



# Type 441 IC

Flanged Safety Relief Valves

## CATALOG

**LESER**

[The-Safety-Valve.com](http://The-Safety-Valve.com)

---

## General Information

### LESER India – Safety Relief Valves

The safety valve Type 441 IC represents

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

### General design features

- Are designed to meet all industrial applications.
- Lifting aid mechanism to ensure valve performance within the specified limits.
- Spring loaded valve as a standard for pressures as low as 0.10 barg.
- Open rapidly within overpressure of 5% to 10% to the full lift.
- Are one of the best selling spring loaded safety relief valves in India.
- Are developed in a close cooperation with plant engineers and service specialists.
- Serve for protection of processes and equipments.

### Approvals

Are approved by all important approval organisations in India which ensures wide applicability e.g.:

- IBR Form III C Certificate with Attachment 8
- Chief Controller of Explosives (CCOE / PESO)

Furthermore, all LESER India Type 441 IC safety relief valves are designed and produced in order to meet the requirements of following regulations (directives, codes, rules and standards). ASME section VIII Division 1, ASME PTC 25, ASME-Code Sec. II, ASME B 16.34 and ASME B16.5, API Std. 520, 521, 526, API Std. 527, API RP 576

### Applications

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

Typical applications are:

- Chemical
- Fertiliser
- Steel
- Compressors
- Pharma
- Boilers
- Oil & Gas
- Process Industries
- Pumps
- Petro Chemicals

## General Information

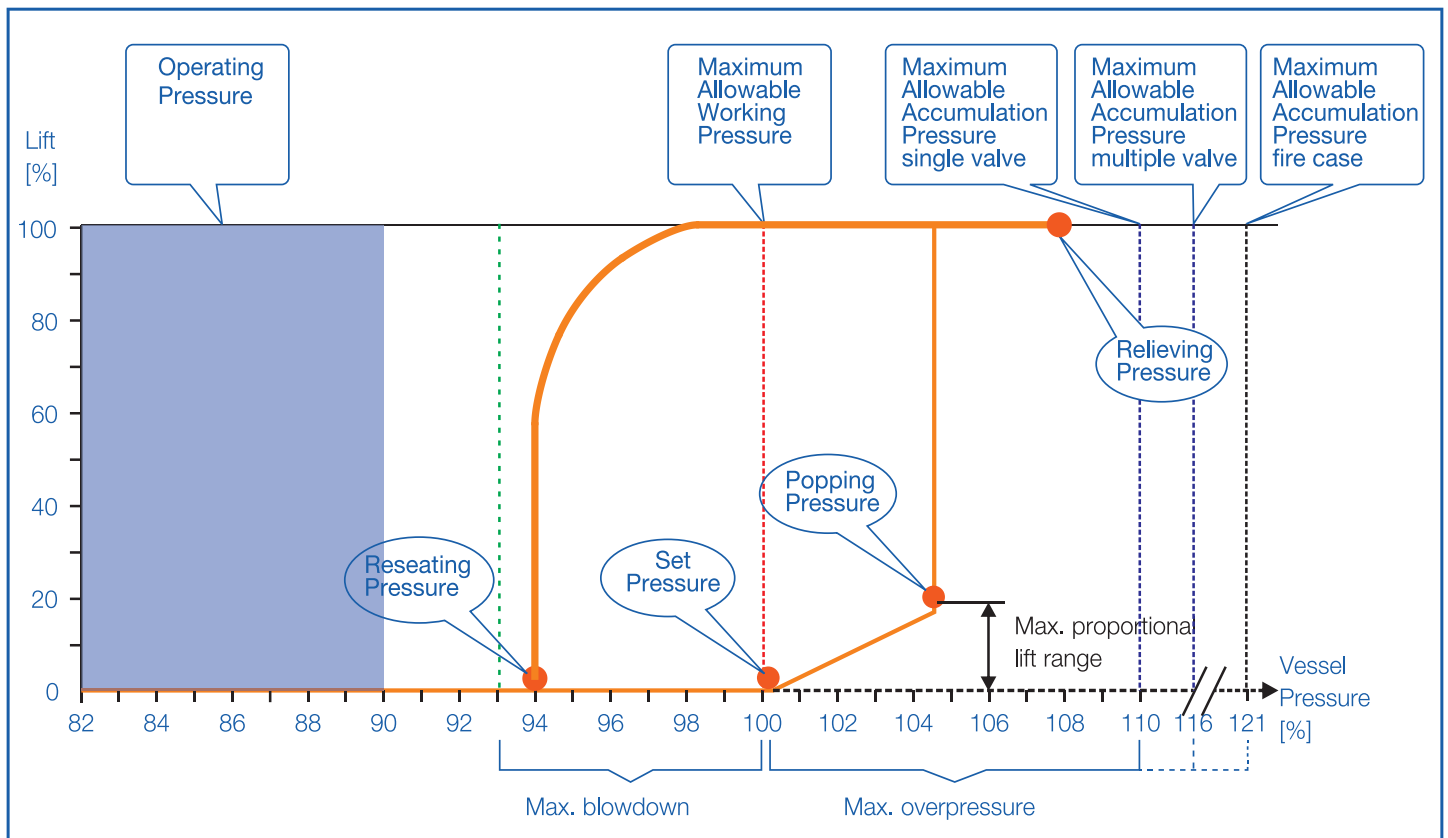
### Product Features

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

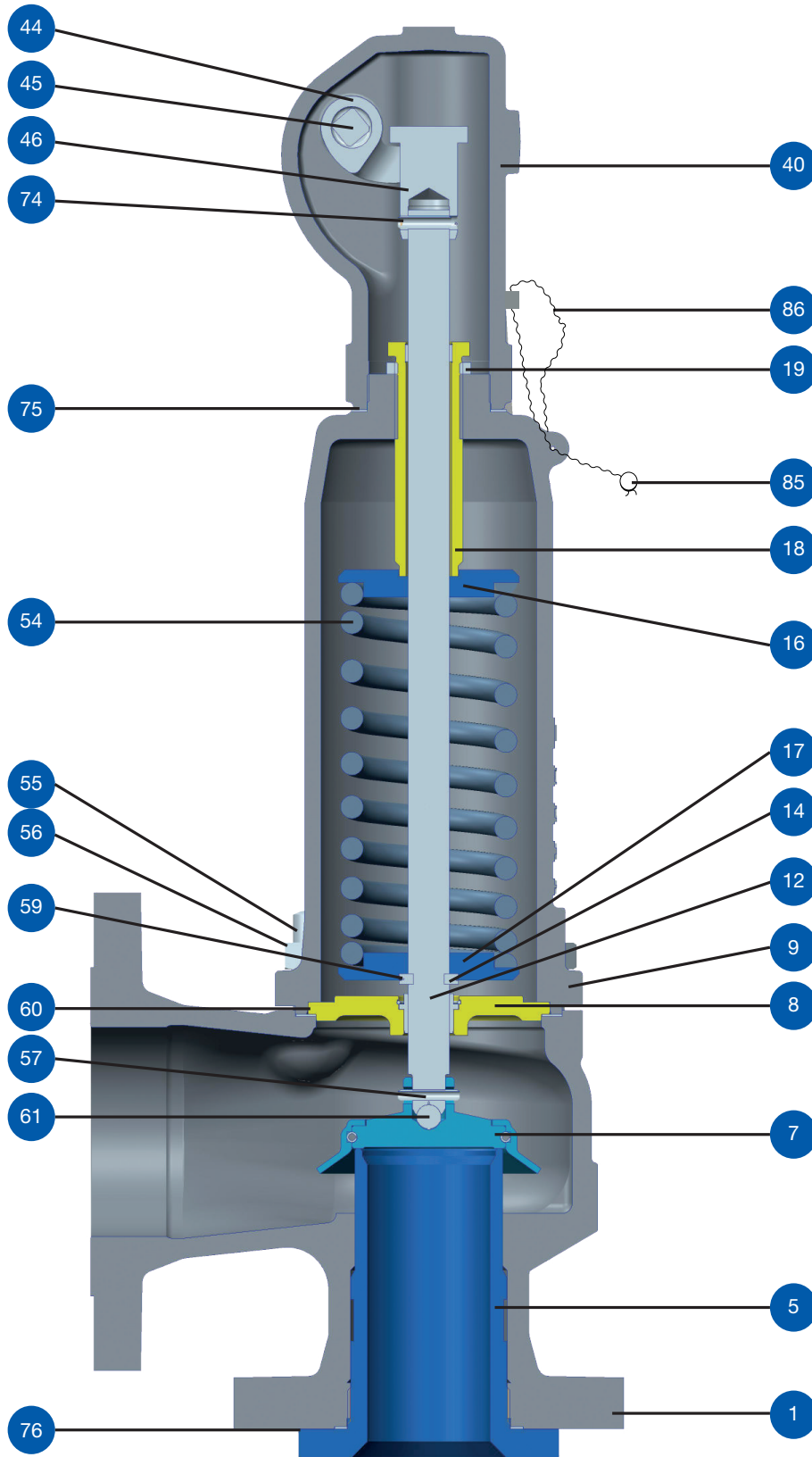
- From DN 25 to DN 200 – 1” to 8” inlet
- Inlet pressure ratings class 150 to class 600 to fit all required design pressures
- Orifice sizes from D/E to T cover all capacity requirements
- Large variety of body materials; e.g. WCB, CF8M, WC6...

- Set pressures from 0.1 to 40 bar / 1.5 to 580 psig make this product group suitable for all industrial processes
- Operating temperatures from -270 to 538 °C / -454 to 1000 °F cover a wide range of applications
- One-piece spindle reduces friction which is leading to high operation accuracy
- Self-draining body design, avoids residues and reduces corrosion
- One design and spring (single trim) for steam, gas and liquid applications reduces the number of spare parts and ensure an easier maintenance

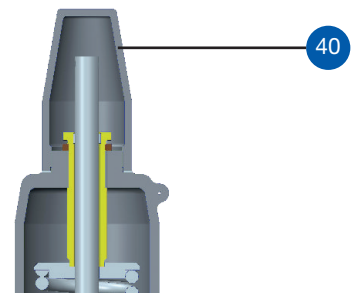
### Typical characteristic of safety valve for compressible fluids according to ASME Sec. VIII Div. 1/API 520



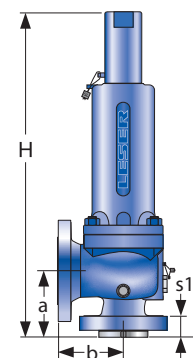
# Type 441 IC



Closed Cap, H2



Item	Part Name
1	Body
5	Nozzle
7	Disc Assembly
8	Guide
9	Bonnet
12	Spindle
14	Split Ring
16-17	Spring Plate
18	Adjusting Screw
19	Lock Nut
40	Cap H2
54	Spring
55	Stud
56	Hex. Nut
57	Roll Pin
59	Securing Ring
60	Gasket
61	Ball
75	Spacer
76	Gasket
85	Lead Seal
86	Seal Wire
40	Lifting Device H4
43	Lever
44	Lifting Fork
45	Lever Shaft
46	Spindle Cap
74	Pin
80	Gland
82	Hex. Nut



**Type 441 IC  
Materials**

Type	Item	Component	Standard Application	Corrosive Application	High Temp. Application	Low Temp/ Cryogenic. Application	Highly Corrosive Application	Highly Corrosive Application
CLOSED CAP, H2	1	Body	A 216 Gr. WCB	A 351 CF 8/8M	A 217 Gr. WC6	A 352 Gr. LCB	A 351 Gr. CF 8/8M	A 351 CF 8/8M
	5	Nozzle	A351 Gr. CF8M	A351 Gr. CF8M	A351 Gr. CF8M	A351 Gr. CF8M	Hastelloy-C	PTFE
	7	Disc Assembly	SS 316	SS 316	SS 316	SS 316	Hastelloy-C	PTFE
	8	Spindle Guide/ Guide Insert	A 216 Gr. WCB SS 316	A 351 CF 8/8M SS 316	A 216 Gr. WCB SS 316	A 351 Gr. CF 8M SS 316	A 351 Gr. CF 8/8M SS 316	A 351 CF 8/8M SS 316
	9	Bonnet	A 216 Gr. WCB	A 351 CF 8/8M	A 217 Gr. WC6	A 352 Gr. LCB	A 351 Gr. CF 8/8M	A 351 CF 8/8M
	12	Spindle	SS 316L	SS 316L	SS 316L	SS 316L	SS 316L	SS 316L
	14	Split Ring	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
	16-17	Spring Plate	CS ZN. Plated	SS 316	CS ZN. Plated	SS 316	SS 316	SS 316
	18	Adjusting Screw	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
	19	Lock Nut	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
	40	Cap	A 216 Gr. WCB	A 351 CF 8/8M	A 216 Gr. WCB	A 351 Gr. CF 8M	A 351 Gr. CF 8/8M	A 351 CF 8/8M
	54	Spring	CS ZN. Plated/ Alloy Steel	Stainless Steel/ Alloy Steel	Alloy Steel	Stainless Steel	Stainless Steel	Stainless Steel
	55	Stud	A 193 Gr. B7	A 193 Gr. B8M	A 193 Gr. B8M	A 193 Gr. B8M	A 193 Gr. B8M	A 193 Gr. B8M
	56	Hex. Nut	A 194 Gr. 2H	A 194 Gr. 8M	A 194 Gr. 8M	A 194 Gr. 8M	A 194 Gr. 8M	A 194 Gr. 8M
	57	Roll Pin	SS	SS	SS	SS	SS	SS
	59	Securing Ring	SS	SS	SS	SS	SS	SS
	60	Gasket	Non Asbestos	Non Asbestos	Non Asbestos	Non Asbestos	Non Asbestos/ PTFE	PTFE
	61	Ball	SS	SS	SS	SS	SS	SS
	75	Spacer	Non Asbestos	Non Asbestos	Non Asbestos	Non Asbestos	Non Asbestos/ PTFE	PTFE
	76	Gasket	Non Asbestos	Non Asbestos	Non Asbestos	Non Asbestos	Non Asbestos/ PTFE	PTFE
85	Lead Seal	Lead	Lead	Lead	Lead	Lead	Lead	
86	Seal Wire	SS	SS	SS	SS	SS	SS	
LIFTING DEVICE, H4	43	Lever	CS	SS 316	CS	SS 316	SS 316	SS 316
	44	Lifting Fork	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
	45	Lever Shaft	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
	46	Spindle Cap	SS 316	SS 316	SS 316	SS 316	SS 316	SS 316
	74	Pin	SS	SS	SS	SS	SS	SS
	80	Gland	CS	SS 316	CS	SS 316	SS 316	SS 316
	82	Hex. Nut	CS	SS	CS	SS	SS	SS

**NOTE**

Material of construction will vary according to the service conditions and customer requirement. Other special materials, for example, Monel, Alloy -20, CF 3, CF 3M and accessories such as Balanced Bellows, Cooling Spacer test Gag, Heating Jacket, Drain Plug, Soft Seat (O-Ring) Disc etc. can be provided on request.

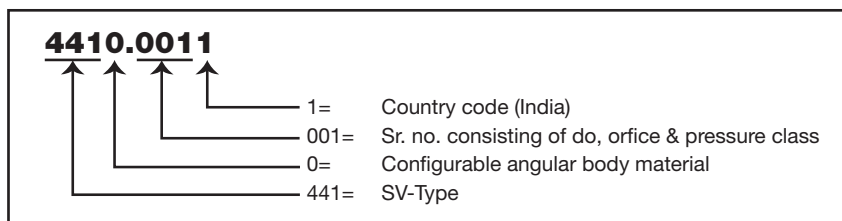
## Type 441 IC

### Article numbers

#### System for configuration

	Valve Type	Country Code	Body Material	do/Orifice	Size Inlet	Pressure Rating Inlet	Size Outlet	Pressure Rating Outlet	Lifting Device	Bonnet Open / Closed
Article No.	X	X		X		X				
Configuration by option code			X		X	X	X	X	X	X

Example:



Orifice (Letter)	Type		Nominal pressure class			
			150	300L	300	600
D	4410	.	0011*		0031*	0041*
			1" x 2"		1" x 2"	1" x 2"
E	4410	.	0091		0111	0121
			1" x 2"		1" x 2"	1" x 2"
F	4410	.	0171	0181		0201
			11/2" x 2"	11/2" x 2"		11/2" x 2"
G	4410	.	0251*	0261*		0281*
			11/2" x 3"	11/2" x 3"		11/2" x 3"
H	4410	.	0331	0341	0351	0361
			11/2" x 3"	11/2" x 3"	2" x 3"	2" x 3"
J	4410	.	0401	0411	0421	0431
			2" x 3"	2" x 3"	3" x 4"	3" x 4"
K	4410	.	0471		0491	0501
			3" x 4"		3" x 4"	3" x 4"
L	4410	.	0541	0551	0561*	0571*
			3" x 4"	3" x 4"	4" x 6"	4" x 6"
M	4410	.	0611		0631	0641
			4" x 6"		4" x 6"	4" x 6"
N	4410	.	0671		0691	0701
			4" x 6"		4" x 6"	4" x 6"
P	4410	.	0731	0741		0761
			4" x 6"	4" x 6"		4" x 6"
Q	4410	.	0791		0811	0821
			6" x 8"		6" x 8"	6" x 8"
R	4410	.	0841		0861	0871
			6" x 10"		6" x 10"	6" x 10"
T	4410	.	0941		0961	0971
			8" x 12"		8" x 12"	8" x 12"

#### NOTE

\* Marked article nos. are applicable for non-IBR valves only.  
The standard sizes are shown in above table, other special sizes may be provided on request.

## Type 441 IC Overall Dimensions

Inlet Size inches	Outlet Size inches	Max. Set Pr. Bar g				Weight Approx. kgs.	Height 'H' Approx.		Center to face dim		"s1" mm
			Orifice Letter	Actual Discharge area sq. in	Flow diameter mm		Closed Cap, H2 mm	Lifting Device, H4 mm	Outlet "b" mm	Inlet "a" mm	
1	2	40.0	D	0.644	23	11.0	340	350	114	105	24.3 - 27.5
1	2	40.0	E	0.644	23	11.0	340	350	114	105	24.3 - 27.5
11/2	2	40.0	F	0.644	23	13.0	360	370	121	124	27.5 - 30.7
11/2	3	40.0	G	1.024	29	18.0	440	470	124	130	27.5 - 30.7
11/2	3	19.7	H	1.024	29	18.0	440	470	124	130	27.5 - 30.7
2	3	40.0	H	1.024	29	21.0	450	480	124	137	29.1 - 32.3
2	3	19.7	J	1.667	37	22.0	490	520	124	137	29.1 - 32.3
3	4	40.0	J	1.667	37	28.0	510	540	162	156	35.9 - 40.6
3	4	40.0	K	2.576	46	35.0	550	580	162	156	35.9 - 40.6
3	4	19.7	L	4.383	60	48.0	640	700	165	156	37.9 - 42.6
4	6	40.0	L	4.383	60	55.0	670	730	184	178	37.9 - 45.8
4	6	40.0	M	4.383	60	55.0	670	730	184	178	37.9 - 45.8
4	6	40.0	N	6.666	74	70.0	770	830	210	197	39.7 - 47.6
4	6	40.0	P	10.304	92	97.0	800	860	229	181	40.4 - 48.3
6	8	28.0	Q	11.692	98	132.0	860	920	241	240	43.4 - 54.6
6	10	24.0	R	19.021	125	164.0	990	990	267	240	44.4 - 49.2
8	12	25.0	T	33.143	165	335.0	1350	1350	279	276	53.6 - 56.8

### NOTE

Flange ratings and center to face dimensions are according to API RP 526 as applicable for Full Nozzle Safety Valves of inlet size 1" (25mm) and above.

## Discharge Capacities

Calculation of mass flow acc. to IBR 1950  
(Saturated Steam capacity in kg/h)

Flow dia mm	Set Pressure, bar <sub>g</sub>													
	1	2	4	6	8	10	12	14	16	18	20	24	28	32
23	318	476	792	1108	1424	1739	2055	2371	2687	3003	3319	3951	4582	5214
29	505	757	1259	1761	2263	2765	3268	3770	4272	4774	5276	6281	7285	8289
37	823	1232	2049	2867	3684	4501	5319	6136	6954	7771	8589	10224	11859	13494
46	1272	1904	3167	4431	5694	6958	8221	9485	10748	12012	13275	15803	18330	20857
60	2164	3239	5388	7538	9688	11837	13987	16137	18286	20436	22586	26885	31185	35484
74	3291	4926	8196	11466	14736	18006	21276	24546	27816	31086	34356	42895	47435	53975
92	5087	7614	12668	17723	22777	27831	32885	37939	42993	48048	53102	63210	73319	83427
98	5772	8640	14375	20110	25844	31579	37314	43049	48784	54519	60254	71724	83194	
125	9391	14056	23386	32717	42047	51377	60708	70038	79368	88699	98029	116690		
165	16363	24491	40749	57006	73263	89520	10577	122034	138291	154548	170806			

### NOTE

Capacities shown here are indicative. For detailed calculations, please provide the complete process data.

# Type 441 IC

## Discharge Capacities

Calculation of mass flow acc. to ASME Sec. VIII Div. 1/ API 526

■ Saturated Steam capacity in lb/h

□ Air capacity at 15°C in scfm

□ Water capacity in U.S.gpm

Orifice Letter	Medium	Set Pressure, psig															
		15	30	50	70	100	140	180	220	260	300	340	380	440	500	550	580
D	Steam	212	310	453	596	810	1096	1382	1668	1954	2240	2526	2812	3241	3670	4028	4242
	Air	76	110	161	212	289	391	492	594	696	798	900	1002	1155	1308	1435	1511
	Water	16	21	28	33	39	46	53	58	63	68	72	76	82	88	92	95
E	Steam	364	531	776	1021	1389	1879	2370	2860	3350	3841	4331	4821	5557	6292	6905	7273
	Air	130	189	276	364	495	670	844	1019	1194	1368	1543	1717	1979	2241	2460	2591
	Water	26	35	45	53	64	75	85	94	102	110	117	124	133	142	149	153
F	Steam	559	816	1192	1569	2133	2886	3639	4392	5145	5898	6651	7404	8534	9663	10604	11169
	Air	199	291	424	559	760	1028	1296	1565	1833	2101	2370	2638	3040	3442	3777	3979
	Water	37	51	65	78	93	109	124	137	149	160	170	180	194	207	217	223
G	Steam	916	1336	1954	2571	3496	4731	5965	7199	8434	9668	10902	12136	13987	15839	17382	18307
	Air	327	476	696	916	1246	1686	2125	2565	3005	3445	3885	4324	4984	5643	6193	6523
	Water	61	82	107	126	151	178	202	224	243	261	278	294	316	337	354	363
H	Steam	1204	1756	2567	3378	4594	6216	7838	9459	11081	12703	14324	15946	18378	20811	22838	24054
	Air	429	626	915	1204	1637	2215	2792	3370	3948	4526	5104	5681	6548	7415	8137	8570
	Water	86	116	150	178	212	251	285	315	342	368	391	414	445	475	498	511
J	Steam	1959	2859	4179	5499	7479	10118	12758	15398	18038	20677	23317	25957	29917	33876	37176	39156
	Air	698	1019	1489	1959	2665	3605	4546	5486	6427	7368	8308	9249	10660	12070	13246	13952
	Water	140	189	244	289	346	409	464	513	557	599	637	674	725	773	811	832
K	Steam	3028	4419	6459	8499	11559	15640	19720	23800	27880	31960	36040	40120	46241	52361	57461	60521
	Air	1079	1574	2301	3028	4118	5571	7025	8478	9932	11385	12839	14292	16472	18652	20469	21559
	Water	216	293	378	447	534	632	717	792	861	925	985	1041	1120	1194	1253	1286
L	Steam	5152	7519	10989	14460	19666	26608	33550	40491	47433	54375	61316	68258	78670	89083	97760	102966
	Air	1835	2679	3915	5152	7006	9479	11952	14425	16898	19371	21844	24317	28027	31737	34828	36683
	Water	368	498	643	760	909	1075	1219	1348	1465	1574	1676	1772	1906	2032	2131	2189
M	Steam	5152	7519	10989	14460	19666	26608	33550	40491	47433	54375	61316	68258	78670	89083	97760	102966
	Air	1835	2679	3915	5152	7006	9479	11952	14425	16898	19371	21844	24317	28027	31737	34828	36683
	Water	368	498	643	760	909	1075	1219	1348	1465	1574	1676	1772	1906	2032	2131	2189
N	Steam	7837	11436	16716	21995	29915	40474	51033	61592	72151	82710	93269	103828	119666	135505	148704	156623
	Air	2792	4074	5954	7835	10656	14417	18178	21939	25700	29462	33223	36984	42626	48267	52969	55790
	Water	559	757	977	1156	1382	1635	1854	2050	2229	2394	2549	2694	2899	3091	3241	3329
P	Steam	12113	17677	25837	33997	46238	62558	78879	95200	111520	127841	144161	160482	184963	209443	229844	242085
	Air	4315	6297	9204	12111	16471	22285	28099	33913	39727	45540	51354	57168	65889	74610	81877	86237
	Water	864	1170	1511	1787	2136	2528	2866	3169	3445	3700	3939	4165	4481	4777	5010	5145
Q	Steam	13744	20058	29317	38576	52466	70984	89503	108022	126540	145059	163578	182097				
	Air	4896	7145	10444	13742	18690	25287	31884	38481	45078	51675	58272	64869				
	Water	981	1328	1714	2028	2424	2868	3252	3596	3909	4199	4470	4726				
R	Steam	22361	32632	47697	62761	85357	115486	145615	175743	205872	236001	266129					
	Air	7965	11624	16990	22356	30406	41138	51870	62602	73334	84067	94799					
	Water	1595	2160	2789	3300	3944	4666	5291	5850	6359	6831	7272					
T	Steam	38962	56859	83107	109355	148727	201223	253719	306215	358711	411208	463704					
	Air	13878	20254	29603	38953	52979	71679	90378	109078	127777	146478	165178					
	Water	2780	3764	4859	5749	6872	8131	9220	10193	11081	11902	12671					

### NOTE

Capacities shown here are indicative. For detailed calculations, please provide the complete process data.



## Type 441 IC Accessories

### 1. Safety Valves with Stainless Steel Bellows

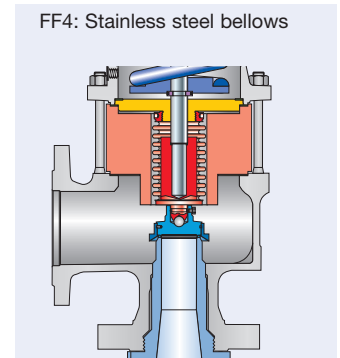
There are two reasons for the use of stainless steel bellows:

- a) Bellows reliably seal the bonnet to the outlet chamber, protecting the guides, moving parts and the spring against failure through action of the fluid, such as dirt, corrosion, impurities or temperature.
- b) Stainless steel bellows compensate for the effects of back pressure. They are so designed that the effective area of the bellows is equivalent to that of the seating area.

Stainless steel bellows must be used when variable back pressure exceeds 15% of set pressure. It can be used for back pressure up to a maximum of 35% of the set pressure. The stainless steel balanced bellows' inherent stiffness affects set and function performance. The min. set pressure is also dependent on the nominal dia. (DN) chosen. Depending on the set pressure, either single or double-walled stainless steel bellows (standard) are used. A shield may also have to be installed if the unit is subjected to a particularly high level of stress, such as abrasive fluids, flow effects, etc.

A ¼" BSP/NPT control thread is fitted into the bonnet to monitor the efficiency of the bellows. A discharge pipe can be attached to the ¼" threaded drain, in the event that provisions have to be made for a safe discharge of fluids in special cases e.g. aggressive or toxic fluids.

The design height of the safety valve is altered if the stainless steel bellows are installed.



FF4: Stainless steel bellows

#### Material & Limits of Application

Bellow material	: SS 316 L / Inconel / Hast. C
Temperature limits	: Up to 450 °C
Set pressure	: 3.0 bar minimum
Back pressure	: Max. 35% of set pressure

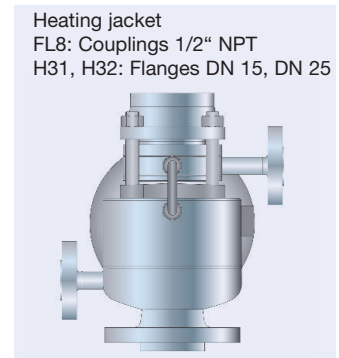
### 2. Safety Valves with Heating Jacket

Safety valve can be fitted with a heating jacket for special applications. Areas of application are systems to be protected from media, which are viscous, sticky or have tendency to crystallize out of solution.

In case of flanged safety valves without stainless steel bellows, only the bodies are fitted with a heating jacket. The heating connections for these safety valves shall be ½" NPT female or ½" ANSI 150 # RF.

Safety valves with stainless steel bellows: For safety valves with stainless steel bellows, the bonnet spacer required to house the bellows is fitted with an additional heating jacket. Both heating jackets are joined by a threaded pipe bend.

Heating jacket  
FL8: Couplings 1/2" NPT  
H31, H32: Flanges DN 15, DN 25



### 3. Safety Valves with Cooling Spacer

To protect the sliding parts and the spring against inadmissible influence of temperature an additional equipment will be necessary for all flanged spring loaded valves if the fluid temperature is 400 °C and higher.

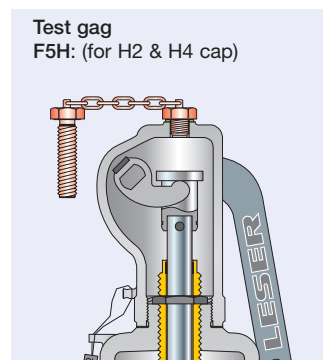
If the temperature is higher than 450 °C stainless steel bellows should be provided as far as they are not fitted already by reason of the back pressure ratio.

## Type 441 IC

### Accessories

#### 4. Safety Valves with Test Gag

In order to allow the adjustment of each Safety Valve in a plant provided with several Safety Valves or to carry out a pressure test above the allowable operating pressure a test gag is required. The test gag is fitted in the lever cover and exerts force on top of the spindle. After testing the test gag shall be removed.



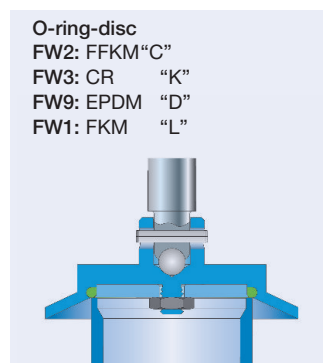
#### 5. O-Ring-Disc Design

With increased demands on the tightness of a safety valve, the valve seat can be provided with a soft seal disc replacing the standard disc. In such cases, the temperature limits and medium resistance for the use of the particular elastomer must be considered.

The range of applications for the soft seal O-ring disc are as follows:

- Demand of higher tightness ( $2.6 \times 10^{-8}$  lmbars<sup>-1</sup>)
- Not so sensitive towards contaminating fluids
- Provides a tightness even if the valve seat is slightly damaged
- Lasting tightness even after repeated operation
- Can be used under vacuum conditions

<sup>1)</sup> actual tightness depends on valve type and pressure, specified values on request

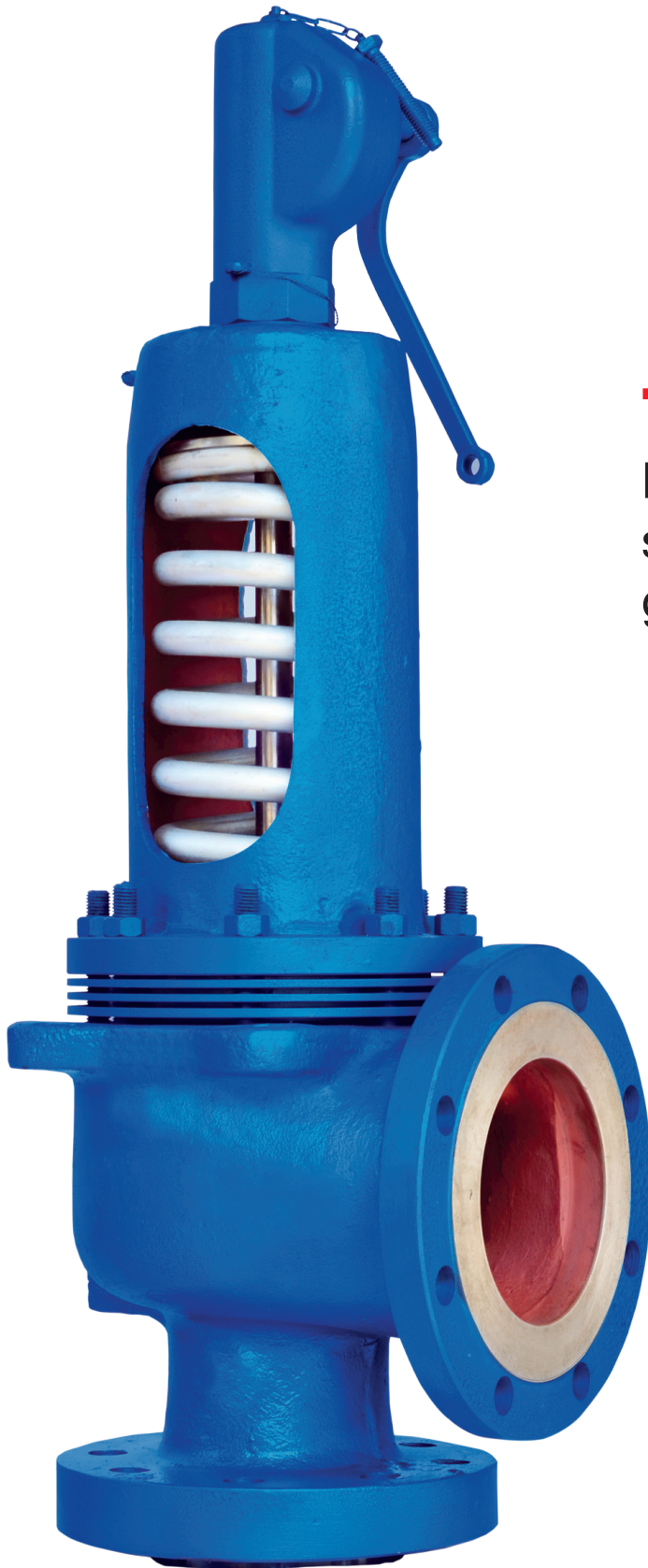


Code	Material	Code letter	Temp. min.	Temp. max.	Applications <sup>2)</sup>
CR	Neoprene	K	-40 °C	100 °C	Paraffin oil, silicone oil and grease, water and water based solvents, refrigerants, ozone
EPDM	Ethylene/ Propylene	D	-45 °C	150 °C	Hot water and superheated steam up to 150 °C, several organic and inorganic acids, silicone oil and grease
FPM (FKM)	Viton	L	-20 °C	180 °C	For high temperature service (no superheated steam), mineral oil and grease, vegetable and animal grease and oil, ozone
FFKM	Kalrez	C	0 °C	250 °C	Nearly all chemicals

#### NOTE

<sup>2)</sup> For every case, the pressure, temperature and service must be checked.

**Type 441 IC**



**Type 441 IC -**

Flanged standard pressure series suitable for steam, gas and liquid service

## Other products



### Type 526 IC

Flanged safety relief valves in line with API 526 standard. Type tested and certified by ASME. Available with "UV" stamp. Also available with IBR and PESO certification.



### Type 237 IC

Compact performance safety relief valve with flanged and threaded connections. Type tested and certified by ASME. Available with "UV" stamp. Also available with IBR and PESO certification.



### Type 459 IC

Compact performance safety relief valves with flanged and threaded connections. Type tested and certified by ASME. Available with "UV" stamp. Also available with IBR and PESO certification.



### Type 447 IC

Critical service lined safety relief valves for corrosive application. Available in 1" to 4" inlet, flanged to 150#. Type tested and certified by ASME. Available with "UV" stamp.

## How to contact LESER India

### Head office in Mumbai

921/922, Bldg. No. 9,  
Solitaire Corporate Park, Guru Hargovindji Road,  
Chakala, Andheri East, Mumbai 400 093. India.  
India  
Telephone: +91-22-6893 3800  
E-mail: [info@leser.co.in](mailto:info@leser.co.in)  
[www.leser.co.in](http://www.leser.co.in)



### Manufacturing facility in Paithan

D-3, M.I.D.C. Paithan,  
Dist. Aurangabad,  
Maharashtra - 431 148  
India  
E-mail: [sales@leser.co.in](mailto:sales@leser.co.in)  
[www.leser.co.in](http://www.leser.co.in)



Type 441 IC  
Edition April 2023

# LESER

[The-Safety-Valve.com](http://The-Safety-Valve.com)