

Type 441 XXL 442 XXL

Flanged Safety Relief Valves – spring loaded



Type 441 XXL
Packed lever
Closed bonnet
Conventional and
balanced bellows design

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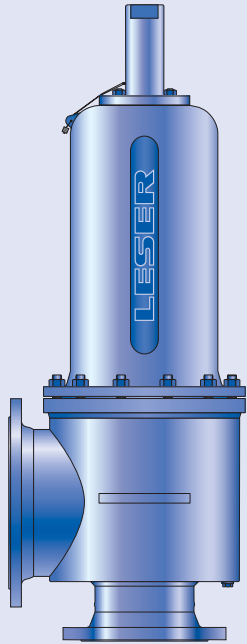
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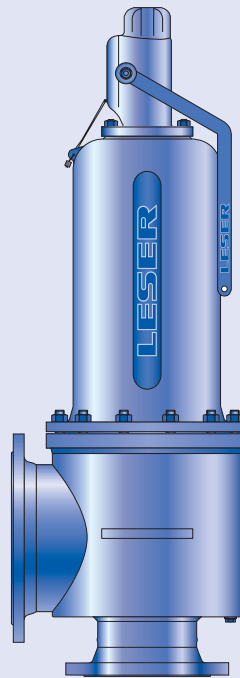
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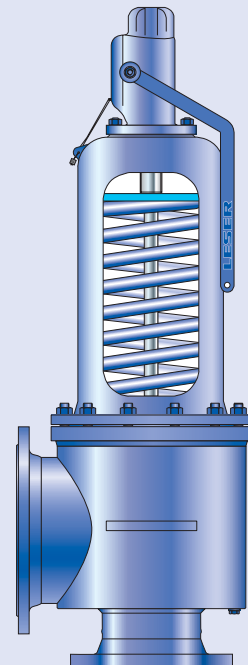
How to order – Article numbers



Type 441 XXL
Bolted cap H1
Closed bonnet
Conventional and
balanced bellows design



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



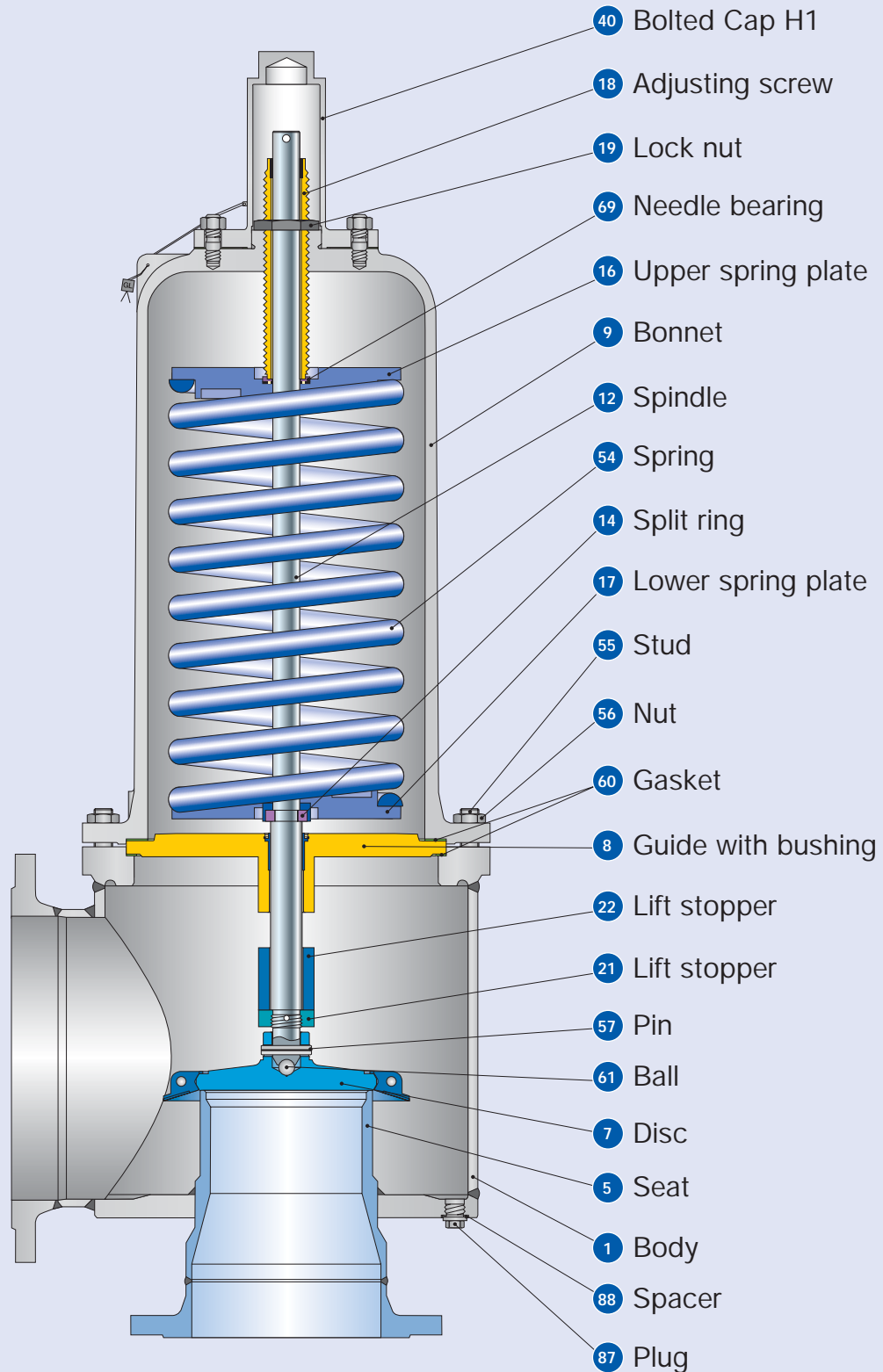
Type 442 XXL
Bolted lifting device H6
Open bonnet
Conventional and
balanced bellows design

How to order – Article numbers

Article numbers				200 x 300	250 x 300	300 x 400	400 x 500
		DN _{I+O}		200 x 300	250 x 300	300 x 400	400 x 500
		Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
		Actual Orifice diameter d ₀ [mm]		165	200	235	295
		Actual Orifice area A ₀ [mm ²]		21382	31416	43374	68349
Body material: 1.0460 / 1.0425 (Carbon steel)							
Bonnet closed	H1	Art.-No. 4412.		4752	4762	4772	4852
	H3	Art.-No. 4412.		–	–	–	–
	H6	Art.-No. 4412.		4754	4764	4774	4784
open	H6	Art.-No. 4412.		4755	4765	4775	4785
Body material: 1.4571 (316Ti)							
Bonnet closed	H1	Art.-No. 4414.		4792	4802	4902	4912
	H6	Art.-No. 4414.		4794	4804	4904	4914

Type 441, 442 XXL

Conventional design



Conventional design

Materials			
Item	Component	Type 4412 XXL / 4422 XXL	Type 4414 XXL
1	Body	1.4060/1.0425	1.4571
		Carbon steel	316Ti
5	Seat	1.0305 stellite, 1.0460 stellite	1.4571
		Carbon steel, stellite	316Ti
7	Disc	1.4404	1.4571
		316L	316Ti
8	DN 200 – 250: Guide with bushing	0.7040	1.4404
		Ductile Gr. 60-40-18 / Chrome steel	316L
		1.4404	1.4404
	DN 300 – 400: Guide	316L	316L
9	Bonnet	0.7043 or 1.0254	1.4571
		Ductile Gr. 60-40-18 or Steel	316Ti
12	Spindle	1.4021	1.4404
		420	316L
14	Split ring	1.4104	1.4404
		Chrome steel	316L
16 / 17	Spring plate	1.0570 or 1.4404	1.4404
		Steel or 316L	316L
18	Adjusting screw with bushing	1.4104 PTFE	1.4404 PTFE
		Chrome steel PTFE	316L PTFE
19	Lock nut	1.4404	1.4404
		316L	316L
21 / 22	Lift stopper	1.4404	1.4404
		316L	316L
40	Bolted cap H1	0.7040	1.4404
		Ductile Gr. 60-40-18	316L
54	Spring standard	1.1200, 1.8159, 1.7102	1.4310
		Carbon steel	Stainless steel
	Spring optional	1.4310	-
		Stainless steel	-
55	Stud	1.1181	1.4401
		Steel	B8M
56	Nut	1.0501	1.4401
		2H	8M
57	Pin	1.4310	1.4310
		Stainless steel	Stainless steel
60	Gasket	Graphite / 1.4401	Graphite / 1.4401
		Graphite / 316	Graphite / 316
61	Ball	1.3541	1.4401
		Hardened stainless steel	316
69	Needle bearing	1.4401	1.4401
		316L	316L
87 / 88	Plug / Spacer	1.4401 / 1.4571	1.4401 / 1.4571
		316 / 316Ti	316 / 316Ti

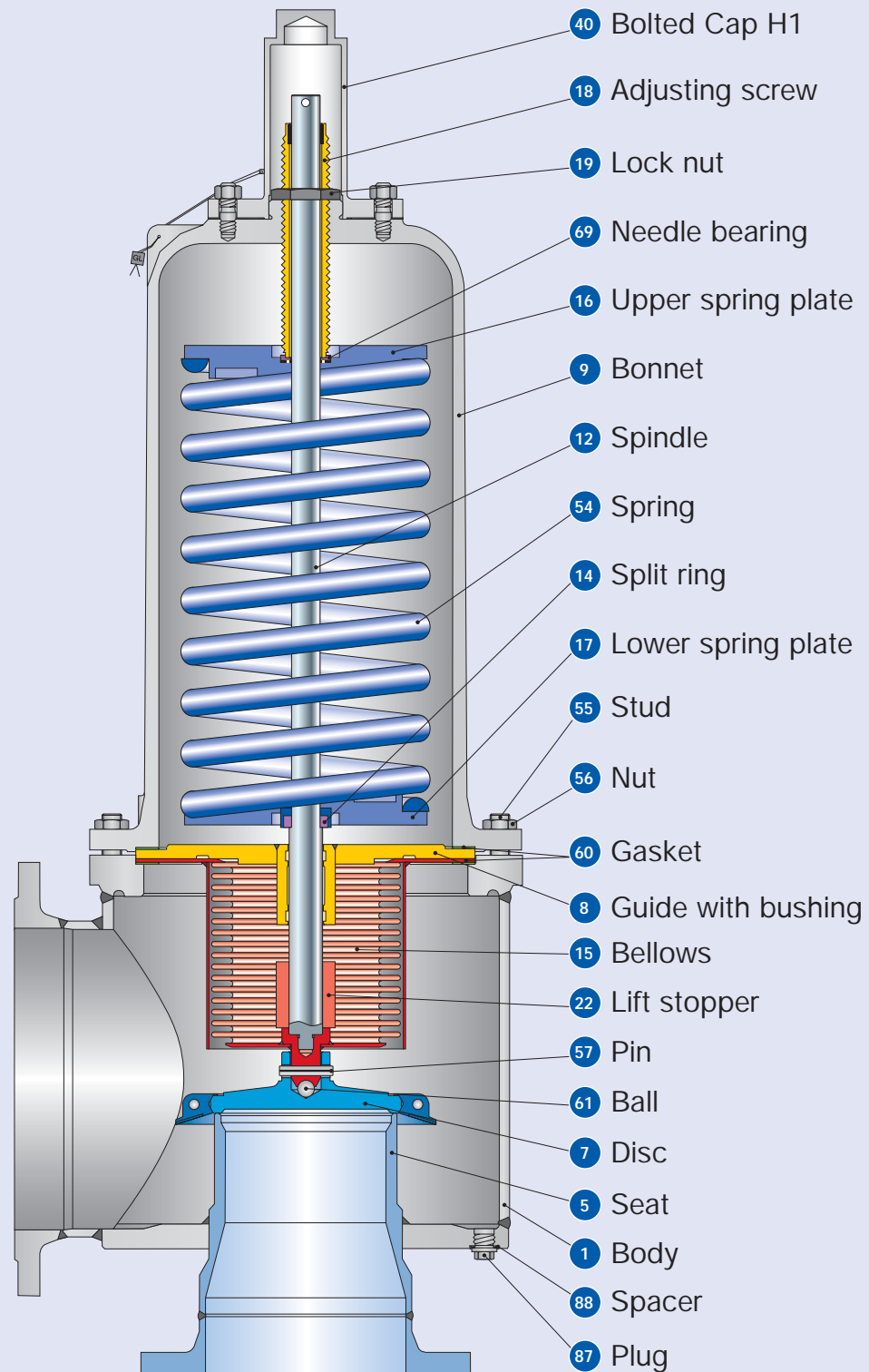
Please notice:

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

Type 441, 442 XXL

LESER

Balanced bellows design



Type 441, 442 XXL

Balanced bellows design

Materials			
Item	Component	Type 4412 XXL / 4422 XXL	Type 4414 XXL
1	Body	1.4060/1.0425	1.4571
		Carbon steel	316Ti
5	Seat DN 200 – 250	1.0305 stellited	1.4571
	DN 300 – 400	Carbon steel, stellited	316Ti
		1.0460 stellited	1.4571
7	Disc	Carbon steel, stellited	316Ti
		1.4404	1.4571
8	Guide	316L	316Ti
		1.4571	1.4571
9	Bonnet	316Ti	316Ti
		0.7043 or 1.0254	1.4571
12	Spindle	Ductile Gr. 60-40-18 or Steel	316Ti
		1.4404	1.4404
14	Split ring	316L	316L
		1.4104	1.4404
15	Bellows	Chrome steel	316L
		1.4571	1.4571
16 / 17	Spring plate	316Ti	316Ti
		1.0570 or 1.4404	1.4404
18	Adjusting screw with bushing	Steel or 316L	316L
		1.4104 PTFE	1.4404 PTFE
19	Lock nut	Chrome steel PTFE	316L PTFE
		1.4404	1.4404
22	Lift stopper	316L	316L
		1.4404	1.4404
40	Bolted cap H1	316L	316L
		0.7040	1.4404
54	Spring standard	Ductile Gr. 60-40-18	316L
		1.1200, 1.8159, 1.7102	1.4310
	Carbon steel	Stainless steel	
55	Stud	1.4310	-
		Stainless steel	-
56	Nut	1.1181	1.4401
		Steel	B8M
57	Pin	1.0501	1.4401
		2H	8M
60	Gasket	1.4310	1.4310
		Stainless steel	Stainless steel
61	Ball	Graphite / 1.4401	Graphite / 1.4401
		Graphite / 316	Graphite / 316
69	Needle bearing	1.3541	1.4401
		Hardened stainless steel	316
87 / 88	Plug / Spacer	1.4401	1.4401
		316L	316L
87 / 88	Plug / Spacer	1.4401 / 1.4571	1.4401 / 1.4571
		316 / 316Ti	316 / 316Ti

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+O}	200 x 300	250 x 350	300 x 400	400 x 500
	Valve size	8" x 12"	10" x 14"	12" x 16"	16" x 20"
	Actual Orifice diameter d ₀ [mm]	165	200	235	295
	Actual Orifice area A ₀ [mm ²]	21382	31416	43374	68349
Weight [kg]		285	335	384	588
	with bellows	289	340	390	595
Center to face [mm]	Inlet a	305	340	330	400
	Outlet b	300	325	394 ¹⁾	477 ¹⁾
Height (H4) [mm]	Standard H max.	1473	1518	1633	1953
	Bellows H max.	1473	1518	1633	1953
Support brackets [mm]	A	470	514	640	800
	B	150	150	180	220
(drilled only on request)	C	Ø 18	Ø 18	Ø 24	Ø 28
	D	305	340	330	400
	E	20	20	20	20

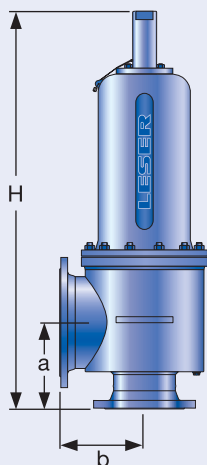
Body material: 1.0460 / 1.0425 (Carbon steel)

DIN Flange²⁾	Inlet	PN 25	PN 16
	Outlet	PN 10	

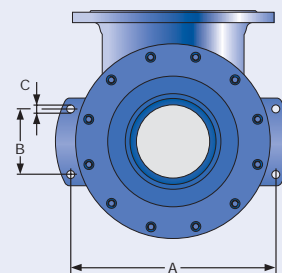
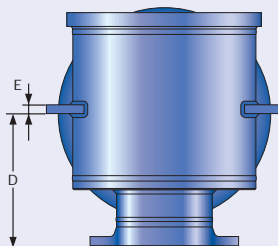
Body material: 1.4571 (316Ti)

DIN Flange²⁾	Inlet	PN 25	PN 16
	Outlet	PN 10	

- ¹⁾ For pressure rating outlet higher than PN 10 centre to face dimension will change
²⁾ Standard flange rating. For other flange drillings and facings please refer to page 03/14.



Conventional and balanced bellows design



Support brackets

Pressure temperature ratings

Metric Units

DN _{I+O}	200 x 300	250 x 350	300 x 400	400 x 500	
Valve size	8" x 12"	10" x 14"	12" x 16"	16" x 20"	
Actual Orifice diameter d ₀ [mm]	165	200	235	295	
Actual Orifice area A ₀ [mm ²]	21382	31416	43374	68349	

Body material: 1.0460 / 1.0425 (Carbon steel)

DIN Flange	Inlet		PN 25		PN 16	
	Outlet		PN 10			
Minimum set pressure	p [bar _g]	S/G/L	0,2	0,2	0,2	0,2
Min. set pressure¹⁾ standard bellows	p [bar _g]	S/G/L	0,2	0,2	0,2	0,2
Min. set pressure low press. bellows	p [bar _g]	S/G/L	-	-	-	-
Maximum set pressure	p [bar _g]	S/G/L	20	13,4	9,25	0,84
Max. set pressure with special spring	p [bar _g]	S/G/L	25	18,5	12	6
Temperature acc. to DIN EN	min. [°C]		-85			
	max. [°C]		+450			
Temperature acc. to ASME	min. [°C]		-29			
	max. [°C]		+427			

Body material: 1.4571 (316Ti)

DIN Flange	Inlet		PN 25		PN 16	
	Outlet		PN 10			
Minimum set pressure	p [bar _g]	S/G/L	0,2	0,2	0,2	0,2
Min. set pressure¹⁾ standard bellows	p [bar _g]	S/G/L	0,2	0,2	0,2	0,2
Min. set pressure low press. bellows	p [bar _g]	S/G/L	-	-	-	-
Maximum set pressure	p [bar _g]	S/G/L	1,45	0	0	0
Max. set pressure with special spring	p [bar _g]	S/G/L	10	6	3,57	2,3
Temperature acc. to DIN EN	min. [°C]		-196			
	max. [°C]		+550			
Temperature acc. to ASME	min. [°C]		-184			
	max. [°C]		+427			

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

Flange drillings and facings

Flange drillings

	DN _{I+O}	200 x 300	250 x 350	300 x 400	400 x 500	
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"	
Actual Orifice diameter d ₀ [mm]		165	200	235	295	
Actual Orifice area A ₀ [mm ²]		21382	31416	43374	68349	
Body material: 1.0460 / 1.0425 (Carbon steel), 1.4571 (316Ti)						
Inlet	DIN EN 1092	PN 10	H44	H44	H44	H44
		PN 16	H45	H45	*	*
		PN 25	*	*	H46	H46
		PN 40	-	-	-	-
	ASME B16.5	CL150	H64	H64	H64	H64
		CL300	H65	-	-	-
Outlet	DIN EN 1092	PN 10	*	*	*	*
		PN 16	H51	H51	H51	H51
		PN 25	-	-	-	-
		PN 40	-	-	-	-
	ASME B16.5	CL150	H79	H79	H79	H79
		CL300	-	-	-	-

Flange facings

Indication	Standard	Inlet	Outlet	Remark
General				
Flange undrilled	-	H38	H39	
Linde-V-Nut, Form V48	Linde Standard 420-08	J07	J08	Groove: Rz 16
Linde-V-Nut, Form V48A	LWN 313.36	J05	J06	Groove: Rz 4, e.g. with hydrogen
Lens seal form L (without sealing lens)	DIN 2696 LWN 313.35	J11	J12	

Acc. to DIN EN

Flange facing		Inlet	Outlet	Remark	
DIN EN 1092 (new)	DIN 2526 (old)	PN 10 – PN 40	PN 10 – PN 40	Rz-data according to DIN EN 1092 in µm	
see also LWN 313.40)					
Raised face	Type B1	Type C	*	*	Facing: Rz = 12,5 – 50
	Type B2	Type D			
		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

Body material	Inlet	Outlet	Smooth finish ²⁾		Serrated finish		RTJ-groove			
			Inlet	Outlet	Inlet	Outlet	Inlet		Outlet	
			Option code	Option code	Option code	Option code	RTJ-Class	Option code	RTJ-Class	Option code
1.0460/1.0425, 1.4571	all	all	L51	L53	*	*	CL150	H62	CL150	H63

¹⁾ According to DIN EN 1092 groove depths and tongue heights increased compared to the formerly valid DIN (refer to LWN 313.40).

LESER manufactures the groove at flanged valves by milling. If a customer demands a turned surface in the soil of the groove according to DIN 2512 and/or DIN EN 1092-1 an additional option code is necessary: "S01: bottom of the groove drilled". Groove and tongue for PN160 flanges refer to DIN 2512/LWN 313.32.

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

For signs and symbols refer to page 00/07

Note: Flange drillings and facings meet always the requirements of mentioned flange standards. Flange thickness and outer diameter may vary from flange standard.

Approvals

Approvals					
	DN ₁₊₀	200 x 300	250 x 350	300 x 400	400 x 500
	Valve size	8" x 12"	10" x 14"	12" x 16"	16" x 20"
	Actual Orifice diameter d ₀ [mm]	1665	200	235	295
	Actual Orifice area A ₀ [mm ²]	21382	31416	43374	68349
Europe		Coefficient of discharge K_{dr}			
DIN EN ISO 4126-1	Approval No.	072020111Z0008/0/08-2			
	S/G	0,75	0,7	0,7	0,7
	L	0,56	0,52	0,52	0,52
Germany		Coefficient of discharge α_w			
AD 2000-Merkblatt A2		TÜV SV 576			
	S/G	0,75	0,7	0,7	0,7
	L	0,56	0,52	0,52	0,52
United States		Coefficient of discharge K			
ASME Sec. VIII	Approval No.	M37044			
	S/G	0,699			
	Approval No.	M37055			
	L	0,521			
Canada		Coefficient of discharge K			
Canada: CRN	Approval No.	OG1182.9C			
	S/G	0,699			
	L	0,521			
China		Coefficient of discharge α_w			
CSBQTS	Approval No.				
	S/G	0,75	0,7	0,7	0,7
	L	0,56	0,52	0,52	0,52
Russia		Coefficient of discharge α_w			
GGTN/ GOSGOTECHNADZOR GOST R	Approval No.	PPC 00-18458			
	S/G	0,75	0,7	0,7	0,7
	L	0,56	0,52	0,52	0,52
Classification societies		Homepage			
Bureau Veritas	BV	www.bureauveritas.com			
Det Norske Veritas	DNV	www.dnv.com			
Germanischer Lloyd	GL	www.gl-group.com			
Lloyd' s register EMEA	LREMEA	www.lr.org			
Registro Italiano Navale	RINA	www.rina.org			
		The valid certification number is changed with every renewal.			
		A sample certificate including the valid certification number can be taken from the homepage of the classification societies.			

Capacities – Steam

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

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

Metric Units		AD 2000-Merkblatt A2 [kg/h]			
DN _{I+O}		200 x 300	250 x 350	300 x 400	400 x 500
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
Act. Orifice dia. d ₀ [mm]		165	200	235	295
Act. Orifice area A ₀ [mm ²]		21382	31416	43374	68349
LEO _{S/G} ^{*)} [inch ²]		23,761	34,910	48,198	75,952
Set pressure [bar]	Capacities [kg/h]				
0,1	0	0	0	0	
0,2	7214	0	14633	0	
0,5	11516	16920	23360	36811	
1	16755	24617	33986	53556	
2	26704	39234	54168	85359	
3	35954	52826	72932	114929	
4	48036	65872	90944	143312	
5	57507	78859	108875	171568	
6	66947	91804	126747	199731	
7	76157	104433	144183		
8	85532	117289	161932		
9	94895	130128	179658		
10	104250	142957	197370		
12	122947	168596	232768		
14	141254	193700			
16	159910	219283			
18	178589	244897			
20	197298				
22	197298				
24	234188				

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

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

US Units		ASME Section VIII [lb/h]			
DN _{I+O}		200 x 300	250 x 350	300 x 400	400 x 500
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
Act. Orifice dia. d ₀ [inch]		6,5	7,87	9,25	11,61
Act. Orifice area A ₀ [inch ²]		33,14	48,69	67,23	105,94
LEO _{S/G} ^{*)} [inch ²]		23,761	34,910	48,198	75,952
Set pressure [psig]	Capacities [lb/h]				
15	38962	57245	79034	124543	
20	44928	66009	91134	143612	
30	56859	83539	115336	181749	
40	69983	102821	141958	223700	
50	83107	122104	168579	265652	
60	96231	141386	195201	307603	
70	109355	160668	221823	349554	
80	122479	179951	248444	391505	
90	135603	199233	275066		
100	148727	218515	301688		
120	174975	257080	354931		
140	201223	295645	408174		
160	227471	334209	461418		
180	253719	372774			
200	279967	411338			
220	306215	449903			
240	332463	488468			
260	358711	527032			
280	384960				
300	411208				
320	437456				
340	463704				
360	489952				

^{*)} 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+O}		200 x 300	250 x 350	300 x 400	400 x 500
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
Act. Orifice dia. d_0 [mm]		165	200	235	295
Act. Orifice area. A_0 [mm ²]		21382	31416	43374	68349
LEO _{S/G} ^{*)} [inch ²]		23,761	34,910	48,198	75,952
Set pressure [bar]	Capacities [m_n^3/h]				
0,1	0	0	0	0	
0,2	8354	0	16945	0	
0,5	13528	19876	27441	43242	
1	19970	29341	40509	63835	
2	32251	47384	65420	103090	
3	43930	64544	89110	140423	
4	59080	81016	111853	176261	
5	71093	97489	134596	212100	
6	83106	113962	157339	247939	
7	95118	130435	180082		
8	107131	146908	202824		
9	119144	163381	225567		
10	119144	163381	225567		
12	155182	212799	293796		
14	179207	245745			
16	203232	278690			
18	227258	311636			
20	251283				
22	275308				
24	299334				

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+O}		200 x 300	250 x 350	300 x 400	400 x 500
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
Act. Orifice dia. d_0 [inch]		6,5	7,87	9,25	11,61
Act. Orifice area. A_0 [inch ²]		33,14	48,69	67,23	105,94
LEO _{S/G} ^{*)} [inch ²]		23,761	34,910	48,198	75,952
Set pressure [psig]	Capacities [S.C.F.M.]				
15	13879	20392	28153	44365	
20	16004	23514	32464	51158	
30	20254	29758	41085	64743	
40	24929	36627	50568	79687	
50	29604	43496	60051	94631	
60	34280	50365	69534	109575	
70	38955	57234	79018	124519	
80	43630	64102	88501	139463	
90	48305	70971	97984		
100	52980	77840	107467		
120	62330	91578	126433		
140	71680	105315	145400		
160	81030	119053	164366		
180	90380	132791			
200	99731	146528			
220	109081	160266			
240	118431	174003			
260	127781	187741			
280	137131				
300	146481				
320	155831				
340	165182				
360	174532				

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

Capacities – Water

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

Metric Units		AD 2000-Merkblatt A2 [10 ³ kg/h]			
DN _{I+O}		200 x 300	250 x 350	300 x 400	400 x 500
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
Act. Orifice dia. d ₀ [mm]		165	200	235	295
Act. Orifice area A ₀ [mm ²]		21382	31416	43374	68349
LEO _L ^{*)} [inch ²]		26,565	39,031	53,887	84,916
Set pressure [bar]	Capacities [10 ³ kg/h]				
0,1	272	372	513	808	
0,2	334	455	628	990	
0,5	472	644	889	1400	
1	639	871	1203	1896	
2	903	1232	1702	2681	
3	1106	1509	2084	3284	
4	1278	1743	2406	3792	
5	1428	1949	2690	4240	
6	1565	2135	2947	4644	
7	1690	2306	3183		
8	1807	2465	3403		
9	1916	2614	3610		
10	2020	2756	3805		
12	2213	3019	4168		
14	2390	3261			
16	2555	3486			
18	2710	3697			
20	2857				
22	2996				
24	3129				

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

US Units		ASME Section VIII [US-G.P.M.]			
DN _{I+O}		200 x 300	250 x 350	300 x 400	400 x 500
Valve size		8" x 12"	10" x 14"	12" x 16"	16" x 20"
Act. Orifice dia. d ₀ [inch]		6,5	7,87	9,25	11,61
Act. Orifice area A ₀ [inch ²]		33,14	48,69	67,23	105,94
LEO _L ^{*)} [inch ²]		26,565	39,031	53,887	84,916
Set pressure [psig]	Capacities [US-G.P.M.]				
15	2780	4084	5639	8886	
20	3142	4617	6374	10044	
30	3764	5530	7635	12031	
40	4346	6386	8816	13893	
50	4859	7139	9857	15532	
60	5323	7821	10797	17015	
70	5749	8447	11662	18378	
80	6146	9031	12468	19647	
90	6519	9578	13224		
100	6872	10096	13939		
120	7528	11060	15270		
140	8131	11946	16493		
160	8692	12771	17632		
180	9220	13546			
200	9718	14279			
220	10193	14975			
240	10646	15641			
260	11081	16280			
280	11499				
300	11902				
320	12293				
340	12671				
360	13039				

^{*)} 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 "Accessories and Options", page 99/01

Type 441, 442 XXL

