.	298	299	303	–	305	–	330	331	335	–	337	–
ASME B1.20.1	**NPT**	H max.	301	301	307	308	308	309	333	333	339	340	340	341

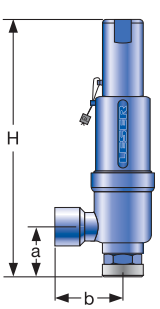
Length of screwed end c [mm]

Size inlet thread		1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
DIN ISO 228-1	**G**	14	16	18	20	22	–
ISO 7-1/BS 21	**R**	19	20	23	–	25	–
ASME B1.20.1	**NPT**	22	22	27	28	28	29

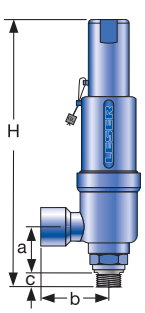
[1)] Inlet thread R only up to 1 1/2".



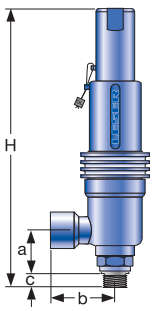
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

Type 459
Dimensions and weights
Threaded connections [US units]

Size Outlet body			1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"	3/4" x 1 1/2"	1" x 1 1/2"	1 1/4" x 1 1/2"	1 1/2" x 1 1/2"
Actual Orifice diameter d_0 [inch]			0.354	0.354	0.354	0.512	0.512	0.512	0.689	0.689	0.689	0.689
Actual Orifice area A_0 [inch^2]			0.099	0.099	0.099	0.206	0.206	0.206	0.374	0.374	0.374	0.374
Weight		[lbs]	6.8	6.8	6.8	6.8	6.8	6.8	8.6	8.6	8.6	8.6
	Balanced bellows	[lbs]	8.6	8.6	8.6	8.6	8.6	8.6	10.4	10.4	10.4	10.4
Required installation diameter d		[inch]	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2

Inlet thread female

Size outlet body			1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"	3/4" x 1 1/2"	1" x 1 1/2"	1 1/4" x 1 1/2"	1 1/2" x 1 1/2"
Actual Orifice diameter d_0 [inch]			0.354	0.354	0.354	0.512	0.512	0.512	0.689	0.689	0.689	0.689
Center to face / Height												
DIN ISO 228-1	**G**	Inlet a	2 3/32	2 7/32	2 7/16	2 3/32	2 7/32	2 7/16	2 3/8	2 19/32	2 5/8	2 7/8
ASME B1.20.1	**NPT**											
Center to face [inch]		Outlet b	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16
Height [inch]		H max.	11 5/32	11 1/14	11 1/2	11 5/32	11 1/14	11 1/2	11 5/16	11 17/32	11 9/16	11 13/16
	Balanced bellows	H max.	12 13/32	12 17/32	12 3/4	12 13/32	12 17/32	12 3/4	12 9/16	12 25/32	12 27/32	13 1/16
ISO 7-1/BS 21	**Rc**	Inlet a	2 3/32	2 7/32	2 17/32	2 3/32	2 7/32	2 17/32	2 3/8	2 11/16	–	3 1/32
Center to face [inch]		Outlet b	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	–	2 15/16
Height [inch]		H max.	11 5/32	11 1/14	11 9/16	11 5/32	11 1/14	11 9/16	11 5/16	11 5/8	–	11 31/32
	Balanced bellows	H max.	12 13/32	12 17/32	12 27/32	12 13/32	12 17/32	12 27/32	12 9/16	12 7/8	–	13 7/32

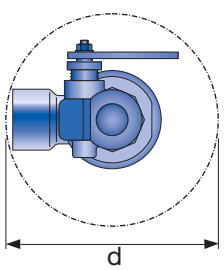
Inlet thread male

Size outlet body			1" – 1 1/2"	1" – 1 1/2"	1 1/2"	2"
Actual Orifice diameter d_0 [mm]			0.354	0.512	0.689	0.689
Center to face [inch]						
DIN ISO 228-1	**G**	Inlet 1/2" – 1" a	2 1/16	2 1/16	–	–
		Inlet 1"– 1 1/2" a	–	–	2 7/32	–
		Outlet b	2 15/16	2 15/16	2 15/16	–
ISO 7-1/BS 21	**R**	Inlet 1/2" – 1" a	1 15/16	1 15/16	–	–
ASME B1.20.1	**NPT**	Inlet 1" – 2" a[1)]	–	–	2 3/32	2 3/32
		Outlet b	2 15/16	2 15/16	2 15/16	4

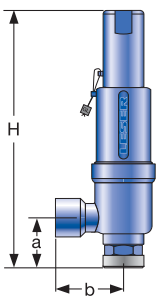
Height [inch]													
			Conventional design						**Balanced bellows**				
		Size inlet thread	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
DIN ISO 228-1	**G**	H max.	11 21/32	11 23/32	11 27/32	11 15/16	12	–	12 29/32	13	13 1/8	13 3/16	13 9/32	–
ISO 7-1/BS 21	**R**	H max.	11 23/32	11 25/32	11 15/16	–	12	–	13	13 1/32	13 3/16	–	13 9/32	–
ASME B1.20.1	**NPT**	H max.	11 27/32	11 27/32	12 3/32	12 1/8	12 1/8	12 5/32	13 1/8	13 1/8	13 11/32	13 3/8	13 3/8	13 7/16

Length of screwed end c [inch]								
		Size inlet thread	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
DIN ISO 228-1	**G**		9/16	5/8	23/32	25/32	7/8	–
ISO 7-1/BS 21	**R**		3/4	25/32	29/32	–	31/32	–
ASME B1.20.1	**NPT**		7/8	7/8	1 1/16	1 3/32	1 3/32	1 5/32

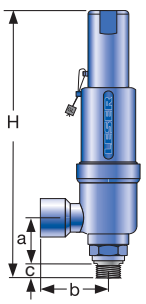
[1)] Inlet thread R only to 1 1/2".



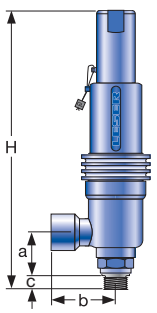
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

Type 459
Dimensions and weights
Flanged connections [Metric units]

			Conventional design			Balanced bellows		
Actual Orifice diameter d_0 [mm]			9	13	17.5	9	13	17.5
Actual Orifice area A_0 [mm²]			63.6	133	241	63.6	133	241
DIN EN 1092-1 (Available flange sizes refer to page 09/07)								
			Flange rating PN 40 – PN 400					
Center to face	[mm]	Inlet a	100	100	105	100	100	105
		Outlet b	100	100	100	100	100	100
Height	[mm]	H max.	330	330	333	375	375	378
ASME B 16.5 (Available flange sizes refer to page 09/07)								
			Flange rating class 150 – 2500					
Center to face	[mm]	Inlet a	100	100	105	100	100	105
		Outlet b	100	100	100	100	100	100
Height	[mm]	H max.	330	330	333	375	375	378

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

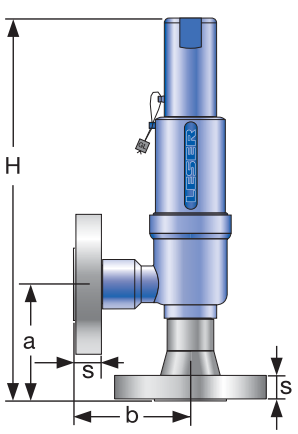
Weight

For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)

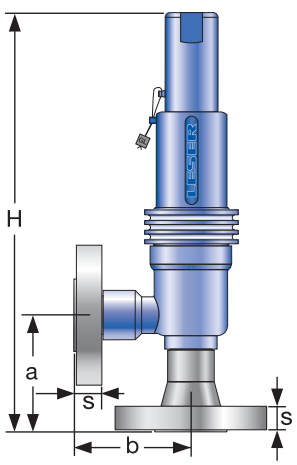
Weight net (without inlet and outlet flange)	[kg]	m_N	3.1	3.1	3.9	4.3	4.3	5.1

Flange dimensions

			DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating						
		Size	40	100	160	250	320	400	Size	150	300	600	900	1500	2500
DN 15									**NPS 1/2"**						
Flange thickness	[mm]	s	18	–	22	28	28	30		14	18	18	26	26	30.2
Weight slip on flange	[kg]	m_F	0.8	–	1.2	2.5	2.5	3.6		0.6	0.9	0.9	2.1	2.1	3
DN 20									**NPS 3/4"**						
Flange thickness	[mm]	s	20	22	–	–	–	–		15	18	18	25.4	25.4	32
Weight slip on flange	[kg]	m_F	1.1	1.3	–	–	–	–		0.8	1.4	1.4	2.3	2.3	3.5
DN 25									**NPS 1"**						
Flange thickness	[mm]	s	22	–	26	30	36	40		17	21.5	21.5	32.5	32.5	40
Weight slip on flange	[kg]	m_F	1.3	–	2.6	3.5	5	7.5		1	2.1	2.1	4.1	4.1	5.1
DN 40									**NPS 1 1/2"**						
Flange thickness	[mm]	s	21	–	23	32	–	–		22	24	24	32	–	–
Weight slip on flange	[kg]	m_F	2.1	–	2.9	4.3	–	–		1.4	2.2	2.2	3.9	–	–



Conventional design



Balanced bellows

Type 459
Dimensions and weights
Flanged connections [US units]

			Conventional design			Balanced bellows		
Actual Orifice diameter d_0 [inch]			0.354	0.512	0.689	0.354	0.512	0.689
Actual Orifice area A_0 [inch^2]			0.099	0.206	0.374	0.099	0.206	0.374
DIN EN 1092-1								
			Flange rating PN 40 – PN 400					
Center to face	[inch]	Inlet a	$3^{15}/_{16}$	$3^{15}/_{16}$	$4^{1}/_{8}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$4^{1}/_{8}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height [H4]	[inch]	H max.	13	13	$13^{1}/_{8}$	$14^{3}/_{4}$	$14^{3}/_{4}$	$14^{7}/_{8}$
ASME B 16.5								
			Flange rating class 150 – 2500					
Center to face	[inch]	Inlet a	$3^{15}/_{16}$	$3^{15}/_{16}$	$4^{1}/_{8}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$4^{1}/_{8}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	13	13	$13^{1}/_{8}$	$14^{3}/_{4}$	$14^{3}/_{4}$	$14^{7}/_{8}$

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

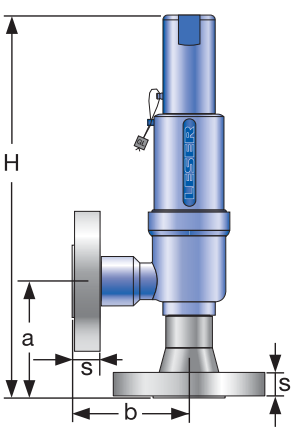
Weight

For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)

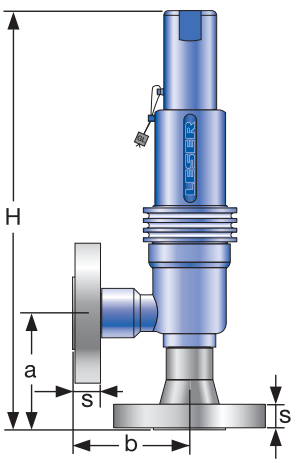
Weight net (without inlet and outlet flange)	[lbs]	m_N	6.8	6.8	8.6	9.5	9.5	11.3

Flange dimensions

			DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating						
		Size	40	100	160	250	320	400	**Size**	150	300	600	900	1500	2500
DN 15									**NPS $^{1}/_{2}$"**						
Flange thickness	[inch] s		$^{23}/_{32}$	–	$^{7}/_{8}$	$1^{3}/_{32}$	$1^{3}/_{32}$	$1^{3}/_{16}$		$^{9}/_{16}$	$^{23}/_{32}$	$^{23}/_{32}$	$1^{1}/_{32}$	$1^{1}/_{32}$	$1^{3}/_{16}$
Weight slip on flange	[lbs] m_F		1.8	–	2.6	5.5	5.5	7.9		1.3	2.0	2.0	4.6	4.6	6.6
DN 20									**NPS $^{3}/_{4}$"**						
Flange thickness	[inch] s		$^{25}/_{32}$	$^{7}/_{8}$	–	–	–	–		$^{19}/_{32}$	$^{23}/_{32}$	$^{23}/_{32}$	1	1	$1^{1}/_{4}$
Weight slip on flange	[lbs] m_F		2.4	2.9	–	–	–	–		1.8	3.1	3.1	5.1	5.1	7.7
DN 25									**NPS 1"**						
Flange thickness	[inch] s		$^{7}/_{8}$	–	$1^{1}/_{32}$	$1^{3}/_{16}$	$1^{13}/_{32}$	$1^{9}/_{16}$		$^{21}/_{32}$	$^{27}/_{32}$	$^{27}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{16}$
Weight slip on flange	[lbs] m_F		2.9	–	5.7	7.7	11.0	16.5		2.2	4.6	4.6	9.0	9.0	11.2
DN 40									**NPS $1^{1}/_{2}$"**						
Flange thickness	[inch] s		$^{13}/_{16}$	–	$^{29}/_{32}$	$1^{1}/_{4}$	–	–		$^{7}/_{8}$	$^{15}/_{16}$	$^{15}/_{16}$	$1^{1}/_{4}$	–	–
Weight slip on flange	[lbs] m_F		4.5	–	6.3	9.5	–	–		3.2	4.8	4.8	8.6	–	–



Conventional design



Balanced bellows

Type 459

Pressure/temperature ratings

[Metric units]

Actual Orifice diameter d_0 [mm]		9			13			17.5				
Actual Orifice Area A_0 [mm²]		63.6			133			241				
Body material: 1.4104 (430)		**Type 4593**										
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
	Pressure rating	PN 400			PN 250			PN 160				
Outlet body	Pressure rating	PN 40			PN 40			PN 40				
Minimum set pressure	p [bar_g] S/G/L	1.5			0.2			0.2				
Min. set pressure standard bellows	p [bar_g] S/G/L	3			3			3				
Min. set pressure[5] high press. bellows	p [bar_g] S/G/L	40			40			40				
Maximum set pressure	p [bar_g] S/G/L	250			200			100				
Temperature acc. to DIN EN	min. [°C]	-10										
	max. [°C]	+300										
Temperature acc. to ASME	min. [°C]	-29										
	max. [°C]	+300										
Body material: 1.4404 (316L)		**Type 4592**										
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
	Pressure rating	PN 250 PN 500 (Option code L20)			PN 160 PN 250 (Option code L20)			PN 160				
Outlet Body	Pressure rating	PN 160			PN 160			PN 160				
Minimum set pressure	p [bar_g] S/G/L	1.5			0.2			0.2				
Min. set pressure standard bellows	p [bar_g] S/G/L	3			3			3				
Min. set pressure[5] high press. bellows	p [bar_g] S/G/L	40			40			40				
Maximum set pressure	p [bar_g] S/G/L	250			200			100				
Temperature acc. to DIN EN	min. [°C]	-85[1]										
	max. [°C]	+450[2]										
Temperature acc. to ASME	min. [°C]	-29										
	max. [°C]	+427										
Body material: 1.4404 (316L)		**Type 4594**										
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
	Pressure rating	PN 250 PN 500 (Option code L20)			PN 160 PN 250 (Option code L20)			PN 160				
Outlet Body	Pressure rating	PN 160			PN 160			PN 160				
Minimum set pressure	p [bar_g] S/G/L	1.5			0.2			0.2				
Min. set pressure standard bellows	p [bar_g] S/G/L	3			3			3				
Min. set pressure[5] high press. bellows	p [bar_g] S/G/L	40			40			40				
Maximum set pressure	p [bar_g] S/G/L	250			200			100				
Temperature acc. to DIN EN	min. [°C]	-273[3]										
	max. [°C]	+400[2]										
Temperature acc. to ASME	min. [°C]	-196										
	max. [°C]	+450[2] [4]										

[1] For DIN EN applications at temperatures under -10 °C please proceed in accordance to AD-2000 Merkblatt W10:
- Load case II: under -10 °C / 14 °F to -60 °C / -76 °F, p_{max} = PN x 0.75
- Load case III: under -60 °C / -76 °F to -85 °C / -121 °F, p_{max} = PN x 0.25

[2] Please notice: from 300 °C / 572 °F a bellows or suitable spring material e.g. Inconel X750 should be selected (refer to LDeS 3001.19).

[3] For DIN EN applications at temperatures under -200 °C please proceed in accordance to AD-2000 Merkblatt W10:
- Load case II: under -200 °C / -328 °F to -255 °C / -427 °F, p_{max} = PN x 0.75
- Load case III: under -255 °C / -427°F to -273 °C / -459 °F, p_{max} = PN x 0.25

[4] The temperature is limited by the standard inlet body. For applications up to 538 °C/1000 °F (temperature limit of outlet body) a suitable inlet body material and a bellows or Inconel spring is requiered.

[5] Min. set pressure high pressure bellows = Max. pressure standard bellows.
Because there is no open bonnet for this type available, please use at a temperature of 300 °C (572 °F) a stainless steel bellows or a specific high temperature model without a bellows.

Type 459
Pressure/temperature ratings
[US units]

Actual Orifice diameter d_0 [inch]		0.354			0.512			0.689				
Actual Orifice Area A_0 [inch^2]		0.099			0.206			0.347				
Body material: 1.4104 (430)					**Type 4593**							
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
Minimum set pressure	p [psig] S/G/L	21.8			2.9			2.9				
Min. set pressure[5] standard bellows	p [psig] S/G/L	43.5			43.5			43.5				
Min. set pressure high press. bellows	p [psig] S/G/L	580			580			580				
Maximum set pressure	p [psig] S/G/L	3625			2900			1450				
Temperature acc. to DIN EN	min. [°F]	+14										
	max. [°F]	+572										
Temperature acc. to ASME	min. [°F]	-20										
	max. [°F]	+572										
Body material: 1.4404 (316L)					**Type 4592**							
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
Minimum set pressure	p [psig] S/G/L	21.8			2.9			2.9				
Min. set pressure[5] standard bellows	p [psig] S/G/L	43.5			43.5			43.5				
Min. set pressure high press. bellows	p [psig] S/G/L	580			580			580				
Maximum set pressure	p [psig] S/G/L	3625			2900			1450				
Temperature acc. to DIN EN	min. [°F]	-121[1]										
	max. [°F]	+752[2]										
Temperature acc. to ASME	min. [°F]	-20										
	max. [°F]	+800[2]										
Body material: 1.4404 (316L)					**Type 4594**							
Base / Inlet Body	Connection size	1 1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
Minimum set pressure	p [psig] S/G/L	21.8			2.9			2.9				
Min. set pressure[5] standard bellows	p [psig] S/G/L	43.5			43.5			43.5				
Min. set pressure high press. bellows	p [psig] S/G/L	580			580			580				
Maximum set pressure	p [psig] S/G/L	3625			2900			1450				
Temperature acc. to DIN EN	min. [°F]	-328[3]										
	max. [°F]	+752[2]										
Temperature acc. to ASME	min. [°F]	-321										
	max. [°F]	+842[2] [4]										

[1] For DIN EN applications at temperatures under -10 °C please proceed in accordance to AD-2000 Merkblatt W10:
- Load case II: under -10 °C / 14 °F to -60 °C / -76 °F, p_{max} = PN x 0.75
- Load case III: under -60 °C / -76 °F to -85 °C / -121 °F, p_{max} = PN x 0.25

[2] Please notice: from 300 °C / 572 °F a bellows or suitable spring material e.g. Inconel X750 should be selected (refer to LDeS 3001.19).

[3] For DIN EN applications at temperatures under -200 °C please proceed in accordance to AD-2000 Merkblatt W10:
- Load case II: under -200 °C / -328 °F to -255 °C / -427 °F, p_{max} = PN x 0.75
- Load case III: under -255 °C / -427°F to -273 °C / -459 °F, p_{max} = PN x 0.25

[4] The temperature is limited by the standard inlet body. For applications up to 538 °C/1000 °F (temperature limit of outlet body) a suitable inlet body material and a bellows or Inconel spring is requiered.

[5] Min. set pressure high pressure bellows = Max. pressure standard bellows.
Because there is no open bonnet for this type available, please use at a temperature of 300 °C (572 °F) a stainless steel bellows or a specific high temperature model without a bellows.

Type 459
Approvals

Actual Orifice diameter d_0 [mm]		9	13	17.5
Actual Orifice area A_0 [mm²]		63.6	133	241
Actual Orifice diameter d_0 [inch]		0.354	0.512	0.689
Actual Orifice area A_0 [inch²]		0.099	0.206	0.374
Europe		**Coefficient of discharge K_{dr}**		
PED / DIN EN ISO 4126-1	Approval No.	072021409Z0022/15/D/0135		
	S/G	0.83	0.81	0.79
	L	0.61	0.53	0.52
Germany		**Coefficient of discharge α_w**		
PED / AD 2000-Merkblatt A2	Approval No.	TÜV SV 909		
	S/G	0.83	0.81	0.79
	L	0.61	0.53	0.52
United States		**Coefficient of discharge K**		
ASME Sec. VIII Div. 1	Approval No.	M 37112		
	S/G	0.811		
	Approval No.	M 37101		
	L	0.566		
Canada		**Coefficient of discharge K**		
CRN	Approval No.	The current approval no. can be found at www.leser.com		
	S/G	0.811		
	L	0.566		
China		**Coefficient of discharge α_w**		
AQSIQ	Approval No.	The current approval no. can be found at www.leser.com		
	S/G	0.83	0.81	0.79
	L	0.61	0.53	0.52
Eurasian Custom Union		**Coefficient of discharge α_w**		
EAC	Approval No.	The current approval no. can be found at www.leser.com		
	S/G	0.83	0.81	0.79
	L	0.61	0.53	0.52

Classification societies		**Homepage**	
Bureau Veritas	BV	www.bureauveritas.com	The valid certification number is changed with every reneval. A sample certificate including the valid certification number can be found at www.leser.com
DNV GL		www.dnvgl.com	
Lloyd's Register EMEA	LREMEA	www.lr.org	
Registro Italiano Navale	RINA	www.rina.org	
U.S. Coast Guard	U.S.C.G	www.uscg.org	

Type 459 HDD
Cap H2

Type 459 HDD
Safety Relief Valves

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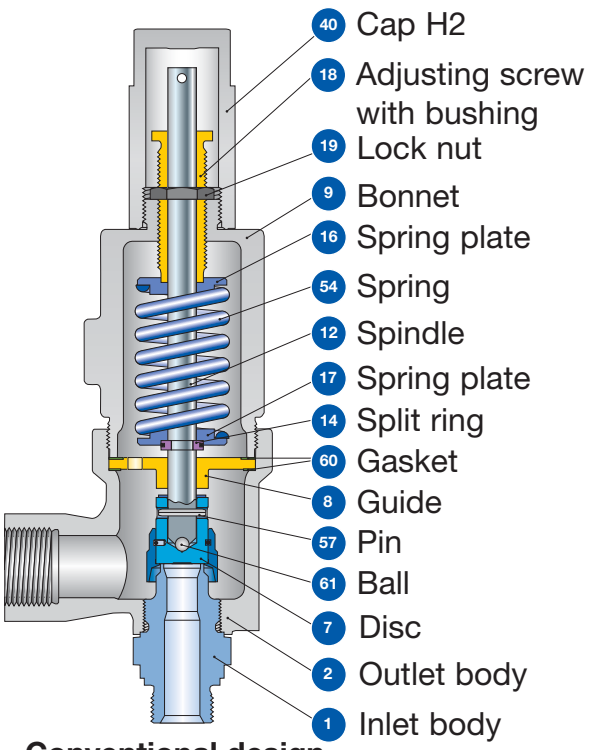
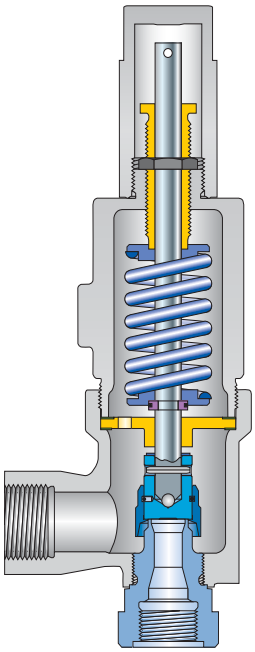
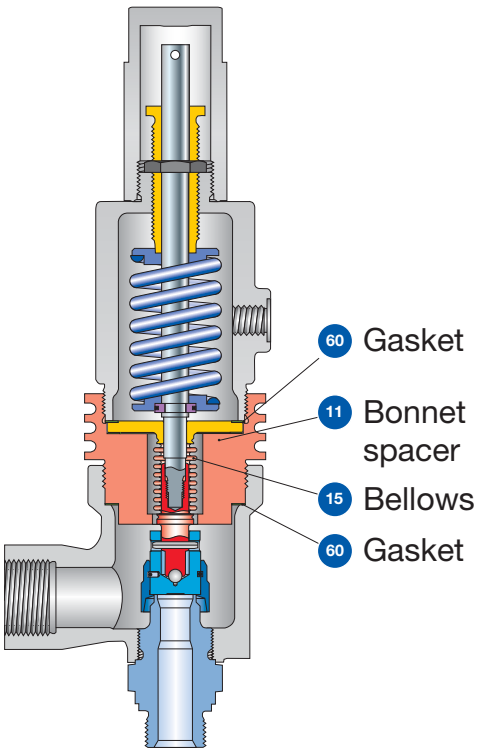
Type 459 HDD
Designs



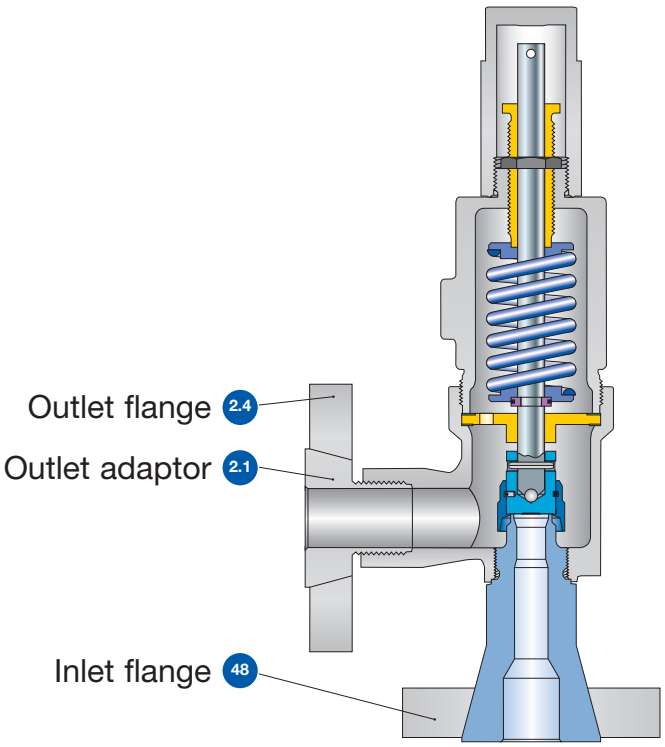
Conventional design
Threaded connection



Conventional design
Threaded connection



Balanced bellows
Threaded connection



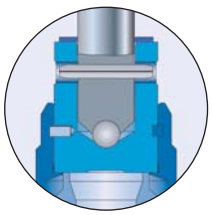
Conventional design
Flange connection

Type 459 HDD
Materials

Item	Component	Design	Type 4594 HDD
1	Base / Inlet body	Threaded connection	1.4404 stellited
			SA 479 316L stellited
		Flange connection	1.4404 stellited
			SA 479 316L stellited
2	Outlet body		1.4408
			CF8M
2.1	Outlet adaptor	Flange connection	1.4404
			316L
2.4	Outlet flange	Flange connection	1.4404
			316L
7	Disc	Metal seat	1.4404 stellited
			SA 479 316L stellited
8	Guide		1.4404
			316L
		Balanced bellows design	1.4404 / SA 316L
			Upper connection of balanced bellows
9	Bonnet		1.4408
			CF8M
		Balanced bellows design	1.4408
			CF8M
11	Bonnet spacer	Balanced bellows design	1.4404
			316L
12	Spindle		1.4404
			316L
		Balanced bellows design	1.4404
			316L
14	Split ring		1.4404
			316L
15	Bellows	Balanced bellows design	1.4571
			316Ti
16/17	Spring plate		1.4404
			316L
18	Adjusting screw with bushung		1.4404 / PTFE
			316L / PTFE
19	Lock nut		1.4404
			316L
40	Cap H2		1.4404
			316L
48	Inlet flange	Flange connection	1.4404
			316L
54	Spring	Standard	1.4310
			Stainless steel
57	Pin		1.4310
			Stainless steel
60	Gasket		Graphite / 1.4301
			Graphite / 316L
61	Ball		1.4401
			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.
- The materials shall meet the requirements of the relevant regulations (Pressure Equipment Directive (PED), acc. to PED applied harmonized standards, AD 2000-Merkblätter, VdTÜV (Werkstoffblätter) as well as further materials listed in Section 8 of the Type-Examination.

Type 459 HDD
Article numbers



Metal seat

	Actual Orifice diameter d_0 [mm]			6[1)]	9
	Actual Orifice area A_0 [mm²]			28.3	63.9
	Actual Orifice diameter d_0 [inch]			0.236	0.354
	Actual Orifice area A_0 [inch²]			0.044	0.099
Body material: 14404 (316L)					
Outlet body	**1.4408 CF8M**	**H2**	Art. No. **4594.**	**2132**	**2142**
Bonnet	**1.4404 1.4408**	**H4**	Art. No. **4594.**	**2134**	**2144**
	p [bar_g]	S/G/L		**420.01 – 850**	**250.01 – 420**
	p [psig]			**6091 – 12328**	**3626 – 6091**

[1)] The specification of the medium is necessary at liquid applications (Option Code M09).

Type 459 HDD

Dimensions and weights

Threaded connections [Metric units]

Size Outlet body			½" x 1"	¾" x 1"	1" x 1"	½" x 1"	¾" x 1"	1" x 1"
Actual Orifice diameter d_0 [mm]			6	6	6	9	9	9
Actual Orifice area A_0 [mm^2]			28.3	28.3	28.3	63.6	63.6	63.6
Weight		[kg]	3.1	3.1	3.1	3.1	3.1	3.1
	Balanced bellows	[kg]	3.9	3.9	3.9	3.9	3.9	3.9
Required installation diameter d		[mm]	165	165	165	165	165	165

Inlet thread female

Size outlet body			½" x 1"	¾" x 1"	1" x 1"	½" x 1"	¾" x 1"	1" x 1"
Actual Orifice diameter d_0 [mm]			6	6	6	9	9	9
Center to face / Height								
DIN ISO 228-1	**G**	Inlet a	53	53	62*)	53	56	62
ASME B1.20.1	**NPT**							
Center to face [mm]		Outlet b	75	75	75*)	75	75	75
Height [mm]		H max.	283	286	292*)	283	286	292
	Balanced bellows	H max.	315	318	342*)	315	318	324
ISO 7-1/BS 21	**Rc**	Inlet a	53	56	64	53	56	64
Center to face [mm]		Outlet b	75	75	75	75	75	75
Height [mm]		H max.	283	286	294	283	286	294
	Balanced bellows	H max.	315	318	326	315	318	326

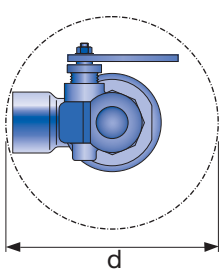
Inlet thread male

Size outlet body			1"	1"
Actual Orifice diameter d_0 [mm]			6	9
Center to face [mm]				
DIN ISO 228-1	**G**	Inlet a	52	52
		Outlet b	75	75
ISO 7-1/BS 21	**R**	Inlet a	49	49
ASME B1.20.1	**NPT**	Outlet b	75	75

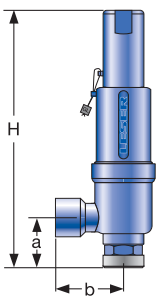
Height [mm]								
			Conventional design			**Balanced bellows**		
		Size inlet thread	1/2"	3/4"	1"	1/2"	3/4"	1"
DIN ISO 228-1	**G**	H max.	296	298	301	328	330	333
ISO 7-1/BS 21	**R**	H max.	298	299	303	330	331	335
ASME B1.20.1	**NPT**	H max.	301	301	307	333	333	339

Length of screwed end c [mm]				
		Size inlet thread	1/2"	3/4"	1"
DIN ISO 228-1	**G**		14	16	18
ISO 7-1/BS 21	**R**		19	20	23
ASME B1.20.1	**NPT**		22	22	27

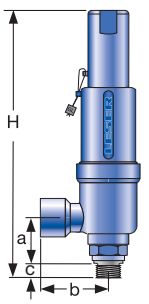
*) DIN ISO 228-1 G not possible.



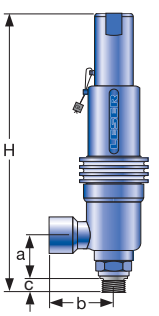
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

Type 459 HDD

Dimensions and weights

Threaded connections [US units]

		Size Outlet body	½" x 1"	¾" x 1"	1" x 1"	½" x 1"	¾" x 1"	1" x 1"
		Actual Orifice diameter d_0 [inch]	0.236	0.236	0.236	0.354	0.354	0.354
		Actual Orifice area A_0 [inch²]	0.044	0.044	0.044	0.099	0.099	0.099
Weight		[lbs]	6.8	6.8	6.8	6.8	6.8	6.8
	Balanced bellows	[lbs]	8.6	8.6	8.6	8.6	8.6	8.6
Required installation diameter d		[inch]	$6^{1}/_{2}$	$6^{1}/_{2}$	$6^{1}/_{2}$	$6^{1}/_{2}$	$6^{1}/_{2}$	$6^{1}/_{2}$

Inlet thread female

		Size outlet body	½" x 1"	¾" x 1"	1" x 1"	½" x 1"	¾" x 1"	1" x 1"
		Actual Orifice diameter d_0 [inch]	0.236	0.236	0.236	0.354	0.354	0.354
Center to face / Height								
DIN ISO 228-1	**G**	Inlet a	$2^{3}/_{32}$	$2^{7}/_{32}$	$2^{7}/_{16}$*)	$2^{3}/_{32}$	$2^{7}/_{32}$	$2^{7}/_{16}$
ASME B1.20.1	**NPT**							
Center to face [inch]		Outlet b	$2^{15}/_{16}$	$2^{15}/_{16}$	$2^{15}/_{16}$*)	$2^{15}/_{16}$	$2^{15}/_{16}$	$2^{15}/_{16}$
Height [inch]		H max.	$11^{5}/_{32}$	$11^{1}/_{14}$	$11^{1}/_{2}$*)	$11^{5}/_{32}$	$11^{1}/_{14}$	$11^{1}/_{2}$
	Balanced bellows	H max.	$12^{13}/_{32}$	$12^{17}/_{32}$	$12^{3}/_{4}$*)	$12^{13}/_{32}$	$12^{17}/_{32}$	$12^{3}/_{4}$
ISO 7-1/BS 21	**Rc**	Inlet a	$2^{3}/_{32}$	$2^{7}/_{32}$	$2^{17}/_{32}$	$2^{3}/_{32}$	$2^{7}/_{32}$	$2^{17}/_{32}$
Center to face [inch]		Outlet b	$2^{15}/_{16}$	$2^{15}/_{16}$	$2^{15}/_{16}$	$2^{15}/_{16}$	$2^{15}/_{16}$	$2^{15}/_{16}$
Height [inch]		H max.	$11^{5}/_{32}$	$11^{1}/_{14}$	$11^{9}/_{16}$	$11^{5}/_{32}$	$11^{1}/_{14}$	$11^{9}/_{16}$
	Balanced bellows	H max.	$12^{13}/_{32}$	$12^{17}/_{32}$	$12^{27}/_{32}$	$12^{13}/_{32}$	$12^{17}/_{32}$	$12^{27}/_{32}$

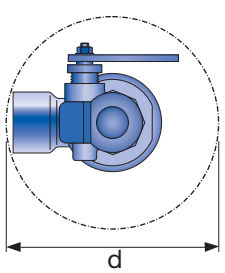
Inlet thread male

		Size outlet body	1"	1"
		Actual Orifice diameter d_0 [inch]	$^{1}/_{4}$	$^{11}/_{32}$
Center to face [inch]				
DIN ISO 228-1	**G**	Inlet a	$2^{1}/_{16}$	$2^{1}/_{16}$
		Outlet b	$2^{15}/_{16}$	$2^{15}/_{16}$
ISO 7-1/BS 21	**R**	Inlet a	$1^{15}/_{16}$	$1^{15}/_{16}$
ASME B1.20.1	**NPT**	Outlet b	$2^{15}/_{16}$	$2^{15}/_{16}$

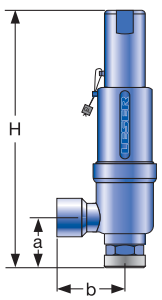
Height [inch]								
			Conventional design			**Balanced bellows**		
		Size inlet thread	$^{1}/_{2}$"	$^{3}/_{4}$"	1"	$^{1}/_{2}$"	$^{3}/_{4}$"	1"
DIN ISO 228-1	**G**	H max.	$11^{21}/_{32}$	$11^{23}/_{32}$	$11^{27}/_{32}$	$12^{29}/_{32}$	13	$13^{1}/_{8}$
ISO 7-1/BS 21	**R**	H max.	$11^{23}/_{32}$	$11^{25}/_{32}$	$11^{15}/_{16}$	13	$13^{1}/_{32}$	$13^{3}/_{16}$
ASME B1.20.1	**NPT**	H max.	$11^{27}/_{32}$	$11^{27}/_{32}$	$12^{3}/_{32}$	$13^{1}/_{8}$	$13^{1}/_{8}$	$13^{11}/_{32}$

Length of screwed end c [inch]					
		Size inlet thread	$^{1}/_{2}$"	$^{3}/_{4}$"	1"
DIN ISO 228-1	**G**		$^{9}/_{16}$	$^{5}/_{8}$	$^{23}/_{32}$
ISO 7-1/BS 21	**R**		$^{3}/_{4}$	$^{25}/_{32}$	$^{29}/_{32}$
ASME B1.20.1	**NPT**		$^{7}/_{8}$	$^{7}/_{8}$	$1^{1}/_{16}$

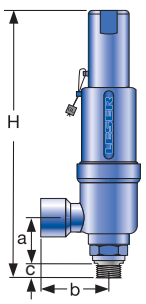
*) DIN ISO 228-1 G not possible.



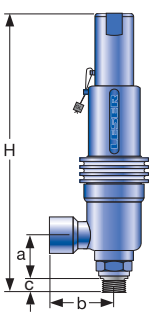
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

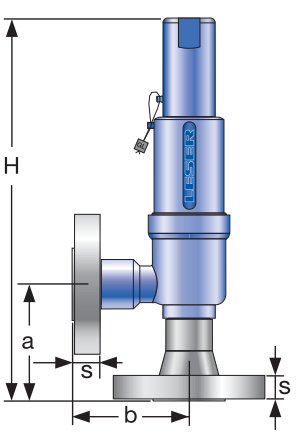
Type 459 HDD
Dimensions and weights
Flanged connections [Metric units]

			Conventional design		Balanced bellows	
Actual Orifice diameter d_0 [mm]			6	9	6	9
Actual Orifice area A_0 [mm²]			28.3	63.6	28.3	63.6
DIN EN 1092-1 (Available flange sizes refer to page 09/07)						
			Flange rating PN 40 – PN 400			
Center to face	[mm]	Inleta	100	100	100	100
		Outlet b	100	100	100	100
Height	[mm]	H max.	330	330	375	375
ASME B 16.5 (Available flange sizes refer to page 09/07)						
			Flange rating class 150 – 2500			
Center to face	[mm]	Inlet a	100	100	100	100
		Outlet b	100	100	100	100
Height	[mm]	H max.	330	330	375	375

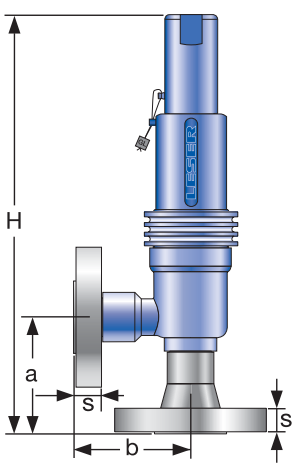
Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

Weight						
For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)						
Weight net (without inlet and outlet flange)	[kg]	m_N	3.1	3.1	4.3	4.3

Flange dimensions														
			DIN EN 1092-1 / Flange rating PN						**DIN ISO 1092-1 / Flange rating class**					
		Size	40	100	160	250	320	400	**Size**	150	300	600	900	1500	2500
DN 15									**NPS 1/2"**						
Flange thickness	[mm]	s	18	–	22	28	28	30		14	18	18	26	26	30.2
Weight slip on flange	[kg]	m_F	0.8	–	1.2	2.5	2.5	3.6		0.6	0.9	0.9	2.1	2.1	3
DN 20									**NPS 3/4"**						
Flange thickness	[mm]	s	20	22	–	–	–	–		15	18	18	25.4	25.4	32
Weight slip on flange	[kg]	m_F	1.1	1.3	–	–	–	–		0.8	1.4	1.4	2.3	2.3	3.5
DN 25									**NPS 1"**						
Flange thickness	[mm]	s	22	–	26	30	36	40		17	21.5	21.5	32.5	32.5	40
Weight slip on flange	[kg]	m_F	1.3	–	2.6	3.5	5	7.5		1	2.1	2.1	4.1	4.1	5.1
DN 40									**NPS 1 1/2"**						
Flange thickness	[mm]	s	21	–	23	32	–	–		22	24	24	32	–	–
Weight slip on flange	[kg]	m_F	2.1	–	2.9	4.3	–	–		1.4	2.2	2.2	3.9	–	–



Conventional design



Balanced bellows

Type 459 HDD
Dimensions and weights
Flanged connections [US units]

			Conventional design		Balanced bellows	
Actual Orifice diameter d_0 [inch]			0.236	0.354	0.236	0.354
Actual Orifice area A_0 [inch²]			0.044	0.099	0.044	0.099
DIN EN 1092-1 (Available flange sizes refer to page 09/07)						
			Flange rating PN 40 – PN 400			
Center to face	[inch]	Inlet a	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	13	13	$14^{3}/_{4}$	$14^{3}/_{4}$
ASME B 16.5 (Available flange sizes refer to page 09/07)						
			Flange rating class 150 – 2500			
Center to face	[inch]	Inlet a	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	13	13	$14^{3}/_{4}$	$14^{3}/_{4}$

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

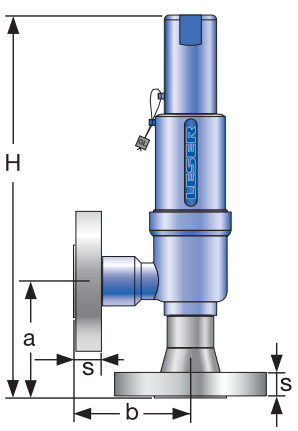
Weight

For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)

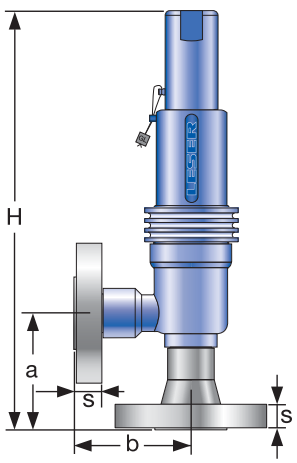
Weight net (without inlet and outlet flange)	[lbs]	m_N	6.8	6.8	9.5	9.5

Flange dimensions

			DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating class						
		Size	40	100	160	250	320	400	Size	150	300	600	900	1500	2500
DN 15									**NPS $^1/_2$"**						
Flange thickness	[mm]	s	$^{23}/_{32}$	–	$^{7}/_{8}$	$1^{3}/_{32}$	$1^{3}/_{32}$	$1^{3}/_{16}$		$^{9}/_{16}$	$^{23}/_{32}$	$^{23}/_{32}$	$1^{1}/_{32}$	$1^{1}/_{32}$	$1^{3}/_{16}$
Weight slip on flange	[kg]	m_F	1.8	–	2.6	5.5	5.5	7.9		1.3	2	2	4.6	4.6	6.6
DN 20									**NPS $^3/_4$"**						
Flange thickness	[mm]	s	$^{25}/_{32}$	$^{7}/_{8}$	–	–	–	–		$^{19}/_{32}$	$^{23}/_{32}$	$^{23}/_{32}$	1	1	$1^{1}/_{4}$
Weight slip on flange	[kg]	m_F	2.4	2.9	–	–	–	–		1.8	3.1	3.1	5.1	5.1	7.7
DN 25									**NPS 1"**						
Flange thickness	[mm]	s	$^{7}/_{8}$	–	$1^{1}/_{32}$	$1^{3}/_{16}$	$1^{3}/_{32}$	$1^{9}/_{16}$		$^{21}/_{32}$	$^{27}/_{32}$	$^{27}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{16}$
Weight slip on flange	[kg]	m_F	2.9	–	5.7	7.7	11	16.5		2.2	4.6	4.6	9	9	11.2
DN 40									**NPS $1^1/_2$"**						
Flange thickness	[mm]	s	$^{13}/_{16}$	–	$^{29}/_{32}$	$1^{1}/_{4}$	–	–		$^{7}/_{8}$	$^{15}/_{16}$	$^{15}/_{16}$	$1^{1}/_{4}$	–	–
Weight slip on flange	[kg]	m_F	4.5	–	6.3	9.5	–	–		3.2	4.8	4.8	8.6	–	–



Conventional design



Balanced bellows

Type 459 HDD
Pressure/temperature ratings
[Metric units + US units]

Metric units

Actual Orifice diameter d_0 [mm]		6			9		
Actual Orifice Area A_0 [mm²]		28.3			63.6		
Body material 1.4404 (316L)		**Type 4594**					
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"
	Pressure rating	PN 850			PN 500		
Outlet body	Pressure rating	PN 160			PN 160		
Minimum set pressure	p [bar_g] S/G/L	420			250.01		
Maximum set pressure	p [bar_g] S/G	850			420		
	p [bar_g] L	–					
Temperature acc. to DIN EN	min. [°C]	-273[1)]			-273[1)]		
	max. [°C]	+400[2)]			+400[2)]		
Temperature acc. to ASME	min. [°C]	-196			-196		
	max. [°C]	+450[3)]			+450[3)]		

US units

Actual Orifice diameter d_0 [inch]		0.236			0.354		
Actual Orifice Area A_0 [inch²]		0.044			0.099		
Body material 1.4404 (316L)		**Type 4594**					
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"
Minimum set pressure	p [psig] S/G/L	6091			3625		
Maximum set pressure	p [psig] S/G	12328			6091		
	p [psig] L	–					
Temperature acc. to DIN EN	min. [°F]	-459[1)]			-459[1)]		
	max. [°F]	+752[2)]			+752[2)]		
Temperature acc. to ASME	min. [°F]	-321			-321		
	max. [°F]	+842[3)]			+842[3)]		

[1)] For DIN EN applications at temperatures under -200 °C / -328 °F please proceed in accordance to AD-2000 Merkblatt W10.
- Load case II: under -200 °C / -328 °F to -255 °C / -427 °F, p_{max} = PN x 0.75
- Load case III: under -255 °C / -427 °F to -273 °C / -459 °F, p_{max} = PN x 0.25

[2)] Please notice: from 300 °C / 572 °F, a bellows or suitable spring material e.g. Inconel X750 should be selected (refer to LDeS 3001.19). For the temperature range >400 °C / >752 °F an outlet body material e.g. 1.4552 or 1.4581 (special casting) is required.

[3)] The temperature is limited by the standard inlet body. For applications up to 538 °C/1000 °F (temperature limit of outlet body) a suitable inlet body material and a bellows or Inconel spring is requiered.

Type 459 HDD
Approvals

Actual Orifice diameter d_0 [mm]		6	9
Actual Orifice area A_0 [mm²]		28.3	63.6
Actual Orifice diameter d_0 [inch]		0.236	0.354
Actual Orifice area A_0 [inch²]		0.044	0.099
Europe		**Coefficient of discharge K_{dr}**	
PED / DIN EN ISO 4126-1	Approval No.	072021409Z0022/15/D/0135	
	S/G	0.81	0.83
	L	0.70	0.61
Germany		**Coefficient of discharge α_w**	
PED / AD 2000-Merkblatt A2	Approval No.	TÜV SV 909	
	S/G	0.81	0.83
	L	0.70	0.61
United States		**Coefficient of discharge K**	
ASME Sec. VIII Div. 1	Approval No.	M 37112	
	S/G	0.811	
	Approval No.	M 37112	
	L	0.566	
Canada		**Coefficient of discharge K**	
CRN	Approval No.	The current approval no. can be found at www.leser.com	
	S/G	0.811	
	L	0.566	
China		**Coefficient of discharge α_w**	
AQSIQ	Approval No.	The current approval no. can be found at www.leser.com	
	S/G	0.81	0.83
	L	0.70	0.61
Eurasian Custom Union		**Coefficient of discharge α_w**	
EAC	Approval No.	The current approval no. can be found at www.leser.com	
	S/G	0.81	0.83
	L	0.70	0.61

Classification societies		**Homepage**	
Bureau Veritas	BV	www.bureauveritas.com	The valid certification number is changed with every reneval. A sample certificate including the valid certification number can be found at www.leser.com
DNV GL		www.dnvgl.com	
Lloyd's Register EMEA	LREMEA	www.lr.org	
Registro Italiano Navale	RINA	www.rina.org	
U.S. Coast Guard	U.S.C.G	www.uscg.org	

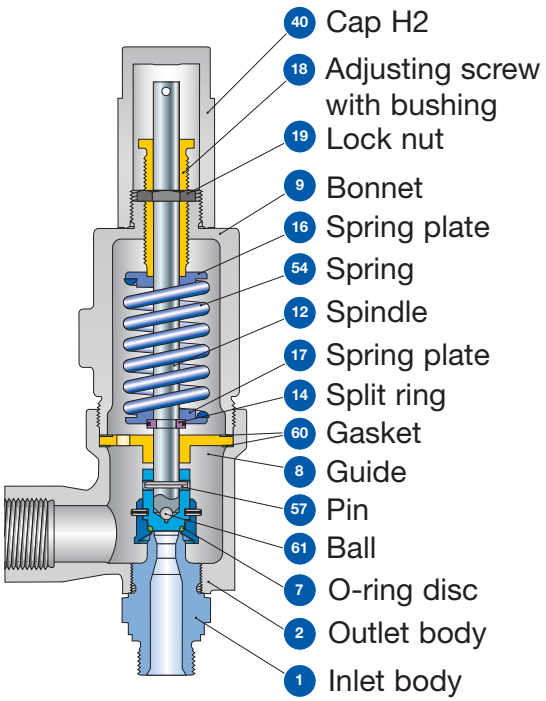
Type 462
Plain lever H3

Type 462
Safety Relief Valves

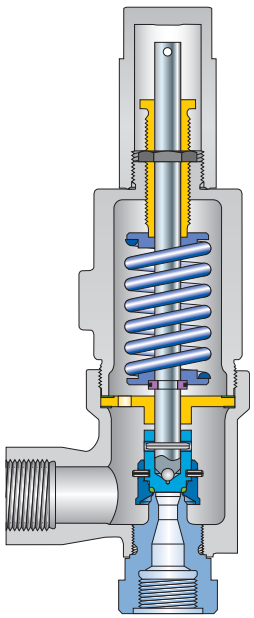
Type 462
Cap H2

Type 462
Refrigeration technology

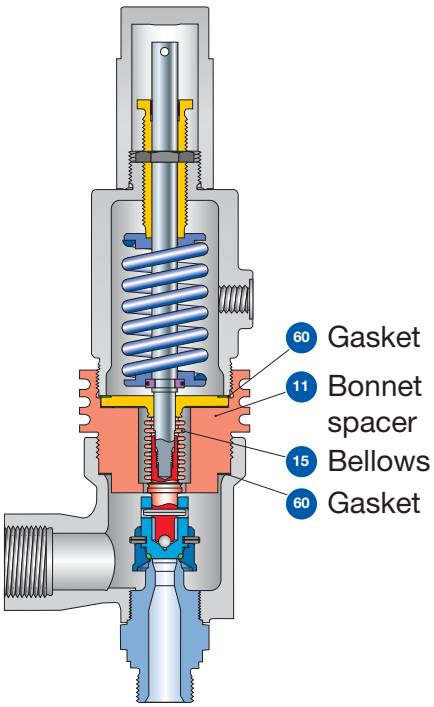
Type 462
Designs



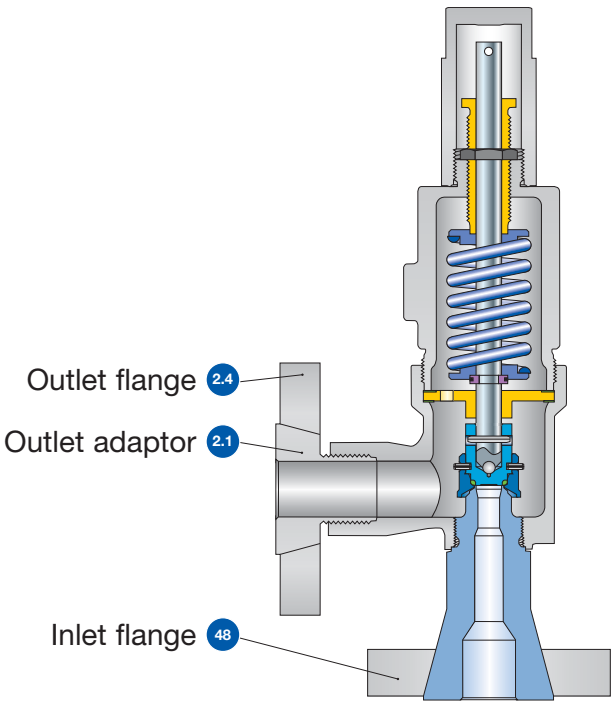
Conventional design
Threaded connection



Conventional design
Threaded connection



Balanced bellows
Threaded connection



Conventional design
Flange connection

Type 462
Materials

Item	Component	Design	Type 4623	Type 4622	Type 4624
1	Base / Inlet body	Threaded connection	1.4104[1], 1.4404 SA 479 430[1], SA 479 316L	1.4404 SA 479 316L	1.4404 SA 479 316L
		Flange connection	1.4404 SA 479 316L	1.4404 SA 479 316L	1.4404 SA 479 316L
2	Outlet body		1.0619 WCB	1.0619 WCB	1.4408 CF8M
2.1	Outlet adaptor	Flange connection	1.4404 316L	1.4404 316L	1.4404 316L
2.4	Outlet flange	Flange connection	1.4404 316L	1.4404 316L	1.4404 316L
7	O-ring disc		1.4404 SA 479 316L	1.4404 SA 479 316L	1.4404 SA 479 316L
7.4	Soft seal O-ring	"N"[2]	NBR Nitrile-Butadiene	NBR Nitrile-Butadiene	NBR Nitrile-Butadiene
		"K"[2]	CR Chloroprene	CR Chloroprene	CR Chloroprene
		"D"[2]	EPDM Ethylen-Propylene-Diene	EPDM Ethylen-Propylene-Diene	EPDM Ethylen-Propylene-Diene
		"L"[2]	FKM Fluorocarbon	FKM Fluorocarbon	FKM Fluorocarbon
		"C"[3]	FFKM Perfluor	FFKM Perfluor	FFKM Perfluor
8	Guide		1.4104 tenifer Chrome steel tenifer	1.4104 tenifer Chrome steel tenifer	1.4404 316L
		Balanced bellows design	1.4404 / SA 316L Upper connection of balanced bellows	1.4404 / SA 316L Upper connection of balanced bellows	1.4404 / SA 316L Upper connection of balanced bellows
9	Bonnet		0.7043 Ductile Gr. 60-40-18	1.0619 WCB	1.4408 CF8M
		Balanced bellows design	1.0619 WCB	1.0619 WCB	1.4408 CF8M
11	Bonnet spacer	Balanced bellows design	1.4404 316L	1.4404 316L	1.4404 316L
12	Spindle		1.4021 420	1.4404 316L	1.4404 316L
		Balanced bellows design	1.4404 316L	1.4404 316L	1.4404 316L
14	Split ring		1.4104 Chrome steel	1.4104 Chrome steel	1.4404 316L
15	Bellows	Balanced bellows design	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	1.4104 / PTFE Chrome steel / PTFE
19	Lock nut		1.4104 430	1.4104 430	1.4404 316L
40	Cap H2		1.0460 SA 105	1.0460 SA 105	1.4404 316L
48	Inlet flange	Flange connection	1.4404 316L	1.4404 316L	1.4404 316L
54	Spring	Standard	1.1200 / 1.8159 / 1.7107 Carbon steel	1.1200 / 1.8159 / 1.7107 Carbon steel	1.4310 Stainless steel
		Optional	1.4310 Stainless steel	1.4310 Stainless steel	– –
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

Please notice:
- Modifications reserved by LESER. If several materials are specified LESER defines the material.
- LESER can upgrade materials without notice.
- Every part can be replaced by other material acc. to customer specification.
- The materials shall meet the requirements of the relevant regulations (Pressure Equipment Directive (PED), acc. to PED applied harmonized standards, AD 2000-Merkblätter, VdTÜV (Werkstoffblätter) as well as further materials listed in Section 8 of the Type-Examination.

[1] only valid for male thread DIN ISO 228-1 G¾ G1, G1½ (Option codes V55, V56, V57) (please note availability regarding d_0)
[2] d_0 9 + 13: O-ring 90 Shore for set pressure > 100 bar
[3] d_0 9 + 13: O-ring 90 Shore for set pressure > 40 bar

Type 462
Article numbers

Type 462

			Actual Orifice diameter d_0 [mm]	9	13	17.5
			Actual Orifice area A_0 [mm²]	63.6	133	241
			Actual Orifice diameter d_0 [inch]	0.354	0.512	0.689
			Actual Orifice area A_0 [inch²]	0.099	0.206	0.374
O-ring material					NBR "N" J30[2]	
					CR "K" J21[2]	
					EPDM "D" J22[2]	
					FKM "L" J23[2]	
					FFKM "C" J20[3]	
Outlet body casted						
Inlet body	**1.4104**	**H2**	Art. No. **4623.**	**2902**	**2912**	**2922**
Outlet body	**1.0619 WCB**	**H3**	Art. No. **4623.**	**2903**	**2913**	**2923**
Bonnet	**0.7043**	**H4**	Art. No. **4623.**	**2904**	**2914**	**2924**
	p [bar_g]		S/G/L	**0.5 – 250[1]**	**0.5 – 180[1]**	**0.5 – 92.5[1]**
	p [psig]			**7.3 – 3625[1]**	**7.3 – 2610[1]**	**7.3 – 1342[1]**
Outlet body investment casted						
Inlet body	**1.4404**	**H2**	Art. No. **4622.**	**3772**	**3782**	**3792**
Outlet body	**1.0619 WCB**	**H3**	Art. No. **4622.**	**3773**	**3783**	**3793**
Bonnet	**1.0619**	**H4**	Art. No. **4622.**	**3774**	**3784**	**3794**
	p [bar_g]		S/G/L	**0.5 – 250**	**0.5 – 180**	**0.5 – 92.5**
	p [psig]			**7.3 – 3625**	**7.3 – 2610**	**7.3 – 1342**
Outlet body investment casted						
Inlet body	**1.4404**					
Outlet body	**1.4408 CF8M**	**H2**	Art. No. **4624.**	**2192**	**2202**	**2212**
Bonnet	**1.4408**	**H4**	Art. No. **4624.**	**2194**	**2204**	**2214**
	p [bar_g]		S/G/L	**0.5 – 250**	**0.5 – 180**	**0.5 – 92.5**
	p [psig]			**7.3 – 3625**	**7.3 – 2610**	**7.3 – 1342**

Type 462 Refrigeration technology

			DN_E	15, 20	15, 20, 25	25
			DN_A	20	25	32
			Actual Orifice diameter d_0 [mm]	13	13	17,5
			Actual Orifice area A_0 [mm²]	133	133	241
			Weight [kg]	3.1	3.1	3.9
O-ring material					NBR "N" J30	
					CR "K" J21	
					EPDM "D" J22	
Outlet body investment casted						
					Inlet + Outlet PN 40	
Inlet body	**1.4404**	**H2**	Art. No. **4622.**	**3882**	**3982**	**3892**
Outlet body	**1.0619 WCB**					
Bonnet	**1.0619**					
		p [bar_g]	D/G/F **0,5 –**	**40**	**40**	**40**

Also all other LESER valve types can be designed for refrigeration technology.

[1] Max. set pressure 69 bar / 1000 psig for Type 4623 acc. to ASME-Code Sec. VIII, Div. 1 with UV-Stamp.
The design of Type 4623 is permitted with limitations acc. to ASME-Code Sec. VIII, Div. 1, UCD-2, UCD-3.
Type 4623 shall not be used for lethal substances, irrespective of their state of aggregation.
[2] d_0 9 + 13: O-ring 90 Shore for set pressure > 100 bar
[3] d_0 9 + 13: O-ring 90 Shore for set pressure > 40 bar

Type 462
Dimensions and weights
Threaded connections [Metric units]

Size Outlet body			1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"	3/4" x 1 1/2"	1" x 1 1/2"	1 1/4" x 1 1/2"	1 1/2" x 1 1/2"
Actual Orifice diameter d_0 [mm]			9	9	9	13	13	13	17.5	17.5	17.5	17.5
Actual Orifice area A_0 [mm²]			63.6	63.6	63.6	133	133	133	241	241	241	241
Weight		[kg]	3.1	3.1	3.1	3.1	3.1	3.1	3.9	3.9	3.9	3.9
	Balanced bellows	[kg]	3.9	3.9	3.9	3.9	3.9	3.9	4.7	4.7	4.7	4.7
Required installation diameter d		[mm]	165	165	165	165	165	165	165	165	165	165

Inlet thread female

Size Outlet body			1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"	3/4" x 1 1/2"	1" x 1 1/2"	1 1/4" x 1 1/2"	1 1/2" x 1 1/2"
Actual Orifice diameter d_0 [mm]			9	9	9	13	13	13	17.5	17.5	17.5	17.5
Center to face / Height												
DIN ISO 228-1 / **ASME B1.20.1**	**G** / **NPT**	Inlet a	53	56	62	53	56	62	60	66	67	73
Center to face [mm]		Outlet b	75	75	75	75	75	75	75	75	75	75
Height [mm]		H max.	283	286	292	283	286	292	287	293	294	300
	Balanced bellows	H max.	315	318	324	315	318	324	319	325	326	332
ISO 7-1/BS 21	**Rc**	Inlet a	53	56	64	53	56	64	60	68	–	77
Center to face [mm]		Outlet b	75	75	75	75	75	75	75	75	–	75
Height [mm]		H max.	283	286	294	283	286	294	287	295	–	304
	Balanced bellows	H max.	315	318	326	315	318	326	319	327	–	336

Inlet thread male

Size outlet body			1" – 1 1/2"	1" – 1 1/2"	1 1/2"	2"
Actual Orifice diameter d_0 [mm]			9	13	17.5	17.5
Center to face [mm]						
DIN ISO 228-1	**G**	Inlet 1/2" – 1" a	52	52	–	–
		Inlet 1"– 1 1/2" a	–	–	56	–
		Outlet b	75	75	75	–
ISO 7-1/BS 21	**R**	Inlet 1/2" – 1" a	49	49	–	–
ASME B1.20.1	**NPT**	Inlet 1" – 2" a[1)]	–	–	53	53
		Outlet b	75	75	75	100

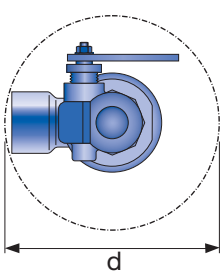
Height [mm]

			Conventional design						Balanced bellows					
Size inlet thread			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
DIN ISO 228-1	**G**	H max.	296	298	301	303	305	–	328	330	333	335	337	–
ISO 7-1/BS 21	**R**	H max.	298	299	303	–	305	–	330	331	335	–	337	–
ASME B1.20.1	**NPT**	H max.	301	301	307	307	308	309	333	333	339	340	340	341

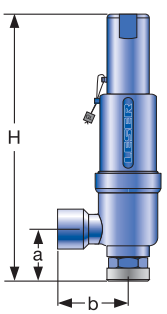
Length of screwed end c [mm]

Size inlet thread		1/2"	3/"	1"	1 1/4"	1 1/2"	2"
DIN ISO 228-1	**G**	14	16	18	20	22	24
ISO 7-1/BS 21	**R**	19	20	23	25	25	–
ASME B1.20.1	**NPT**	22	22	27	28	28	29

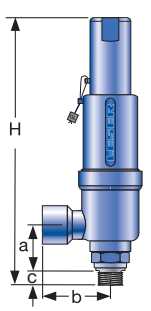
[1)] Inlet thread R only up to 1 1/2".



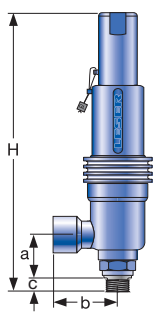
Required installation diameter



Conventional design – Female thread



Conventional design – Male thread



Balanced bellows

Type 462

Dimensions and weights

Threaded connections [US units]

Size Outlet body			1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"	3/4" x 1 1/2"	1" x 1 1/2"	1 1/4" x 1 1/2"	1 1/2" x 1 1/2"
Actual Orifice diameter d_0 [inch]			0.354	0.354	0.354	0.512	0.512	0.512	0.689	0.689	0.689	0.689
Actual Orifice area A_0 [inch^2]			0.099	0.099	0.099	0.206	0.206	0.206	0.374	0.374	0.374	0.374
Weight		[lbs]	6.8	6.8	6.8	6.8	6.8	6.8	8.6	8.6	8.6	8.6
Balanced bellows		[lbs]	8.6	8.6	8.6	8.6	8.6	8.6	10.4	10.4	10.4	10.4
Required installation diameter d		[inch]	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2	6 1/2

Inlet thread female

Size Outlet body			1/2" x 1"	3/4" x 1"	1" x 1"	1/2" x 1"	3/4" x 1"	1" x 1"	3/4" x 1 1/2"	1" x 1 1/2"	1 1/4" x 1 1/2"	1 1/2" x 1 1/2"
Actual Orifice diameter d_0 [inch]			0.354	0.354	0.354	0.512	0.512	0.512	0.689	0.689	0.689	0.689
Center to face / Height												
DIN ISO 228-1 / **ASME B1.20.1**	**G** / **NPT**	Inlet a	2 3/32	2 7/32	2 7/16	2 3/32	2 7/32	2 7/16	2 3/8	2 19/32	2 5/8	2 7/8
Center to face [inch]		Outlet b	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16
Height [inch]		H max.	11 5/32	11 1/14	11 1/2	11 5/32	11 1/4	11 1/2	11 5/16	11 17/32	11 9/16	11 13/16
Balanced bellows		H max.	12 13/32	12 17/32	12 3/4	12 13/32	12 17/32	12 3/4	12 9/16	12 25/32	12 27/32	13 1/16
ISO 7-1/BS 21	**Rc**	Inlet a	2 3/32	2 7/32	2 17/32	2 3/32	2 7/32	2 17/32	2 3/8	2 11/16	–	3 1/32
Center to face [inch]		Outlet b	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	2 15/16	–	2 15/16
Height [inch]		H max.	11 5/32	11 1/14	11 9/16	11 5/32	11 1/14	11 9/16	11 5/16	11 5/8	–	11 31/32
Balanced bellows		H max.	12 13/32	12 17/32	12 27/32	12 13/32	12 17/32	12 27/32	12 9/16	12 7/8	–	13 7/32

Inlet thread male

Size outlet body			1" – 1 1/2"	1" – 1 1/2"	1 1/2"	2"
Actual Orifice diameter d_0 [mm]			0.354	0.512	0.689	0.689
Center to face [inch]						
DIN ISO 228-1	**G**	Inlet 1/2" – 1" a	2 1/16	2 1/16	–	–
		Inlet 1"– 1 1/2" a	–	–	2 7/32	–
		Outlet b	2 15/16	2 15/16	2 15/16	–
ISO 7-1/BS 21	**R**	Inlet 1/2" – 1" a	1 15/16	1 15/16	–	–
ASME B1.20.1	**NPT**	Inlet 1" – 2" a[1)]	–	–	2 3/32	2 3/32
		Outlet b	2 15/16	2 15/16	2 15/16	4

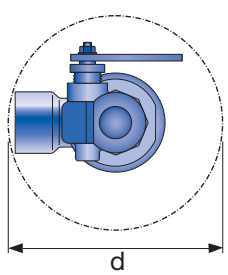
Height [inch]

			Conventional design						Balanced bellows					
		Size inlet thread	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	1/2"	3/4"	1"	1 1/4"	1 1/2"	2"
DIN ISO 228-1	**G**	H max.	11 21/32	11 23/32	11 27/32	11 15/16	12	–	12 29/32	13	13 1/8	13 3/16	13 9/32	–
ISO 7-1/BS 21	**R**	H max.	11 23/32	11 25/32	11 15/16	–	12	–	13	13 1/32	13 3/16	–	13 9/32	–
ASME B1.20.1	**NPT**	H max.	11 27/32	11 27/32	12 3/32	12 1/8	12 1/8	12 5/32	13 1/8	13 1/8	13 11/32	13 3/8	13 3/8	13 7/16

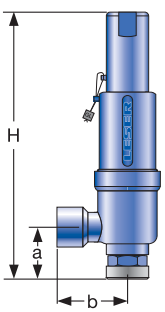
Length of screwed end c [inch]

		Size inlet thread	1/2"	3/"	1"	1 1/4"	1 1/2"	2"
DIN ISO 228-1	**G**		9/16	5/8	23/32	25/32	7/8	15/16
ISO 7-1/BS 21	**R**		3/4	25/32	29/32	31/32	31/32	–
ASME B1.20.1	**NPT**		7/8	7/8	1 1/16	1 3/32	1 3/32	1 5/32

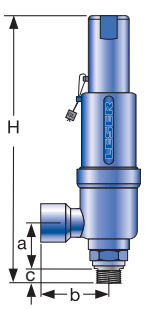
[1)] Inlet thread R only up to 1 1/2".



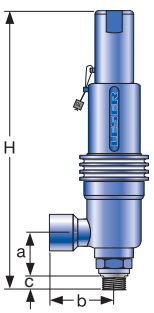
Required installation diameter



Conventional design – Female thread



Conventional design – Male thread



Balanced bellows

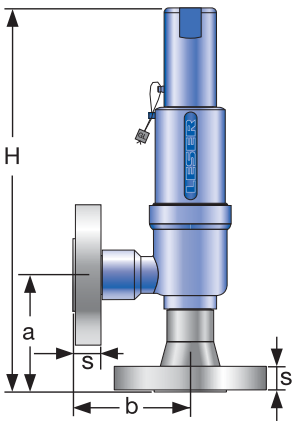
Type 462
Dimensions and weights
Flanged connections [Metric units]

			Conventional design			Balanced bellows		
Actual Orifice diameter d_0 [mm]			9	13	17.5	9	13	17.5
Actual Orifice area A_0 [mm²]			63.6	133	241	63.6	133	241
DIN EN 1092-1								
			Flange rating PN 40 – 400					
Center to face	[mm]	Inlet a	100	100	105	100	100	105
		Outlet b	100	100	100	100	100	100
Height	[mm]	H max.	330	330	333	375	375	378
ASME B 16.5								
			Flange rating class 150 – 2500					
Center to face	[mm]	Inlet a	100	100	105	100	100	105
		Outlet b	100	100	100	100	100	100
Height	[mm]	H max.	330	330	333	375	375	378

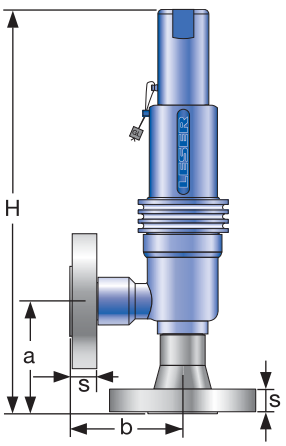
Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

Weight								
For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)								
Weight net (without inlet and outlet flange)	[kg]	m_N	3.1	3.1	3.5	4.3	4.3	4.7

Flange dimensions															
			DIN EN 1092-1 / Flange rating PN						**ASME B16.5 / Flange rating class**						
		Size	40	100	160	250	320	400	**Size**	150	300	600	900	1500	2500
		DN 15							**NPS ½"**						
Flange thickness	[mm]	s	18	–	22	28	28	30		14	18	18	26	26	30.2
Weight slip on flange	[kg]	m_F	0.8	–	1.2	2.5	2.5	3.6		0.6	0.9	0.9	2.1	2.1	3
		DN 20							**NPS ¾"**						
Flange thickness	[mm]	s	20	22	–	–	–	–		15	18	18	25.4	25.4	32
Weight slip on flange	[kg]	m_F	1.1	1.3	–	–	–	–		0.8	1.4	1.4	2.3	2.3	3.5
		DN 25							**NPS 1"**						
Flange thickness	[mm]	s	22	–	26	30	36	40		17	21.5	21.5	32.5	32.5	40
Weight slip on flange	[kg]	m_F	1.3	–	2.6	3.5	5	7.5		1	2.1	2.1	4.1	4.1	5.1
		DN 40							**NPS 1½"**						
Flange thickness	[mm]	s	21	–	23	32	–	–		22	24	24	32	–	–
Weight slip on flange	[kg]	m_F	2.1	–	2.9	4.3	–	–		1.4	2.2	2.2	3.9	–	–



Conventional design



Balanced bellows

Type 462
Dimensions and weights
Flanged connections [US units]

			Conventional design			Balanced bellows		
Actual Orifice diameter d_0 [inch]			0.354	0.512	0.689	0.354	0.512	0.689
Actual Orifice area A_0 [inch²]			0.099	0.206	0.374	0.099	0.206	0.374
DIN EN 1092-1								
			Flange rating PN 40 – 400					
Center to face	[inch]	Inlet a	3 15/16	3 15/16	4 1/8	3 15/16	3 15/16	4 1/8
		Outlet b	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16
Height	[inch]	H max.	13	13	13 1/8	14 3/4	14 3/4	14 7/8
ASME B 16.5								
			Flange rating class 150 – 2500					
Center to face	[inch]	Inlet a	3 15/16	3 15/16	4 1/8	3 15/16	3 15/16	4 1/8
		Outlet b	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16	3 15/16
Height	[inch]	H max.	13	13	13 1/8	14 3/4	14 3/4	14 7/8

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

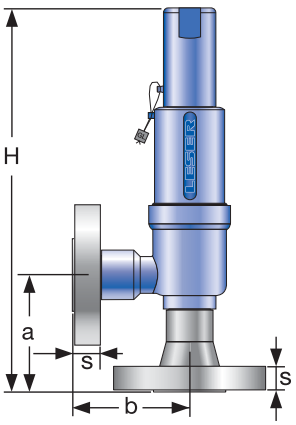
Weight

For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)

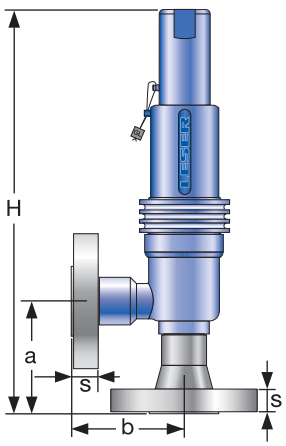
Weight net (without inlet and outlet flange)	[lbs]	m_N	6.8	6.8	7.7	9.5	9.5	10.4

Flange dimensions

			DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating class						
		Size	40	100	160	250	320	400	Size	150	300	600	900	1500	2500
		DN 15							**NPS 1/2"**						
Flange thickness	[mm]	s	23/32	–	7/8	1 3/32	1 3/32	1 3/16		9/16	23/32	23/32	1 1/32	1 1/32	1 3/16
Weight slip on flange	[lbs]	m_F	1.8	–	2.6	5.5	5.5	7.9		1.3	2.0	2.0	4.6	4.6	6.6
		DN 20							**NPS 3/4"**						
Flange thickness	[mm]	s	25/32	7/8	–	–	–	–		19/32	23/32	23/32	1	1	1 1/4
Weight slip on flange	[lbs]	m_F	2.4	2.9	–	–	–	–		1.8	3.1	3.1	5.1	5.1	7.7
		DN 25							**NPS 1"**						
Flange thickness	[mm]	s	7/8	–	1 1/32	1 3/16	1 3/32	1 9/16		21/32	27/32	27/32	1 9/32	1 9/32	1 9/16
Weight slip on flange	[lbs]	m_F	2.9	–	5.7	7.7	11.0	16.5		2.2	4.6	4.6	9.0	9.0	11.2
		DN 40							**NPS 1 1/2"**						
Flange thickness	[mm]	s	13/16	–	29/32	1 1/4	–	–		7/8	15/16	15/16	1 1/4	–	–
Weight slip on flange	[lbs]	m_F	4.5	–	6.3	9.5	–	–		3.2	4.8	4.8	8.6	–	–



Conventional design



Balanced bellows

Type 462
Pressure/temperature ratings
Metric units

Actual Orifice diameter d_0 [mm]		9			13			17.5				
Actual Orifice Area A_0 [mm²]		63.6			133			241				
Body material: 1.4104 (430F)					**Type 4623**							
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
	Pressure rating	PN 400			PN 250			PN 160				
Outlet body	Pressure rating	PN 40			PN 40			PN 40				
Minimum set pressure	p [bar_g] S/G/L	0.5			0.5			0.5				
Min. set pressure standard bellows	p [bar_g] S/G/L	3			3			3				
Min. set pressure[1] high press. bellows	p [bar_g] S/G/L	40			40			40				
Maximum set pressure	p [bar_g] S/G/L	250			180			92.5				
Temperature acc. to DIN EN[3]	min. [°C]	-10[2]										
	max. [°C]	+150										
Temperature acc. to ASME[3]	min. [°C]	-29										
	max. [°C]	+150										
Body material: 1.4404 (316L)					**Type 4622**							
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
	Pressure rating	PN 250			PN 160			PN 160				
Outlet Body	Pressure rating	PN 160			PN 160			PN 160				
Minimum set pressure	p [bar_g] S/G/L	0.5			0.5			0.5				
Min. set pressure standard bellows	p [bar_g] S/G/L	3			3			3				
Min. set pressure[1] high press. bellows	p [bar_g] S/G/L	40			40			40				
Maximum set pressure	p [bar_g] S/G/L	250			180			92.5				
Temperature acc. to DIN EN[3]	min. [°C]	-45										
	max. [°C]	+150										
Temperature acc. to ASME[3]	min. [°C]	-29										
	max. [°C]	+150										
Body material: 1.4404 (316L)					**Type 4624**							
Base / Inlet Body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
	Pressure rating	PN 250			PN 160			PN 160				
Outlet Body	Pressure rating	PN 160			PN 160			PN 160				
Minimum set pressure	p [bar_g] S/G/L	0.5			0.5			0.5				
Min. set pressure standard bellows	p [bar_g] S/G/L	3			3			3				
Min. set pressure[1] high press. bellows	p [bar_g] S/G/L	40			40			40				
Maximum set pressure	p [bar_g] S/G/L	250			180			92.5				
Temperature acc. to DIN EN[3]	min. [°C]	-45										
	max. [°C]	+150										
Temperature acc. to ASME[3]	min. [°C]	-45										
	max. [°C]	+150										

[1] Min. set pressure high pressure bellows = Max. pressure standard bellows.
[2] For DIN EN applications at temperatures under -10°C please proceed according to AD 2000-Merkblatt W10.
[3] The temperature is limited by the soft seal material. The stated values are valid for EPDM.

Type 462
Pressure/temperature ratings
US units

Actual Orifice diameter d_0 [inch]		0.354			0.512			0.689				
Actual Orifice Area A_0 [inch^2]		0.099			0.206			0.374				
Body material: 1.4104 (430F)		**Type 4623**										
Base / Inlet body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
Minimum set pressure	p [psig] S/G/L	7.3			7.3			7.3				
Min. set pressure standard bellows	p [psig] S/G/L	43.5			43.5			43.5				
Min. set pressure[1] high press. bellows	p [psig] S/G/L	580			580			580				
Maximum set pressure	p [psig] S/G/L	3625			2610			1342				
Temperature acc. to DIN EN[3]	min. [°F]	+14[2]										
	max. [°F]	+302										
Temperature acc. to ASME[3]	min. [°F]	-20										
	max. [°F]	+302										
Body material: 1.4404 (316L)		**Type 4622**										
Base / Inlet body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
Minimum set pressure	p [psig] S/G/L	7.3			7.3			7.3				
Min. set pressure standard bellows	p [psig] S/G/L	43.5			43.5			43.5				
Min. set pressure[1] high press. bellows	p [psig] S/G/L	580			580			580				
Maximum set pressure	p [psig] S/G/L	3625			2610			1342				
Temperature acc. to DIN EN[3]	min. [°F]	-49										
	max. [°F]	+302										
Temperature acc. to ASME[3]	min. [°F]	-20										
	max. [°F]	+302										
Body material: 1.4404 (316L)		**Type 4624**										
Base / Inlet body	Connection size	1/2"	3/4"	1"	1/2"	3/4"	1"	3/4"	1"	1 1/4"	1 1/2"	2"
Minimum set pressure	p [psig] S/G/L	7.3			7.3			7.3				
Min. set pressure standard bellows	p [psig] S/G/L	43.5			43.5			43.5				
Min. set pressure[1] high press. bellows	p [psig] S/G/L	580			580			580				
Maximum set pressure	p [psig] S/G/L	3625			2610			1342				
Temperature acc. to DIN EN[3]	min. [°F]	-49										
	max. [°F]	+302										
Temperature acc. to ASME[3]	min. [°F]	-49										
	max. [°F]	+302										

[1] Min. set pressure high pressure bellows = Max. pressure standard bellows.
[2] For DIN EN applications at temperatures under -10°C please proceed according to AD 2000-Merkblatt W10.
[3] The temperature is limited by the soft seal material. The stated values are valid for EPDM.

Type 462
Approvals

Actual Orifice diameter d_0 [mm]		9	13	17.5
Actual Orifice area A_0 [mm²]		63.6	133	241
Actual Orifice diameter d_0 [inch]		0.354	0.512	0.689
Actual Orifice area A_0 [inch²]		0.099	0.206	0.374
Europe			**Coefficient of discharge K_{dr}**	
	Approval No.		072021409Z0022/15/D/0135	
PED / DIN EN ISO 4126-1	S/G	0.83	0.81	0.79
	L	0.61	0.61	0.52
Germany			**Coefficient of discharge α_w**	
	Approval No.		TÜV SV 909	
PED / AD 2000-Merkblatt A2	S/G	0.83	0.81	0.79
	L	0.61	0.61	0.52
United States			**Coefficient of discharge K**	
	Approval No.		M 37112	
	S/G		0.811	
ASME Sec. VIII Div. 1	Approval No.		M 37101	
	L		0.566	
Canada			**Coefficient of discharge K**	
	Approval No.		The current approval no. can be found at www.leser.com	
CRN	S/G		0.811	
	L		0.566	
China			**Coefficient of discharge α_w**	
	Approval No.		The current approval no. can be found at www.leser.com	
AQSIQ	S/G	0.83	0.81	0.79
	L	0.61	0.61	0.52
Eurasian Custom Union			**Coefficient of discharge α_w**	
	Approval No.		The current approval no. can be found at www.leser.com	
EAC	S/G	0.83	0.81	0.79
	L	0.61	0.61	0.52

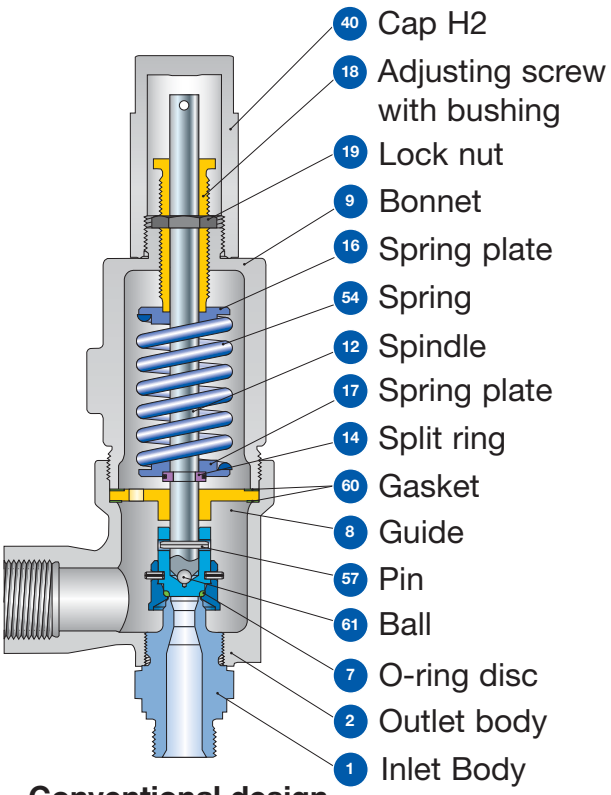
Classification societies		Homepage	
Bureau Veritas	BV	www.bureauveritas.com	The valid certification number is changed with every reneval. A sample certificate including the valid certification number can be found at www.leser.com
DNV GL	DNV	www.dnvgl.com	
Lloyd's Register EMEA	LREMEA	www.lr.org	
Registro Italiano Navale	RINA	www.rina.org	
U.S. Coast Guard	U.S.C.G	www.uscg.org	

Type 462 HDD
Cap H2

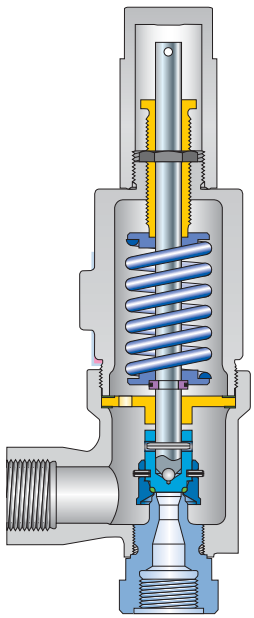
Type 462 HDD
Safety Relief Valves

Series 459

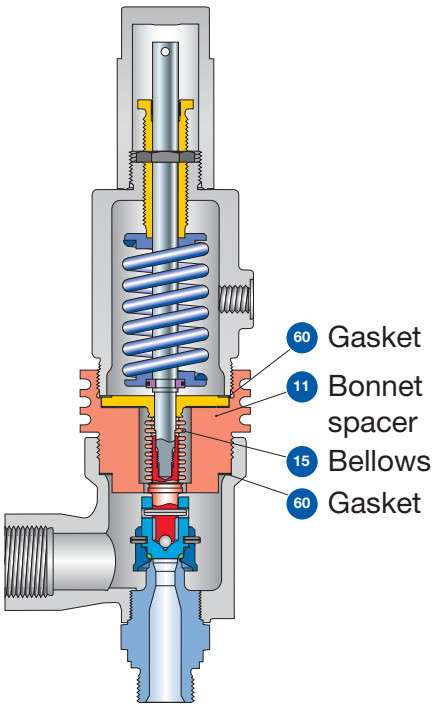
Type 462 HDD
Designs



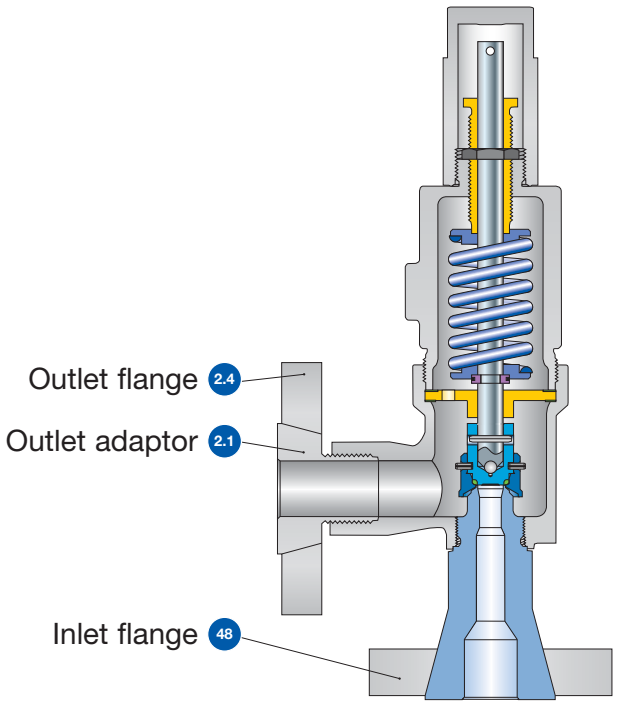
Conventional design
Threaded connection



Conventional design
Threaded connection



Balanced bellows
Threaded connection



Conventional design
Flange connection

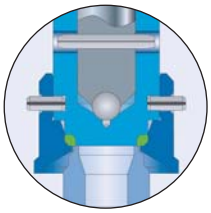
Type 462 HDD
Materials

Item	Component	Design	Type 4624 HDD
1	Base / Inlet body	Threaded connection	1.4404 SA 479 316L
		Flange connection	1.4404 SA 479 316L
2	Outlet body		1.4408 CF8M
2.1	Outlet adaptor	Flange connection	1.4404 316L
2.4	Outlet flange	Flange connection	1.4404 316L
7	O-ring disc		1.4404 SA 479 316L
7.4	Soft seal O-ring	"N"[1]	NBR Nitrile-Butadiene
		"K"[1]	CR Chloroprene
		"D"[1]	EPDM Ethylen-Propylene-Diene
		"L"[1]	FKM Fluorocarbon
		"C"[2]	FFKM Perfluor
8	Guide		1.4404 316L
		Balanced bellows design	1.4404 / SA 316L Upper conn. part of balanced bellows
9	Bonnet		1.4408 CF8M
		Balanced bellows design	1.4408 CF8M
11	Bonnet spacer	Balanced bellows design	1.4404 316L
12	Spindle		1.4404 316L
		Balanced bellows design	1.4404 316L
14	Split ring		1.4404 316L
15	Bellows	Balanced bellows design	1.4571 316Ti
16/17	Spring plate		1.4404 316L
18	Adjusting screw with bushing		1.4404 / PTFE 316L / PTFE
19	Lock nut		1.4404 316L
40	Cap H2		1.4404 316L
48	Inlet flange	Flange connection	1.4404 316L
54	Spring	Standard	1.4310 Stainless steel
57	Pin		1.4310 Stainless steel
60	Gasket		Graphite / 1.4301 Graphite / 316L
61	Ball		1.4401 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.
- The materials shall meet the requirements of the relevant regulations (Pressure Equipment Directive (PED), acc. to PED applied harmonized standards, AD 2000-Merkblätter, VdTÜV (Werkstoffblätter) as well as further materials listed in Section 8 of the Type-Examination.

[1] O-ring 90 Shore for set pressures > 100 bar
[2] O-ring 90 Shore for set pressures > 40 bar

Type 462 HDD
Article numbers



O-ring disc

	Actual Orifice diameter d_0 [mm]			9
	Actual Orifice area A_0 [mm²]			63,9
	Actual Orifice diameter d_0 [inch]			0.354
	Actual Orifice area A_0 [inch²]			0.099
O-ring material			NBR “N”	J30[1]
			CR “K”	J21[1]
			EPDM “D”	J22[1]
			FKM “L”	J23[1]
			FFKM “C”	J20[2]
Body material: 1.4404 (316L)				
Outlet body	**1.4408 CF8M**	**H2**	Art. No. **4624.**	**2152**
Bonnet	**1.4404 1.4408**	**H4**	Art. No. **4624.**	**2154**
	p [bar_g]	S/G/L		**250.01 – 350**
	p [psig]	S/G/L		**3625 – 5076**

[1] O-ring 90 Shore for set pressures > 100 bar
[2] O-ring 90 Shore for set pressures > 40 bar

Type 462 HDD

Dimensions and weights

Threaded connections [Metric units]

		Size Outlet body	1/2" x 1"	3/4" x 1"	1" x 1"
		Actual Orifice diameter d_0 [mm]	9	9	9
		Actual Orifice area A_0 [mm²]	63.6	63.6	63.6
Weight		[kg]	3.1	3.1	3.1
	Balanced bellows	[kg]	3.9	3.9	3.9
Required installation diameter d		[mm]	165	165	165

Inlet thread female

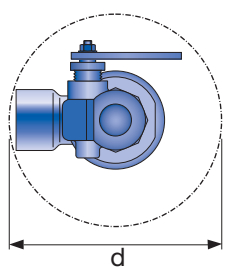
		Size Outlet body	1/2" x 1"	3/4" x 1"	1" x 1"
		Actual Orifice diameter d_0 [mm]	9	9	9
Center to face / Height					
DIN ISO 228-1	**G**	Inlet a	53	56	62
ASME B1.20.1	**NPT**				
Center to face [mm]		Outlet b	75	75	75
Height [mm]		H max.	283	286	292
	Balanced bellows	H max.	315	318	324
ISO 7-1/BS 21	**Rc**	Inlet a	53	56	64
Center to face [mm]		Outlet b	75	75	75
Height [mm]		H max.	283	286	294
	Balanced bellows	H max.	315	318	326

Inlet thread male

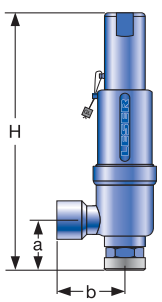
		Size outlet body		1"	
		Actual Orifice diameter d_0 [mm]		9	
Center to face [mm]					
DIN ISO 228-1	**G**	Inlet a		52	
		Outlet b		75	
ISO 7-1/BS 21	**R**	Inlet a		49	
ASME B1.20.1	**NPT**				
		Outlet b		75	

Height [mm]								
		Size inlet thread	**Conventional design**			**Balanced bellows**		
			1/2"	3/4"	1"	1/2"	3/4"	1"
DIN ISO 228-1	**G**	H max.	296	298	301	328	330	333
ISO 7-1/BS 21	**R**	H max.	298	299	303	330	331	335
ASME B1.20.1	**NPT**	H max.	301	301	307	333	333	339

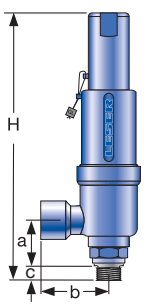
Length of screwed end c [mm]					
		Size inlet thread	1/2"	3/4"	1"
DIN ISO 228-1	**G**		14	16	18
ISO 7-1/BS 21	**R**		19	20	23
ASME B1.20.1	**NPT**		22	22	27



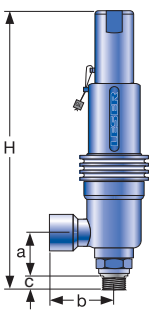
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

Type 462 HDD

Dimensions and weights

Threaded connections [US units]

Size Outlet body		1/2" x 1"	3/4" x 1"	1" x 1"
Actual Orifice diameter d_0 [inch]		0.354	0.354	0.354
Actual Orifice area A_0 [inch^2]		0.099	0.099	0.099
Weight	[lbs]	6.8	6.8	6.8
Balanced bellows	[lbs]	8.6	8.6	8.6
Required installation diameter d	[inch]	$6^{1}/_{2}$	$6^{1}/_{2}$	$6^{1}/_{2}$

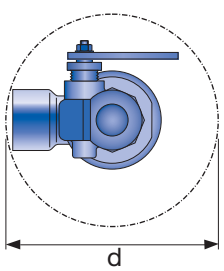
Inlet thread female

Size Outlet body		1/2" x 1"	3/4" x 1"	1" x 1"
Actual Orifice diameter d_0 [inch]		0.354	0.354	0.354
Center to face / Height				
DIN ISO 228-1 G **ASME B1.20.1 NPT**	Inlet a	$2^{3}/_{32}$	$2^{7}/_{32}$	$2^{7}/_{16}$
Center to face [inch]	Outlet b	$2^{15}/_{16}$	$2^{15}/_{16}$	$2^{15}/_{16}$
Height [inch]	H max.	$11^{5}/_{32}$	$11^{1}/_{14}$	$11^{1}/_{2}$
Balanced bellows	H max.	$12^{13}/_{32}$	$12^{17}/_{32}$	$12^{3}/_{4}$
ISO 7-1/BS 21 Rc	Inlet a	$2^{3}/_{32}$	$2^{7}/_{32}$	$2^{17}/_{32}$
Center to face [inch]	Outlet b	$2^{15}/_{16}$	$2^{15}/_{16}$	$2^{15}/_{16}$
Height [inch]	H max.	$11^{5}/_{32}$	$11^{1}/_{14}$	$11^{9}/_{16}$
Balanced bellows	H max.	$12^{13}/_{32}$	$12^{17}/_{32}$	$12^{27}/_{32}$

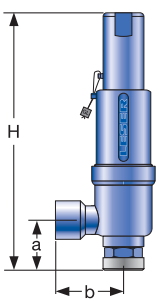
Inlet thread male

Size outlet body		1"					
Actual Orifice diameter d_0 [inch]		0.354					
Center to face [inch]							
DIN ISO 228-1 G	Inlet a	$2^{1}/_{16}$					
	Outlet b	$2^{15}/_{16}$					
ISO 7-1/BS 21 R **ASME B1.20.1 NPT**	Inlet a	$1^{15}/_{16}$					
	Outlet b	$2^{15}/_{16}$					
Height [inch]							
	Size inlet thread	**Conventional design**			**Balanced bellows**		
		3/8"	1/2"	3/8"	1/2"	3/8"	1/2"
DIN ISO 228-1 G	H max.	$11^{21}/_{32}$	$11^{23}/_{32}$	$11^{27}/_{32}$	$12^{29}/_{32}$	13	$13^{1}/_{8}$
ISO 7-1/BS 21 R	H max.	$11^{23}/_{32}$	$11^{25}/_{32}$	$11^{15}/_{16}$	13	$13^{1}/_{32}$	$13^{3}/_{16}$
ASME B1.20.1 NPT	H max.	$11^{27}/_{32}$	$11^{27}/_{32}$	$12^{3}/_{32}$	$13^{1}/_{8}$	$13^{1}/_{8}$	$13^{11}/_{32}$

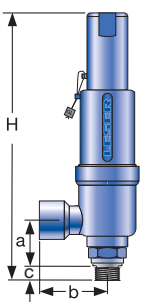
Length of screwed end "c" [inch]				
Size inlet thread		1/2"	3/4"	1"
DIN ISO 228-1	**G**	$^{9}/_{16}$	$^{5}/_{8}$	$^{23}/_{32}$
ISO 7-1/BS 21	**R**	$^{3}/_{4}$	$^{25}/_{32}$	$^{29}/_{32}$
ASME B1.20.1	**NPT**	$^{7}/_{8}$	$^{7}/_{8}$	$^{11}/_{16}$



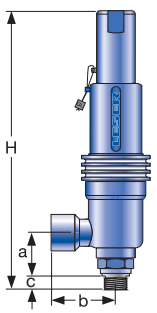
Required installation diameter



Conventional design – female thread



Conventional design – male thread



Balanced bellows

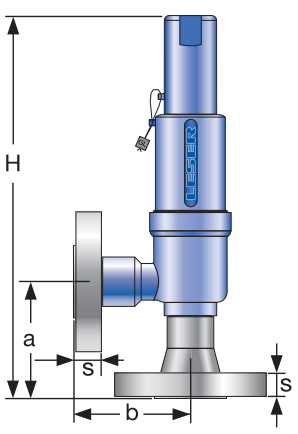
Type 462 HDD
Dimensions and weights
Flanged connections [Metric units]

			Conventional design	Balanced bellows
Actual Orifice diameter d_0 [mm]			9	9
Actual Orifice area A_0 [mm²]			63.6	63.6
DIN EN 1092-1				
			Flange rating PN 40 – 400	
Center to face	[mm]	Inlet a	100	100
		Outlet b	100	100
Height	[mm]	H max.	330	375
ASME B 16.5				
			Flange rating class 150 – 2500	
Center to face	[mm]	Inlet a	100	100
		Outlet b	100	100
Height	[mm]	H max.	330	375

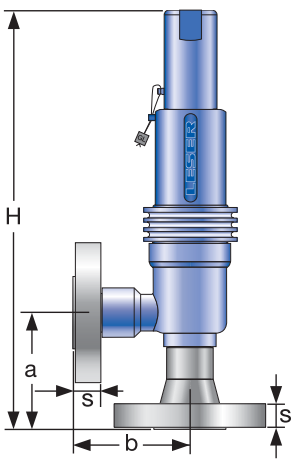
Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

Weight				
For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)				
Weight net (without inlet and outlet flange)	[kg]	m_N	3.1	4.3

Flange dimensions															
			DIN EN 1092-1 / Flange rating PN						**ASME B16.5 / Flange rating class**						
		Size	40	100	160	250	320	400	**Size**	150	300	600	900	1500	2500
DN 15									**NPS 1/2"**						
Flange thickness	[mm]	s	18	–	22	28	28	30		14	18	18	26	26	30.2
Weight slip on flange	[kg]	m_F	0.8	–	1.2	2.5	2.5	3.6		0.6	0.9	0.9	2.1	2.1	3
DN 20									**NPS 3/4"**						
Flange thickness	[mm]	s	20	22	–	–	–	–		15	18	18	25.4	25.4	32
Weight slip on flange	[kg]	m_F	1.1	1.3	–	–	–	–		0.8	1.4	1.4	2.3	2.3	3.5
DN 25									**NPS 1"**						
Flange thickness	[mm]	s	22	–	26	30	36	40		17	21.5	21.5	32.5	32.5	40
Flange thickness	[kg]	m_F	1.3	–	2.6	3.5	5	7.5		1	2.1	2.1	4.1	4.1	5.1
DN 40									**NPS 1 1/2"**						
Flanschblattdicke	[mm]	s	21	–	23	32	–	–		22	24	24	32	–	–
Weight slip on flange	[kg]	m_F	2.1	–	2.9	4.3	–	–		1.4	2.2	2.2	3.9	–	–



Conventional design



Balanced bellows

Type 462 HDD
Dimensions and weights
Flanged connections [US units]

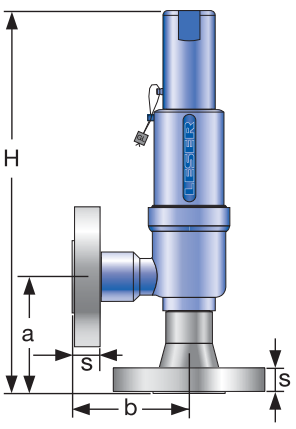
			Conventional design	Balanced bellows
Actual Orifice diameter d_0 [inch]			0.354	0.354
Actual Orifice area A_0 [inch²]			0.099	0.099
DIN EN 1092-1				
			Flange rating PN 40 – 400	
Center to face	[inch]	Inlet a	$3^{15}/_{16}$	$3^{15}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	13	$14^{3}/_{4}$
ASME B 16.5				
			Flange rating class 150 – 2500	
Center to face	[inch]	Inlet a	$3^{15}/_{16}$	$3^{15}/_{16}$
		Outlet b	$3^{15}/_{16}$	$3^{15}/_{16}$
Height	[inch]	H max.	13	$14^{3}/_{4}$

Note The outlet dimension b can differ at special combinations of nominal diameter and pressure range if flanged connections are used at the inlet and outlet. Special dimensions are possible. More information at sales@leser.com.

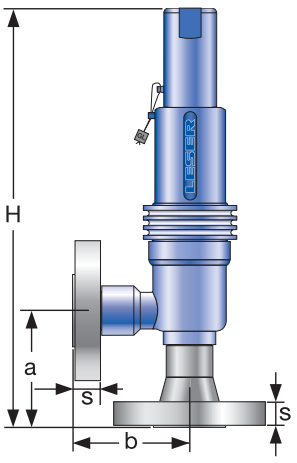
Weight				
For the calculation of the total weight please use the Formular: $W_T = W_N + W_F$ (Inlet) + W_F (Outlet)				
Weight net (without inlet and outlet flange)	[lbs]	m_N	6.8	9.5

Flange dimensions

			DIN EN 1092-1 / Flange rating PN						ASME B16.5 / Flange rating class						
		Size	40	100	160	250	320	400	Size	150	300	600	900	1500	2500
		DN 15							**NPS $^1/_2$"**						
Flange thickness	[inch]	s	$^{23}/_{32}$	–	$^{7}/_{8}$	$1^{3}/_{32}$	$1^{3}/_{32}$	$1^{3}/_{16}$		$^{9}/_{16}$	$^{23}/_{32}$	$^{23}/_{32}$	$1^{1}/_{32}$	$1^{1}/_{32}$	$1^{3}/_{16}$
Weight slip on flange	[lbs]	m_F	1.8	–	2.6	5.5	5.5	7.9		1.3	2.0	2.0	4.6	4.6	6.6
		DN 20							**NPS $^3/_4$"**						
Flange thickness	[inch]	s	$^{25}/_{32}$	$^{7}/_{8}$	–	–	–	–		$^{19}/_{32}$	$^{23}/_{32}$	$^{23}/_{32}$	1	1	$1^{1}/_{4}$
Weight slip on flange	[lbs]	m_F	2.4	2.9	–	–	–	–		1.8	3.1	3.1	5.1	5.1	7.7
		DN 25							**NPS 1"**						
Flange thickness	[inch]	s	$^{7}/_{8}$	–	$1^{1}/_{32}$	$1^{3}/_{16}$	$1^{3}/_{32}$	$1^{9}/_{16}$		$^{21}/_{32}$	$^{27}/_{32}$	$^{27}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{32}$	$1^{9}/_{16}$
Flange thickness	[lbs]	m_F	2.9	–	5.7	7.7	11.0	16.5		2.2	4.6	4.6	9.0	9.0	11.2
		DN 40							**NPS $1^1/_2$"**						
Flanschblattdicke	[inch]	s	$^{13}/_{16}$	–	$^{29}/_{32}$	$1^{1}/_{4}$	–	–		$^{7}/_{8}$	$^{15}/_{16}$	$^{15}/_{16}$	$1^{1}/_{4}$	–	–
Weight slip on flange	[lbs]	m_F	4.5	–	6.3	9.5	–	–		3.2	4.8	4.8	8.6	–	–



Conventional design



Balanced bellows

Type 462 HDD

Pressure temperature ratings

[Metric units + US units]

Metric units

Actual Orifice diameter d_0 [mm]		9		
Actual Orifice Area A_0 [mm²]		63.6		
Body material 1.4404 (316L)		**Type 4624**		
Base / Inlet Body	Connection size	1/2"	3/4"	1"
	Pressure rating	PN 500		
Outlet body	Pressure rating	PN 160		
Minimum set pressure	p [bar_g] S/G/L	250.01		
Maximum set pressure	p [bar_g] S/G/L	350		
Temperature acc. to DIN EN[1)]	min. [°C]	-45		
	max. [°C]	+150		
Temperature acc. to ASME[1)]	min. [°C]	-45		
	max. [°C]	+150		

US units

Actual Orifice diameter d_0 [inch]		0.354		
Actual Orifice Area A_0 [inch²]		0.099		
Body material 1.4404 (316L)		**Type 4624**		
Base / Inlet Body	Connection size	1/2"	3/4"	1"
Minimum set pressure	p [psig] S/G/L	3625		
Maximum set pressure	p [psig] S/G/L	5076		
Temperature acc. to DIN EN[1)]	min. [°F]	-49		
	max. [°F]	+302		
Temperature acc. to ASME[1)]	min. [°F]	-49		
	max. [°F]	+302		

[1)] The temperature is limited by soft seal material. The stated values are valid for EPDM.

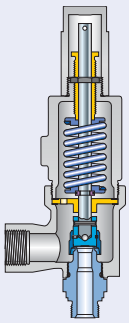
Type 462 HDD
Approvals

Actual Orifice diameter d_0 [mm]		9
Actual Orifice area A_0 [mm²]		63.6
Actual Orifice diameter d_0 [inch]		0.354
Actual Orifice area A_0 [inch²]		0.099
Europe		**Coefficient of discharge K_{dr}**
PED / DIN EN ISO 4126-1	Approval No.	072021409Z0022/15/D/0135
	S/G	0.83
	L	0.61
Germany		**Coefficient of discharge α_w**
PED / AD 2000-Merkblatt A2	Approval No.	TÜV SV 909
	S/G	0.83
	L	0.61
United States		**Coefficient of discharge K**
ASME Sec. VIII Div. 1	Approval No.	M 37112
	S/G	0.811
	Approval No.	M 37101
	L	0.566
Canada		**Coefficient of discharge K**
CRN	Approval No.	The current approval no. can be found at www.leser.com
	S/G	0.811
	L	0.566
China		**Coefficient of discharge α_w**
AQSIQ	Approval No.	The current approval no. can be found at www.leser.com
	S/G	0.83
	L	0.61
Eurasian Custom Union		**Coefficient of discharge α_w**
EAC	Approval No.	The current approval no. can be found at www.leser.com
	S/G	0.83
	L	0.61

Classification societies		**Homepage**	
Bureau Veritas	BV	www.bureauveritas.com	The valid certification number is changed with every reneval. A sample certificate including the valid certification number can be found at www.leser.com
DNV GL		www.dnvgl.com	
Lloyd's Register EMEA	LREMEA	www.lr.org	
Registro Italiano Navale	RINA	www.rina.org	
U.S. Coast Guard	U.S.C.G	www.uscg.org	

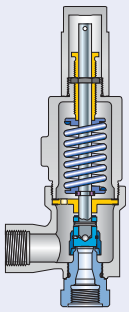
Series 459
Available Options

Male thread



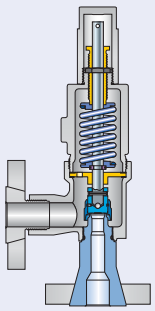
Type 459

Female thread



Type 459

Flanged version



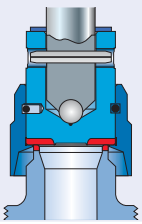
Type 462

Solar valve
N80

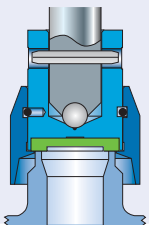
4592.2482
4592.2484

Type 462

Stellited sealing surface
J25: Disc stellited
L20: Base/inlet body



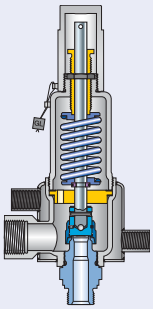
Disc with inserted sealing plate
J44: PTFE-FDA "A"
J48: PCTFE "G"
J49: VESPEL-SP "T"



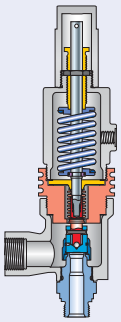
Soft seal o-ring disc
J30: NBR "N"
J21: CR "K"
J22: EPDM "D"
J23: FKM "L"
J20: FFKM "C"

Refrigeration technology
Art. No. see page 65

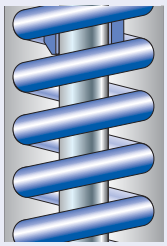
Heating jacket
H29



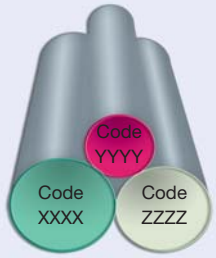
Balanced bellows



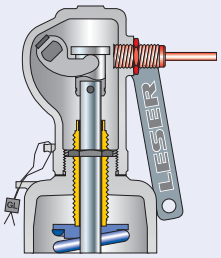
INCONEL X-750 spring
X08



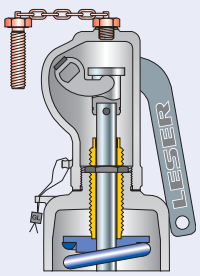
Special material



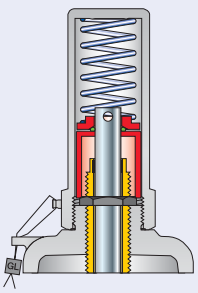
Lift indicator
J93: Lift indicator



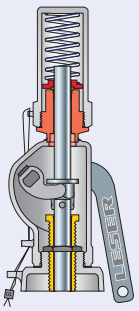
Test gag
J69: H4
J70: H2



O-ring-damper H2
J65



O-ring-damper H4
J66



Series 459
Available connections
Threaded connections

Actual Orifice diameter d_0 [mm]		6		9 / 13		17.5	
Actual Orifice area A_0 [mm²]		28.3		63.9 / 133		241	
Actual Orifice diameter d_0 [inch]		0.236		0.345 / 0.512		0.689	
Actual Orifice area A_0 [inch²]		0.044		0.099 / 0.206		0.374	
		Inlet	**Outlet**	**Inlet**	**Outlet**	**Inlet**	**Outlet**
Male thread DIN ISO 228-1							
G	**1/2"**	V54[5]	–	V54[1]	–	–	–
	3/4 "	V55[5]	–	V55	–	–	–
	1"	V56[5]		V56	V68	V56	–
	1 1/4"	–		–	–	V83	–
	1 1/2"	–	V69	–	V69	V57	V69
Female thread DIN ISO 228-1							
G	**1/2"**	V50[5]	–	V50	–	–	–
	3/4 "	V51[5]	–	V51	–	V51	–
	1"	–	V66	V52[2]	V66	V52	–
	1 1/4"	–	V81	–	V81	V84	–
	1 1/2"	–	V67	–	V67	V53	V67
Male thread ISO 7-1/BS 21							
R/BSPT	**1/2"**	V30[3) 5]	–	V30[6]	–	–	–
	3/4 "	V31[5]	–	V31	–	–	–
	1"	V32[5]		V32	V42	V32	–
	1 1/2"	–	V43	–	V43	V33	V43
Female thread ISO 7-1/BS 21							
Rc/BSPT	**1/2"**	V38[5]	–	V38	–	–	–
	3/4 "	V39[5]	–	V39	–	V39	–
	1"	V40[5]		V40	V36	V40	–
	1 1/2"	–	V37	–	V37	V41	V37
Male thread ANSI/ASME B1.20.1							
NPT	**1/2"**	V61[5]	–	V61[4]	–	–	–
	3/4 "	V62[5]	–	V62	–	–	–
	1"	V63[5]		V63	V73	V63	–
	1 1/4"	–		–	–	V85	–
	1 1/2"	–	V74	–	V74	V64	V74
	2"	–	–	–	–	V86	–
Female thread ANSI/ASME B1.20.1							
NPT	**1/2"**	V58[5]	–	V58	–	–	–
	3/4 "	V59[5]	–	V59	–	V59	–
	1"	V60[5]	V71	V60	V71	V60	–
	1 1/4"	–	V80	–	V80	V87	–
	1 1/2"	–	V72	–	V72	V75	V72
	2"	–	–	–	–	–	V88

Flanged and threaded connections can be combined.
Threads according to other standards are available. Please specify in writing (diameter, pressure rating, standard).

[1] Only for d_0 9 mm
[2] d_0 9 mm: up to PN 420
[3] Only as special design
[4] d_0 13 mm: up to 125 bar and 455 °C
[5] max. PN 700: For higher set pressures a special inlet body is required (see LDeS 3001.19)
[6] V30 d_0 9 mm

Series 459
Available connections
Flanged connections

Nominal diameter	Pressure rating	d_0 6 mm		d_0 9 mm		d_0 13 mm		d_0 17.5 mm	
DIN EN 1092-1									
		Option code		Option code		Option code		Option code	
DN	PN	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
15	40	I21	–	I21	–	I21	–	–	–
	160	I22	–	I22	–	I22	–	–	–
	250	I23	–	I23	–	I23	–	–	–
	320	I24	–	I24	–	I24	–	–	–
	400	I25	–	I25	–	I25	–	–	–
20	40	I26	–	I26	–	I26	–	I26	–
	160	I27	–	I27	–	I27	–	I27	–
25	40	I31	I46	I31	I46	I31	I46	I31	–
	160	I32	I47	I32	I47	I32	I47	I32	–
	250	I33	I48[2]	I33	I48[1]	I33	I48[1]	I33	–
	320	I34	–	I34	–	I34	–	I34	–
	400	I35	–	I35	–	I35	–	I35	–
40	40	–	–	–	I49	–	I49	–	I49
	160	–	–	–	I50	–	I50	–	I50
	250	–	–	–	I51[1]	–	I51[1]	–	I51[1]
ANSI/ASME B 16.5									
NPS	CL	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
1/2"	150	V01	–	V01	–	V01	–	–	–
	300	V02	–	V02	–	V02	–	–	–
	600	V02	–	V02	–	V02	–	–	–
	900	V03	–	V03	–	V03	–	–	–
	1500	V03	–	V03	–	V03	–	–	–
	2500	V04	–	V04	–	V04	–	–	–
3/4"	150	V05	–	V05	–	V05	–	V05	–
	300	V06	–	V06	–	V06	–	V06	–
	600	V06	–	V06	–	V06	–	V06	–
	900	V07	–	V07	–	V07	–	V07	–
	1500	V07	–	V07	–	V07	–	V07	–
	2500	V08	–	V08	–	V08	–	V08	–
1"	150	V09	–	V09	V18	V09	V18	V09	–
	300	V10	V19	V10	V19	V10	V19	V10	–
	600	V10	V19	V10	V19	V10	V19	V10	–
	900	V11	–	V11	–	V11	–	V11	–
	1500	V11	–	V11	–	V11	–	V11	–
	2500	V12	–	V12	–	V12	–	V12	–
1 1/2"	150	–	–	–	V21	–	V21	–	V21
	300	–	–	–	V22	–	V22	–	V22
	600	–	–	–	V22	–	V22	–	V22

Type 462 Refrigeration technology – Flange facings DIN EN 1092, groove face D

Nominal diameter		Center to face [mm]		d_0 13 mm		d_0 13 mm		d_0 17.5 mm	
DIN EN 1092-1									
DN		a	b	Option code		Option code		Option code	
Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet	Inlet	Outlet
15	**20**	90	80	I1C	I1J	–	–	–	–
20	**20**	90	80	I1D	I1J	–	–	–	–
15	**25**	100	100	–	–	I1A	I1H	–	–
15	**25**	95	95	–	–	I1F	I1L	–	–
20	**25**	90	80	–	–	I1D	I1K	–	–
20	**25**	95	95	–	–	I1G	I51	–	–
25	**25**	100	100	–	–	I1B	I1H	–	–
25	**25**	90	80	–	–	I1E	I1K	–	–
25	**32**	100	100	–	–	–	–	I1B	I1M

Flanged and threaded connections can be combined. Flanges according to other standards, e. g. JIS are available. Please specify in writing (diameter, pressure rating and standard).

[1] Caution! Only connecting dimensions correspond to PN 250, outlet body and bonnet are designed for PN 160.

Series 459
LESER Original Spare Parts Kits Type 459

Article numbers

	d_0	9	13	17,5
	Art. No.			
Type 459	**5012.**	**1230**	**1231**	**1232**

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

Contents – Type 459

Item	Component	Material	Quantity
7	Disc	1.4404 / 316L	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	2
61	Ball	1.4401 / 316	1
63	Gasket	Graphite / 1.4401 Graphite / 316	1