LESER

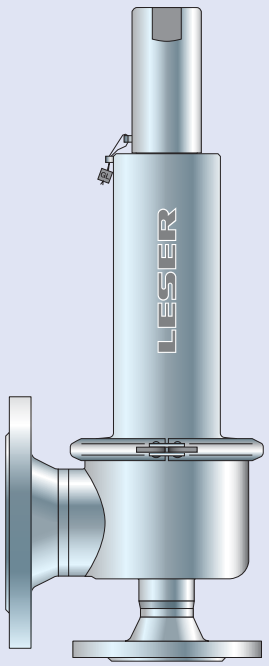
Type 444 DIN

Flanged Safety Relief Valves – spring loaded

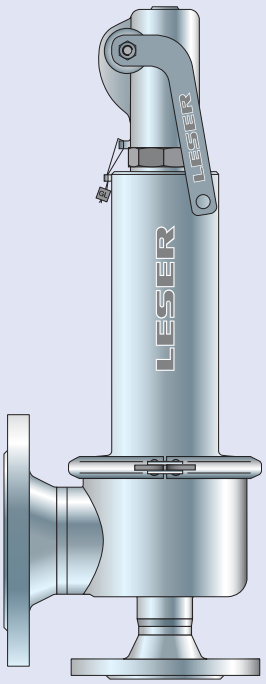
Type 444 DIN
Packed lever H4
Closed bonnet
Conventional design

Contents — Chapter/Page

How to order – Article numbers



Type 444
Cap H2
Closed bonnet
Conventional design

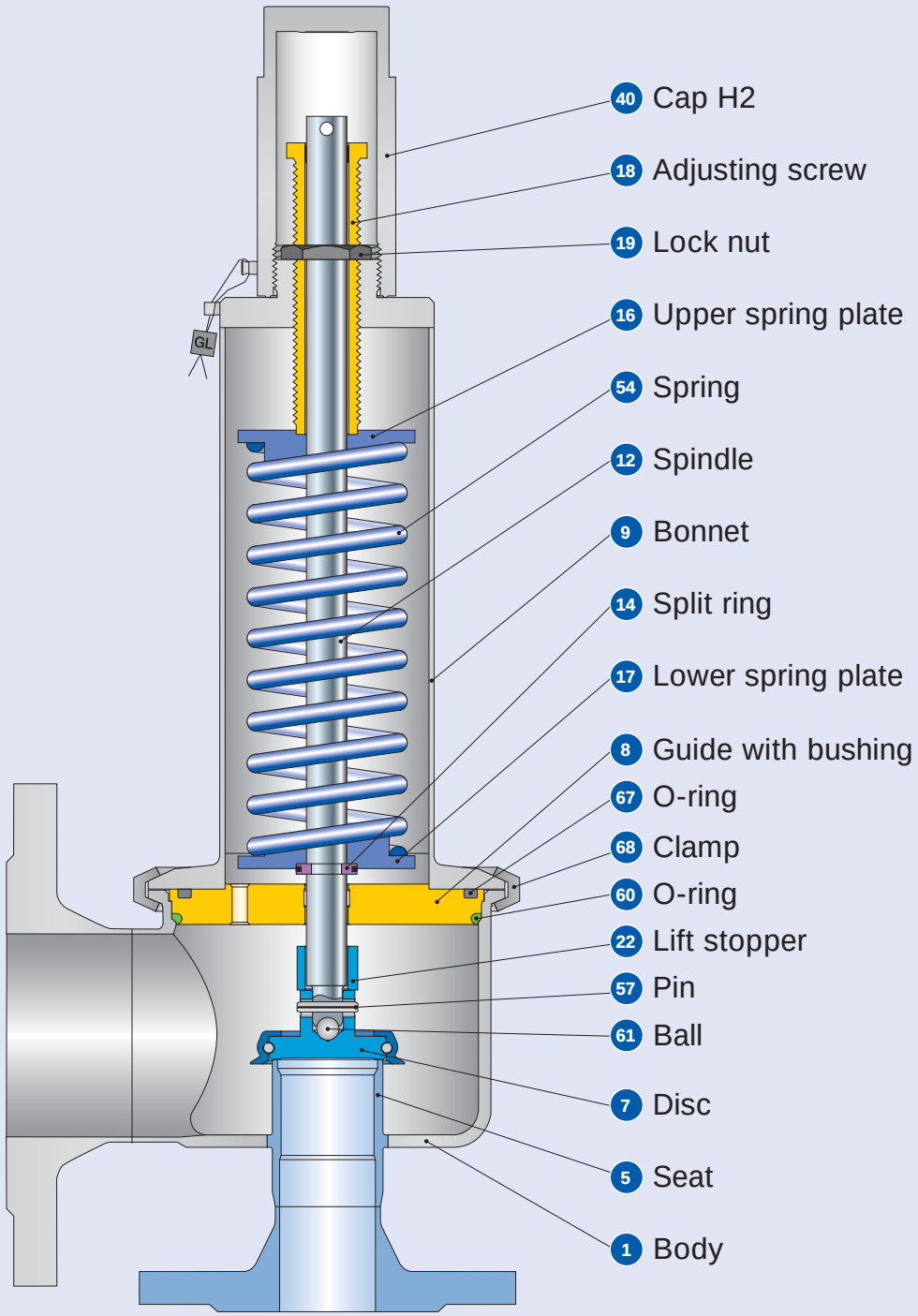


Type 444
Packed lever H4
Closed bonnet
Conventional design

Article numbers

		DN_I	25	25	50	65	80	80
		DN_O	50	80	80	100	100	100
		Actual Orifice diameter d_0 [mm]	23	37	46	60	74	74
		Actual Orifice area A_0 [mm^2]	416	1075	1662	2827	4301	4301
		Set pressure range S/G/L [bar_g]	see page 04/08				0,1 – 6,8	6,81 – 16
		Set pressure range S/G/L [psig]					1,5 – 98,6	98,61 – 232
Body material: 1.4404 (316L)								
Bonnet closed	**H2**	Art.-No. **4444.**	**3642**	**3662**	**3672**	**3682**	**3692**	**3702**
	H4	Art.-No. **4444.**	**3644**	**3664**	**3674**	**3684**	**3694**	**3704**

Conventional design



Conventional design

Materials

Item	Component	Type 4444 DIN
1	**Body**	1.4404 316L
5	Seat	1.4404 316L
7	Disc	1.4404 316L
8	Guide	1.4404 316L
	with bushing	PTFE +15% Glas -"-
9	**Bonnet**	1.4404 316L
12	Spindle	1.4404 316L
14	Split ring	1.4404 316L
16 / 17	Spring plate	1.4404 316L
18	Adjusting screw with bushing	1.4404, PTFE + 15% Glas 316L, PTFE + 15% Glas
19	Lock nut	1.4404 316L
22	Lift stopper	1.4404 316L
40	Cap H2	1.4404 316L
54	Spring	1.4310 Stainless steel
57	Pin	1.4310 302
60	O-ring	EPDM-FDA -"-
61	Ball	1.4401 316
67	O-ring	EPDM-FDA -"-
68	Clamp	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.

Dimensions and weights

Metric Units

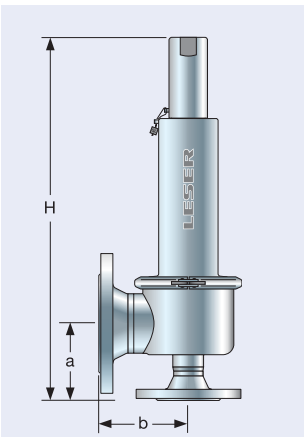
	DN_I	25	40	50	65	80	80
	DN_O	50	80	80	100	100	100
Actual Orifice diameter d_0 [mm]		23	37	46	60	74	74
Actual Orifice area A_0 [mm^2]		416	1075	1662	2827	4301	4301
Set pressure range S/G/L [bar_g]		see page 04/08				0,1 – 6,8	6,81 – 16
Weight [kg]		7	13	14	23	24	24
Center to face [mm]	Inlet a	85	110	110	125	125	125
	Outlet b	90	128	128	160	160	160
Height (H4) [mm]	Standard H max.	308	519	519	631	631	631

Body material: 1.4404 (316L)		
DIN Flange	Inlet	PN 16
	Outlet	PN 16

US Units

	DN_I	25	40	50	65	80	80
	DN_O	50	80	80	100	100	100
Actual Orifice diameter d_0 [inch]		0,91	1,46	1,81	2,36	2,91	2,91
Actual Orifice area A_0 $inch^2$]		0,644	1,667	2,576	4,383	6,666	6,666
Set pressure range S/G/L [psig]		see page 04/08				1,5 – 98,6	98,61 – 232
Weight [lbs]		16	29	31	51	53	53
Center to face [inch]	Inlet a	$3^3/_8$	$4^5/_{16}$	$4^5/_{16}$	$4^{15}/_{16}$	$4^{15}/_{16}$	$4^{15}/_{16}$
	Outlet b	$3^1/_2$	$5^1/_{16}$	$5^1/_{16}$	$6^5/_{16}$	$6^5/_{16}$	$6^5/_{16}$
Height (H4) [inch]	Standard H max.	$12^1/_8$	$20^7/_{16}$	$20^7/_{16}$	$20^{13}/_{16}$	$20^{13}/_{16}$	$20^{13}/_{16}$

Body material: 1.4404 (316L)		
DIN Flange	Inlet	PN 16
	Outlet	PN 16



Conventional design

Pressure temperature ratings

Metric Units

	DN_I	25	40	50	65	80	80
	DN_O	50	80	80	100	100	100
	Actual Orifice diameter d_0 [mm]	23	37	46	60	74	74
	Actual Orifice area A_0 [mm^2]	416	1075	1662	2827	4301	4301
Body material: 1.4404 (316L)							
DIN Flange	Inlet	**PN 16**					
	Outlet	**PN 16**					
Minimum set pressure	p [bar_g] S/G/L	0,1	0,1	0,1	0,1	0,1	6,81
Maximum set pressure	p [bar_g] S/G/L	16	16	16	16	6,8	16
Temperature acc. to DIN EN	min. [°C]	-45					
	max. [°C]	+200					
Temperature acc. to ASME	min. [°C]	-45					
	max. [°C]	+200					

US Units

	DN_I	25	40	50	65	80	80
	DN_O	50	80	80	100	100	100
	Actual Orifice diameter d_0 [inch]	0,91	1,46	1,81	2,36	2,91	2,91
	Actual Orifice area A_0 [$inch^2$]	0,644	1,667	2,576	4,383	6,666	6,666
Body material: 1.4404 (316L)							
DIN Flange	Inlet	**PN 16**					
	Outlet	**PN 16**					
Minimum set pressure	p [psig] S/G/L	1,5	1,5	1,5	1,5	1,5	98,61
Maximum set pressure	p [psig] S/G/L	232	232	232	232	98,6	232
Temperature acc. to DIN EN	min. [°F]	-49					
	max. [°F]	+392					
Temperature acc. to ASME	min. [°F]	-49					
	max. [°F]	+392					

Flange drillings and facings

Flange drillings

		DN_I	25	40	50	65	80
		DN_O	50	80	80	100	100
		Valve size	1" x 2"	$1^1/_2$" x 3"	2" x 3"	$2^1/_2$" x 4"	3" x 4"
		Actual Orifice diameter d_0 [mm]	23	37	46	60	74
		Actual Orifice area A_0 [mm^2]	416	1075	1662	2827	4301
Body material: 1.4404 (316L)							
Inlet	**DIN EN 1092**	PN 10	–	–	–	–	–
		PN 16	*	*	*	*	*
		PN 25	–	–	–	–	–
		PN 40	–	–	–	–	–
	ASME B16.5	CL150	Please use Type 444 ANSI				
		CL300					
Outlet	**DIN EN 1092**	PN 10	–	–	–	–	–
		PN 16	*	*	*	*	*
		PN 25	–	–	–	–	–
		PN 40	–	–	–	–	–
	ASME B16.5	CL150	Please use Type 444 ANSI				
		CL300					

Flange facings

Indication	Standard	Inlet	Outlet	Remark
General				
Flange undrilled	–	H38	H39	
Lens seal form L (without sealing lens)	DIN 2696 LWN 313.35	J11	J12	

Acc. to DIN EN					
Flange facing			**Inlet**	**Outlet**	**Remark**
DIN EN 1092 (new) see also LWN 313.40)		**DIN 2526 (old)**	PN 10 – PN 40	PN 10 – PN 40	Rz-data according to DIN EN 1092 in µm
Raised face	Type B1	Type C	*	*	Facing: Rz = 12,5 – 50
		Type D			
	Type B2	Type E	L36	L38	Facing: Rz = 3,2 – 12,5
Tongue face C[1)]		Tongue face F	H94	H92	Steel flanges only
Groove face D[1)]		Groove face N	H93	H91	
Male face E		Male face V13	H96	H98	
Female face F		Female face R13	H97	H99	
O-ring male face G		Male face V14	J01	J02	
O-ring female face H		Female face R14	J03	J04	
Acc. to ASME B16.5					
Please use Type 444 ANSI					

[1)] According to DIN EN 1092 groove depths and tongue heights increased compared to the formerly valid DIN (refer to LWN 313.40).
LESER manufactures the groove at flanged valves by milling. If a customer demands a turned surface in the soil of the groove according to DIN 2512 and/or DIN EN 1092-1 an additional option code is necessary: “S01: bottom of the groove drilled”. Groove and tongue for PN160 flanges refer to DIN 2512/LWN 313.32.
[2)] Smooth finish is not defined in the effective standards. For L ESER‘s definition for smooth finish see page 00/07.

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

Approvals

Approvals							
	DN_I	25	40	50	65	80	80
	DN_O	50	80	80	100	100	100
Actual Orifice diameter d_0 [mm]		23	37	46	60	74	74
Actual Orifice area A_0 [mm^2]		416	1075	1662	2827	4301	4301
Set pressure range S/G/L [bar_g]		see page 04/08				0,1 – 6,8	6,81 – 16
Set pressure range S/G/L [psig]						1,5 – 98,6	98,61 – 232
Europe		**Coefficient of discharge K_{dr}**					
DIN EN ISO 4126-1	Approval No.	072020111Z0008/0/08-2					
	S/G	0,7					0,55
	L	0,48					0,48
Germany		**Coefficient of discharge α_w**					
AD 2000-Merkblatt A2	Approval No.	TÜV SV 576					
	S/G	0,7					0,55
	L	0,48					0,48
United States		**Coefficient of discharge K**					
ASME Sec. VIII	Approval No.	M37044					–
	S/G	0,699					–
	Approval No.	M37055					M37055
	L	0,521					0,521
Canada		**Coefficient of discharge K**					
Canada: CRN	Approval No.	OG1182.9C					
	S/G	0,699					–
	L	0,521					0,521
China		**Coefficient of discharge α_w**					
CSBQTS	Approval No.						
	S/G	0,7					0,55
	L	0,48					0,48
Russia		**Coefficient of discharge α_w**					
GGTN/ GOSGOTECHNADZOR GOST R	Approval No.	PPC 00-18458					
	S/G	0,7					0,55
	L	0,48					0,48
Classification societies							
		on request					

Capacities – Steam

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

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

Metric Units – AD 2000-Merkblatt A2 [kg/h]

DN_I	25	40	50	65	80	80
DN_O	50	80	80	100	100	100
Act. Orifice dia. d_0 [mm]	23	37	46	60	74	74
Act. Orifice area A_0 [mm²]	416	1075	1662	2827	4301	4301
$LEO_{S/G}$*) [inch²]	0,462	1,195	1,847	3,142	4,779	4,779
Set pressure S/G [bar_g]					0,1–6,8	6,81–16
Set pressure [bar]	**Capacities** [kg/h]					
0,1	112	274	405	720	1093	
0,2	144	353	524	927	1417	
0,5	223	546	822	1434	2221	
1	324	790	1209	2086	3262	
2	529	1285	2002	3413	5377	
3	699	1761	2770	4695	7237	
4	872	2256	3487	5932	9023	
5	1043	2700	4174	7101	10801	
6	1215	3143	4858	8266	12573	
7	1382	3575	5526	9402		11237
8	1552	4015	6206	10559		12619
9	1721	4455	6885	11714		14000
10	1891	4894	7564	12868		15380
12	2230	5772	8922	15179		18141
14	2562	6631	10249	17437		20840
16	2901	7507	11603	19740		23593

US Units – ASME Section VIII [lb/h]

DN_I	25	40	50	65	80	80
DN_O	50	80	80	100	100	100
Act. Orifice dia. d_0 [inch]	0,91	1,46	1,81	2,36	2,91	2,91
Act. Orifice area A_0 [inch²]	0,644	1,667	2,576	4,383	6,666	6,666
$LEO_{S/G}$*) [inch²]	0,462	1,195	1,847	3,142	4,779	4,779
Set pressure S/G [psig]					1,5–98,6	98,61–232
Set pressure [psig]	**Capacities** [lb/h]					
15	758	1962	3032	5159	7847	
20	874	2262	3496	5948	9047	
30	1106	2862	4423	7525	11447	
40	1361	3522	5443	9261	14087	
50	1616	4182	6463	10996	16726	
60	1871	4842	7483	12732	19366	
70	2126	5501	8503	14467	22006	
80	2381	6161	9523	16202	24646	
90	2636	6821	10543	17938	27285	
100	2891	7481	11563	19673	29925	
120	3401	8801	13604	23144		35205
140	3911	10121	15644	26615		40484
160	4421	11441	17684	30086		45764
180	4931	12761	19724	33557		51043
200	5441	14081	21764	37027		56323
220	5951	15401	23804	40498		61602
230	6206	16060	24824	42234		64242

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

Capacities – Air

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

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

DN_I	25	40	50	65	80	80
DN_O	50	80	80	100	100	100
Act. Orifice dia. d_0 [mm]	23	37	46	60	74	74
Act. Orifice area A_0 [mm^2]	416	661	1075	1662	2827	6648
$LEO_{S/G}$*) [$inch^2$]	0,462	1,195	1,847	3,142	4,779	4,779
Set pressure S/G [bar_g]					0,1–6,8	6,81–16
Set pressure [bar]	**Capacities** [m_n^3/h]					
0,1	129	316	466	829	1257	
0,2	167	409	607	1073	1640	
0,5	262	640	964	1683	2607	
1	386	941	1440	2484	3884	
2	639	1551	2416	4119	6489	
3	853	2150	3382	5732	8835	
4	1071	2772	4284	7289	11088	
5	1289	3335	5155	8771	13341	
6	1506	3899	6026	10252	15594	
7	1724	4462	6897	11733		14023
8	1942	5025	7767	13214		15793
9	2159	5588	8638	14696		17564
10	2377	6152	9509	16177		19334
12	2812	7278	11250	19140		22875
14	3248	8405	12991	22102		26416
16	3683	9532	14733	25065		29956

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

US Units — **ASME Section VIII** [S.C.F.M.]

DN_I	25	40	50	65	80	80
DN_O	50	80	80	100	100	100
Act. Orifice dia. d_0 [inch]	0,91	1,46	1,81	2,36	2,91	2,91
Act. Orifice area A_0 [$inch^2$]	0,644	1,667	2,576	4,383	6,666	6,666
$LEO_{S/G}$*) [$inch^2$]	0,462	1,195	1,847	3,142	4,779	4,779
Set pressure S/G [psig]					1,5–98,6	98,61–232
Set pressure [psig]	**Capacities** [S.C.F.M.]					
15	269	697	1077	1832	2786	
20	310	803	1241	2112	3212	
30	393	1016	1571	2672	4064	
40	483	1250	1933	3288	5002	
50	574	1485	2295	3904	5939	
60	664	1719	2657	4521	6876	
70	755	1953	3019	5137	7814	
80	845	2188	3381	5753	8751	
90	936	2422	3744	6369	9688	
100	1026	2656	4106	6985	10625	
120	1208	3125	4830	8218		12500
140	1389	3594	5555	9450		14375
160	1570	4062	6279	10682		16249
180	1751	4531	7003	11915		18124
200	1932	5000	7728	13147		19998
220	2113	5468	8452	14380		21873
230	2204	5703	8814	14996		22810

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

Capacities – Water

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

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

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

DN_I	25	40	50	65	80	80
DN_O	50	80	80	100	100	100
Act. Orifice dia. d_0 [mm]	23	37	46	60	74	74
Act. Orifice area A_0 [mm^2]	416	1075	1662	2827	4301	4301
LEO_L*) [$inch^2$]	0,516	1,336	2,065	3,513	5,343	5,343
Set pressure L [bar_g]					0,1–6,8	6,81–16
Set pressure [bar]	**Capacities** [10^3kg/h]					
0,1	4,54	11,8	18,2	30,9	47	
0,2	5,56	14,4	22,2	37,8	57,6	
0,5	7,87	20,4	31,5	53,5	81,4	
1	10,6	27,6	42,6	72,5	110	
2	15,1	39	60,2	102	156	
3	18,4	47,7	73,8	126	191	
4	21,3	55,1	85,2	145	220	
5	23,8	61,6	95,3	162	246	
6	26,1	67,5	104	178	270	
7	28,2	72,9	113	192		292
8	30,1	77,9	120	205		312
9	31,9	82,7	128	217		331
10	33,7	87,2	135	229		349
12	36,9	95,5	148	251		382
14	39,8	103	159	271		412
16	42,6	110	170	290		441

US Units — ASME Section VIII [US-G.P.M.]

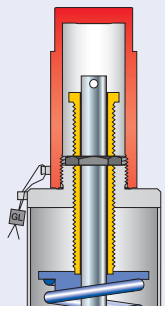
DN_I	25	40	50	65	80	80
DN_O	50	80	80	100	100	100
Act. Orifice dia. d_0 [inch]	0,91	1,46	1,81	2,36	2,91	2,91
Act. Orifice area A_0 [$inch^2$]	0,644	1,667	2,576	4,383	6,666	6,666
LEO_L*) [$inch^2$]	0,516	1,336	2,065	3,513	5,343	5,343
Set pressure L [psig]					1,5–98,6	98,61–232
Set pressure [psig]	**Capacities** [US-G.P.M.]					
15	54,1	140	216	368	560	
20	61,1	158	245	416	633	
30	73,2	190	293	498	758	
40	84,6	219	338	576	875	
50	94,6	245	378	643	979	
60	104	268	414	705	1072	
70	112	290	447	761	1158	
80	120	310	478	814	1238	
90	127	328	507	863	1313	
100	134	346	535	910	1384	
120	146	379	586	997		1516
140	158	409	633	1077		1638
160	169	438	677	1151		1751
180	179	464	718	1221		1857
200	189	489	756	1287		1958
220	198	513	793	1350		2053
230	203	525	811	1380		2099

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

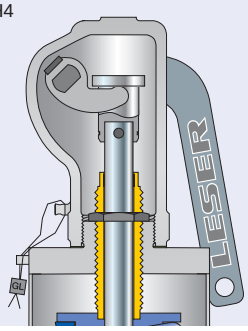
Available Options

For further information refer to
“Accesoires and Options”, page 99/01

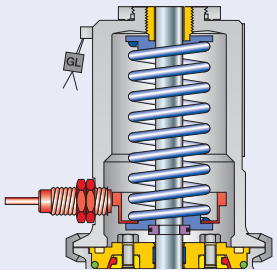
Screwed cap H2



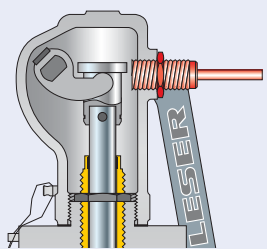
Packed lever H4
H4



Lift indicator bonnet
J38: Adaptor bonnet DN 25
J93: Lift indicator

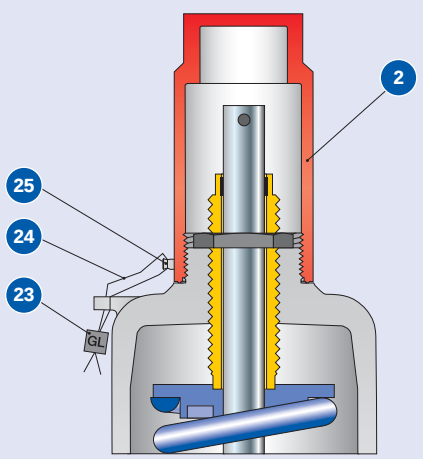


Lift indicator H4
DN 40 to DN 80
J38: Adaptor H4
J93: Lift indicator

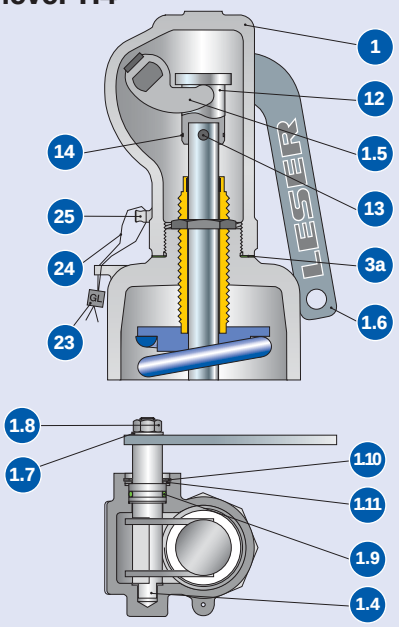


Caps and levers – Subassembly item 40

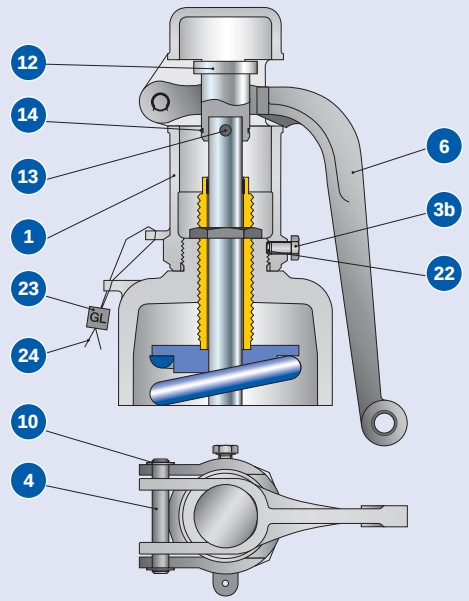
Cap H2



Packed lever H4

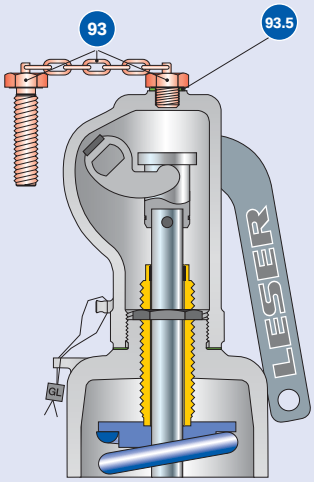


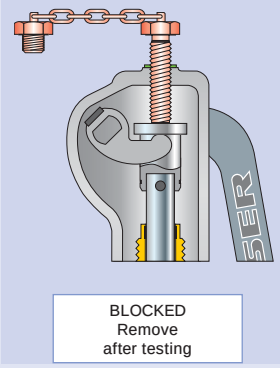
Plain lever H3



Test gag

Cap H2: J70
Packed lever H4: J69





Test gag

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

The test gag is used for:
- to perform pressure tests in a system without dismantling of the safety valve
- the individual adjustment of safety valves installed in the same system

After testing the test gag must be removed because otherwise the safety valve cannot protect the system against unallowable overpressure!